● Msc Thesis by Denise van der Weerd ●

PGIS WITH SOCIAL COMMUNITY ENTERPRISES

A multiple case study on the relevance, process and empowerment related to PGIS with social community enterprises in Arnhem

PGIS with social community enterprises. A multiple case study on the relevance, process and empowerment related to PGIS with social community enterprises in Arnhem.

This master thesis research has been performed by Denise van der Weerd, conducted at Wageningen University and Gemeente Arnhem from September 2018 - March 2019

Denise van der Weerd | 941020934100
MSc programme: Communication, Health and Life Science
Specialization: Health & Society
Course: HSO-80336

Supervisors
Dr.ir. Lenneke Vaandrager | Wageningen University, chair group HSO
Erik Hendriks | Gemeente Arnhem, afdeling informatie
Paul Getz | Gemeente Arnhem, afdeling informatie

Second examiner
Prof. Dr. Marleen Bekker | Wageningen University, chair group HSO

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After a total of six years of studying, this thesis marks the end of my study of Health and Society at Wageningen University. At the start of my student journey I would not have figured that I would be capable of performing my own research. But I did it, and the many challenges and adventures that I encountered helped me to push it.

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I struggled a lot, especially at the beginning of my thesis. But reflecting up on the last seven months, I enjoyed a lot of moments as well and I am happy and proud with the thesis that lies in front of you. Hopefully you will enjoy reading my thesis.

Denise van der Weerd

Abstract

Participatory Geo-Information Science (PGIS) combines collaborative methods with Geographic Information Systems (GIS). A lot of studies have focused on utilities of PGIS on community groups and have addressed its impact in regard to empowerment. However, little research has been done on PGIS in relation to social community enterprises. The aims of this thesis are threefold: 1) to assess the needs and the perceived utility of PGIS with social community enterprises, 2) to assess what factors positively contribute to a PGIS with social community enterprise, and what their information needs are and lastly 3) to explore the relationship between the PGIS intervention and the empowerment of the social community enterprise participants. A total of three PGIS cases with social community enterprises in Arnhem have been carried out, each case consisted of two PGIS meetings and an interview. Each case was analyzed on process and outcome indicators, both individually and collectively. The results show that the perceived purpose of PGIS meetings with social community enterprises are very case specific, due to a lot of contextual factors such as a case aim. The PGIS meetings showed to be mainly of strategical and organizational purpose, and to a lesser extent tactical and administrative. A lot of inter-related factors were found to contribute to the process of each PGIS case, topics include for example the atmosphere, the formulation of the case aim and the role of the research team. All participants indicated that the pleasant working relationship to be the most contributive factor to the PGIS process. This research also shows that there are some changes to be observed in relation to empowerment. In two cases the target group focus has slightly shifted as a results of the PGIS project, some participants indicated an increased sense of self-confidence and an increased knowledge on the amount and nature of the data easily available to them.

Abbreviations

BRP   Basisregistratie Personen [Dutch Population Register]

CBS   Centraal Bureau voor de Statistiek [Statistics Netherlands]

GIS   Geographic Information Systems

LSA   Landelijk Samenwerkingsverband Actieve Bewoners [National Collaboration Union for Active Residents]

PGIS   Participatory Geographic Information Systems

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1. Introduction

In this day and age data is being collected everywhere. The amount of available data on housing, income, safety and many other aspects in society is steadily increasing. For many actors, data is crucial to making effective decisions. Especially spatial data, data that has a spatial component to it, is of great importance. Spatial data can be used to plan, evaluate, monitor and execute plans (Greene, 2000). The Netherlands have a long tradition of data collection, and more recently of data sharing. Thousands of indicators are free and readily available to the public on the website of Statistics Netherlands (CBS). Data collection and data sharing is also a common practice for municipalities in the Netherlands. It is not the availability of data that falls short, it is meaningfully using and interpreting these data that poses a challenge for many. Wood & Fels (1992) argued that when the available information can be visualized and analyzed spatially in maps, that they have the power to transfer ideas, help convince people from the importance of those ideas, and to improve informed decision making.

Geographic Information Systems (GIS) can be used as a tool to visualize spatial data. The term GIS can be applied to a large group of technologies that can analyze spatial data. There are many different definitions listed in the literature. To summarize, GIS covers three main components. Firstly, GIS is a computer system, secondly it uses geographical data and lastly, GIS can perform management and analysis tasks on these data (Heywood, Cornelius & Carver, 2006). GIS also allows to provide more nuances to stats and graphs that usually summarize the data in areas. In this process, a lot of very relevant information gets lost and does not reflect the true distributions of indicators across a smaller area and may resemble little of the true distributions across community groups in an area (Sawicki & Peterman, 2002). Community access to GIS however, can be an issue. Several reasons for this can be found in the literature. First, communities are often not aware of GIS and GIS software. Also, it takes a lot of time and technical skills to master this software and interpret the maps (Leitner, Elwood, Sheppard, McMaster & McMaster, 2000; Ghose, 2017 & Elwood, 2002).

GIS opportunities with social community enterprises in Arnhem
The Dutch municipality of Arnhem also collects large sums of data. The many indicators do help to get more insight in the processes happening in the city, yet the vast amount of it make it difficult to comprehend. Annually, a large number of indicators is assessed and summarized in a web-based application called 'Arnhem in Cijfers' (https://arnhem.incijfers.nl/jive). Also, 'Staat van de Stad' is an annual publication on the trends and developments within the municipality. Arnhem has increasingly put effort to start collaborative GIS projects to visualize data with GIS for the purpose of increasing informed decision making. Examples of policy areas where they put this into practice are property ownership distributions of housing corporations, redevelopment proposals in the city centre and the spatial distribution of long-term care facilities. They do see the added value of incorporating GIS and the results have often led to new insights and meaningful discussions as the sessions usually incorporate the perspectives of multiple stakeholders. Therefore, the municipality wants to take the

opportunity to further explore the potentials of taking on GIS projects with other local actors that contribute towards improving the well-being of its citizens.

As of late, policy makers have increasingly stressed the importance of collaboration between governments and the third sector as a mechanism for effective governance (Barraket & Archer, 2010). The third sector is that part of the economy that is neither public, nor fully private and is usually driven by values and goals with certain social or political perspectives (Defourny, Hulgård & Pestoff, 2014). This collaboration is stressed because the third sector often plays a role in the social policy goals of (local) governments. One form of organization that would qualify as third sector are social community enterprises. Generally speaking, social community enterprises are organization that work on the economic, physical and social development of an area and are originated and controlled by residents themselves (LSA, 2018). Social community enterprises play an important role in the city of Arnhem as they all play their part in improving the living conditions for (vulnerable) residents in the city. The focus and aim and activities of each social community enterprises is unique.

The municipality of Arnhem already tries to increase collaboration with social community enterprises. Sometimes passively, by funding some of their activities, but increasingly more actively with projects such as 'Zin in de Wijk'. This is a four-year research project that focuses on measuring the impacts that a total of six social community enterprises have on the health of local residents. In the course of this collaborative research project, it became apparent that social community enterprises are often not aware of GIS, the available local data resources, and to what extent that could contribute to their activities and proceedings.

The municipality of Arnhem does have GIS expertise at hand, but was never actively involved with GIS for social community enterprises. Therefore they propose to look into Participatory Geo-Information Science (PGIS). This field of study combines collaborative methods with Geographic Information Systems (GIS) and is an attempt to use GIS in the context of the needs and capabilities of communities (Minang, 2003). PGIS projects often take place with local, often marginalized communities and its relevance for social community enterprises has hardly been assessed yet. This leads to the main motives of this study: to assess the relevance of PGIS meetings with social community enterprises in Arnhem, and looking into the processes that contribute to successful PGIS projects. Also, since the subject of empowerment is very prevalent in the PGIS literature, this study aims to explore the relationship between a PGIS intervention and the empowerment of its participants. This knowledge will help to make the municipality to make any future decisions on the implementation of PGIS projects and will diversify the currently existing body of literature regarding PGIS for social community enterprises.

2. Background and Theoretical Framework

Pozzebon, Tello Rozas & Delgado (2015) propose a multi-level framework for analyzing PGIS in communities. The three dimensions identified are: context, process and content (figure 2.1). The contents of this framework will be addressed below:
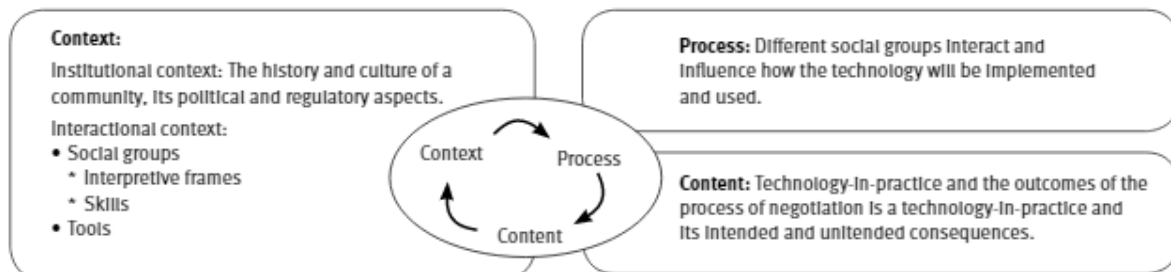

Figure 2.1: Multi-level framework for PGIS analyis (Pozzebon, Tello Rozas & Delgado, 2015)

The first dimension **context** refers to the social setting with whom the PGIS project takes place. This again consists of both an institutional and an interactional context.

- The <u>institutional context</u> refers to the historical, cultural, political land regulatory aspects of a community
- The <u>interactional context</u> refers to the way the social groups in the PGIS can have certain interpretative frames, as people from the same social group usually share certain assumptions, beliefs and expectations about for example GIS. Which is an important factor, as Lin & Silva (2005) identify that the extent of similarity of these frames may determine effective PGIS project implementation. The interactional context also involves the skills that the social groups have in terms of the applied technologies and the change they would like to organize, following from the PGIS project. Lastly, this context consists of the tools and methodologies that were used to carry out the PGIS project.

The **process** dimension refers to how the different social groups interact and how this influences the outcomes of a PGIS project in terms of whether products from the sessions will be implemented or used.

Lastly, the **content** dimension is the product of both the context and process dimension. Which are the consequences of the PGIS project. The focus here lies on the enactment upon certain outcomes of the PGIS project.

2.1. GIS for communities

Pozzebon, Tello Rozas & Delgado (2015) do not further elaborate on the possible outcomes of a PGIS project, however Craig and Elwood (1998) do identify four main purposes of GIS for communities:

- **Administrative**
  - Provide information to support actions of staff members
  - Inform programming by neighborhood group.

- **Strategic**
    - General assessment of neighborhood needs and existing resources
    - Search for general location of service or organization
    - Evaluate the success of existing city and community programs

- **Tactical**
    - Guide action/assistance to specific parts of neighborhood
    - Contest maps of opponents

- **Organizing**
    - Recruit new members
    - Facilitate meetings
    - Get attention and assistance from government, granting agencies or other neighborhoods

2.2. PGIS and empowerment

A large number of studies imply that GIS in community contexts increases empowerment. Empowerment is an ambiguous term, and there are many different definitions. Most of them imply a certain political or social change and that it increases an individual's or community power (Corbett & Keller, 2005). At first, research on empowerment and PGIS was mainly related to advocacy and public visibility, yet later shifted to more internal changes, such as an increase of confidence or newly acquired skills (Tsai, Lu, Chung & Lien, 2013). Elwood (2002) defines three forms of empowerment, distributive change, procedural change, and capacity-building change**. Distributive change** relates to a redistribution of power, such as acquisition of resources in terms of money or political participation; **procedural change** refers to change in how decisions are made and how certain things are done; and **capacity-building change** refers to an increased understanding of events or an increased self-confidence. Empowerment in PGIS studies is often measured in terms of observations or with interviews (Tsai, Lu, Chung & Lien, 2013). Several critical side notes have been made on empowerment related to PGIS in communities. McCall and Minang (2005) state that empowerment is a complex concept and that the process of empowerment manifests itself in different ways, for different kinds of people and across a range of degrees. Also, Ghose (2017) confirms that empowerment is a gradual process and not necessarily a product of a PGIS project. Often, scholars do not explain what they mean with empowerment, this comes forward in a literature review from Corbett, Cochrane & Gill (2016).

Some scholars found that GIS and PGIS could also work marginalizing to community groups (Weiner, Harris & Craig, 2002). This is mainly because communities do not always have access to GIS. Several reasons for that can be found in the literature. First, financial constraints. GIS applications are often costly, and data sets are also not always free of charge. Secondly, privacy restrictions do not allow (local) governments to freely share all of their data. And lastly, there is often a lack of technical skill to use or interpret GIS and maps (Ghose, 2017 & Elwood, 2002). In PGIS studies, the difference in

hierarchy between the participants and a lack of technical skills were perceived to be marginalizing (Elwood, 2002).

2.3. Visualization methods and PGIS project contents

Psychological studies such as from Casner (1991) demonstrate two ways in which graphics are useful in visualizing and communicating information. The first is computation: graphics allow the user to obtain more information because of the use of color, distance and size features. The second way is by search: graphics can help to reduce the user's search for information because separate pieces of information are usually pieced together in one graphic or map. Maceachren, and Brewer (2004) uncovered ways in which geo-visualization on a display has the potential to more easily share and integrate information, compare perspectives and negotiate approaches and solutions to problems. This is because geo-visualization on a display provides a shared object to talk about, a shared object to think with and to help clarify and support the structuring of arguments, and finally to be able to coordinate perspective and actions.

Different representations of the same pieces of information have different effects. Therefore, it is the case that there is not 'a best way' to represent information. This is because different representations best support different questions or goals (Casner, 1991). Therefore, it is important to consider the goal for which the representation is going to be used. Casner's (1991) study also showed that different representations of information for airline schedules, either reduced or increased user's performance to do their task. However, the study from McKendry (2000) found the opposite. Three different representations of the same data, did not have a substantial effect on the user's performance task. Their explanation for this effect was that the map user's experience compensated for poor map design, however this does require good map interpretation skills.

Several authors found that poor map design impedes proper understanding by map users, could communicate false ideas and restricts proper communication of information (Weibel & Buttenfield, 1992; Maceachren & Brewer, 2004). Therefore, good map design is of great importance. Several textbooks, guidelines and articles are written about the subject. Frequent map design errors include maps with too much details, irrelevant symbols, the wrong use of scales, the use of unstandardized data and more. Many of the problems with map design originate in the aspects of cartographic generalization, map symbolization, or map projection (Weibel & Buttenfield, 1992). The main problem of this however is that, these design elements are interdependent and cannot easily be separated. Often, these rules for geo-visualization are not strict and are difficult to implement them in your own context.

Robinson & Petchenik (1976) touch upon the matter of subjectivity of maps. They argue that maps are derived from systems of assumption, needs and cognitive characteristics. Also Harris & Weiner (1998) stress that GIS are not objective and value free. Monmonier (1996) adds to that that when the number of layers and products of a map increases, that the list of assumptions grows with it, and that certain

uncertainties should be made explicit too. Monmonier (1996) wrote in his provocative book 'How to Lie with Maps´ about the necessity of telling white lies in order to present a useful and truthful picture. Too much truthful information could lead the focus of the map reader away.

Sawecki and Craig (1996) stress that simply providing data visualizations and information to communities does not necessarily lead to empowerment. Neighborhood communities react negatively to receiving data dumps with information. Rather, they like to see minimal and context specific information, this helps them to address the right issues (Sawicki and Craig, 1996). Elwood and Leitner (1998) found that different community groups are in need of different types of data, information and knowledge. This obviously correlates with the specific contexts of the communities. Common data needs found by Elwood & Leitner (1998) have been summarized in figure 2.3.1.

Housing and Property Information	Population Data	Transportation	Physical/ Social Environment	Economic Development
Housing	Race	Traffic volumes	Air/Water pollution	Existing businesses
- type	Age	Traffic patterns	Contaminated soil	Available employment
- condition	Income	Bus routes	Toxic emissions	Business potential
- tenure	Household type	Sidewalks	Crime statistics	
Property values	Length of residence	Bike routes	Public health statistics	
Zoning				

Figure 2.3.1: Common data needs by community groups (Leitner, 1998)

2.4. Project management

A lot of scholars have tried to summarize the factors that contribute to successful projects. Chan, Scott, Ada & Chan (2004) have made efforts to develop a framework on critical success factors. They selected five groups of independent variables; project-related factors, project management actions, external environment, human-related factors, and project procedures. This framework is mainly focused on the management of construction projects, yet the majority of its component apply to other projects as well (figure 2.4.1).
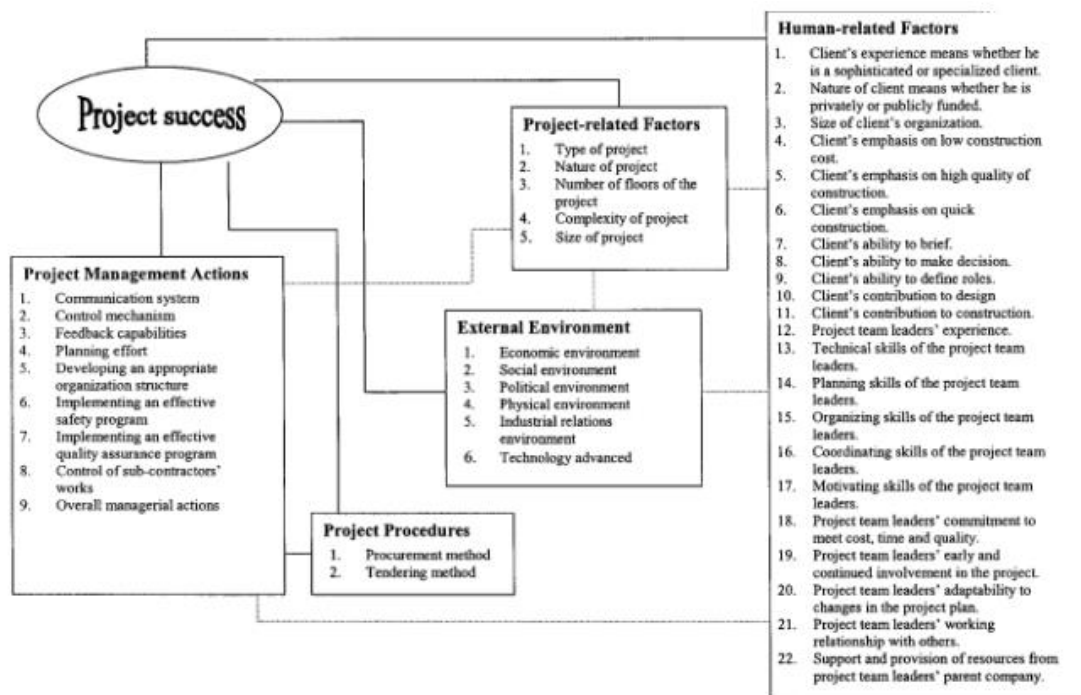
Project success

Project-related Factors
1. Type of project
2. Nature of project
3. Number of floors of the project
4. Complexity of project
5. Size of project

Project Management Actions
1. Communication system
2. Control mechanism
3. Feedback capabilities
4. Planning effort
5. Developing an appropriate organization structure
6. Implementing an effective safety program
7. Implementing an effective quality assurance program
8. Control of sub-contractors' works
9. Overall managerial actions

External Environment
1. Economic environment
2. Social environment
3. Political environment
4. Physical environment
5. Industrial relations environment
6. Technology advanced

Project Procedures
1. Procurement method
2. Tendering method

Human-related Factors
1. Client's experience means whether he is a sophisticated or specialized client.
2. Nature of client means whether he is privately or publicly funded.
3. Size of client's organization.
4. Client's emphasis on low construction cost.
5. Client's emphasis on high quality of construction.
6. Client's emphasis on quick construction.
7. Client's ability to brief.
8. Client's ability to make decision.
9. Client's ability to define roles.
10. Client's contribution to design
11. Client's contribution to construction.
12. Project team leaders' experience.
13. Technical skills of the project team leaders.
14. Planning skills of the project team leaders.
15. Organizing skills of the project team leaders.
16. Coordinating skills of the project team leaders.
17. Motivating skills of the project team leaders.
18. Project team leaders' commitment to meet cost, time and quality.
19. Project team leaders' early and continued involvement in the project.
20. Project team leaders' adaptability to changes in the project plan.
21. Project team leaders' working relationship with others.
22. Support and provision of resources from project team leaders' parent company.

Figure 2.4.1: Conceptual framework on project success (Chan et al., 2004)

2.5. Main terms

The following terms are often discussed during the course of this study and will be briefly defined to give the reader a clear understanding of what is meant by these terms.

Empowerment

A recurring concept in PGIS literature, which knows many different definitions. Most definitions imply a certain political or social change and that it increases an individual's or community power (Corbett & Keller, 2005).

Relevance

The term relevance (n.d.) is defined by the Cambridge Dictionary as "the degree to which something is related or useful to what is happening or being talked about". In this study relevance of PGIS for social community enterprises is assessed with interview questions.

Social community enterprise

An enterprise works on the economic, physical or social development of an area or community and are originated and controlled by residents themselves. Usually these enterprises cooperate with local governments, community groups and institutions or companies. This definition of a social community enterprise is based on the basic principles of a BewonersBedrijf [community enterprise] formulated by LSA (2018).

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Social community enterprises are different from community groups, because they are usually more formally organized, and because they generate a revenue stream that flows back into the community or neighborhood. On the other hand, social community enterprises are different from 'regular' enterprises in the sense that they have more focus on the social value and not necessarily on profit.

Successful

A PGIS case in this study is considered successful when the participants from the social community enterprise indicate that they found the project to be relevant and when participants indicated to have either changed certain perspective, changed certain procedures or indicate to act upon the contents of the meetings in the future.

3. Research relevance, objectives and research questions

3.1. Research relevance

Scientific

Research on PGIS is very case specific as the processes and outcomes of a PGIS project are very context sensitive. This research will diversify the PGIS literature with focus on social community enterprises. Also, this study will go in-depth on the process and implementation of said PGIS projects which might offer insights to others when trying to implement their own PGIS project.

Practical

This research offers an opportunity for the municipality of Arnhem to collaborate with social community enterprises. The knowledge gained during the course of this study will support the municipality in their future decisions regarding PGIS projects, whether they want to pursue similar projects and what ways they could go about to organize them.

3.2. Research objectives

- To assess the perceived relevance and information needs for social community enterprise participants in PGIS projects.

- To gain insights into what factors positively contribute to the PGIS project process with social community enterprises.

- To explore the relationship between a PGIS intervention and the empowerment of social community enterprise participants.

3.3. Research questions

To achieve the before mentioned research objectives, the following questions have been formulated:

1. What is the perceived relevance of PGIS projects for social community enterprises in Arnhem on the following levels:
    o What are the perceived strategic purposes?
    o What are the perceived organizational purposes?
    o What are the perceived administrative purpose?
    o What are the perceived tactical purpose?

2. What factors positively or negatively influence the PGIS process?

- What are the information needs of social community enterprise members?

3. To what extent do PGIS projects contribute to an empowerment process amongst the social community enterprise participants?
   - To what extent can disruptive change be observed?
   - To what extent can procedural change be observed?
   - To what extent can capacity-building change be observed?

4. Methods

This chapter includes the main research methods and strategies of this research. The choice of the study design of a multiple case study will be further elaborated upon, then the case definition and case and participant selection will be discussed. The data collection methods and data analysis follow subsequently and then, to get a broader overview of other research processes, an overview of the research process before, during and after data collection is presented in figure 4.1. The accessed tools will be discussed at the end of the chapter.

4.1. Multiple case study

The overall methodological approach to this study is multiple case study. This approach was chosen because of the exploratory nature of this study and because it has been proven particularly useful in study fields where theoretical and conceptual frameworks are incomplete (Chetty, 1996). A total of three cases have been created and analyzed in order to be able to study the PGIS relevance, process and empowerment. Also, multiple cases allowed for further researching the contrasts and similarities of the processes and outcomes of each case.

4.1.1. Case definition

Each case was a five-month PGIS project. Each organization has been assigned to a case.

The following people were present during each of the cases:
> *Members from the social community enterprises*
- Two members that are highly involved with the organization

> *Members from the research team*
- One civil servant from the municipality that supported the process with a background in GIS technology.
- One civil servant from the municipality with more comprehensive knowledge on the goals and activities of each social community enterprises.
- The main researcher who was the first point of contact for the social community enterprises and lead and moderated the meetings.

Each case compromised of at least the following components[1]:
- One introductory meeting where the purpose of this study was explained and the potential applications for the social community enterprise in question was explored.
- A first PGIS meeting, presenting the selected data, visualized on maps.

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[1] For organization A an additional meeting had been scheduled to discuss the possibilities of the application of GIS and the Maptable to support a plan of action that they had to present in order to get additional funding. However, due to time constraints this action has not yet been followed up on and this meeting was not included in the data analysis.

- A second PGIS[2] meeting, where subject of more interest were elaborated upon.
- An interview with both participants.

The units of analysis were the social community enterprises, which will also be referred to as 'organizations' in the rest of the study. The structure and content of each meeting was tailored to the aims and focus of each case.

4.1.2. Case and participant selection

Three social community enterprises have been purposefully selected. All social community enterprises participate in the same 4-year study called 'Zin in de Wijk' which focuses on the effects of social community enterprises on their volunteers and participants. The organizations were selected because they target different population groups and offer different kinds of activities. The sample might not be representative for all existing social community enterprises in relation to PGIS, but the sample includes a variety of types of organizations.

For each organization a total of two members have been asked to join the study. These participants were put forward by the social community enterprises themselves. This number of participants per case would balance out the amount of civil servants and would allow the participants to share mutual experiences.

4.2. Data collection

Audio recordings were made during each PGIS meeting. This resulted in a total of six transcripts, two per case. Also, at the end of each case, a group interview with both social community enterprise participants was held. This resulted in a total of three group interviews, one per case. Also, the research team gathered after each meeting to briefly review the meeting. These informal and unstructured gatherings resulted in numerous notes and reflections which were included in the report in the 'notes from the research team' boxes in chapter 5.

- *PGIS meetings*

  Each meeting consisted of an introduction, the meeting's contents and an ending and lasted approximately one and a half hours. ArcMap and 'Arnhem in Cijfers' were used as main GIS tools during the meetings. GIS data included for example population demographics and survey results, which were translated to maps and were overlaid on either a satellite image or a basic map of the city. These visualizations were shown on a maptable for discussion. The different GIS tools will be further elaborated upon in section 4.5. Audio recordings have been made and the meetings were transcribed literally.

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[2] For organization B the second meeting was a round table discussion.

- *Interviews*

   For each case a group interview has been conducted a couple of days, up to a few weeks after the last PGIS meeting. These interviews serve as the base for the relevance and empowerment assessments. The interviews have been recorded and transcribed literally. They took place at the offices of each social community enterprise, together with the researcher and both study participants. A total of three group interviews have been conducted, each lasted between 30 and 45 minutes. The questions were semi-structured and open-ended and focused on gaining insights on the participant's experience of the relevance, process, and empowerment process of the PGIS meetings. This format was chosen because in each case the two members of the social community enterprise went through the research project together, and because the open-ended questions allowed for discussion to emerge on this explorative subject. The interview guide can be found in appendix I.

- *Notes from the research team*

   After each meeting, the meeting was briefly reviewed by the research team in order to note remarkable situations and opportunities for future meetings. These resulted sometimes in minor adjustments that were applied to the other meetings, one example would be that it was considered to be beneficial to write down an agenda of the meeting on the white board in the meeting room. These remarks are included in a box with the description of each case in the results chapter under a box called 'Notes from the research team'.

4.3. Data analysis

All transcripts of each case were initially scanned through in order to recognize certain recurring themes and patterns. Then codes were formulated and categorized based on the theoretical framework, together with additional open codes. This was done in ATLAS.ti, a software package suited for text-based qualitative analysis. First, the data was analyzed per case on the subjects of relevance, process and empowerment. This was done by looking at for example at all 'relevance' codes within one case, and looking what other codes co-occurred with them. Later, this same process was repeated for all transcripts collectively.

- *Relevance assessment*

   These codes mainly followed from interviews with the participants where participants were asked about the perceived relevance of the PGIS meetings, to a lesser extent the codes followed from the PGIS meetings. The coding was done by labeling phrases, for example when a participant started talking about a map that would should show the location of volunteers it was labeled as 'relevance: administrative'.

- Process assessment

   These codes mainly followed from the PGIS meetings and supplemented with codes from the

interview. For this assessment, single phrases and entire sections of text were coded. The codes were very diverse ranging from notes on the maptable or ArcGIS, to codes on the participant's interaction with the data such as 'reaction: interested' or 'reaction: confused'.

- *Empowerment assessment*
  Again, these codes followed mainly from the interviews and were interpreted in the light of the theoretical framework. Codes were based on phrases and lead to codes such as for example 'empower: capacity'

4.4. Research process

To get a better overview of the entire research process of this study, a flow chart has been made (figure 4.1). It includes the process of the three main stages of this research being: before data collection, during data collection, and after data collection. It shows the subsequent steps made, including what factors certain processes helped to give these steps shape, and the products that followed from this study. As the study consists of three cases, the data collection stage has been gone through three times as well.
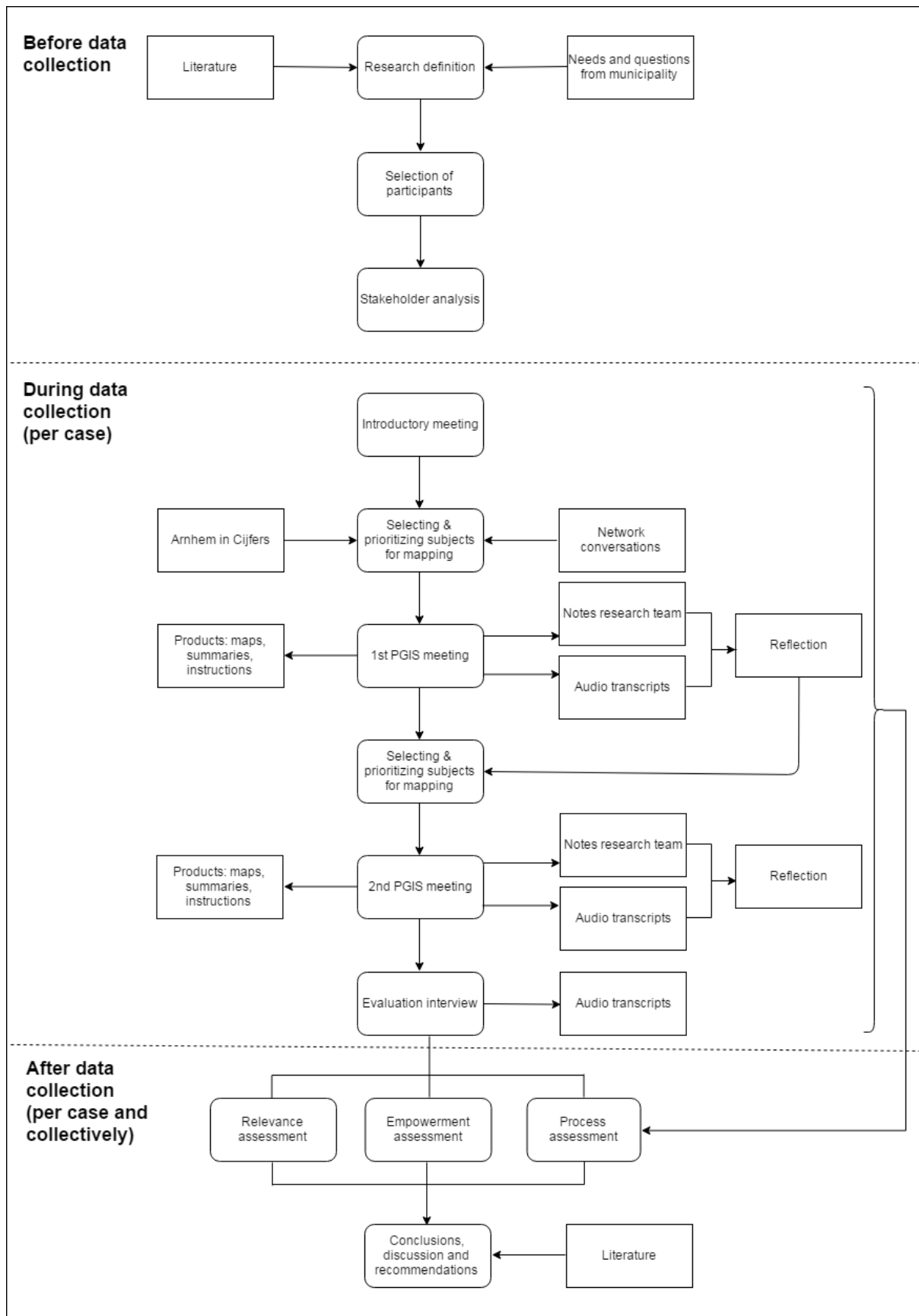
Figure 4.1: Overview of research processes before, during and after data collection

4.5. Accessed Tools

To be able to carry out the PGIS projects, there were various tools at hand. This section will briefly discuss these.

Maptable

One of yhe most important tools was the Maptable, a digital table with a high resolution touch-screen and a computer built into it. The height of the table can be adjusted and the screen can be oriented both horizontally and vertically. On the computer runs GIS software in (ArcMap and QGIS) in order to perform spatial analyses. In this study the Maptable was used as a platform to share the maps and spatial analyses made and adjust them to the needs of the participants (e.g. making certain features transparent). All participants were standing around the table. The touch-feature had been turned off so that people can point to specific areas without disrupting the map on the screen.

'Arnhem in Cijfers'

'Arnhem in Cijfers' (www.arnhem.incijfer.nl) in an online application that introduces people from in- and outside the municipality to municipal information. It is a database with resident, neighborhood and district information on themes such as housing, economy, education, social indicators, safety and elections. A lot of the data is available on both district and neighborhood level. The data viewer allows you to see the information on a map or in a table or graph. The available data originates from multiple sources, such as the municipality itself, the Dutch Population Register (BRP), or CBS. Data on housing, livabity and residents have been exported as .csv files from 'Arnhem in Cijfers' and uploaded and edited in the GIS software ArcMap 10.4 Basic.

ArcMap 10.4 Basic

This is the GIS software the municipality of Arnhem typically uses to view, edit, create and analyze geospatial data. The maps created and shown for the purpose of this research were made in ArcMap.

QGIS v2.18

This is a free and open-source GIS software alternative to ArcMap. QGIS is not available on the regular desktops at the municipality, only at the maptable. As QGIS is free, this software was used to introduce organization B to GIS.

4.6. Ethics and Privacy

4.6.1. Ethics

At the start of the research the participants were informed about the procedures of the study with an introductory meeting and with a project briefing, an example of a project briefing has been included in Appendix II. Before the start of a meeting, respondents were asked for permission to record the meetings. During the interviews, participants were assured that they did not have to tell something when they did not want to, that their information was going to remain anonymous and the participants were asked to sign an informed consent (Appendix III).

4.6.2. Privacy

For this study, mainly those data sources have been consulted that were publicly accessible. In order to provide more extensive spatial analysis of certain phenomena, in some cases non-publicly available sources have been consulted and presented as well. In doing so, the municipality's privacy regulations have been taken into consideration. One of these sources is the BRP of Arnhem, which is a database that includes personal data from all the residents of Arnhem. Residents are not permitted to access these data in order to prevent abuse. Civil servants from the municipality themselves are able to access it, yet are not allowed to share it. Generating maps that include data from the BRP have to be anonymized. One way of doing so is by summarizing the data based on a neighborhood or district level (figure 4.6.1.), a lot of detail is lost in this process. Another way of doing so, is to summarize the data in smaller result areas, for example by 50x50m areas, which assures more detail. Box 4.1. exemplifies how individual cases are summarized for certain areas so that resident's privacy is guaranteed.
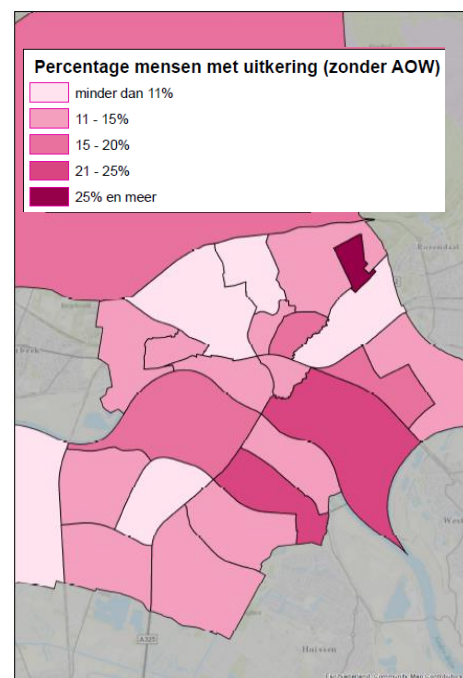

Figure 4.6.1: Percentage of people of social benefits per neighborhood in Arnhem

Box 4.1: Example on securing privacy during data visualization

The following example is fictional and residents or households cannot be retraced

First, data is retrieved from the BRP, which enables to see details such as household definition, address and place of birth about each resident registered in Arnhem. Figure box 4.1 shows how a non-anonymized map generated in ArcMap could look like. On this map, the red dots show the fictional location of single person households. The blue squares are 50x50m areas, the hue represents the summary of the single person households located in that area. When an area has no colour, this means that the total number of single person households is lower than five (to guarantee privacy). The information in figure box 4.1 would be retractable to a specific household's location and it would therefore not be allowed to be shared publicly.
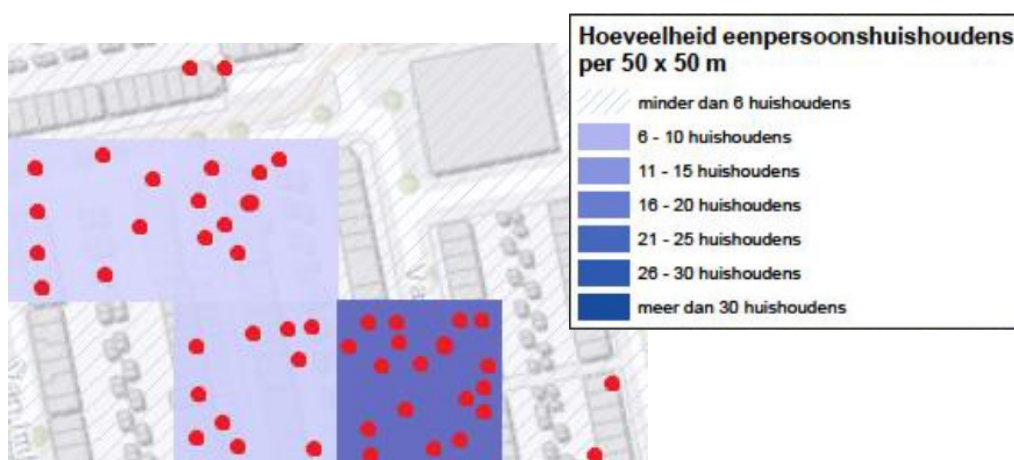

Figure box 4.1: Fictional example of non-anonymized map showing location of single person households

Figure box 4.2 shows the same information as in figure box 4.1., yet here the view is zoomed out to a cropped-out view of a neighborhood in Arnhem, and the data is anonymized. As the blue areas summarize the specific location of single person households, the map no longer contains any privacy sensitive information and can be freely shared.
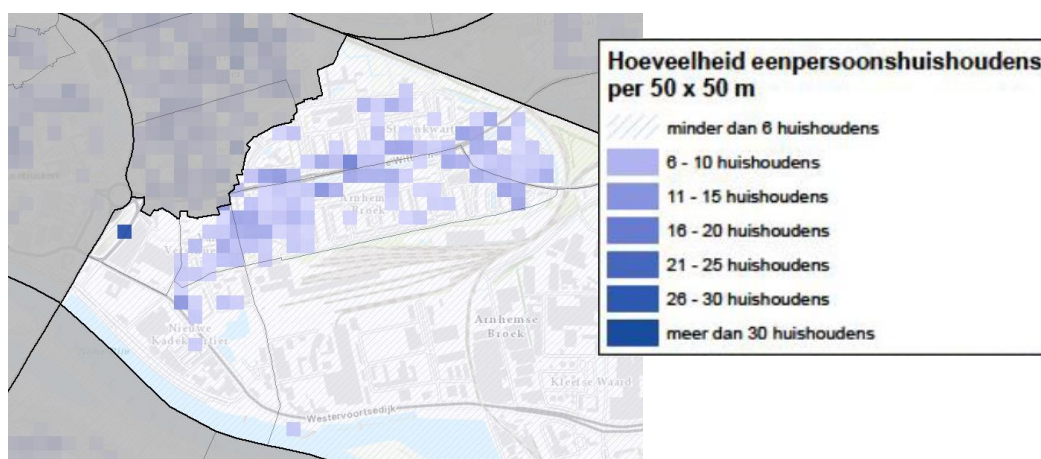

Figure box 4.2: Fictional example of an anonymized map that shows incidence of single person households per 50x50m in a neighborhood in Arnhem

5. Results

In this chapter, the three cases will be reviewed consecutively. For each of the cases, the framework for participatory GIS analysis was used as a guide to structure the results. The part on **context** is based on available information online: from the organization's website, 'Arnhem in Cijfers', and from network conversations. Then, the part on **process**, ranging from preparing the different sessions to the extra deliverables that were made for each of the cases, were extracted from the transcriptions of each of the PGIS meetings combined with notes from the research team. Lastly, the results on **outcomes** are drawn from the interview transcriptions. Dutch quotes have been translated to English, the original quotes can be found in appendix IV.

5.1. Case A

5.1.1. Context

Description of organization A

Organization A means to increase the vitality and social cohesion of the neighborhood and particularly does this by focusing on people with an increased distance to the labour market. They create and offer work focused participatory trajectories for these people so that they can develop their confidence and skills and that in the future they might be able to find paid work. Some of these trajectories include helping out with fixing bikes, parking cars, doing maintenance work on the organization's building or support in city wide activities. The people that follow a trajectory originate from all over the city and are not necessarily merely from the adjacent neighborhoods. After people complete a trajectory with organization A, some of them are able to find a paid job through their gained experience. In 2018 a total of 35 people followed a trajectory and a total of five volunteers were involved with the organization. Organization A also organizes activities that are usually bound to the neighborhood such as a Christmas market, or sports activities for children. To a large extent the organization is dependent on the financial support of the municipality in the form of subsidies. Also, they receive money for each person that follows a trajectory with the organization.

The organization is located in one of the more vulnerable neighborhoods of the city, a large amount of the housing is social rent, many residents receive some form of social benefit, the incomes are low and there are a lot of immigrant groups. After the Dutch, the Turkish population has the majority. Over the last years the migration from non-western conflict countries such as Syria and Eritrea has also increased. Its population is relatively young, there are few people aged over 65 and many people live alone. From the bi-annual survey on quality of life and safety resident indicate that there are only a few facilities in the neighborhood and that residents experience feelings of unsafety in the neighborhood.

Recruitment process

The social community enterprise expert contacted one member of this organization in person and via e-mail to check whether they would be interested in participating with two members in PGIS sessions

to plot neighborhood and city information on the map. They expressed interest and a date for an introductory meeting was set. During this meeting, the two members from the organization and the three members from the research team were present. The focus of this meeting was to get clarity about the participants' knowledge gaps and how data and information from the municipality could help them to close these gaps. A few days after this meeting, one of the participants called one of the members of the research team to express doubt on the added value of the PGIS sessions. The participant was reassured, the main researcher drew up a project briefing and this was thoroughly discussed with the organization in person.

Box 5.1.2: Notes from the research team
- Check at the end of the introductory meeting whether the intentions are clear.
- Draw up a project briefing to make the PGIS project more clear and tangible.
- Social community enterprises members indicate that locating certain target groups in the neighborhood can be valuable for the promotion of activities.

Case focus

For this PGIS research project the predefined goal was to **increase the understanding of the socio-demographic distributions of their neighborhood**. With this information the organization hoped to gain a better understanding of the diversity of the neighborhood and think about activities to approach the diverse groups in the neighborhood. To do so, a total of two PGIS meetings had been scheduled. The purpose of the first meeting was to let the members of the organizations get to know the possibilities of the data within the municipality and to introduce them to GIS and demographic data. The second meeting was meant to provide more depth to the information provided in the first meeting. Table 5.1.1 shows an overview of the attendees, date and aims of the meetings and interview. An elaboration on the participants can be found in Appendix V.

Table 5.1.1: overview of data collection moments case A

Case ID	Participant ID	Date	Meeting ID	Aim meeting
A	A01, A02, all Z	14-11-2018	A-P1	Familiarize with GIS technology, familiarize with neighborhood data, setting course for 2nd meeting
	A01, all Z	22-12-2018	A-P2	In-depth analysis population groups, familiarize with 'WoonZorg wijzer'
	A01, A02, Z03	06-02-2019	A-I1	Evaluate project process and outcomes and empowerment

5.1.2. Process & Content

Preparing first PGIS meeting

First, a stakeholder analysis was conducted to get a better grasp of the context of organization A. Based on the organization's goals and activities, the stakeholder analysis and the introductory meeting, a selection of topics was made: demographics, income, work and social benefits and quality of life and safety. 'Arnhem in Cijfers' was consulted to check data availability of variables that fitted within these topics. Data sets were downloaded, adjusted to fit the criteria of ArcMap and transformed into maps. In ArcMap, for each variable a suitable data visualization form was selected. This involved checking whether the data had to be classified, where the borders of the classes would be, whether information would have to be presented in percentages of the total population or in absolute numbers, whether labels were necessary to explain the values or whether graphs such as diagrams, pie charts, or bar charts would be most appropriate to visualize the information. When possible, variables would be included for both neighborhood and district level. For each variable, its value was consciously weighted before including it in the presentation. Figure 5.1.2.1 shows how the layers in ArcMap were organized, which determined a large part of the workflow of the PGIS meeting. The presentation's contents and workflow were checked with the GIS expert of the municipality, the main researcher would lead and moderate the presentation, the GIS expert would control the maptable and ArcMap, the social community enterprise expert would contribute with local and contextual knowledge. The duration of the meeting was set to one and a half hours. The preparation of the first PGIS meeting took approximately one full week.

Box 5.1.3: Notes from the research team

- For each data set it is valuable to include the neighborhood population numbers in order to work with both relative numbers (percentages of the total) and absolute numbers. The research team found data to be more easily comparable this way.

Figure 5.1.2.1: Part of the table of contents of first PGIS meeting with organization A

Figure 5.1.2.2.: Restructured table of contents of first PGIS meeting with organization C

First PGIS meeting

The meeting took place at the meeting room where the maptable is located. The meeting started off standing around the maptable. The details of the maptable and the software were explained to the participants to familiarize them. Then, an areal picture of the city and the location of the participating organization from 'Zin in de Wijk' were shown. This positively starts the meeting off, participants recognize their location and their facilities and respond enthusiastically.

Demographics

The first topic was related to demographics, including age distribution, country of origin of the residents and distribution of different household forms. The results showed the information categorized by neighborhood. First, absolute values were shown, but participant A01 expressed that it restrained her from making a proper comparison between the different neighborhoods. Therefore the presentation view was set to relative data. Comparing the age distributions of their neighborhood to the other neighborhoods put their own neighborhood into perspective. It allowed them to see how their neighborhood was similar on certain aspects to certain neighborhoods (for example other vulnerable neighborhoods) and how they were different on other aspects as well. One thing that particularly stood out was that the group of people aged over 60 was underrepresented compared to the other neighborhoods. This invalidated one of the assumptions of the participants:

I find this really spacial. I thought that people aged 60 years and older were more represented, and that they were generally more lonely.

- Participant A01

Showing information on a more detailed level, per district, caused the participants to try to explain the differences between adjacent districts:

I think that here at the Veilingstraat and the Nieuwe Kadekwartier, the deviation in elderly has something to do with the nursery home. That one is located here right?

- Participant A01

Most of the other information, such as the relatively high prevalence of single parent households in their neighborhood, caused a sense confirmation of their own assumptions and experiences.

Income and social benefits

Information on the income distribution and the amount of people with low incomes confirmed existing assumptions. As one of the participants had already used 'Arnhem in Cijfers', she was already familiar with some of the data it includes. However the information on the social benefits was new. Participants responded enthusiastically and indicated that they were interested in more detailed information on the topic of social benefits.

Especially for these variables, the data collection methods were deemed especially important by the participants. The data was obtained from surveys, which indicated for the participants that the data is not conclusive and is merely a notion on the real-life situation. One of the participants referred to the information as being less interesting because it is an 'emotional figure':

"That means that we dont know the percentages of people in the 'WMO' or 'Jeugdwet'? I find that more interesting, since this is just an emotional figure".

- Participant A01

These 'emotional figures' needed more clarification, concerning the way the data was collected (e.g. what survey questions were used), and how they could be interpreted. Especially combining different figures from this survey, such as the percentage of people that indicated that they needed help and people that indicated that they received some form of help from the community, were difficult to explain and to interpret. These combinations did trigger a lot of response and stories on the neighborhood because these data would in part reveal real-life feelings and assumptions into data format:

"That is the closeness of the neighborhood. I think you really touch upon the core of the problems in the neighborhood. Very impressive".

- Participant A01

The contribution from the research team was primality being able to exemplify the information, to help to clarify certain phenomena and to provide contextual and historical knowledge. The atmosphere of the meeting was good, jokes were made, people laughed, and there was space to address uncertainties or questions. Loading different graphs and maps could take a considerable amount of waiting time. This would distract participants and the conversations would be more likely to falter.

Ending

The last ten minutes of the meeting were scheduled to summarize the meeting and to set a focus for the next meeting. Both participants came back to the fact that they doubted the value of data and the PGIS meetings for them:

"I was doubting because of him whether I should do this (…). I already changed my mind when I talked to Denise".

- Participant A01

"I changed my mind. From yesterday onwards I have a new course on environmentally oriented working approaches, which is exactly this. By looking at

On 'Arnhem in Cijfers'

Participant A01 indicated that 'Arnhem in Cijfers' was a very useful tool, yet that, when working alone with it, she found it difficult to single out those variables that were of most relevance to them. Also being able to shift back and forth between different, previously seen variables was perceived as being difficult. Participants responded enthusiastically and indicated that they were interested in more detailed information on the topic of social benefits.

Box .1.4: Notes from the research team

- Variables and topics, such as age distribution, at first don't seem to convey a lot. But they actually can form a basis for critical thinking, causing participants to look for confirmation or contradictions.
- The workflow could be improved by structuring the table of contents of ArcMap differently (Figure 5.1.2.1 & 5.1.2.2).
- The research team plays an important role in clarifying the data.
- Showing city-wide information places a specific neighborhood in more context.
- The information in the maps helps participants to structure and give validity to their assumptions and arguments.
- Information from the social domain needs a lot of clarification support from the research team. Information on the social domain does cause participants to share a lot of stories about their organization and neighborhood.
- Relative figures allow participants to make an honest comparison between neighborhoods.

Preparing second PGIS meeting

First, the workflow was altered by restructuring the table of contents within ArcMap differently, so that it would be easier to shift between certain variables. To be able to give more detailed information on the distribution of different household forms within the neighborhood, information from the BRP were extracted, sorted and plotted while taking privacy restrictions into consideration (Box 4.1). Maps with different detail levels were created, on postal code-6 (PC-6) level, 100x100m, 50x50m and heat maps with the goal of finding an optimal presentation form. Also information from the 'WoonZorg wijzer' was included, a website that shows information about health and disabilities on PC-6 level. Since organization A works with people that often have a form of disability it was deemed as a possible interesting source of information for them. The initially planned appointment was rescheduled to be a week later because the preparations for this meeting took longer than expected. The main researches would now not only moderate the meeting, but also control the maptable and ArcMap.

Second PGIS meeting

The meeting starts hectic and a few minutes too late. Participant A01 showed up alone since participant A02 could not make it. Participant A01 indicated to be stressed. The contents of the meeting are clearly discussed at the beginning of the meeting.

Detailed demographic information

First, a 100x100m grid is shown for indicating concentrations of single person households across the city. This variable required extensive clarification and was difficult for the participant to interpret. Consecutively, the same variable is shown with different projections (50x50m grid, PC-6, heat map). However, no single data presentation form seemed to provoke a positive response. Then, the same data presentation forms are used to show information on age distributions across the city, but the response remains the same.

> *"I keep thinking, how can I work with this? I can't figure it out".*
>
> *- Participant A01*

'WoonZorg wijzer'

The researcher decides to change the course of the meeting and introduce the 'WoonZorg wijzer'. As the maps on the 'WoonZorg wijzer' are the result of a complicated model, the results also required extensive clarification. Especially the definitions and dating of the different variables were important to be able to interpret the information. The definitions of the determinants were referred back to multiple times. For example the variable 'psychiatric problems' could be defined in many different ways, yet for interpretation it is very important that everyone knows what is exactly meant by this. Dating is considered important because of the current changes taking place in the neighborhood. Currently, an area compromising approximately 100 houses is being rebuilt, this does affect where people are (not) living. The participant asks multiple times for the researchers to interpret the information on the map and asks whether her interpretations of the information are correct. The response to the maps was immediately very positive and actively asks whether other variables can be shown too.

> *"We've only seen one now, but I'm curious tot he others as well. Could you just quickly turn this map on?"*
>
> *- Participant A01*

Social benefits

To provide more depth to the first meeting. Different categories for the law on social support (WMO) are presented. Also here, the participants reacts enthusiastically because the information is very relevant to the organization. The participant also noted the added value of combining the information from the 'WoonZorg wijzer' with the data sources from the municipality on WMO.

At the end of the meeting, the application of the data was discussed. Participant A01 saw an added value in going through the data with the 'team living environment', a department from the municipality that plays an active role in the financing of organization A. The ending of the meeting was again rushed, as the participant found out she was running late for another meeting.

Box 5.1.5: Notes from the research team

- Abstract data with a lot of detail can be difficult to interpret, and does not create a clear image in the participant's mind.
- Adding focus the contents of the meeting could help structure the meeting more.
- External factors such as stress can have an effect on the course of the meeting.
- For the dynamic of the meeting the presence of at least two members from an organization is important. As with the presence of two members, one can confirm or counter the story from the other.
- The physical position from the moderator in relation to the participant(s) can be important for the interaction with the participants. As the main researcher was directly beside the participant, both controlling ArcMap and communicating was difficult.
- Participants see value in combining data from different sources in order to get a more comprehensive image.

Extras and PGIS products

A few days after the meeting, the web link to the internet application of the 'WoonZorg wijzer' was sent to the participant along with a clarification of how information could be interpreted and where certain functions and buttons could be found. This way, the participant could have a look at the application by herself and with the other participant as well.

In January, a meeting was organized to determine how the participants wanted to use the gained information. During the meeting it became apparent that there was an opportunity to utilize the information to support an application for a long term funding budget with team living environment. Participants thought the information and maps could strengthen and validate the story from the organization. Unfortunately due to time constraints, this project has been pushed to a later moment in the future. A summary of the contents of both meetings were send by the end of the PGIS project (appendix VI).

5.1.3. Outcomes and evaluation

Experience

Participant A02 indicated that at first he was hesitant towards the PGIS meetings, yet after asking for clarification with participant A01 and the research team, he was able to start the first meeting 'blank'. Also, as he was introduced to a course on a similar subject just one day before the initial meeting,

which made him change his mind about the meetings. Participant A01 was initially enthusiastic, yet was placed in doubt by participant A02.

The goal for case A was to 'increase the understanding of the socio-demographic distributions of their neighborhood' and participants indicated that they were satisfied with the outcomes of the project. Although participant A01 says that there were few new insights from the data, besides the underrepresentation of elderly and the high number of single parent households, which were striking to her. The other information mainly confirmed already existing assumptions.

As participant A01 joined the second meeting alone, she was the only one to comment on the difference between the two meetings. She said that the second meeting made her more aware of the value and clarity of the first meeting, as she did not 'click' so much with the initial contents of the second meeting on the location analysis. Initially, both participants found it difficult to recall the most valuable contents of the meeting:

> *"I'm digging here, what have we all seen on that table? I can't recall. I just remember that we walked back and said to each other: this is so good and valuable to see".*
>
> *- Participant A02*

Participant A01 considered the 'WoonZorg wijzer' to be the most relevant topic of the meetings. Especially because it gives a clear indication on what social support is necessary in the neighborhood.

Relevance

Organization A did not specifically apply the information that they received during the meetings yet. However, there are plans for future applications. Such as using the maps so that they know specifically in what parts of the neighborhood or city they should distribute activity flyers. Also participant A01 stated that she thinks that due to the meetings they came to realize that merely focussing on the neighborhood is too narrow of a scope. Focussing on other low SES neighborhoods could be a good move since many characteristics of those neighborhoods are similar. Also in the financial meeting with 'team living environment', will be in part be supported with the data that were also shown during the meetings. Also she said that even though there is not a main focus on the data and the meetings at this point, that it is currently under the attention of the organization and that they expect to use the contents of it very soon. Participant A01 also saw good use for the information that was presented for other actors as well, for example for several other departments of the municipality that focus more on the social side of specific neighborhoods.

Data presentation and maptable

Even though there was a specific focus on the organization's neighborhood, the participants found it particularly insightful to be able to see the presentation of all the data for each neighborhood in

Arnhem, which allowed them to broaden their focus, easily make comparisons and see how their neighborhood was unique in its own way. A drawback for them was the fact that not all data were up-to-date, as for example the 'WoonZorg wijzer' only showed results up until 2016. Participant A01 referred to the maptable and ArcMap to be useful tools to make otherwise difficult to interpret data more insightful because it allowed her to see mutual relationships between figures.

Participant A01 was already familiar with 'Arnhem in Cijfers', yet experienced the sessions to be very different than accessing that information on her own. As she was mainly looking at tables and numbers, and not necessarily at the maps views. Also, she found it difficult to shift between different topics within the application. Because of the presentation with the maptable and ArcMap, the imaging was very different as it showed the data for example in graphs or colours.

Design of the meeting

The participants found it difficult to think of points for improvement on the spot, Yet later in the interview participant A01 suggested that the meeting could have been more 'comfortable' in the sense that focusing and standing for over an hour was very intensive after a long working day. She would have found it more enjoyable to be able to change position more frequently and to get more offers to drink. On the topic of timing, the consensus was that the meetings could have been shorter, yet that the pace was good. Participant A02 specifically indicated that the pacing was good and that he would have felt free to share it when he felt like things were going too slow or too fast. The two meetings were considered to be sufficient to get a better image of the socio-demographic distributions within the neighborhood. Participant A01 found it pleasant that we set aside some time to think about how their organization could utilize the information from the meetings for their own purpose. Both participants were satisfied with the working relationship with the research team, the role of all members was appreciated and participant A01 indicated that the main researcher played a particular important role in the time-management of the meeting. The presence of the two research team members during an important activity for the organization was highly valued.

5.2. Case B

5.2.1. Context

Description of organization B

This organization develops online media products with a social purpose. They develop these products together with interns and with people with a distance to the labour market that have affinity with online media. This organization offers a participatory space with a lot of support and guidance. One of their projects focuses on creating a platform for initiatives located within the city of Arnhem. They are currently exploring the possibilities of this platform. The organization consists of two fixed members, who are both self-employed and work in this organization on the side. The organization's work is in part subsidized and they receive money for each person that follows a trajectory (similar to organization A). The focus and working area of this initiative has shifted slightly over time, yet now the

activities and work of the organization are not necessarily linked to the neighborhood that they are located in, they are more focussed on the entire city of Arnhem.

Recruitment process

As with organization A, this organization was contacted by the social community enterprise expert that was already familiar with both members of the organization. During the introductory session it quickly became apparent that the PGIS project aim was going to be very different from the one of organization A. Organization B was not necessarily interested in exploring the demographics of the city, yet they wanted to find out how they could utilize GIS for one of their own projects. In the introduction session all participants were mainly brainstorming about possible applications of GIS technologies. It was proposed that the sessions could be aimed at helping organization B to use GIS technologies and necessary data resources, both members responded enthusiastically to this suggestion.

Box 5.2.1: Notes from the research team
- It is important to have an open attitude towards the possible contents of the PGIS sessions, as each organization has a slightly differing goal, the means of reaching those goals can be very different.

Case focus

As organization B wanted to explore the possibilities of GIS-technologies for its project for local initiatives, the PGIS project aim was **to familiarize them more with GIS technologies and with the available data at hand**. To do so, a first meeting was a workshop on how to retrieve data from different sources and how to display and analyze data in QGIS. The second meeting was aimed at dissecting their proposed geo-information applications for their platform and help brainstorm them about possible starting points, other applications and working procedures. Table 5.1.2 shows an overview of the attendance, date and aims of the meetings and interview.

Table 5.1.2: overview of data collection moments case B

Case ID	Participant ID	date	Meeting ID	Aim meeting
B	B01, B02, all Z	21-12-2018	B-P1	Familiarize with GIS technology, show how to extract data from different sources, show how to use QGIS
	B01, B02, all Z	01-02-2019	B-P2	Brainstorm about different approaches to incorporating GIS
	B01, B02, Z03	13-02-2019	B-I1	Evaluate project process and outcomes

5.2.2. Process & Content

Preparation first PGIS meeting

As the proposed content of this meeting was very different from the first meeting with organization A, the research team brainstormed about a suitable way to go about the meeting. The priorities were set as follows: Familiarize organization B with critical thinking about data presentation and conveying a message through data. Familiarize the organization with the different open data sources at hand. Lastly, show how data from different sources can be uploaded, edited and analysed in a free GIS software; QGIS. Multiple data experts within the municipality were consulted in order to further master the functionalities of the different data sources. The contents and time frame of the meeting were thoroughly prepared and summarized in a Word document. The program for the meeting was written down on the white board in the meeting room.

Box 5.2.2: Notes from the research team

- Taking into consideration the technical and software skills of the participants is critical for the preparation of the contents and pace of the meeting.

First PGIS meeting

The meeting was started at a high table so that the participants would not get distracted by the maptable at the other side of the room. There is a little bit of chatting before the meeting started. Again, first the contents of the meetings are cited and the functionality of the maptable and ArcMap were addressed. From the start, it was clear that the participants had more feeling with the technologies that are involved with ArcMap and the maptable.

Data interpretation

The meeting proceeded with the part on data interpretation, since the organization might want to work with visualized data themselves. The maps used for the data interpretation part were created for the purpose of the fist PGIS meeting with organization A. With these maps, the research team highlighted the importance of data interpretation, what does the data say, what does it not say, how is it collected and how and why can it be interpreted in a certain way. Maps were shown on subjects ranging from social cohesion, to age distribution, to the distributions of social benefits across the city. Even though the actual contents of the maps were not very applicable to organization B, they still responded enthusiastically because of the way the information was visualized. Also, they saw the added value that such maps could have on local initiatives to get a better overview on their target group. For example they mentioned that it could be useful for an initiative focusing on elderly, to check the age distributions in the initiative's working area.

"When you visualize it, you get an entirely different feeling with it".

- Participant B01

Data sources

Then, from four possible data sources, the functionalities were shown. It was shown how the online interface worked, what data was on there, and lastly how data could be extracted and saved from these sources. The pace of this part of the presentation was high, but both participants could still follow. Both participants were pleasantly surprised by the amount of data available on both the population demographics and the social domain. Also the possibilities for embedding the data was perceived as very useful, as this means that they don't have to store the data locally, but that they can obtain it from an external location.

QGIS

Lastly QGIS, a free GIS software was introduced. It was shown how exported data from two of the four data sources could be imported, edited and analysed in QGIS. As the software is quite complex, the participants were talked through step by step. Both seemed to be able to follow, yet they did express some concern considering using the programme by themselves. It was managed to go through all the parts of the presentation just before the end of the 1,5 hours, however the last part on QGIS could have used a little more time for elaboration.

Ending

At the end of the meeting the participants expressed that they did not know there were so many possibilities with data and maps and that they have an interest to start work with GIS on their own. A second meeting was set approximately one month later with the aim to discuss possible obstacles and opportunities the participants encountered when working with data and GIS.

Collaboration

The atmosphere during the meetings was good, which clearly showed by the fact that everyone shared thoughts and questions and that jokes were made throughout the meeting. In some instances, a certain undercurrent was noticeable. Both participants would make jokes about the municipality that had a certain negative connotation to them, e.g. about the fact that municipality employees were hardly present on Fridays. This could have to do with previous allegations with certain departments of the municipality, but were not thought to be directly related to this particular project.

> *Box 5.2.3: Notes from the research team*
> * As the meeting ended with a complex and slightly rushed topic, participants might have left the meeting insecure about their ability to work with QGIS.

Preparing second PGIS meeting

Approximately one week before the scheduled second meeting, organization B was called in order to ask for an elaboration on the possible obstacles and opportunities they encountered so that the contents of the second meeting could be prepared. A few days later, the organization sent an e-mail with topics that could possibly be addressed with GIS. These topics were talked through with the

research team. As the list of possibilities was still very generic, the research team was at first not sure to ask for clarification on the topics. It was decided not to, since it was up to the organization to express what they wanted to discuss during the second PGIS meeting.

The following five topics for GIS applications were sent in by organization B:

1. Showing the distribution of neighborhood newspapers on a map. Is the data available? When an initiative organizes something for a certain area, it is useful to know what local newspapers to write to.
2. Showing the working areas of initiatives that focus on loneliness amongst elderly in Arnhem. In order to get a good image on the working areas per theme, it would be nice to see per theme or target group initiatives are active. How do we go about this?
3. Can we develop a data scan? For example we want to show which variables are either low or high in a certain target group of an organization.
4. Is it possible to show with an historical map data to measure the impact of an initiative? For example, when an initiative focusing on loneliness has been active since two years, did the sense of loneliness in that working area decline?
5. We want to write a blog about how an initiative can work with data. What would be a good example?

Second PGIS meeting

This time, the meeting was set up around a table in the meeting room. First the participants were asked how they had tried working with QGIS and the provided data sources. They had tried, yet they expressed that working on it proved to be challenging and they found it difficult to make a start without a specific purpose in mind:

"It is just so much. I wanted to work on it, but I just don't know where to start. Such a huge amount… "

- Participant B01

They mentioned that they shared part of their experience, on being able to find for example age distributions across the city online on 'Arnhem in Cijfers', on social media and immediately got a positive response from one of their followers saying: 'ooh, is that possible?'. This demonstrated to them that others were interested in finding that kind of information online. They simply did not know it was available.

Five Topics

The five topics that the organization sent were talked through consecutively and can be found in the section on the preparations of the meeting. It quickly became apparent that the participants wanted input on where to start their work with GIS. The first topic was very concrete, and quite feasible in a short time frame with their skills and with the available data. The following topics became more difficult

for them to carry out because of the limitations of the data and because of the technical difficulties for implementing such systems onto a website. Nonetheless, the topics were jointly talked through with the steps that had to be taken in order to carry out the indicated topics, possible ways of working and possible barriers of such systems. During the meeting it became increasingly clear that for each of the topics that there are multiple possible ways to address these. On the one hand it's a opportunity, but since both participants are not very familiar with GIS, it was also perceived as complex to get started. The last topic was again very concrete and the research team proposed to share their findings of the relevance of data and maps for social community enterprises in order to enable the members from organization B to write a blog about it. As this was a very concrete and easily feasible topic, it was a conducive way to end the meeting on a positive note.

During the meeting it became apparent that participant B02 would familiarize himself with GIS. Also there would be one assigned intern who will start working on the smaller activities that were involved with the addressed topics. The intern was not yet informed on this matter.

<u>Ending</u>
The meeting finished well on time and ended with setting a date for a follow-up meeting on the progressions of organization B on working with GIS.

<u>Collaboration</u>
Soon in the meeting, it became apparent that the organization really was looking for a place to start applying GIS to their ongoing project for initiatives. As the contents of the meetings were very much focused on GIS and the technical aspects of their questions. Therefore the GIS expert could contribute relatively more to the meeting than in the social community enterprise expert. Otherwise, all participants, including the other members of the research team, contributed equally to the meeting. The general atmosphere was calmer than the previous meeting, which could possibly be explained due to the more passive design of the meeting. Nonetheless, all participants were still very interested and attentive. All present company seemed relaxed and again there were a lot of jokes made during the meeting.

Box 5.2.4: Notes from the research team
- The contribution of the research team members could differ slightly, dependent on the set goals and topics discussed during the meeting.
- Ending the meeting with a concrete topic may cause the meeting to end on a positive note.

Extra and PGIS products
Following from the first PGIS meeting, a summary and instruction guide was sent to the participants to help them get started with GIS themselves. Also, after the second PGIS meeting, a follow-up meeting was set in May. Then, they will to go about their proceedings and questions regarding applying GIS for their initiative with the other members of the research team outside the scope of this research.

5.2.3. Outcomes and evaluation

Experience

Participant B01 shared that she was surprised with the amount of possibilities of GIS and with the complexity of GIS. Also, both participants were unknown with the already existing possibilities and the user-friendlyness of 'Arnhem in Cijfers'. Participant B01 said that she initially found an application for GIS for their project for local initiatives and that she mainly joined the project out of curiosity and started with a blank mindset.

The goal of the meetings with organization B was to familiarize them with GIS technologies and the available data at hand so that they could start integrate GIS on the website for their project for local initiatives. Both indicated that they feel like, due to the course of the meetings, they are able to make a proper start. They initially plan on including a map that shows the location and reach of all local news papers in Arnhem and have concrete steps in mind to make a start. From there onwards, they want to work on other, more complex GIS options and they realize that it is going to be a self-learning long-term project. As, up to this point, their questions were not more specific, they indicated that the research team could not have further supported them.

Relevance

Especially participant B02 has been looking into GIS and more particularly the contents of the initial meeting, yet he still found it very complex to work with the software himself. Both discussed the opportunity of letting one of their interns work with GIS, however they have not yet introduced them to it. To this point, no concrete steps were taken to apply GIS in their ongoing project for local initiatives. The organization did share the weblink for 'Arnhem in Cijfers' on their website for local intiatives. Also organization B plans to write a blogpost to make other local initiatives more aware of the user friendly opportunities to find data about their and the other neighborhoods in Arnhem.

Participant B01 indicated that they saw a good opporutunity for the available data, and GIS for other initiatives as it would allow them to look more abstractively to their working area and zoom out of their daily experiences. Especially the inclusion of variables on loneliness and for example dementia were considered new and very applicable for local initiatives. The participants agreed that since a large part of the available data is collected for the purpose of the municipality can be considered as a limitation. This means that certain data are not conclusive. For example, they talked about the municipality's tree register, where solely municipality owned trees were registered and published.

Data presentation and maptable

According to participant B01, the maptable contributed to the atmosphere in the meetings because of its set up. All present company were standing around the table, which made the meeting seem like a joint contribution, instead of just the municipality sending information to organization B. Both participants saw more opportunities for the maptable in terms of the touch screen, using it with multiple

people, or being able to select and drop and drag certain features accross the screen. Despite the points of improvement on the subject of the maptable, the participants still agreed that it positively contributed to the meeting.

"It is just really an horizontal screen, no more than that".

- Participant B02

All contents of the meeting were perceived as being useful and applicable to the organization according to participant B01. Both participants felt that the contents of the meetings were properly supported with detailed e-mails, summaries, and instructions.

Design of the meeting

Both participants discussed that they appreciated the sense of equality during the project, the decisions were made in consultation, and the participants felt like they had to offer something to the municipality as well. Also the way the municipality was facilitating the social community enterprises was perceived as very good.

About the presence of the social community enterprise expert, participant B01 said that she appreciated that he introduced them into the PGIS project, yet that 'he was just sitting there' and that he could not connect properly with the subject. Which was perceived to some extent as strange. Participant B02 addressed the particular value of the presence of the GIS expert as he knows a lot about GIS and could support them if necessary:

"He knows what paths to take to make it work. Because for us, its just not doable. At least now we have another contact person at the Municipality that we can contact with map related questions"

- Participant B02

Participant B02 noted that he felt that the time during the meetings passed very quickly, yet the pace could have been a little bit because of his technical knowledge. The amount of time spend per meeting was deemed sufficient. Participant B01 agreed and added that she felt that the duration was good considering the large amount of information which was presented. She said that they still would have enjoyed themselves in case of more meetings. Only the duration between the meetings could have been further apart so that they could work on GIS themselves more and that the addressed points could be more specific. For a possible future meeting, participant B01 suggests that it would be advisable to add a clear goal and focus to the meeting.

"I think that when we just had the meeting we thought like 'yes!', here we can work with. But then there are so many other things you are simultaneously working on. You really need a goal to work towards for the next meeting".

The meeting room was perceived as fine, yet according to participant B01 it could have been more 'inspiring' with for example the ability to pin things to the wall, physical maps present, or with project outputs from others present so that one can get inspired with the possibilities of maps and data. In the current situation, the participants only knew what the other possibilities with GIS and the maptable were through conversations with the research team.

5.3. Case C

5.3.1. Context

Description of organization C

Organization C is an overarching organization that provides a common space for five socially oriented organizations. Together they organize a combination of activities ranging from coffee drinks, games, international nights and workshops for people from the two neighborhoods that are close to the location of the organization. Their main target group is aged 30-60 years. Their activities are intended for the neighborhood residents and are meant to connect people in an easy going living room setting. Often, the activities have a cultural component to them, such as arts, theatre or dance.

The neighborhood in which the organization is located, is very characteristic and known for its city scape. The houses are built in the period 1920-1930, and are all low-rise. Many homes, approximately 82%, are owned by social housing corporations. Many facilities and buildings have fallen into disrepair, and there are quite some vacant buildings. Over the last couple of years, the social housing corporations have been selling off homes to private buyers. As stated by participant C01, the neighborhood knows two very distinctive groups, the 'old inhabitants', being the residents that have lived in that neighborhood for a long time, who often did not receive any form of higher education and of whose kids often stay in that neighborhood as well. Generally, the social cohesion amongst this group is perceived as being relatively high. Also, there are the 'new inhabitants'. These are the residents that recently bought a relatively cheap house in the neighborhood who often have or are planning to have children. Lastly the organization identified those people who have been forced to move from their social housing from another neighborhood in the city (personal communication 14-11-2018). The majority, approximately 75% of the neighborhood is Dutch. The unemployment rate in the neighborhood is high (21% in 2017), and many people receive some form of social benefit. Following from the bi-annual survey on quality of life and safety, residents indicate being dissatisfied with the liveability of the neighborhood, yet are satisfied with its facilities. The working area of the organization is not strictly bound to the neighborhood and many participants come from an adjacent neighborhood. In general, the adjacent neighborhood is very different in terms of both houses and population characteristics. The majority of the homes is privately owned and over the last couple of year a lot of high-end houses have been built. Only the homes directly facing the borders of the neighborhood are owned by social housing corporations. Generally, the population is more satisfied on the liveability and

safety of the neighborhood and is characterized by high incomes and many couples with or without children.

Recruitment process

The recruitment process for the case was similar to the recruitment process of case A and B. During the introductory meeting, only participant C01 was present. She noted that certain population groups within the neighborhood were increasingly growing apart from each other. She felt the organization could play a role in setting a common ground for both groups and create a space to connect them. To be able to address both groups, it was considered beneficial to be able to localize them within the neighborhoods.

Case focus

For this PGIS project, the focus was on **distinguishing and localizing two main groups within the neighborhoods** so that organization C could more easily target to these specific groups. To do so, the PGIS meetings were similarly structured to the ones in case A. The first meeting aimed towards familiarizing the organization with GIS and the possibilities. The second meeting offering a more in depth analysis. Table 5.1.3 shows an overview of the attendance, date and aims of the meetings and interview.

Table 5.1.2: overview of data collection moments case C

Case ID	Participant ID	date	Meeting ID	Aim meeting
C	C01, C02, all Z	11-01-2019	C-P1	Familiarize with GIS technology, familiarize with neighborhood data, setting course for 2nd meeting
	C01, C02, all Z	07-02-2019	C-P2	In-depth analysis and supplement with other variables
	C01, C02, Z03	11-02-2018	C-I1	Evaluate project process and outcomes

5.3.2. Process & Content

Preparing first PGIS meeting

The aim for the first meeting was set to familiarize the organization with GIS and population data in order to gain an increased focus for an analysis in the second meeting. As maps on generic population variables were already made in preparation for the meetings with organization A, some of them could be reused. Other variables on themes that seemed applicable to the organization were again retrieved from 'Arnhem in Cijfers'. For the first time, 'Arnhem in Cijfers' will also directly be accessed during the meeting to be able to show certain changes in time or in migration flows that would have been difficult to show in ArcMap. The general workflow from the second PGIS meeting with organization A was used again. Yet this time the meeting did not start with showing all population demographics consecutively, but they were shown throughout the presentation when it seemed like

the demographic data could clarify another variable. Also, variables were more carefully chosen in order to set focus to the presentation. The order of the shown variables within a theme (for example employment) was strictly set and important, as they together built up more of a story.

The main researcher would leave the selection of the order of the topics to be up to the organization, so that they had more say on the contents of the meeting. Previously observed points such as the importance of an introduction away from the maptable and the main researcher's position relative to the participants' position at the maptable were again taken into account.

First PGIS meeting

Within the first minutes at the maptable, when still introducing the maptable and ArcMap, participant C01 expresses that she wants the view to be focused merely on their neighborhoods. When zooming in, both participants directly located and recognized the organization's facility on the areal picture which lead to a sense of enthusiasm.

Living

The first topic was 'living', which comprises variables such as in- and outmigration and social housing corporation possessions. When elaborating on the first definition of the shown variable, participant C01 immediately commented on the definition of the neighborhood. As she felt that her definition (or boundaries) of the neighborhood did not correspond with the municipality's definition of the neighborhood. As it is important to know where the boundaries of a neighborhood lie, when making decisions about it, we clarified this specifically. 'Arnhem in Cijfers' was directly accessed to show the migration flows, which worked well and did not interfere with the workflow from the meeting. The topic of living provoked a lot of response amongst the participants, as throughout this topic many stories, assumptions and possible explanations for certain figures were shared. Also, this topic triggered the participants to want to know more:

"This makes you very curious".

- Participant C02

"Yes, you want to know who and why".

- Participant C01

As the neighborhood has a very strong and persistent image, there were many assumptions to check. The data shown during the PGIS meetings allowed participants to more objectively reflect upon these assumptions. For example, one of these assumption was that many people from other low SES neighborhoods moved to their neighborhood because of the available social housing. Data on migration flows allowed for more nuance in these assumptions.

After the topic on living, participants were free to choose from the other topics that were selected for the presentation. On the one hand it was appreciated by the participants that they had a say in the contents of the meeting, yet on the other hand it was also perceived as difficult to choose:

"I find them all so interesting, I just can't choose".

- Participant C01

Demographics
Participant C01 indicated an interest in the age distribution of the neighborhoods, especially to be able to check the presence of elderly within the neighborhood. As expected, there were relatively more elderly located in the adjacent neighborhood. Which they thought could be partially be explained by the presence of nursing homes located there. Then, other generic topics such as household distributions and income distributions naturally followed. Especially the income distribution affirmed their assumptions. The amount of single person households in the neighborhood was perceived as being remarkable and participant C02 saw possibilities for addressing this group with certain activities. Other initiatives were mentioned as they did not focus on this group either. The presentation went back and forth between different variables to check assumptions on the age of single person households. One of the members from the research team proposed to focus on that point during the next presentation. Which was positively agreed upon by both participants. The attention of all participants focused more towards the opportunities of certain target groups, such as single person households, specific activities tailored to them and what role other initiatives play for these target groups.

Participants replied very avidly on the maps that showed the distribution of the social housing corporation ownership. Most striking to them was the fact that almost all corporations own several blocks of houses instead of just one or two corporations being active in the neighborhoods. When zooming in on the owned properties of the corporation, the phenomena of them selling of houses or entire blocks was clearly visible. Both participants recognized areas where volunteers or friends were living. Participant C01 immediately asked for a copy of the map to show to the volunteers at the organization.

Throughout the presentation, participant C02 mentioned multiple times that she finds the presentation to be mainly confirming and that she does not necessarily see a lot of new things:

"So far, I haven't seen anything that are very different than expected."

- Participant C01

As the variables that go together under one topic are naturally more successive, the workflow from this presentation is better than the PGIS presentations with organization A. At the end of the presentation, the decision was made not to broach a new topic. Instead, a more self-contained determinant was

discussed. The other topic could be discussed in its entirety for the next meeting. Therefore there was enough time to calmly discuss the contents of the next meeting, which were set on two of the remaining prepared topics on quality of life and safety, social benefits and an analysis of single person households.

<u>Ending</u>
When finishing up the meeting there were a few topics left to discuss, yet these were moved to the next meeting. Also, other subjects that were of interest to the organization were identified such as sports and the 'GelrePas' and an analysis of the single person households.

Collaboration

During the meeting one participant expressed multiple discomforts during the meeting. For example the screen was not clearly visible and was flickering, there was a lack of fresh air and the maptable was positioned too high for her to stand and look comfortably. The atmosphere of the meeting is friendly, yet the participants are not nearly as enthusiastic or positive about the presentation as the members from the other organizations have been up to this point. Rather, they were more critical about the data collection methods and the interpretations following from these data.

Box 5.3.1: Notes from the research team
- 'Arnhem in Cijfers' can easily be incorporated in meetings and can for example be used easily to compare certain variables over the course of time.
- The definition of neighborhood borders is very important, since it has a strong impact on the interpretation of the maps. Defining the neighborhood borders at the start of the meeting could get the different participants on the same page.

Preparing second PGIS meeting

The analysis on the single person households was thought to be the most time-consuming part of the presentation. Therefore this was the subject to be discussed first. Data on residents of all neighborhoods in Arnhem were extracted from the BRP. Single households were selected per 10-year age groups, for which a pivot table was made in order to be able to make a graphical analysis in ArcMap. A similar process was gone through to make a distribution on the marital status of the single person households. Then these graphs were combined with the grids that were created for the purpose of the second PGIS meeting with organization A. Lastly, the topics on quality of life and safety and social benefits were slightly revised to fit the purpose of the meeting better. One day before the initial meeting date, the organization asked to postpone the meeting by a week.

Second PGIS meeting

Prior to the start of the meeting, one of the participants expressed that she was not feeling too well and that she might be less attentive as during the previous meeting. This did not show throughout the

presentation, except for one brief moment where she seemed to get emotional because of some bad news. Also participant C01 expressed that a paper version that she felt like a paper version of the presentation would be good to properly process the vast amount of information presented. Also she stated it would be easier to act upon certain things when the numbers would be presented on paper.

<u>Single person household analysis</u>

A day before the meeting, an article was published in a local newspaper about the fact that Arnhem is one of the cities where mostly single-person household reside. This was a good introduction to the analysis that was prepared for the meeting. To prevent confusion, the way the data on single person households was collected and presented was more thoroughly discussed than in the previous meeting with organization A. Both participants instantly seemed to grasp the content of the maps. As the maps were again structured by 100x100m and 50x50m grids, it allowed a more detailed view on the location of single person households. Specific locations and the importance of the type of housing to predict the presence of single person households were again identified by the participants:

*"These are family homes, so there are very few single person households. That
makes sense. The same goes for this area. In the apartment buildings there are
many single person households again".*
- Participant C01

Generally, both participants were very positive towards the data. A critical note towards the data was the fact that there is not just one group of single person households, as there are many sub-groups with their own differences. This was a fluent transition to the age category analysis of the single person households. Among the single person households, the most common age groups were between 30 – 60 years, which they noted was also their target group. Again, a few critical questions were asked about the visualization of the different age groups. Then the marital status from the single person households was shown. This led to a less enthusiastic response with one of the participants saying:

*"I thought the last map with single person households and age categories was
more interesting. With this one I only think: 'well, yes"*

- Participant C01

*"It is something that you take with you in the back of your mind. Many are simply
not married".*

- Participant C02

Also, critical side notes were made on what exactly entailed for example 'divorced', would that only be in case of marriage, or also in case of a registered partnership. Still, participants both started brainstorming about certain activities for single person households, such as 'dealing with grief' or activities focused on meeting new people.

<u>Social benefits and 'GelrePas'</u>
Figures on income and social benefits triggered a conversation about the 'GelrePas', a card for persons from low-income households which they can use to get a discount on both cultural and sports activities. It started a conversation about how they work with this 'GelrePas' to give people with a lower income discounts. Who exactly gets this card and how one should apply for one. Combining the figures on the percentage of people that qualified for this card and the amount of people that actually owned a 'GelrePas' indicated that there is still a number of people that could apply for one. This formed the cause of thinking about an activity to focus on the promotion and the terms and conditions of the 'GelrePas'.

Figures on the distribution of the different forms of social benefits in the neighborhood triggered a conversation about money, incapacitation and drink and drug abuse and the effect it has on the children that live in the neighborhood. One of the members of the research team started the conversation about the unique characteristics of the neighborhood and how that could shape the focus of an organization. For example how organization A has a strong focus on emancipating through work because of the neighborhood's high unemployment rate. We started talking about what organization C's assets and where they tend to put their focus on with their activities. Immediately they started brainstorming their assets: nutrition, sports, meaningfulness and making the cultural activities accessible to all. They mentioned that the figures of the presentation made it easier to make an argument for certain activities.

<u>Quality of life and safety</u>
This was the topic left from the previous meeting and it was quickly talked through. Variables for example on satisfaction of the residents regarding the neighborhood, social cohesion and the amount of support received from the community were included. Both participants were positively surprised with this data being available, again they were critical about the data collection methods. However, the maps represented most of the assumptions on the neighborhood.

<u>Additional</u>
Lastly the presentation included some information on the amount of people active as volunteers and the amount of people active in sports in the neighborhood. Their neighborhood especially stood out because of the low participating sports rate, which again relates to a theme they want to increase focus on in the future. As this is a topic they both feel passionate about, this was a positive ending of the meeting.

<u>Ending</u>
Participant C02 made a joke by saying he wanted an annual update on the figures. At the end of the meeting they said that it had made them think critically about their activities and focus. They continued talking about this later with one of the research team members.

5.3.3. Outcomes and evaluation

Experience

The mindset before joining in the PGIS sessions of both participants was open, participant C01 said she was curious, yet 'blank' before stepping into the first meeting. The second meeting she did know what to expect. Participant C02 confirmed this, yet he added that he expected to be presented with a lot of numbers and information. As both participants said they were familiar with 'Arnhem in Cijfers', participant C01 to a lesser extent than participant C02, they had a notion of what to expect as well.

Despite the fact that the research team did not manage to fulfill the pre-set goal of the case: 'distinguishing and localizing two main groups within the neighborhoods', the participants still indicated that they were happy with the outcomes of the sessions and that it was good for now. They expressed that they would need more time to look into what they really want to know about. Both participants were positively surprised with what sorts of information could be extracted from the data sources of the municipality. What they mainly drew from the presentation was confirmation of their own assumptions and not necessarily a lot of new information. As both participants are already familiar with the neighborhood because they are both living and or working (close to) the neighborhood for several years. Lastly the participants enjoyed the visuals by which the data were presented to them as it made it very easy to interpret the information.

> *"The assumptions were there, but those are now confirmed. Its more definite now,*
> *it really is like that"*
>
> *- Participant C02*

The second meeting was perceived to be more interesting content wise. Mainly because of the added depth, due to the single person household analysis, and on the other hand because of the focus on the survey on quality of life and safety. Other topics that seemed to be of most relevance were age distribution and income distribution. Participant C01 thought the information on migration background of the residents was missing from the presentation. To be able to process the information better, the participants indicated that they were keen on receiving a summary of the meetings, thereby allowing them to go through the information one more time in their own pace.

Relevance

The participants found it difficult to pinpoint how and to what extent they can translate the information they gained to a specific purpose, yet it was clearly in the back of their minds. Also, in the e-mail correspondence after finishing up the project, participant C01 expressed that due to time constraints, they will not 'dive into the data' themselves anytime soon. Contrastingly, participant C02 does see an application to share the information in one of the neighborhood committees of the neighborhood, as he states that it would be fun for them too to look into the available data on the survey on quality of life and safety. Also, they mentioned that due to the conversations that took place during the PGIS meetings that they were going to look into the development of the collaboration between the different organizations, that they are going to target the single person households more, that they might increase the focus of their activities on moving and sports and lastly that they want more focus and insights on the 'GelrePas'. Both do not exclude the possibility of doing similar PGIS meetings in the future, but then it would be good to have a more targeted question. Participant C02 also added that he had interest to play with the available information himself.

Otherwise, as stated before the meetings confirmed most of their assumptions on the neighborhood. Only the fact that the number of single person household was relatively high, was for one of the participants very surprising. Generally, they found the meetings to increase their overall insight, and that it can remove your blinkers when it comes down to knowledge on your neighborhood. Lastly, it might make you attentive of things in the neighborhood that you would have otherwise overlooked.

Data presentation & Maptable

Participant C01 expressed that she desired more detailed information on certain variables, focused on a smaller area than neighborhoods and districts. She expressed that this would possibly reveal the large contrast within smaller areas. As for example the one side of the street could be a 'good area' while as the other side of the street could be a 'bad area'. She expressed to want to know this to get more grip on certain situations that are happening within the neighborhood.
Both participants were enthusiastic about the way the information was presented to them. Especially participant C02 found it convenient to see the results about the other neighborhoods as well. The way ArcMap freely allowed to zoom in and out, turn certain layers on or off, overlap layers, and to show satellite images, and to extract the exact numbers on a certain neighborhood made figures very insightful. The added value of the map views was that it allowed them to interpret a lot of information at a glance. They expressed they found the maptable and ArcMap to be 'spectator-friendly', yet they were happy they did not have to work with it themselves.

> *"I find it a very good system I should say. It is nice how you can turn maps on or off, move them, enlarge them, also Google Earth… That makes it very insightful".*
>
> *- Participant C01*

Design of the meeting

In general, the participants were happy with the way the meetings were designed. The number of people present worked for them, as too much participants from the organization could make the meetings chaotic and, due to busy schedules, difficult to organize. Fewer people in the meetings would also be considered as being less pleasant. The atmosphere and working relationship with the research team was also considered to be pleasant and open. There was plenty of space to discuss anything. The contribution of the main researcher and the expert on social community enterprises was considered to be more, and considered the GIS expert as a 'back-up'. Participant C01 noted, she considered it to be difficult to focus on three people from the municipality, rather than two.

On the topic of timing, the opinion of the participants were slightly different. Participant C01 found the time scheduled per meeting to be sufficient and stated that a longer meeting would require too much focus and concentration. Participant C02 initially found the meetings too short and would have liked to spend more time per meeting, as maybe two hours per meeting would have made each meeting a little calmer. He also admitted that limiting the meeting to a certain time frame was good, because then there would be enough material still to discuss during a follow-up meeting. The pace of the meetings was considered as fine. Lastly, both participants found the number of meetings to be sufficient and said they would only want a third or next meeting when they would have a more targeted question, but for now it was all right. .

The meeting room was not considered as being either obstructive or constructive for the purpose of the meeting. Especially participant C01 suggested that the indoor climate of the meeting room could be improved on things such as lighting, fresh air and greenery.
To improve overall outcomes of such meetings, the participants suggested the research team to give 'homework' to give homework to the organization after the first PGIS meeting. Where the organization is asked to sit down after the first meeting and think about what topics they would want to address during the second meeting. In this way, the organization would enter the second meeting more focused on the needs of the organization.

6. Discussion

In this chapter, the results of the different cases will be interpreted and discussed in relation to each other, the current body of literature and the theoretical framework. Next, the strengths and weaknesses will addressed and the chapter concludes with the suggestions for future research.

With the interpretation of the results, the PGIS analysis framework of Pozzebon, Tello Rozas & Delgado (2015) was taken into account (figure 6.1). This framework implies that the 'content' dimension, which in this study are considered to be the consequences and relevance of the PGIS project, are the result of an interaction of both context (institutional, interactional and tools) and process (interaction and how technology is implemented and used). When looking at the consequences it is important to take the interaction between factors into account.
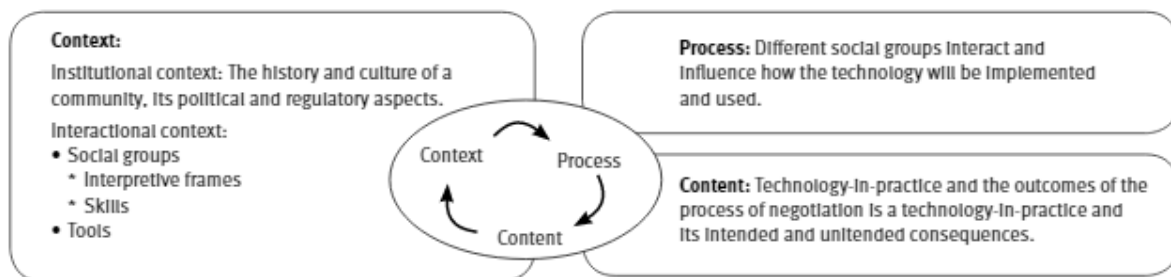

Context:
Institutional context: The history and culture of a community, its political and regulatory aspects.
Interactional context:
- Social groups
  - Interpretive frames
  - Skills
- Tools

Process: Different social groups interact and influence how the technology will be implemented and used.

Content: Technology-in-practice and the outcomes of the process of negotiation is a technology-in-practice and its intended and unitended consequences.

Context → Process → Content

Figure 6.1: Multi-level framework for PGIS analyis (Pozzebon, Tello Rozas & Delgado, 2015)

6.1. Main findings

As the research questions of this research were three-fold, this section is sorted per question:
1) On the perceived relevance of PGIS in the context of social community enterprises in Arnhem
2) On the factors that positively or negatively influence the process of the PGIS projects
3) On the relation between PGIS and empowerment.

6.1.1 Perceived relevance of PGIS

To start, all three individual PGIS cases are perceived as successful. All participants found the meetings to be relevant and were satisfied with the results. Especially one participant strongly doubted the relevance of the PGIS project for their organization, but changed his mind already during the first session. It is important to note that the maps shown during the meeting could only answer certain questions. For example on the single household distribution across a neighborhood, will only answer the question 'where?' and 'how much?', and not necessarily 'why does this happen?' It became very clear that the participants and the research team had to brainstorm about probable explanations for certain phenomena and that this triggered a sense or curiosity amongst the participants.

Following from the interviews, the social community enterprises indicate that they have valued the PGIS meetings, yet there is not a priority to act upon the ideas they came up with during the meetings. To a certain extent, the contents and the experience have been incorporated in back of the minds of

the social community enterprise member and things such as target groups and the focus of activities were reconsidered in case of organization A and C.

The results from this study show that the three social community enterprises primarily see **strategic purposes** for PGIS projects as described by Craig & Elwood (1998). They saw it as a method to identify certain target groups, and to assess specific needs in the neighborhood. The organizations indicate that due to the meetings, they have a more established image of the neighborhood. This is mainly because of the confirmation of already existing assumptions, and to a lesser extent because they obtained new information. Organization C mentioned the value of taking the time to jointly look at the neighborhood data as a means of zooming out of the daily routine. Especially the social community enterprise expert played an important role in fueling the conversation about (re)considering each organization's purpose, target group and activities and relating the shown information specifically to the organization (A & C) itself. These contributions were valued by the participants.

Organizational purposes are mainly related to localizing possible target groups. For both organization A and B, it became very apparent that they were interested in localizing for example single person households as a target group so that they can organize their flyer distribution activities more targeted. On the other hand, organizational purposes also include getting attention and assistance from for example the government. This was very apparent in case A, who after the PGIS project became confident that their future strategy plans could be properly substantiated with GIS. They want to substantiate certain themes with corresponding data so that they have a more legitimate position towards the 'team living environment' department of the municipality, that in part funds the organization. As the activities or trajectories that social community enterprises organize are usually the core activities and source of a revenue stream, it is expected that this might be considered as one of the most valuable purposes.

To a certain extent all three organizations also saw **administrative purposes** for GIS, although these are unlikely be implemented by organization A and C, since obtaining the information for administrative maps was considered to be time consuming and the priority is fairly low. Organization A briefly talked about mapping the countries of origin and the current living location of the people that take a trajectory with their organization, organization B addressed the desire to map where the living location of the volunteers of the organizations. These maps would have included important information for staff members or volunteers to have at hand. The administrative purposes of GIS for organization B were clearer from the beginning onwards as they want to map the working area of the local news papers in Arnhem, which they are currently trying to make work.

Only in case B, the **tactical purpose** has become clearly visible. This can in part be explained because organization A and C did not have a specific action in mind to tactically plan. It is probable that when an organization specifically wants GIS to support the more tactical aspects of activity, then the tactical purpose would have come out stronger. This shows for organization B, that with help of the

PGIS meetings planned the applications of GIS that they want to integrate. Subsequently, you can see that for organization B the other three main purposes are less applicable.

6.1.2. Process of implementing PGIS projects

The codes and interpretations made on the process were structured following from the five groups from the project management framework of Chan et al. (2004): project-related factors, project management actions, external environment, human-related factors, and project procedures. It is important to note that elements from the different groups are very interrelated and co-occur. Different element within and across groups could influence each other, therefore it is hard to say whether one element individually contributes to the success of a project or that that element collectively contributes with the other elements.

Project-related factors

Considering the **focus and aim** of a PGIS project is of high importance. It was observed that in the meetings that had a clear aim, helped to prepare and structure the contents and the flow of a PGIS meeting. This corresponds with the findings of Sawicki and Craig (1996) that found that community groups are most benefited by minimal and context specific information. Also, the aim should be feasible within the set time frame and with the resources available. With organization B, the set aim was clear, yet with organization A and C, the aim was more widely interpretable which in made it challenging to select very specific contents. Also, during the course of preparing the meetings it became clear that the aim of organization C was difficult to achieve with the available time and resources at hand.

More **complex** maps were generally more difficult for participants to interpret. The research team played an important role in clarifying for example the methodologies behind the different data. This often caused the topic of discussion to lead away from the contents of maps, towards the more methodological discussions. Complex maps were characterized by information density, multiple attributes or data sets, and more complex or abstract methodologies to collect the data (such as surveys), and the conditions that come with these methodologies.

Participants within and across cases were not unanimous about the **size of the project** in the amount of meetings and the amount of time spent per meeting. Some found the meetings to be too short, and would have liked to address even more topics per meeting, others found the meetings too long because of the amount of focus and concentration that were necessary for the meetings. In all cases, the participants were open to a follow-up, yet then they all wanted to have a more focused aim in mind.

The **maptable as a tool** was considered by all participants to be contributive to the process of the meetings. It is in part was considered to be 'spectator-friendly' and participants indicated that the maptable contributed to the collaborative nature of the meetings and the participants used images

from the maptable to structure their arguments. It was seen as especially valuable that with ArcMap and the maptable it was easy to shift between different maps, and to overlay the maps for example with satellite images.

Project management factors

Structuring the project beforehand in collaboration with the participants helped to provide clarity to both the research team and the participants. A project briefing was additionally underlined the set agreements. By the research team it was noted that saving some time for introducing the maptable and the contents of the meeting helped with the clarity and structure of each meeting. Additionally, saving some minutes at the end of each meeting to reflect upon the meeting and to set the target for a next meeting, helped to structure the next meeting. The flexibility during the course of the meetings was highly appreciated by the participants.

The PGIS meetings were thoroughly **planned and prepared.** As the research team briefly reviewed each PGIS meeting, it came forward that the planning and preparing of the meetings contributed to the structure, clarity and pace of the meeting. The research team knew the technical details of the contents and made sure the contents were appropriate.

The **moderating and monitoring** role that some of the research team members took on was considered to be contributive to the meetings. As the maps during the meetings usually provoked a conversation or discussion, it was noted by some participants that it was important that one person of the research team kept track of the timing and proceedings of the meetings. Otherwise discussions would go off-topic and the meeting would run short in time. Also, it was considered to be valuable that the research team actively initiated to relate the data shown to the context of the social community enterprise.

External environment

In case of the second meeting with organization A, it was clearly visible that **external stressors** from participant A01 combined with other factors did have an effect on the proceedings of the meeting. The participant seemed rushed and less focused than in the previous meeting. In a meeting with organization C, the research team utilized an external factor (a news paper article that related to the contents of the meeting) in favour of the meeting.

The **physical environment** was addressed by some participants during the meetings and in the interviews, regarding the air quality and the height of the maptable and the light reflections on the screen. They mentioned that the physical environment of the meeting room could be improved, but that it was not considered as being very important. In all probability there are more external factors that played a role in the proceedings of the meetings, such as the political or financial context of the social community enterprises.

Also the **previous experiences in the working relationship** with the municipality of Arnhem and the social community enterprises played a role. To an extent this could be noticed from certain comments from the participants during and outside the meetings. However, too few things could be observed to make a strong statement about it.

Human related factors

The **role of the different research team members** took on was perceived as contributive. The combination of the different expertises were valuable to the meetings. The attendance of the different research team members was differently valued for each case. This could again in part be attributed to the nature of each of the cases. This is an important aspect to take into consideration for future PGIS meetings. However, all research team members were found to play a facilitating role, clarifying certain data and adding to the conversation on a certain subject.

The open **atmosphere** during the meetings was appreciated and addressed by all participants. Again it is not merely one action that contributed to the atmosphere of the meetings. Yet it is possible that it helped that the research team members stressed that all concerns could be addressed in the meetings (for example showing a different map), that the participants were already familiar with the social community enterprise expert, that jokes were made and there was no noticeable hierarcy during the meetings.

Elwood and Leitner (1998) made an inventarisation of the most **common information needs** of community groups, being: housing and property information, population data, transportation, physical/social environment and economic development. All social community enterprises showed large interest in population data, such as income and age distributions, and social population data on topics such as perceived social cohesion or mobility. Based on the focus of the enterprise, other data were also of interest to them. To a lesser extent the organizations were interested in transportation and the physical environment, which again can be fully explained by the focus of the organizations. Especially being able to combine different sorts of information, easily shift between them, and being able to compare data across neighborhoods were considered as contributive. Lastly, all participants were keen on obtaining a summary of the meetings on paper, as they indicated that the contents of the meetings were a lot to remember. Also, this would allow them to go through the contents of the meetings at an easier pace and contribute to a sense of ownership of the PGIS products (Mccall & Dunn, 2004).

6.1.3. PGIS and the empowerment process

As there is currently no consensus in the literate on the methods to determine to what extent and how entire communities or individual PGIS participants could be empowered via PGIS, a combination of literature was to explore the relationship between the PGIS interventions and the empowerment of the social community enterprise participants.

Elwood (2002) identifies three forms of empowerment, being: distributive change, procedural change and capacity change. In this study we found no evidence for **distributive change**. Distributive change refers to a redistribution of power and could entail that an organization or members from an organization gained more political influence for instance.

Then there is **procedural change**, which refers to a change in how decisions are made and where priorities lie. The PGIS meetings did have a certain effect on the target groups of organization A and C. For organization A, they indicated that they realize that there mere focus on activities for the neighborhood is too narrow and they intend to organize future activities for other low SES neighborhoods as well. Organization C indicated that because of the PGIS meetings, they realize there is a large number of single person households in their neighborhood, because of this they would like to focus more of their activities on them. Also they indicated that the meetings have triggered the conversation within the organization to focus more on sports activities. Participant C02 indicated that he would like to make more use out of 'Arnhem in Cijfers' as a GIS tool. However this does not directly indicate any procedural changes. Also, one should be careful on drawing any conclusions of any procedural changes from one interview. With organization B, no procedural change could be observed.

Capacity-building change refers to a change in access to new information and developing skills that could foster their organization and confidence. This change was most prevalent in all three organizations. All participants were unknown to the amounts and kinds of data that were freely available to them. Especially the user-friendly way this information can be visualized online with 'Arnhem in Cijfers' can be a great new asset for some participant. The research team focused on critical data interpretation efforts during the meeting, yet none of the organizations indicated that they look differently at data provided to them. In case of organization A and C, they did stress that the meetings played an important role in the way they saw their neighborhood, as their assumptions were supported with data. Some participants indicated to feel more confident about that the things they are working on are relevant in their neighborhood. As case C had a bigger focus on gaining certain data handling and GIS skills, such as data exportation from several sources and data visualization in QGIS, it is to be expected that the capacity-building change is most prevalent in these participants. During the time of the interview only one participant had actually try to learn QGIS, yet still found it very challenging to work with. It is unknown how these efforts will further develop or sustain. Organization C also mentioned that they gained a new contact within the municipality that they can turn to in case this was necessary.

Sustainable empowerment

As Corbett, Cochrane & Gill (2016) address in their review on studies on empowerment and PGIS, checking the sustainability of empowerment is an important factor that is often still missing in today's literature on the subject. Unfortunately, this study can also only addressed those observed possible changes on the short-term. To check whether working procedures, or capacities from the individuals or

other members from their communities are sustained should have to be checked. Still, it will be difficult to relate a change in working procedures to the PGIS in the future as many other factors play a role in working procedures, and there is no base-line measurement from before the PGIS meetings. Also, as Ghose (2017) notes in her paper, "empowerment must be seen as a gradual process and not as the end product of PGIS", which means that extent of, or level of empowerment is not fixed. Lastly, it is important to keep into consideration that empowerment is a process that happens internally and is not something that can be 'done to' an individual or community (Rowlands, 1997), and that attempting to determine an extent or level of empowerment by a researcher is highly dependent on the self-reflection skills of an individual.

Marginalization

In the literature scholars talk about the fact that GIS applications could to a certain extent also marginalize certain communities. The topic of marginalization in relation to this study will be discussed briefly. Elwood (2002) found in his PGIS study that certain participants found that they were 'locked in' by the complex technologies, that their own observations were in a sense undermined, also some participants felt inferior or marginalized due to the perceived hierarchy in the PGIS group. In this study, the research team purposefully designed the meetings in such a way that the research team took an equal position with the case participants, both directly and indirectly. Directly in the sense that the research team would mix with the participants during talks and meetings, in no situation the research team was on the one side of the table and the participants were at the other side. Indirectly in the sense that the research team saw the participants as the neighborhood experts, and that the research team only played a supportive and facilitative role. In all three cases, the participants indicated the good collaborating atmosphere between them and the research team. With case B and C, participants indicated that either the 'open atmosphere' or the 'equal working relationship' was considered one of the strong suits of their case. Also participants did not indicate that they were not able to follow the meetings. Since no indications for marginalization of participants were either observed or indicated, it can be assumed that in this study no participants felt marginalized, yet it can never be fully excluded.

6.2. Strengths and weaknesses

One of the main strengths of this research is that three cases were executed, thoroughly described and analyzed. As the focus and aim of the different cases was slightly different, this sheds some light on the diverse nature of the PGIS meeting possibilities and outcomes. Many studies lack a thorough description of the processes that were involved with a case, and others make an extensive description, yet describe only one case where they can base there results on (such as Tsai et al., 2012). Also, the cases were thoroughly prepared, so the research team could almost always clarify the data and provide with the spontaneous wishes from the organizations. Lastly, organizing two meetings relatively short one and a half hour meetings allowed the project to be accessible and done without it costing too much effort for the organizations. Multiple examples in the literature show multiple full-day meetings,

which may produce different results, yet will be less appealing to social community enterprises as GIS is not a priority to them.

Another strength of the study has been the way the collaboration between the municipality and the different social community enterprises has been organized. The municipality and the social community enterprises were both equal partners in this project, this expressed in an open atmosphere that was pleasant for both the research team and the participants to work in. In the literature, a lot of the PGIS studies were carried out with partners that were not 'equal', meaning for example that participants were underrepresented or were part of marginalized communities (Elwood, 2002). The research team played a facilitative role for the organizations. Also the meetings were very much catered to the social community enterprise in question, and the technology supported the aim. In many other studies, complex technical methods are applied that left certain participants marginalized (Sieber, 2006).

Despite the added value of this research to the PGIS literature, this study also has a few weaknesses. The observations and interpretations made during this study heavily rely on the researcher's bias. To try and keep the bias as contained as possible, observations and interpretations of the other research team members were shared and certain assumptions were checked with the participants during the interviews. However, they do remain subjective. Also, the purposes of the meetings were mainly based on what the participants planned on doing with the outcomes of the meetings, however at the time of the interviews, the participants indicated that they had not done anything with it thus far. Additionally, the outcomes of the cases have been assessed on the short-term, it is not possible to say something about the long-term effects of the study. This has also been mentioned in Corbett, Cochrane & Gill's (2002) review, they noticed this trend too in other PGIS studies. They state that this does not necessarily mean that there are no long-term effects, but that significant insights are lacking.

The results from this study, and mainly those based of the interviews, are prone to positivity bias. Participants would highlight positive elements of the project such as the open atmosphere or the experienced equivalence during they meeting. However, they would rarely comment on negative experiences with the research team. It could be the case that they hardly had any negative experiences, but it could also be that they did not feel comfortable sharing this information. Especially since the organizations and the municipality collaborate for at least another three years in the 'Zin in de Wijk' project. Also, because the evaluations took place with the main researcher and both participants from each organization together, the results might not be exhaustive.

The possibility for contents and the participatory methods of PGIS projects are very diverse, it is for example possible for communities to be involved in their own data collection, or to draw up their own maps. It is therefore expected that the outcomes, contributing process factors and the empowerment process of each PGIS project can very much depend on the particular design of the meeting. This study involved the participants in thinking along with the possible goals for the project, but the contents of the sessions were not very participatory. Involving the participants in more participatory methods,

such as collecting their own GPS data for instance could have had a major impact on the to what extent PGIS has been empowering for the social community enterprises.

6.3. Suggestions for further research

As stated before, the PGIS literature is mainly outcome and empowerment driven and does not necessarily expand much on the processes that contribute to a PGIS's project success or failure. These processes are highly context specific, yet there are definitely more generic factors to be identified that would hold for most PGIS projects, such as ensuring a good working relationship between the research team and the participants. This would be particularly insightful for researchers or organizations that want to try to involve organizations such as social community enterprises or other actors.

Also, the effects of PGIS projects on the long-term are still unknown. To this date, no research articles could be found that followed up on the effects of the PGIS projects. It is expected that it will be difficult to determine whether effects can be fully related to the PGIS project, it is still relevant to shed some light on this matter.

7. Conclusion

The multiple case study revealed that there are several different purposes for PGIS in a social community enterprise context in Arnhem. Undoubtedly, the relevance and applications differs per individual case because of the different contextual factors such as goals that are set, different actions undertaken and a different collaboration between the research team and the participants. The same goes for the identified processes that are beneficial to each case and the empowerment processes per case. However, it is interesting to see that with the different natures of the PGIS cases, to a certain extent the same purposes and contributive processes emerged.

It is not possible to conclude on the overall relevance of PGIS for social community enterprises, because this is considered to be case specific. However, it can be said that with similarly designed PGIS cases with social community enterprises, most probably, similar results will come forward. In this set of cases, mostly administrative and tactical purposes could be identified for case A and C. And because of the more action oriented nature of case B, the purpose was mainly perceived as tactical. A lot of factors were found to contribute to the overall outcomes and success of the meetings, it is impossible to say that factor X leads to either a positive or a negative outcome because the factors are highly interrelated. The main factor that all participants highlighted was the pleasant working relationship and the open atmosphere during the PGIS meetings. The main information needs for social community enterprises were the opportunity to see demographic and social population data for the different neighborhoods in the city, and obtaining a summary of the meeting contents for reference.

This research did not aim to make and solid conclusions on the level, extent and sustainability of any empowerment process taking place following from the PGIS meetings. However, this study does show that there are opportunities for empowering social community enterprise members with PGIS. Certain procedural changes, such as slight change in focus of the organization were observed. But it were mainly capacity-building changes that could be identified, such as an expressed increased self confidence in the work the participants do with the organization and an increased insight to what data is available. However similar GIS software and applications, such as 'Arnhem in Cijfers' are at hand for the social community enterprises, but it is yet to be seen whether the social community enterprisis will apply those in their own time.

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Appendix I: Interview guide

<u>Interview introduceren</u>

- We hebben een uur staan, maar het vorig interview heeft een stuk korter geduurd.

- Misschien is er kans op wat herhaling.

- Toelichting, informed consent, opnemen van het interview.

<u>Opzet/algemeen</u>

- Wat vond je van het proces van hele project? (van A tot Z)

- Wat vond je van de bijeenkomsten op het stadskantoor met de maptable?
    - Duur
    - Aantal
    - Tempo
    - Sfeer → verschil eerste en tweede
    - Ruimte van de bijeenkomsten → bevorderend, belemmerend (geluid, licht, hoogte tafel, benauwdheid)

- Wat waren je verwachtingen voordat we begonnen aan de eerste en tweede sessie - waarop was dat gebaseerd?
    - Uitkomen van verwachtingen
    - Waren er nog duidelijke verschillen voor jullie tussen de eerste en de tweede bijeenkomst?

- Hoe heb je het ervaren om met de maptable te werken?
    - Gebruiksvriendelijk
    - Duidelijk
    - Vertraging

- Ervaring van de samenwerking
    - Rolverdeling → combinatie van mensen? Werkte dat goed? Of had je het liever met meer of minder mensen nog besproken
    - Vertrouwen

- Wat vond je van de kaarten als communicatiemiddel?
    - Wijk, buurt, grid, heatmap

- Heb je alle informatie goed kunnen verwerken? Hoe heb je dat gedaan?

- Wat vond je van de informatie die niet alleen specifiek over het Arnhemse Broek ging?

<u>Goede punten / punten voor verbetering</u>

- Heb je de resultaten of de bijeenkomsten nog met anderen besproken? En wat vertelde je dan?
- Wat zijn dingen die we in het vervolg erin moeten houden bij de sessies?
- Wat zijn punten die beter hadden gekund?
- Hadden we jullie nog op een andere manier kunnen helpen om het doel van meer inzicht te bereiken?
  - o Bijvoorbeeld samen de wijk in?

<u>Toepassing en nut</u>

- Ben je tevreden met het resultaat van de bijeenkomsten?
- Ben je tevreden met het resultaat van de bijeenkomsten?
  - o Waar staan jullie nu?
- Welke informatie vond je het meest nuttig?
  - o Kun je dit toelichten?
- Met welke informatie kon je niet zoveel?
- Heb je nieuwe ideeën en activiteiten voor de wijk?
  - o Kun je dat toelichten?
- Zou je vergelijkbare sessies aanraden aan andere wijkondernemingen?
  - o Kun je dat toelichten

Appendix II: Project briefing example

GIS analyse in de wijk – onderzoek naar het nut en de processen van GIS in de context van ██████████

Samenwerkingsproject gemeente Arnhem en ████████████

Projectdoelstelling

De gemeente Arnhem wil samen met ███████████████ onderzoeken hoe de visuele presentatie van ruimtelijke data kan helpen bij het ondersteunen van de werkzaamheden van ███████████████ Tijdens de kennismaking op 25 oktober uitte ██████████ ██████ meerwaarde te zien in het ruimtelijke verloop van sociaal-demografische data in de wijk 't ████ Resultaten dan het onderzoek moeten, waar mogelijk ██████████ █████ ondersteunen om vast te stellen hoe ze de wijk verder kunnen activeren, hoe ze de diversiteit van de wijk kunnen bereiken, waar en welke problemen in de wijk spelen en ten slotte welke activiteiten kunnen worden georganiseerd waar iedereen zich welkom voelt.

Beoogde projectresultaten

- Een verbeterd inzicht in de ruimtelijke verdeling van doelgroepen in de wijk ███████████
- Een beoordeling van het nut van ruimtelijk inzichtelijke data voor ██████████████
- Een beoordeling van het proces van de ruimtelijke analyse, zodat in toekomstige samenwerkingsprojecten het proces kan worden geoptimaliseerd

Afspraken

██████████████ neemt de rol van opdrachtgever op zich, ondersteund ██████████ Denise van der Weerd zal als opdrachtnemer en eerste aanspreekpunt vanuit de gemeente optreden, ondersteund door Paul Getz en Erik Hendriks.

De opdrachtgever levert input voor de GIS analyse, met name informatie over welke vraagstukken er liggen en met welke informatie zij geholpen zijn. Na afloop van de samenwerking werkt de opdrachtgever mee aan een evaluatie van het project. Na afloop van het project is de opdrachtgever, na overleg met de opdrachtnemer, vrij om de resultaten van de GIS analyse te delen met andere partijen.

De opdrachtnemer voert de ruimtelijke analyse uit, presenteert de resultaten en is het eerste aanspreekpunt voor het project. De gemeente Arnhem draagt de eindverantwoordelijkheid van het project.

Activiteiten

Tijdens het project zullen de volgende fases worden doorlopen:
- Kennismakingsgesprek
  Plan en doelstellingen van het project worden geïnitieerd. De eerste wensen van de sociale onderneming zullen ook worden gepeild. Na het eerste kennismakingsgesprek gaat de student aan de slag met een achtergrond onderzoek: wie zijn er betrokken bij de wijkinitiatieven, welke belangen spelen, wat zijn belangrijke onderlinge relaties en welke data bestanden zijn wellicht interessant?
- Tweede gesprek: data match en vaststellen kaarten
  De eerste interim-resultaten worden gedeeld met de sociale wijkonderneming. Deze resultaten kunnen worden gerepresenteerd op kaarten en zullen als basis dienen voor de gespreksvoering en vorming van een focus van het onderzoek. Er zullen audio-opnamen worden gemaakt die kunnen dienen als basis voor de procesevaluatie.

- Derde gesprek: Data-duiding
  Uiteindelijke resultaten worden gepresenteerd. Wederom worden er audio-opnamen gemaakt die dienen als basis voor de procesevaluatie.
- Tenslotte vindt er een projectevaluatie plaats met Stichting 't Broek Omhoog waar de uitkomsten en het proces van het project worden besproken.

Planning

Donderdag 25 oktober: kennismakingsgesprek en eerste vraagstelling bepalen

Op basis van het gesprek zijn de volgende interessante indiciatoren geïdentificeerd:
- Sociaal domein > schulden > instroom van personen in schuldhulpverlening/ouders die instromen in schuldhulpverlening/Arnhem cardhouders/Gelrepashouders
- Sociaal domein > Gezondheid en zelfredzaamheid > % beleving gezonde psychische gezondheid/% beleving goede fysieke gezondheid/mate van zelfredzaamheid buitenshuis/mate van zelfredzaamheid binnenshuis
- Sociaal domein > inkomen > inkomen particuliere huishoudens/huishoudens met lage inkomens/personen met een heel jaar inkomen
- Sociaal domein > uitkeringen > participatiewet/WAO/AOW/WW
- Sociaal domein > werkzoekenden > werkloosheidspercentage

Woensdag 14 november: data match en vaststellen kaarten
De bovenstaande data zullen inzichtelijk worden gemaakt en worden gepresenteerd aan ▆▆▆▆▆ (en eventueel andere betrokken spelers). Er wordt gekeken of met beschikbare data al een deel van de vraag beantwoord kan worden, welke data nog ontbreekt en op welke schaal de data gepresenteerd moet worden (adres, straat, wijk, etc.). Aan de hand hiervan wordt ook bepaald wat voor themakaarten zullen worden gemaakt.

Te bepalen: data-duiding (2/3 weken later)
De kaarten zullen worden besproken en zullen als basis dienen voor de discussie over het vraagstuk. De initiële verwachtingen zullen worden gecheckt met de werkelijkheid op kaart.

Te bepalen: evaluatie (enkele dagen later)
Betrokkenen zullen worden geïnterviewd over het nut van de ruimtelijk inzichtelijke data. Daarnaast zal ook het proces van het project worden geëvalueerd.

Achtergrond informatie

Uit ervaring blijkt dat ongeveer 80% van alle verzamelde informatie een 'ruimtelijke component' heeft. Dat betekent dat de beschikbare data kan worden gekoppeld aan een locatie, bijvoorbeeld een adres of een andere plek. Deze data staat nu opgeslagen in grote databases, welke niet altijd vrij toegankelijk zijn en welke niet altijd gevisualiseerd zijn. Met geografische informatiesystemen (GIS) kan deze data duidelijk in beeld worden gebracht. Wanneer de data wordt gekoppeld aan een locatie met GIS, kan de data ruimtelijk geanalyseerd worden met bijvoorbeeld kaarten. Doordat bijvoorbeeld clusteringen en relaties tussen variabelen op kaart zichtbaar kunnen worden gemaakt, kun je relaties zien die anders onopgemerkt waren gebleven.

De gemeente Arnhem heeft al meerdere projecten uitgevoerd waarin de met GIS geproduceerde kaarten van meerwaarde leken bij discussies en besluitvorming, bijvoorbeeld bij de reorganisatie van de binnenstad of bij het in kaart brengen van regionale zorgaanbieders. Lokale data is nog niet op grote schaal inzichtelijk gemaakt. Lokale spelers, zoals sociale wijkondernemingen kunnen ook gebaat zijn bij ruimtelijk inzichtelijke data in bijvoorbeeld hun besluitvorming en strategische beslissingen. Het precieze nut is nog niet bekend en er bestaat nog geen procedure om dit proces te ondersteunen. Daarom wil gemeente Arnhem in samenwerking met drie sociale wijkondernemingen kijken wat ruimtelijk inzichtelijk gemaakte data (met behulp van GIS) kan betekenen voor sociale wijkondernemingen. Kan deze nieuwe kennis bijdrage aan het beantwoorden van onopgeloste vraagstukken? Kan de nieuwe kennis ondersteuning bieden in besluitvorming?

Appendix III: Informed consent

Toestemmingsverklaring

Interview over evaluatie ████████████ - inzicht in de wijk

Februari 2019:

- Ik ben over het onderzoek geïnformeerd en ben in staat gesteld vragen te stellen over dit onderzoek.
- Ik weet dat ik vrijwillig meedoe. Ik weet dat ik op ieder moment kan beslissen om toch niet mee te doen. Daarvoor hoef ik geen reden te geven.
- Ik weet dat de gegevens en resultaten van het onderzoek **anoniem** en **vertrouwelijk** behandeld worden.
- Ik geef toestemming om mijn gegevens te gebruiken, voor de doelen van het onderzoek
- Ik vind het goed om aan dit onderzoek mee te doen.

Naam participant: _____

Datum: _____ Handtekening: --

Ik verklaar hierbij dat ik deze participant volledig heb geïnformeerd over het genoemde onderzoek.

Naam onderzoeker (of diens vertegenwoordiger): _____

Datum: _____ Handtekening: --

Appendix IV: Quotes in English and Dutch

Case A

First PGIS meeting (A-P1)		
Participant ID	**Original quote in Dutch**	**English translation**
A01	*Maar dit vind ik al een hele bijzondere. Want ik dacht echt dat 60 jaar en ouder sterker vertegenwoordigd was en dat hier een grote mate van eenzaamheid speelt.*	*I find this really spacial. I thought that people aged 60 years and older were more represented, and that they were generally more lonely.*
A01	*Ik denk dat toch hier, de Veilingstraat, het Nieuwe Kadekwartier de afwijking in de ouderen. Dat dat vooral te maken heeft met de Driegastenhuizen, die zit hier toch?*	*I think that here at the Veilingstraat and the Nieuwe Kadekwartier, the deviation in elderly has something to do with the nursery home. That one is located here right?*
A01	*Dat betekent dus dat we niet in beeld hebben, percentages die WMO of jeugdwet krijgen. Dat vind ik interessanter eerlijkgezegd dat dit, want dit is een gevoelsmatig cijfer.*	*That means that we dont know the percentages of people in the 'WMO' or 'Jeugdwet'? I find that more interesting, since this is just an emotional figure.*
A01	*Dat is de geslotenheid van de wijk. Dit is volgens mij, raak je hier echt aan de kern van het probleem in de wijk. Knap van jullie. Echt heel knap.*	*That is the closeness of the neighborhood. I think you really touch upon the core of the problems in the neighborhood. Very impressive.*
A01	*Ik twijfelde door input of ik dit nu wel moest doen? (…) Ik ben al van mening veranderd toen ik met Denise even…*	*I was doubting because of him whether I should do this (…). I already changed my mind when I talked to Denise.*
A02	*De input is van gedachten veranderd. Sinds gisteren heb ik een nieuw vak, omgevingsgericht werken, dat is precies dit. (…) Maar door er zo met zijn alle naar te kijken, ga je toch dingen vinden die opvallen, waarvan je wel denkt. Van wacht eens even, dit is wel bruikbaar.*	*I changed my mind. From yesterday onwards I have a new course on environmentally oriented working approaches, which is exactly this. By looking at figures it like this, you are going to see things that stand out, of which you think… Wait a moment, this is valuable.*

Second PGIS meeting (A-P2)		
Participant ID	**Original quote in Dutch**	**English translation**
A01	*Ik zit steeds maar te denken, wat kan ik hier dan mee. Maar het kwartje valt gewoon nog niet.*	*I keep thinking, how can I work with this. I can't figure it out.*
A01	*Want we hebben er nu eentje, ik ben ook wel benieuwd naar anderen. Even heel snel, deze kaart doen.*	*We've only seen one now, but I'm curious tot he others as well. Could you just quickly turn this map on?*

Interview (A-I1)		
Participant ID	**Original quote in Dutch**	**English translation**
A02	*Ja ik zit ook inderdaad een beetje te graven, van wat heb ik toen allemaal gezien op die tafel jongen. Dat kan ik me niet meer terughalen. Wat ik gewoon nog weet, is dat toen we daar wegliepen, dat we toen we terugliepen*	*I'm digging here, what have we all seen on that table? I can't recall. I just remember that we walked back and said to each other: this is so good and valuable to see.*

	dat we tegen elkaar zeiden van toch mooi om te zien en toch nuttig.	

Case B

First PGIS meeting (B-P1)		
Participant ID	**Original quote in Dutch**	**English translation**
B01	*En als je het visueel maakt. Je hebt er dan meteen een ander gevoel bij.*	*When you visualize it, you get an entirely different feeling with it.*

Second meeting (B-P2)		
Participant ID	**Original quote in Dutch**	**English translation**
B02	*Dat is wel echt heel veel. Ik dacht ook van, ik wil er ook nog even mee bezig, maar dan weet je bijna niet waar je moet beginnen zeg maar. Zo, ja. grote bak met..*	*It is just so much. I wanted to work on it, but I just don't know where to start. Such a huge amount…*

Interview (B-I1)		
Participant ID	**Original quote in Dutch**	**English translation**
B02	*Het is eigenlijk gewoon een liggend scherm. Meer is het ook niet.*	*It is just really an horizontal screen, no more than that.*
B02	*Die kent ook de weg een beetje hoe je dat ook voor elkaar moet krijgen, want voor ons. Dat is niet te doen denk ik. We hebben er in ieder geval een contactpersoon bij, bij de gemeente. Als we vragen hebben over kaarten.*	*He knows what paths to take to make it work. Because for us, its just not doable. At least now we have another contact person at the Municipality that we can contact with map related questions.*
B01	*Wij hebben dan toch, dan heb je een afspraak gehad en dan denk je van o ja! we kunnen hier echt wat mee. En dan zijn er weer honderd andere dingen waar je mee aan de slag gaat. Je hebt het dan ook wel nodig om ook weer een doel te hebben om naartoe te werken of een volgende sessie of iets.*	*I think that when we just had the meeting we thought like 'yes!', here we can work with. But then there are so many other things you are simultaneously working on. You really need a goal to work towards for the next meeting.*

Case C

First PGIS meeting (C-P1)		
Participant ID	**Original quote in Dutch**	**English translation**
C02	*Je wordt hier wel nieuwsgierig van zeg.*	*This makes you very curious*
C01	*Ja, wilt weten wie en waarom.*	*Yes, you want to know who and why*
C01	*Ik vind ze allemaal heel interessant, het is zo vervelend ik kan niet kiezen.*	*I find them al lso interesting, I just can't choose.*
C01	*Ik vind het tot nu toe nog niet dat dingen er heel erg uitspringen die anders zijn dan ik had verwacht.*	*So far, I havent seen any that are very different than expected.*

Second PGIS meeting (C-P2)		
Participant ID	**Original quote in Dutch**	**English translation**
C01	*En hier zijn gezinshuizen, dus daar heb je weinig alleenstaanden. Dat is logisch. En dat geldt bij ons ook en*	*These are family homes, so there are very few single person households. That makes sense. The same goes for*

	hier ook helemaal. Hier zijn ze niet. Hier in de flatjes weer wel.	this area. At the appartment buildings there are many single person households again.
C01	Ik vond de vorige interessanter met die alleenstaanden en de leeftijdscategorieën. Nu denk ik ja	I thought the last map with single person households and age categories was more interesting. With this one I only think: 'well, yes'.
C02	het is iets wat je meeneemt gewoon in je achterhoofd als gegeven. Het is toch wel veel niet gehuwd.	It is something that you take with you in the back of your mind. Many are simply not married.

Interview (C-I1)		
Participant ID	**Original quote in Dutch**	**English translation**
C02	Het gevoel was er, maar dat is nu wel bevestigd. Er staat een punt achter van oké het is ook echt zo.	The assumptions were there, but those are now confirmed. Its more definite now, it really is like that.
C01	Ik vond het ook een heel mooi systeem hoor, dat moet ik zeggen. Ik vond het wel heel mooi hoe je elke keer, de kaart aan de onderkant kon doen of weg kan halen of. (…) Groter, kleiner, ja precies Google Earth, dat maakt het wel heel inzichtelijk.	I find it a very good system I should say. It is nice how you can turn maps on or off, move them, enlarge them, also Google Earth… That makes it very insightful.

Appendix V: Overview of participants and presence at project meetings

Participant ID	Status	Presence			
		Introductory meeting (not recorded)	1st PGIS meetings	2nd PGIS meeting	Interview
A01	Member community organization A	x	x	x	x
A02	Member community organization A	x	x		x
B01	Member community organization B	x	x	x	x
B02	Member community organization B	x	x	x	x
C01	Member community organization C	x	x	x	x
C02	Member community organization C		x	x	x
Z01	Social community enterprise expert at municipality				
Z02	GIS expert at municipality	Participated all meetings			
Z03	Main researcher (intern)				x

Appendix VI: Example summary PGIS meeting

This document is available upon request.