Open Data Ecosystem

– The Data Market between Municipalities and
Businesses

Jonathan Crusoe

Supervisor: Ulf Melin
Examiner: Johanna Sefyrin

Abstract: *Inside an open data ecosystem, between municipality and business there exists an unexplored data market based on open data sets. As actors works towards a functioning ecosystem, resistance is expressed. In this study, we explore and expand the insight of an open data ecosystem and bring forth actors' resistance expression. This paper is the result of a case study about three municipalities, five business and their relation towards the data market in a Swedish context. From interviews, observations, documents and thorough analysis we found that municipalities have limited knowledge, resources and political leadership, while businesses are affected by the lacking technical infrastructure on many levels, where open data products never become reality and are in a constant fear. The lacking collaboration infrastructure makes it impossible for municipalities to hear the prayers chanted by businesses. And nowhere to be found is the political leadership needed to move this chaos into order. From this a deadlock is condensed were no one can act.*

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1. Introduction

This thesis is about municipalities, businesses, their relation and a resource called open data. A resource whose existence was uncovered populating the information flow of governments and released to achieve innovation through businesses. From an abstract perspective, we can use the following story as a metaphor to better explain our topic:

On one of many warm summer days, we are walking in a forest. Our travels lead us to enter a meadow through a detour. In the center, there is a crystal clear water spring. The surrounding flat grassland is populated with beautiful foliage that draws us back to the magical stories from childhood memories. The possibilities envisioned are endless and we contemplate the next appropriate action; maybe a brewery, a farm, a spa, a bed & breakfast, or why not just take a swim? It strikes us; why haven't others taken these opportunities themselves, and where is the origin of the spring? After an investigation with some calls to the local municipality's office, it is revealed that the water is left over from one of their processes and released for reuse by others in hopes to improve society. It strikes us that none of our friends know about this, and it was only through luck that this was uncovered.

In reality, this spring is the fountain of open data. In our exploration of theories, we found that the concept's meaning varies among authors and organizations (See section 3.1.), and from the case (See chapter 5) we can extract the lowest common denominator definition and deduct that *open data is published on the internet, by municipalities or governmental agencies, in some format, for reuse by others*. The true forms taken by open data are things such as geographical information, air quality, and population density.

In reference to the earlier tale, its resemblance is eerily uncanny to that of Sweden's current development of open data. The vast network of interconnecting and -dependent technical and social systems create a forest of which we can explore. With valuable data springs published by different actors, open data platforms (e.g. CKAN, 2016), hackathon events (e.g. "East Sweden Hack 2016 | East Sweden Hack", 2016) and forums (e.g. "OpenGov.se - Din ingång till värdeskapande genom transparens & öppenhet!", 2016) are all propelling the development of open data. In this myriad, we find streams of information originating from the hands of publishing actors flowing through refineries to spread out in society for the value of citizens.

In the flow between publisher and refinery, the interest grows as municipality and business fill their roles, and a circular dependency exists between the actors (Dawes, Vidiasova, and Parkhimovich, 2016). In the above tale, we only gained the perspective of the business and not the municipality, making it rather one-sided. In this thesis, we will encounter municipalities in the role of data publishers, businesses in the role of data users, and will describe the relationship in between. To start we will explore the underlying background, then move over to purpose and research questions, ending with target audience, limitation, and delimitations.

1.1. Background

The concept of open data is not unexplored or unknown for academia (e.g. Janssen, Charalabidis and Zuiderwijk, 2012, Gonzalez-Zapata and Heeks, 2015, Dawes, Vidiasova, and

Parkhimovich, 2016), governments (e.g. Obama, 2009, Davies, 2010, Swedish Parliament, 2016), and other organizations (e.g. Tauberer, 2016, Verhulst & Youngm, 2016 and Dietrich, Gray, McNamara, Poikola, Pollock, Tait, & Zijlstra, 2016). Through works such as Open Knowledge (Open Knowledge, 2016), Socrata Inc (2013), and Tauberer (2016) we have a well-established definition and principles on open data. Berners-Lee, (2015) the inventor of the web, has even created a five-star scale open data plan.

The many open data portals implemented through the web make open data easily associated as part of the internet. Lourenço (2015) has created a theory to assess and compare different open data portals with each other. The structure of open data is still in flux, but it has been proposed that it should be implemented with linked data (Shadbold, O'Hara, Berners-Lee, Glaser & Hall, 2012, Vander Sande, Dimou, Colpaert, Mannens & Van de Walle, 2013, Ding, Lebo, Erickson, DiFranzo, Villiams, Li & Flores, 2011, Zuiderwijk, Jeffery & Janssen, 2012). Moving from technical to social structures we even find that a comparison framework for open data policies has been created (Zuiderwijk & Janssen, 2014).

The resulting benefits have been categorized, and the myths and barriers have been clarified by Janssen, Charalabidis, and Zuiderwijk (2012). Barry and Bannister (2013) have continued to even further clarify and brings up barriers of open data development from a top-down governmental perspective.

The idea to view open data's social and technical systems as an ecosystem is explored. We have identified how to build an ecosystem, (Pollock, 2011, Harrison, Pardo & Cook, 2012, Zuiderwijk, Janssen & Davis, 2014, Lee, 2014) the infrastructure needed to support an ecosystem (Davies, 2011), and lastly a complete model (Dawes, Vidiasova, and Parkhimovich, 2016, Davies, 2011).

When it comes to the inhabitants of the open data's existence, Gonzalez-Zapata and Heeks (2015) have identified many of their perspectives. Ten impediments for the use of data have also been identified with a heavy leaning towards the technical (Zuiderwijk, Janssen, Choenni, Meijer, Alibaks & Sheikh Alibaks, 2012). The relationship between publishers and users from a governmental perspective has also been explored (Janssen & Zuiderwijk, 2012, May). Chan (2013, January) has even come to explore what strategies will foster participation and collaboration in open data initiatives.

Open data from a holistic perspective has come to be part of the open government movement (Wirtz & Birkmeyer, 2015, Sandoval-Almazan & Gil-Garcia,2015) and is almost used synonymously by some (Lee & Kwak, 2011, June). At the time of this writing, the field of open data is being explored by researchers far and wide. In our exploration, we have only found one author to be critical against the use of open data, as it could marginalize minorities (Johnson, 2014).

To summarize the above; we have definitions, perspectives, myths, barriers, benefits, action plans, assessment methods, structural outlines for both technical and social, a model for an ecosystem and how to build one, and we know the inhabitants of open data. It is a well-explored existence but there is still room for further exploration.

The focus on technical systems inside the perspectives on open data programs can be perceived as that social systems exist more to support open data and bring forth its benefits (Dawes, Vidiasova, and Parkhimovich, 2016). This opens up doors to explore how social systems, inside an open data ecosystem between actors, can be used in a more active way to achieve a symbiosis between the technical and social.

The focus on government opens up to explore the other side of the coin; the businesses and how they actually transform open data as a resource to benefit society. On each side of the coin we have its carving representing its diversity, for example; on the first side we have municipalities and governmental agencies while on the other we find small to large businesses with different competitive edges. The ecosystems and social and technical structures do not solely consist of the government; there are also other actors that play a detrimental role to achieve the benefits of open data.

An open data ecosystem is a circle of effects and actions, where we find politicians making policies and strategies that affect the data published by municipalities, businesses transform open data into products that give benefits to the end-users, and lastly the experiences and expressions made by the end users will affect the politicians' policies and strategies (Dawes, Vidiasova, and Parkhimovich, 2016).

With Dawes, Vidiasova, and Parkhimovich's (2016) model, we gain an insight into the workings of open data in the social and technical structures. With this we can, for example, take a look at the missing gap pointed out by Gonzalez-Zapata and Heeks (2015) that was identified in the Chilean context. We have the government trying to reach certain benefits by publishing open data through created policies that will motivate governmental agencies and municipalities to open the floodgates. They hope that companies will create applications and build an industry on this new resource, resulting in the perceived benefits, but the middle is forgotten. In an abstract and simple way, we have a relationship chain that goes; Government to agency and municipality, agency and municipality to business, and business to user and society. Here we can see that the middle is the municipality and business relationship, therefore, understanding it will help us understand challenges for translating policies into effects inside an open data ecosystem.

In the literature review we identified no studies exploring the relationship between municipality and business in relation to open data (See chapter 3). What we found instead was something for us to explore. Without an understanding of the relationship between municipalities and businesses we perceive a central unknown factor in how open data policies are translated into benefits.

1.2. Purpose

This study is aimed to describe and explore the relationship between municipalities and business to fill the identified gap. This gap only states a release-to-use relation; we have identified barriers, balances and lacking infrastructure between the two actors, revealing the relationship to be complex. The relationship is commercial in nature, exists inside an open data ecosystem and can be divided into a technical and social level. On a technical level, we have the businesses dependent on the municipalities, while on the social level we find the reverse. All of this has been synthesized into the purpose to study resistance factors towards open data development and usage in the relationship between municipalities and businesses inside an ecosystem.

With this we achieved three objectives; First, expanding the ecosystem model created by Dawes, Vidiasova, and Parkhimovich's (2016) to include a richer relation between publisher and user, that accounts for its complexity. Secondly, we have identified resistance expressions between and inside the two actors, making it possible to lower future resistance towards development and usage of open data. Thirdly, we open for research on how open data policies transforms into benefits through municipalities and businesses.

1.2.1 Research Questions

In the context of Sweden and the municipalities and businesses that were accessible, and from the purpose of the study, the following research questions were created;

- What are the open data ecosystem elements surrounding and constituting the relationship between municipalities and businesses?
    - How and why do they affect open data development and resulting benefits?
    - Is the existing ecosystem sufficient and, if not so, why?
- How and why is resistance towards a fully developed open data ecosystem expressed in the relationship between municipalities and businesses?
    - How and why is resistance expressed in actors?
    - How and why is resistance expressed between actors?

1.2.2. Target Audience

The interaction inside the open data ecosystem is interesting to a wider pool of actors that both populate and study the structure. As an example, the resulting knowledge garnered from this study can guide future open data policies enacted by the government, as they are only one part of the whole. For this study, we aim to bring insight and understanding to municipalities and businesses about their relationship, meaning that both parties are the targeting audiences of the study. Further, the same insight and understanding is of interest to researchers studying open data, as it will help to clarify the relationship and interaction between actors.

1.2.3. Limitations and Delimitations

Limitations placed on this study are those of lacking resources such as monetary funding and time. There are 290 municipalities and a vast sector of businesses in Sweden, where the interactions with open data of both parties vary. The study was conducted in the spring of 2016 at a time when open data had not fully matured in Sweden, limiting the possible sources for data collection. This degree of maturity continues to limit the direct study of relationships between municipality and business, resulting in a study of the relationship between municipalities and businesses.

There were four delimitations placed by us on this study; (1) we selected municipalities populating the same county and that all had relations with a common open data project, (2) businesses selected had varying motivations, and not all had a pure business model based on open data, (3) the political system and governmental agencies were not studied, and (4) citizens were not studied.

Selection of municipalities (1) was done to gain insight into the research topic on different maturity levels. We could have selected Sweden's frontrunning municipalities, but that would forget municipalities in a more challenging state. In the selection of businesses (2) we had two options; select a varied sample or study one organization at a deeper level. We executed the first option, as it would give us a broader understanding and we, therefore, miss the deeper individual challenges per case. By excluding the study of the political system, governmental agencies, and citizens (3 & 4) we lose insight into the politically driven forces and the main beneficiaries of open data. With these delimitations enacted we hope to narrow the study to only contain the relationship between municipalities and businesses.

Other areas for research that were not explored in this study are; maturity process inside and compared to between municipality and businesses, ecosystem origin and growth, and impacts on municipalities from open data, released by them, transformed by businesses. All of these were not selected because of the current Swedish context, and delimitations and limitations.

1.3 Thesis Outline

From chapter two and forward this thesis is divided into eight parts. After reading this, you have completed the introductory chapter. The next upcoming parts are research approach, theory, case, analysis, conclusion, reflection, references, and lastly annexes. The summary of coming chapters are as follows;

Research Approach: Contains the research approach for the study. Here we contemplate over different ways to understand the identified gap and finally select one. After that, we explained the used data collection method and analysis process.

Theory: In this chapter, we highlight theories both behind the study and that are important for a basic understanding of open data. Here we will find what open data is, it's origins in Sweden, shapes, myths, barriers, benefits, perspectives, and ecosystem. Lastly, we will define the theoretical framework used in the study.

Case: Three municipalities, named after their sizes, and five businesses, named after their focus, are presented in the chapter. To gain a more complete picture we have included Swedish actions around open data on a national level. This will give full insight into the case and the surrounding actors.

Analysis: Through the analysis we process case data into theory. Explaining, analysing and discussing the collected data. The analysis was divided into three parts; First, we analyzed the surrounding ecosystem. Second, we studied the relationship between municipalities and businesses. Lastly, we merge the two analysis into one concluding analysis. All of this focused on answering our research questions.

Conclusion: Here we present our findings and conclusions, also bringing up doors opened for future research. The presentation is structured according to the research questions making it easy to map question to answer.

Reflection: Before we can close this study we conducted a reflection to summarize the learned experience; this is done to achieve the best possible knowledge gain. Here we will give self-critique towards weaknesses and bring up perceived strengths.

References and annexes: The last two parts are references and annexes, the later contains interview guides, data sources, and codebook.

2. Research Approach

In this chapter, we will explore the selection process behind the given research method and the resulting method. Myers (2013) has identified two common research methods; quantitative and qualitative. In a broad sense, the first focuses on numbers, while the later focuses on text. The study could be conducted solely as one or as a mix of both. To build up for selection, we need to explore the properties of both research methods.

Quantitative research can be described through Myers's (2013, p. 7-8) citation of Straub, Gefen, and Boudreau (2004): *'[the numbers] come to represent values and levels of theoretical constructs and concepts, and the interpretation of numbers is viewed as strong scientific evidence of how a phenomenon works'*. In this classification, there is a use of large sample sizes where we generalize to the larger population. In practice, these means that we study many organizations and people to identify patterns and trends. With the generalization from the large sample, the context becomes noise that is often treated as something getting in the way of the research (ibid.). An example in relation to this study would be to use surveys to study participation in different stages of open data development, or use econometrics to explain the economic growth around and from open data.

Qualitative research is fitted for studying one or a few organizations, where the researcher explores a certain subject in depth. It is ideal for studying cultural, social, and political elements of organizations and people, making it good for exploring new topics and unknown subjects. This comes with the price that it is often hard to generalize to the larger population, as the findings are very close to the context (Myers, 2013). Two examples in relation to the study; (1) case study to explore the social contexts around the development of open data and (2) grounded theory to identify the practical way for policy to become implementation.

As both qualitative and quantitative research perceives the world in different ways, they can be used to gain two different viewports on the same subject. If both are used in the study, it would achieve triangulation and methodological pluralism (Olsen, 2004). For example, a survey can be conducted to gain insight into the ecological system around open data, and after the data has been analyzed, a case study can be conducted to identify common traits and differences at a deeper level.

As for the limited scope and sample size for this study, there is not enough room to conduct a mixed qualitative and quantitative research. There are also challenges to create and test a quantitative hypothesis stemming from the fragmented research subject and a lack of a larger mature sample to explore in Sweden. Quantitative research also views context, culture, and social structures as noise to be ignored. One of the barriers identified by Barry and Bannister (2013) is culture. By ignoring these, we would essentially ignore resistance expressions and would therefore gain an incomplete understanding for the phenomena under study. From this, we see that the research method to use should be based on qualitative research. This moves us over to the explore which philosophical assumption to use.

2.1 Philosophical Assumptions

As we move into the qualitative field we need to define our philosophical perspective. This helps us and others evaluate the study and results, giving us a way to see what is in focus and of importance. Myers (2013) has identified three common philosophical perspectives; positivist, critical and interpretive.

Researchers of the positivistic perspective generally assume that reality is objective and can be described by measurable variables which are independent of the researcher and the tools used. There is a high focus on validity dependent on the fact that the researcher cannot affect the object of study, or vice versa. Replicable findings are seen as facts and truths. Questions and hypotheses are subject to empirical tests to validate and affecting variables need to be controlled (Guba & Lincoln, 1994). The positivistic perspective could be used to study how different inputs (policies, resources, knowledge, and motivation) affect the relationship between municipalities and businesses and, in the end, measure the end impact on both the central and contextual aspects.

Critical researchers assume that the social reality is historically constructed, and formed and reformed by humans. Regardless of that, humans can consciously act to change their social and economic contexts. These researchers believe that their ability to do this is hindered by social, cultural, and political dominance. This means that not all interpretations have the same value in a given social situation. Some of these interpretations are of preference over others; sometimes they are incorporated by an individual or group. Instead of just describing current knowledge and convictions, like the interpretive perspective, the idea is to challenge current convictions, values, and assumptions that can be taken as granted by humans. The goal of the perspective is that of social criticism. This kind of perspective is often anchored in some kind of ethical or moral base to motivate research and change (Myers, 2013). With a critical perspective, this study could aim to not only understand why the relationship between municipalities and businesses isn't developed but also critical ethical aspects that are clouded inside the social structures. Johnson (2014) conducts a discussion around the later subject where he brought up that minorities can get shadowed by the data of majorities.

Interpretive researchers assume that humans create and associate their own subjective and intersubjective meanings when they interact with the world around them. The social reality is produced and reinforced by humans through their actions and interaction. There is a focus to understand phenomena through the meanings given by humans. It is assumed that organizations, groups, and social systems cannot exist without humans, and can therefore not be understood, characterized, or measured with any objective or universal method (Orlikowski and Baroudis, 1991). This perspective can be used to study the current deeper social structures inside of the relationship between municipalities and businesses but the result can, in the end, be hard to replicate and apply to different situations. Here we could study current interactions with context but from a social perspective rather than technical.

Positive research is challenging to apply on social structures as there are many unknown and uncountable variables that affect the results. In relation to the research questions it is challenging as conflicting perspectives are subjective, not objective, and predefined variables make it hard to identify lacking areas. While positive research focuses on quantities, critical

research focuses on certain aspects in the historical social structure and works to critique them from an ethical standpoint. For the research questions, this is a possible route, but we are lacking an ethical standpoint and the matter studied is not historical, rather under constant and current change making it easier to critique government bureaucracies' interaction with businesses, rather than municipalities and businesses relation around open data. As the study aims to describe and explore social structures in-depth, without focusing on critical aspects, interpretive research becomes applicable. Here we have room to study the ecosystem elements, with accordance to our research questions and the relationship between actors. The weakness of interpretive research comes when studying the elements effects on open data benefits, we can identify connections, but not accurate influence levels. Because of this, we used interpretive perspective in the study, following its ontology and epistemology. This can be solved with as we have selected philosophical assumption we can now select the research method to use for the qualitative interpretive study.

2.2. Research Method

With the standing in qualitative research and the wearing of interpretive researcher glasses, we approach the selection of research method. Research cannot be achieved by dragging feet or running without direction. We need a method; a way to reach and understand the goal. Chamberlain (2012) cited Crotty (1998, p. 3) to define methodology as *"the strategy, plan of action, process, or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes.".* This unconventional way to quote was chosen to give us an understanding of Chamberlain's perspective on the selection of methodology as he criticizes the given subject. This criticism does not take the form of an antiserum, rather it focuses on the current application; the off-the-shelf usage. The author thinks that we should work to adopt our methodology to the research we conduct in a more dynamic manner than just applying a finished framework.

To be critical against Chamberlain's (2012) statement; if everyone were to use their own custom methodology in research, there would be a need to, in greater detail, explain your progression in every work. This would lead to both double inventions and create challenges to validate the results through replication. There would be challenges to compare different studies with each other as the focuses can differentiate. This is still true even if we use the same philosophical assumptions, as we can perceive things differently and focus around different data sources. We would have journals filled with methods containing articles. One reason, we can see, for the use of off-the-shelf methodologies, is that they are quick to convey to others without having to define and explain every detail. This means that an author can simply write "I have used a case study" and the reader gets a grasp for the execution. We view Chamberlain's discussion as a call to work more dynamically with research methodologies, meaning that we should adopt off-the-shelf methodologies to our studies and explain what we do different and why. Myers's (2013) book functions as a stable base to build from as it gives us insight into normal off-the-shelf methodologies, without creating strict borders of execution.

To make a clear difference between method and methodology, we can listen to the words of Wahyuni (2012) *"a method is a practical application of doing research whereas a methodology is the theoretical and ideological foundation of a method."* (p. 72). This is further developed by the author into that we use research design to connect methodology to a set of research methods to

address a certain research question or hypothesis that aims to examine social phenomena. In the reflection of Chamberlain (2012), we can view methodology as a standard pattern to build out from that gives direction for what research methods to focus on, where we work to customize and expand methods to examine social phenomena, explaining the usage in a way to improve validity and reliability.

In this thesis, we will not bring up and compare every research methodology, as it is not something we aim to answer. We still need to find the best-suited methodology, and for this, we conducted a small literature search where we searched for articles to complement and expand on Myers's (2013) book. From it we identified 24 research methodologies with the help of the Wahyuni (2012) definition, and further examination was conducted in relation to what was studied. To conclude, three research methodologies were popular: ethnography, phenomenology, and case study. Other options were the case cluster method and qualitative longitudinal research, but were excluded because of their resource needs. In the following sub-chapters, we will discuss a theoretical application of each of the methodologies mentioned. Lastly, we will select one of them.

2.2.1. Ethnography

To grasp the most inner properties of human existence we can use ethnography, as it is one of the most in-depth research methods (Myers, 2013). As a research method, ethnography lets us step out from our narrow cultural background and view the world from a new perspective (Spradley, 1980). You emerge yourself in the world of the phenomena of study and spend a longer time inside its boundaries (Myers, 2013). Common data collection tools are those of observational kind and the methodology is suited for examining organizational culture (ibid.).

In Ethnography, we would conduct an exploration of the cultural ecosystem around the municipality and business relationship in practice from one perspective. Here we would find ourselves to be in a position to follow each step of the journey, from child to adulthood. Here we would look at the differences in cultural aspects as the ecosystem transforms from a policy to societal implementation, letting open data become the "child" of the "caretakers" around it. As this is one of the most in-depth research methods, we would achieve unique insight into the lives and development of individuals in the given context. The main drawback is that it would anchor us on one side of the relationship between municipalities and businesses. With this kind of in-depth detail it we would be hard to apply the acquired knowledge on other cases, but we cannot forget that the knowledge gained can still support further understanding in the field for others. In the end, we would be looking at the relationship from one side; either it would be municipality in relation to businesses or business in relation to municipalities. In relation to our research questions, this methodology is potential, but not optimal, as we want to study the perspectives and challenges on both sides, not on one perspective. If we relate the methodology to identified barriers from theory (See subsection 3.4.2), we can note that culture is not a central resistance expression, and that many other barriers have been identified. If ethnography is used, we could gain deeper insight into culture on completion, but we would have long before that identified the surrounding ecosystem and different prominent resistance expressions, and in that answered the research questions.

2.2.2. Phenomenology

As the study is interpretive, we will focus on interpretive phenomenology rather than descriptive phenomenology. With interpretive phenomenology we describe, understand, and interpret participants' experiences (Tuohy, Cooney, Dowling, Murphy & Sixsmith, 2013) around a given phenomenon.

Fore-structure is a core aspect of interpretive phenomenology (Tuohy, et. al., 2013) and is more commonly known as bias. It is important for the research to acknowledge these and bring them to attention for the readers to know about, making both context and possible influencing factors clear.

For the phenomena of study there exist four important life-world existential themes; lived space, lived time, lived body and lived human relation (Tuohy, et. al., 2013). They can be transformed into the questions of where is the phenomena, when is the phenomena, who is the phenomena, and what relations exist around the phenomena? These themes help us understand the context of the studied individual in relation to the given phenomenon.

Lastly, the hermeneutic circle is central to interpretive phenomenology, where we derive meaning and understanding through the circular process of continuous re-examination of propositions. The subjects of study can be viewed as experts of their own experience (Tuohy, et. al., 2013).

For interpretive phenomenology, we see two different approaches. First, our subjects could come from a defined group of municipalities and business. Here we would focus on the collected experiences through time and how views differ between the subjects. Second, we could follow our subjects as an open data project goes from policy to implementation. Here we would focus on individual growth and relate it to the others. We could either follow a few selected individuals or the whole team. The main result from this kind of study would be an understanding of how individuals perceive the relationship between municipalities and businesses, and their collective experience. If we combine interpretive phenomenology with our research questions we would study teams or individuals from a business and a municipality. This would give insight into the growth of the relationship between the two actors and we would lose the ability to map the ecosystem. Interpretive phenomenology focuses on personal experience and not the main social structures; with this we would be able to answer only one part of the research questions, making it not suitable.

2.2.3. Qualitative Case Study

A case study is the examination of a particular case and aims to convince other researchers of the applicability of a particular proposition or theory through empirical evidence. A case can be viewed as one example of a broader category of phenomenon. To make a narrower definition we can view a case as a social unit; something that cannot be separated from the studied phenomena, and that the researcher does not have full control over. Case studies can be used to explore new topics. The cases must be written in such a way that it is plausible and convincing for readers, as well as engaging and interesting (Myers, 2013).

To fully understand the phenomena inside the relationship between municipalities and businesses in an open data ecosystem, would mean that the whole ecosystem becomes the case, but we need to keep a narrow selection to keep the study executable. See case in the next subsection (2.2.4).

In relation to the research questions, a case study can work to answer all the research questions, but will lack the in-depth of other mentioned methodologies. The most challenging questions to answer will be those exploring longer lines of impact and the lack of certain elements. For the first, the challenge lies in relationship chains where some actors are not part of the case. For the later, we can identify a lack of something, but not the correct implementation as the lack is subjectively experienced, making it suitable.

2.2.4. Selection of Methodology

Phenomenology gives the human experience too wide of a focus and needs an already established and aged relationship between municipalities and businesses. Ethnography focuses, to a larger extent, on the behaviors and cultures of the organizations of study and locks the researcher in one organization. Both of the methodologies miss the more technical aspects, as they focus more on the social once. The case study does not give the depth of ethnography and phenomenology, but gives us access to the two perspectives populating the relationship. From the three mentioned research methodologies, case study was selected. It might have been noted that the above case study section has a shorter description than ethnography and phenomenology; this has been done on purpose to lessen the repetitive nature in this thesis. In the following section, we will continue to expand on the selected methodology; case study.

Walsham (1995) has outlined a minimum for case studies content and presentation. A case study needs to contain a complete case or cases, and with this, we need to report site, interviewees, and other data sources, as well as explain our selection process. For the analysis process, we need to outline the iterative process between data and theory, and evolution over time. Two other important elements are the role of theory and what kind of result will come from the method. In the following texts, we will explore these central factors to case studies.

The phenomenon to study is the relationship between municipalities and businesses inside an open data ecosystem. From a case study, we can observe this through data collections of different data sources from an organizational perspective (Myers, 2013). To continue we will, in this study, report our interpretations of other people's interpretations of a phenomenon (Walsham, 1995). Therefore, the cases studied were the municipalities and businesses around the phenomenon of study. This was limited to only cases that were involved with the phenomenon.

Municipalities were selected from advice from already established researchers and officials, with the aim to access the maximum spread in maturity levels. Officially selected for interview from these municipalities were the main leaders of open data development at an organizational level. The main challenge was to identify businesses that had been working with open data, as municipalities didn't have direct access to such information. A larger amount of time and resources went into identifying and finding any business that was active around open data. In the end, we had to participate in events, call on recommendations from politicians, officials, and

other parties, post on forums, and use any search engine at hand. The most effective method of finding participants was to use forum posts. In the end, the selection criteria for businesses was that they had developed something with open data from a municipality. In total, three municipalities and five businesses participated (See chapter 4).

Moving over to data collection methods, Myers (2013) states that interviews and documents are the most normal tools of data collection, while fieldwork and participant observation are common in ethnography. We viewed those methods as primary but were ready to expand with other methods if needed. For example, in one data collection event, participant observation was more effective than interviewing, as a municipality and a business conducted a meeting about open data. Here, we could observe the relationship in action and the values populating the context. All data sources from the cases have been recorded (See annex 3), and websites were compressed and recorded as one source, to keep municipalities and businesses anonymous.
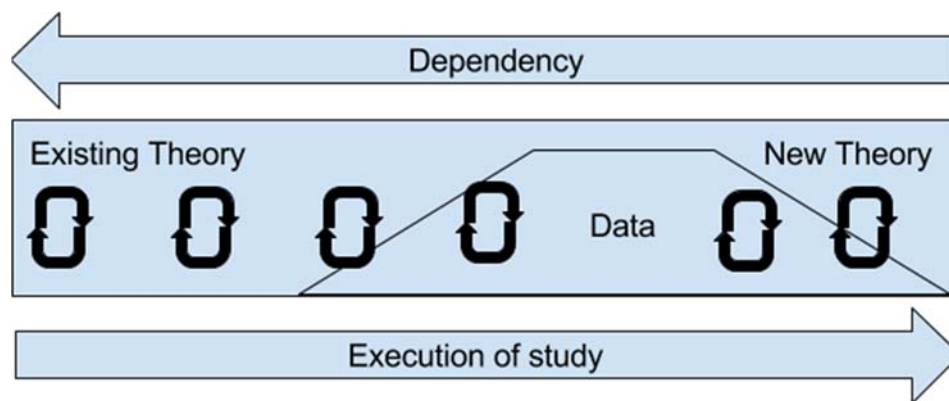
Figure 2.1: Iteration development between data and theory through the study

In the analysis process, iterations between data and theory started with a focus on the later (See Figure 2.1). Over time it moved from existing theory to data to new theory, making a slow shift in focus. We started with identifying existing theories on open data that could support the study. From this, a theoretical framework was created (See section 3.6) by letting theories interact. Late in this process data collection started and could, therefore, influence framework and theories. Soon a new theory started to grow from the mixture of existing theories and data. This means that the new theory is based on both existing theories and collected data, and we moved from abstract to more exact.

We can view the execution of study as knitting a sweater, where each strand of thread is either a theory or empirical data. At the start, we weave a theoretical framework from different theories creating the main cloth of a sweater. Slowly moving over to details by weaving in the colors of empirical data, creating dependencies between the base and the details. Over time as we weave the sweater becomes a whole, where certain spots will need reinforcing with some extra weaving. This also means that the further we tailor the greater the threads will be dependent on each other.

Lastly, the role of theory was an iterative process of data collection and analysis, slowly getting pulled into a vortex transforming it into a new theory with data, where we view the result from this method as theory generating. Therefore, we also view this study as inductive with the support of theories.

2.3. Procedure of Execution

To bind everything together we created a procedure of execution (See Figure 2.2). As we are studying the phenomena through the individuals populating its realm, we have selected primary data collection methods that placed us close to those individuals, while we used supplementary documents to gain insight into their context. With the combination of closeness and supplementary we aimed to gain a deeper and holistic view of the actor and phenomena. We also studied the context around all the actors; here we used documents and debates to gain an understanding of what was moving around them in relation to phenomena. We also searched for theories to explain the phenomena, that were used to create a theoretical framework for later stage analysis (See section 3.6) for selection criteria for theory see beginning at chapter 3. Theories shouldn't be associated with theory in the figure (2.2), the first stands for knowledge collection about the phenomena from academia, while the latter is the end result of analysis and the study.
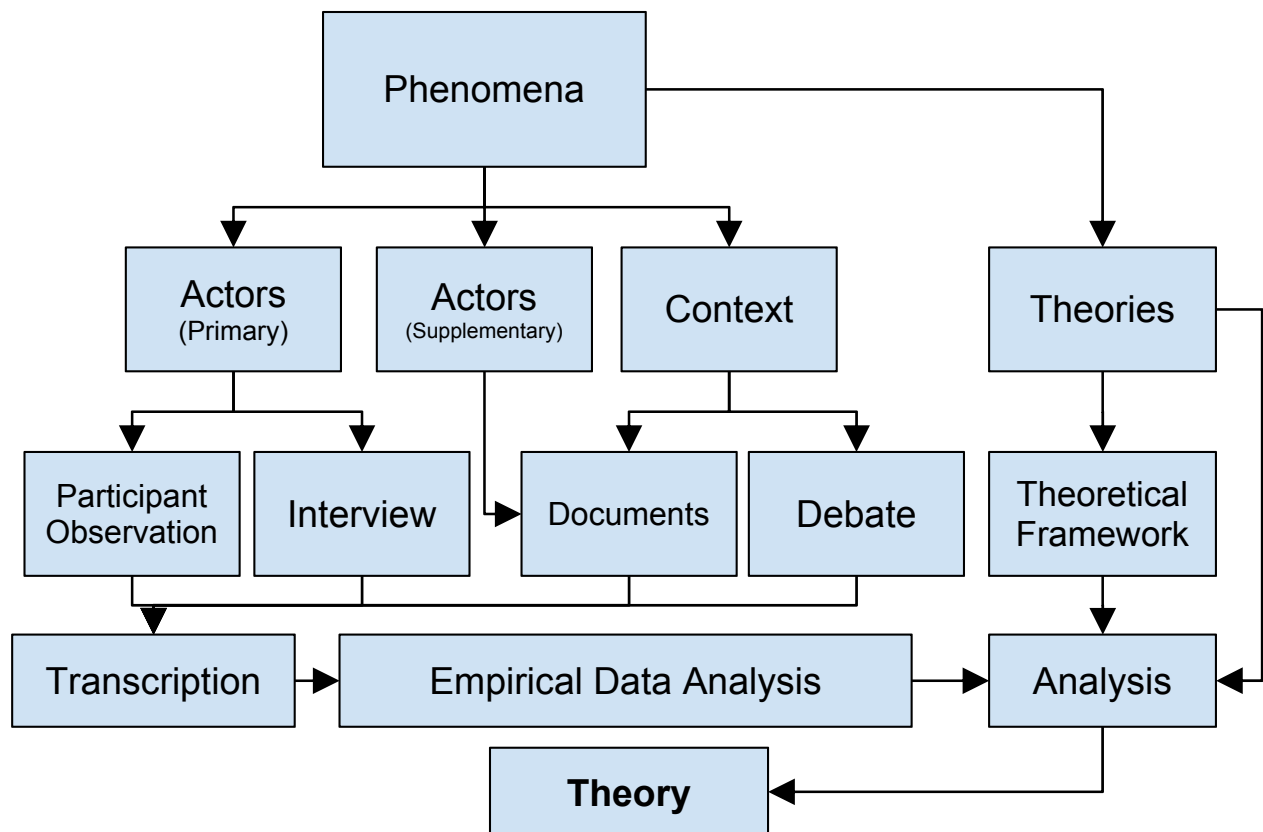
Figure 2.2: Procedure of execution, arrows represent information flow

All collected data was transcribed and then initially coded (See section 2.5). When enough materials were collected, we started empirical data analysis to generate themes. At start we collected theories to create a framework and data for initial coding, where the first were prioritized. In the middle, we focused on data collection while theory collection and analysis were still active. In the end of the study we focused on analysis, and data and theory collection were down prioritized, but the theoretical framework became central to the process. From the analysis we made conclusions about the phenomena under study.

As we were in close proximity to the actors we affected their daily lives, as they saw our interest in open data, and our interviews came to make them reflect; they either came to show passion or regret for not working hard enough. The total impact of our study was a stir up of open data, making it feel important and might have motivated further work on it for the interviewees.

In total, nine one-hour long interviews, four observations, and 16 documents were collected. In the following sections we will discuss methods in this order; data collection, empirical data analysis and analysis. Discussions surrounding ethics, validity and relevance have been moved (See chapter 7), as we believe only through reflection of such have we successfully achieved them.

2.4. Data Collection

Before studying the case there was a literature review of the open data research field as part of a thesis proposal. Exploring search engines, top journals, libraries, books, and other literature to build a basic understand of open data. At the start we didn't have insight into the field of open data; we consulted a researcher versed in the subject. From this, we acquired two articles and a lesser introduction. By investigating the references, we could find more articles and material to study. The following of references continued until we hit articles not treating the subject; each article summarized as quotes in a row inside a table with dates of publication and keywords. To further expand the material, we searched for articles on open data and identify journals; International Journal of Public Administration, Journal of Organizational Computing and Electronic Commerce, Journal of Public Administration Research and Theory, Government Information Quarterly, and eJournal of eDemocracy and Open Government. The journal expanding the article pool the most was Government Information Quarterly. The literature review process can be summarized as (1) identify articles, (2) study material, (3) put referenced articles in inbox, (4) move studied article from inbox to outbox, and (5) repeat. If an article was not treating the subject of open data, it was discarded. This processes continued after the thesis proposal was written and until the knowledge need was saturated and resources exhausted. In total, 40 articles were identified and processed this way, giving us a stable and broad foundation of theory.

The primary source for data was semi-structured interviews and, to an extent, documents (Often municipalities and businesses websites). The interview guide was written to leave room for discussion and explanation while focusing on the central themes of the study. All interviews were recorded and transcribed. The leading municipality was participating in a project called NODS that also included Linköpings University (Eriksson, Hammarsten & Melin, 2014). As part of this there had already been two interviews conducted by other researchers, and therefore, their interviews were reused, as they had been recorded we transcribed and initial coded them. This was done to not overload an otherwise loaded municipality. To compensate, participative observations were conducted on three occasions with the municipality where there was the chance to study the direct interaction between the organization and business. A consequence of this for the study was that interviewees were not asked the questions of the interview guide, but, it allowed us to conduct observations that allowed deeper insights. This created an unbalance between this case and others, making it hard to make direct connections between transcribed data.

In the study we choose to keep all the data sources anonymous, this to make it easier for interviewees to express and discuss challenges. We also selected to merge interviews from one organization into one, not focusing on internal relations and conflicts, this means that organizations with one participant were strongly colored by said individual. Further, the anonymization makes it hard to track data back to its roots and therefore hard to validate for others reading this paper.

2.4.1. Interviews

Conducting an interview is not as easily as walking somewhere and asking questions to a random person. First of all, we need to address what kind of interviews we will be using. According to Myers (2013), there exists three different types; Structured, semi-structured and unstructured interviews. For the study, we used semi-structured, as it balances the strengths and weaknesses of both structured and unstructured interviews. The structured follows a row of questions and can therefore easily miss important topics in an interview, but it's easy to compare the answers between interviewees. The unstructured interview follows a collection of discussion topics and can be hard to compare between interviewees. By combining them, we get the semi-structured interview, where we have a row of questions, and if the interviewee states something of interest we can ask more about that subject. We created an interview guide for municipalities (See annex 1) and one for businesses (See annex 2). As the interviews were conducted in Swedish, the guide is written in the same language; this is done for convenience. Interviewees were asked if they wanted to see the interview guide before the interview; this was especially stressed with businesses after one of them expressed worries about leaking information about their competitive edge. This was done to calm the interviewee.

According to Morse (1991), there are three important factors for the selection of interviewee; (1) knowledge about the topic, (2) [the interviewee] can reflect and provide detailed experimental information, and (3) is willing to talk. In the case of the study, interviewees were selected according to these three principles. If there was a case where there were no interviewees that had the full knowledge about the topic, but there were participants with partial knowledge, several interviews would be conducted. This case never happened.

In total nine interviews were used; two reused and two over the phone, and the rest face-to-face. All interviews were audio recorded and transcribed. According to both Myers (2013) and Whiting (2008), this brings with it some challenges. For example, anonymity, and that some subjects might become tabu as everything is recorded. Who would want to be caught on a tape saying that their boss or peers are some really *negative word*? Therefore, it was important to point out that the interviewees are anonymous; only the researcher will have access to the content, and it would be deleted after transcription is complete. As the studied subject is not sensitive in nature, we did not believe that there was a need for the participants to sign a form, giving us complete ownership of the taped audio.

As a mentioned before, we used an interview guide, but that is only one part of our interview strategy. The interview guide is part of a strategy created from the advice from Whiting (2008) and Myers' (2013, p.126) interview model. With Myers' model, we view the interview as a drama, with a stage (location), actors and audience (interviewer and interviewees), a script (interview

guide), entry, exit, and performance. The guide is divided into three parts with an introductory table (So nothing is forgotten). The parts follow the categories in this order; personal, organizational and ecosystem. Interview guides used can be found under annex 1 and 2.

The stage is the location where the interview is conducted; for interviews in the business field, it is a likely chance this will be an office (Myers, 2013). We agree with Myers on this, and believe that it can be hard to control the stage, but we can put forward requests to the interviewee for the place to be calm and comfortable. In our situation, we never needed to do this as interviewees themselves suggested it.

The *entry* described by Myers (2013) is referred to as building rapport by Whiting (2008). Sadly, Whiting never goes to greater lengths to describe this. However, it is all about the first impression, and when we first encountered the interviewee it was important that we were dressed in a way that made them feel comfortable and minimized the social dissonance. Small talk and accepting an offered beverage can work to make the atmosphere more relaxed. To our deepest distress, only two of the interviewees offered us a beverage.

Before we could start the interview, there was a need to "set the drama", also known as interview preparation. According to Myers, this is something done by clearly explain to the interviewee the purpose, goals, and topic of the interview. Whiting (2008) brings up the same points as Myers but also expands with a few points; (1) format, (2) approximate length, (3) assurance of confidentiality, (4) purpose of the digital recorder, asking for permission to use it, and explain who will listen to it, (5) assure interviewee that they may seek clarification of questions, (6) assure interviewee that they can decline to answer a question, and lastly (7) assure interviewee that there will be opportunities for them to ask questions. By setting the drama we hope to enclose and aim the interviewees thought towards the subject of study. We can view this as a way to synchronize both parties before communication. Beyond this, it also gives the interviewee insight into the purpose of research and can ask any questions before.

For the seventh point mentioned above, Myers warns that some interviewees might try to acquire information about other interviewees. This is something that we should work to block, as it breaks confidentiality, and also the trust, in the interviewee. A few of the interviewees did try this, but we actively chose to say that we either didn't know or couldn't answer such a question. If we were ever to speak about collected data, it was in general, and after conducted interview.

After we have given the introduction the interview and, in a sense, the performance, can start. Here the advice shifts, as Myers leaves it more open while Whiting goes into a more in-depth explanation of the process. The interview will go through the phases of apprehension, exploration, cooperative, participation, and conclusion (Whiting, 2008).

The initial state of the interview is the apprehension phase contains aspects of strangeness and uncertainty. This can be eased before the interview with some small talk, and a relaxed atmosphere is the preferred goal. This early in the interview the wording of questions is important; they should contain elements that make them familiar to the interviewee (Whiting, 2008). This is also supported by Myers (2013) as it shows the interviewee that we are listening and interested. We adopted this in our interview guides, making the first of three parts about the person in question, letting them feel central and comfortable. If we perceived that an interview

didn't feel relaxed in an interview, we tried to ask them a few more questions about themselves. This worked in all interviewees except one, were underlying stress made it hard for the respondent to relax, resulting in a structured interview with short answers.

Table 2.1: Probing techniques (Russell Bernard, 2000). Table is cited from Whiting (2008)

Type of probe technique	Description of probe
Silent	Interviewer remains silent and allows the participant to think aloud.
Echo	Interviewer repeats the participant's point, encouraging him or her to develop it further
Verbal agreement	The interviewer expresses interest in the participant's views with the use of phrases, such as 'uh-huh', or 'yes, okay'.
Tell me more'	The interviewer clearly asks the participant to expand on a particular point or issue - without the use of echoing.
Long question	The interviewer asks a lengthier question that also suggests that a detailed response is sought
Leading	The interviewer asks a question that encourages the participant to explain his or her reasoning.
'Baiting'	The interviewer gives the impression that he or she is aware of certain information. This might prompt the participant to explain further.

As the interview progresses we will enter the exploration phase and the interviewee should begin to engage in more in-depth descriptions. This should be achieved and continued, developed by using open-ended questions because some individuals are not used to expressing feelings. At this phase, we will gain access to vast amounts of information and there is a need to gain more insight into the interviewee's experiences; a technique for this is probing (Whiting, 2008). Whiting (2008) advises using Russell Bernard's (2000) probing techniques (See table 2.1). Two of the interviewees never reached this point; one was too stressed by life, and the other can only be described as well disciplined. The second showed openness by using a more personal language, but never spoke for a longer time. It is at this point we can ask the second category of questions concerning organization. By putting them here we hoped that the interviewee should feel safe enough to talk about needs, perspectives, and challenges in a more personal and in-depth way. Here we focused on using verbal agreement, tell me more, leading, and echoing as probing techniques. We avoided silent, long questions and baiting, as we perceived that they could be experienced as negative and forceful. A wrongly enacted baiting could lose the trust of the interviewee.

When a full comfort level is reached the interview enters the co-operative phase, and the discussions becomes freer. Confidence has expanded and clarification can be used more extensively. This can be expressed in signs of enjoying the interview and a more open language. Other signs can be sharing family information, and while it is seen as acceptable for the

interviewer to share some information, it is important not to lose focus. At this phase, more sensitive questions can be asked (Whiting, 2008). When our interviewees had talked about themselves and the organization we moved over to ask about the third category ecosystems. We hoped that the earlier categories should now have made the interviewee comfortable enough to talk freely about others and collaboration. To our distress we found that very few of the organizations had developed to such a degree that they could talk deeply about surrounding subjects. When this was encountered we seized the opportunity to probe about earlier statements from the interviewee and asked to clarify different statements. If there were opportunity, we made statements such as "I understand that you are… is this correct?" or "From what I see there are challenges here… why do you think it is like this?".

The penultimate phase is called participation and is not always acquired. This is dependent on factors such as time, comfortability, topic, environment, and timing. At this phase, the highest connection between the actors has been reached. The main element of this phase is that the interviewee is teaching and guiding the interviewer in the given subject (Whiting, 2008). In the interviewees this was never achieved, this can come from the fact that the interviewees didn't have the longest experience with the matter, open data is fairly new, this is only a hypothesis. The main drawback created from this is that we do not gain greater insight into the interviewees rational and logical capabilities and, strategic response to open data at a deeper level.

The last phase of the interview is the conclusion, or what is referred as the exit by Myers. Whiting (2008) advises that all actors should feel ready and comfortable to finish. It is best if it ends on a positive note. To achieve this, we asked the interviewee if they have any more questions, or if anything needs to be clarified. We followed Myers advice about asking for permission to follow up, and for recommendations for others to interview. We also added a positive question about benefits from open data to the interview guide at the end to further develop this positive ending. Asking for recommendations showed to be of central importance to the study as it would lead us to the next interviewee or someone else who could help.

For the formulation of the script (interview guide) we followed the advice from both Whiting (2008) and Myers (2013). Whiting (2008) advises for open-ended and open questions in general. Good use of interview questions will lead to the generation of knowledge and maintain the interaction. In contrast, Myers (2013) advises beginning them with 'who', 'what', 'why', 'where', 'when', and 'how'. The author also brings up that we can ask the interviewees about experiences, behaviors, opinions, values, feelings, sensory experiences, and personal background. From the author's advice, we see that there is a need to ask questions that are familiar at first, and then slowly move over to the broader questions. We will go from questions about the person, to open data, and lastly move over to the open data ecosystem. Questions will be formulated to be open for the interpretation of the interviewee, and give room for longer answers that can be followed up on.

2.4.2. Participant Observation

Participant observation is a method where we, as part of the daily life of participants, can study them. The aim is to become a neutral part in the context so that we can directly study the actions in the natural setting as a member of the community. With this, the research data collection process should be easier and we can observe the difference between words and actions, both

becomes strong advantages while the disadvantage is the time consumption. In combination with interviews, the method can be used to gain a holistic understanding of the phenomena under study (Kawulich, 2005, May).

Two interviews had already been conducted by two other researchers with one of the municipalities; it opened for either deeper interviews or participant observation. Deeper interviews would open up for questions about progression, experience, emotions, and future endeavors, but it would also bear a higher chance of scraping the bottom. With participant observation, we could see the application of the words mentioned in interviews in practice, also gaining a more holistic understanding of the phenomena. The method would let actions speak over words, and give a deep and rich insight into the daily reality of the municipality. Because of limited resources on parts of the municipality and mentioned advantages we selected participant observation.

According to Kawulich (2005, May), there are different approaches to carrying out the participant observations. We can observe everything to something specific. At the first meeting, we observed everything, absorbing every possible bit of knowledge to gain deeper insight. With the information, we could at later meetings focus more on the important data. In practice, we participated in meetings, often less than 6 hours, between the municipality and other actor groups. We positioned ourselves at the edge of the social group, giving room for the participant's activity. This gave us the opportunity to study the interaction, future strategies, actions around open data, conflicting perspectives, and expressed challenges. At the end of a meeting, if there was a need, we could ask the participants to bring clouded factors into clarity. From such questions we learned and experienced the conflicting perspective of society versus economy in the municipality and business relationship.

Participant observations were documented with Spradley's (1980, p.78) grand tour observation. Keywords and statements by participants in the observation were written down and later coded. The grand tour contains nine main dimensions that centralize around the main aspects that exist in every social situation. These dimensions are *Location* (Physical location), *Actor* (Involved individuals), *Activity* (Series of related actions individuals perform), *Object* (Physical object at the location), *Action* (Single actions performed by individuals), *Event* (A series of related activities performed by persons), *Time* (Sequences that are performed with time), *Goal* (The mission of the individuals involved) and *Feeling* (Expressions and perceived feelings).

In total three participant observations were conducted with one of the municipalities, with the focus on the relationship between them and business. In the first event there was opposition between both parties, but in the last two, it contained feelings of collaboration. Between those two there was a change of event and businesses. In the first one businesses tried to sell their product, while in the later the business was a collaboration partner. While the first event gave deeper insight into the relationship between business and municipality, the later ones clarified the internal goals and challenges of the municipality.

On a more critical note, as mentioned at the beginning this method, it's execution is time-consuming and there is a need for longer exposures to gain enough data. This we believe was solved by having the two interviews from earlier, making the participating observation and interviews complement each other.

2.4.3. Documents and Interpellation Debates

Documents can be anything from emails, blogs, web pages to newspapers; any text written by humans (Myers, 2013). If collected documents were central to the phenomenon of study they were coded, else we analyzed them for any important data on the context to be stored before being discarded. The documentations were to the majority websites where we gathered information about the municipality or business. One action plan was inquired from a municipality. One project report was inquired from a business. All collected documents were under criteria of authenticity, credibility, representativeness, and meaning (Scott, 1990). As we conducted the data collection we noticed a strong trend of poor turnout for documents, and this became a driving factor transforming the collection method into supplementary rather than primary. As this method was not primary, we didn't apply any major theories to its execution, as there was not enough collected data. In the end document, collection became supplementary to interviews to give a more holistic understanding.

As the study continued we noted that the context surrounding municipalities and businesses, in relation to open data, were more than then the studied cases, the Swedish parliament, and Swedish governmental agencies were important contextual factors, mentioned several times by the interviewees. From their references we started to collect data in the form of documents and observed parliamentary interpellation debates to understand these contextual factors. This became a central role for these data collection methods; to build and understand the context around businesses and municipalities in relation to open data.

For interpellation debates, we gained the insight while observing one of the open data community's forums, a post about a Swedish open data interpellation debate was uploaded. Out of curiosity, we chose to explore. The interpellation debate was central to the open data context in Sweden and was therefore added; it was already transcribed and we only needed to initial code it. The debate didn't have any major impact on the participants, rather it showed that the government is working with issues around open data. This is one of the best examples we have on how the study evolved over time, and we hope it will show that we didn't leave any stones unturned.

In the end, both debates and document collection were not primary methods but had an important role as supplementary and context building. While document collection went from primary to supplementary and context building, the study of interpellation debates came into existence through the curiosity to understand the Swedish government open data context. We have come to view this as an excellent example of the iterative evolution of research and it brings up that we cannot plan for everything, but will always have the capabilities to adapt.

2.4.4. Asynchronous Email Interview

This data collection method was never used but was prepared as a backup. Asynchronous email interviews were not a main source for data collection, rather they were a backup method. It would be used when there was a lack of resources on any side of the participants in an interview, but the main weight would be put on the interviewee's free time. This method of data collection is often used when the subject of interest is highly sensitive to the interviewee (Ratislavová & Ratislav, 2014, Cook, 2012).

2.5. Empirical Data Analysis

To make sense of and gain insight into the collected data we need to analyze it through some process. In this section, we will outline the empirical data analysis method used and also explore the different selections and qualities. The goal is to make it possible for you to be able to duplicate this in the future. We will start by outlining the process abstractly and then explore it on a deeper level.

Code analysis is one of the simplest ways to analyze qualitative data (Myers, 2013). Coding is conducted when we connect some data to one of many codes. These codes are then sorted into categories that we synthesize into concepts and themes. From themes and concepts, we make abstractions to identify and synthesize theories (Saldaña, 2015).

In the analysis we used coding as the empirical data analysis method and the initial codebook (See annex 5) were created from the theoretical framework. We found the selection of coding techniques challenging as there existed a few of them (Saldaña, 2015). The method was selected because of earlier experience with coding, the vast application range, and its ability to map the unknown. Saldaña (2015) describes the coding processes to be structured in two cycles, the first and the second. The first focuses on transforming data into codes and structuring the results. The second focuses on bringing forth connections and relations into a theme and to later synthesize a theory. For this study, we have used three cycles instead of two.

The extra cycle is added before the first cycle and can be viewed as an initial cycle. This cycle is added so that the municipalities and businesses do not merge into one and make filtering for important resistance factors more obvious. It is a way to strongly separate the collected data from different actors and sort it before more complex codes and connections were used; it supports versus coding.

2.5.1. Summary of Empirical Data Analysis Process

To summarize the empirical data analysis (See Figure 2.3), we started by creating an initial codebook from the theoretical framework (See section 3.6), with an abstract level of codes, breaking up the transcribed data collections named after the codes.
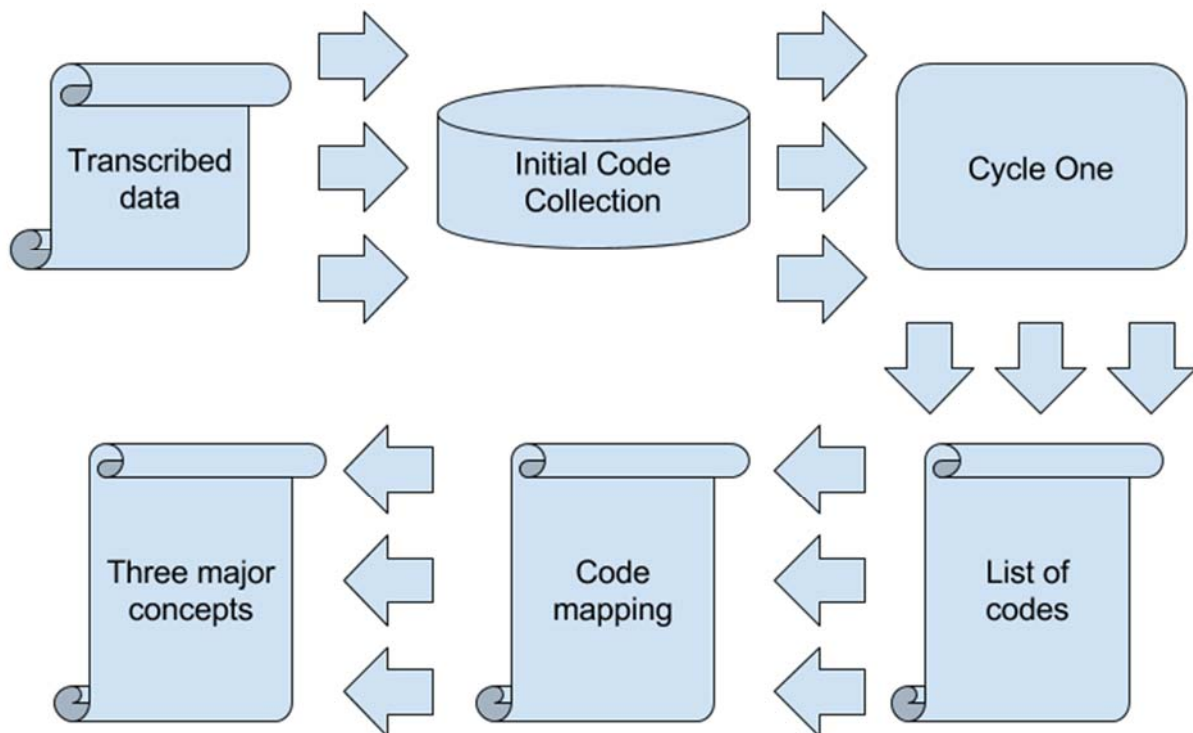
Figure 2.3: Procedure of analysis method

Data was coded following the codebook and quotes were collected. In the first cycle, we selected initial data collections and the coded data was split into smaller more precise codes, creating a list of codes. Here we selected collections of codes that would help answer our research questions. At the end of the stage, code mapping was deployed and three major themes were created for further analysis The second cycle was never used and existed only if there were challenges in identifying a theory and three themes. To summarize;

1. Initial Cycle: Code collected data into codebook that is based on theoretical framework. Creating collections of data under codes.
2. Cycle One: Select data collections and split them into smaller and more precise codes.
3. After Cycle One: Code map and identify three themes; Barriers, Balance and Infrastructure.
4. Cycle Two: If all else fails, use theoretical coding to filter and re-sort codes.

2.5.2. Initial Cycle

In an earlier literature review, we can identify keywords such as; bureaucratic, political, risk, standards, etc (See 3.6). These can be used as codes or categories for a code analysis. The initial codebook was created from the theoretical framework (See table 2.2). All identified and

created codes was stored in a codebook where each code had a content description and a brief data example (Saldaña, 2015).

The codes were not selected at random. Saldaña (2015) has identified 25 codes, but we cannot apply all of them in one analysis; that would kill the data and probably the researchers. We wanted to understand the relationship between business and municipality in connection to open data, therefore, we also need to understand the parts before we can understand the whole. For the empirical data analysis, this means that this cycle focuses to understand the parts and sort all of the relationship data into a future analysis collection. We divide the vast and broad amount of data into collections of data. In an abstract way we can view the initial cycle as a way to filter and sort the data.

In one way we can view this as coding the theoretical framework. We could have used initial coding to fast code the framework, but that would result in a messy solution. Another option was to use structural coding, creating codes sorted to the research question. This would be faster in giving us answers to our research questions, but we risk getting locked inside a conceptual thought box. The resulting coding style used was descriptive, breaking out descriptive codes from the theoretical framework.

The advantage with this step is that we can easily view resistance for each and between the actors. The main disadvantage is that we code more than we need, and when we go over to the first cycle, we can sort out what is important to the study and not. For example, we included and coded development and opening methods; something this study does not aim to understand. This comes from the fact that we created a broader initial codebook in hopes to catch any complex relationships, behaviours, or factors, in accordance with the sociotechnical approach. For initial codebook see annex 5.

2.5.3. Cycle One

In cycle one, we focused on developing categories and identifying more precise codes for marked data (Saldaña. 2015). To select codes to use we turned our attention to the first cycle coding methods mentioned by Saldaña (2015). From the methods brought up by the author two groups became central; elemental and effective methods. In the first group only descriptive and in vivo coding was applicable to the study, but as we were already planning to identify quotes, it was not selected. For the effective method it was more of a challenge of selection as we have emotion, values, versus, and evaluation coding, where all could be applied to the current case. The first to be terminated was evaluation coding as we are not aiming for such goals. As we are studying the relationship between municipalities and businesses inside an open data ecosystem, we can expect emotions, conflict, and values differing in the population. The complexity of the selected subject made us discontinue emotional coding as we perceived it to be too challenging to find exactly what had created such an emotional response. In the end we selected versus, descriptive, and value coding;

- Versus coding: Aims to identify conflicts between an actor and something else. For example, it could be Business versus Municipal Bureaucracy or Social versus Economic perspective.

- Descriptive coding: Aims to summarize collected data into topics; it is important to note this is not a compression of content, rather a synthesis what is talked about. For example, knowledge or social challenges.
- Values coding: Works to identify a participant's values, attitudes, and beliefs. If this could be connected to action it could work to explore barriers and perspectives more. For example, we can see values affecting the progression of open data.

When the first coding cycle comes to an end, we enter what Saldaña (2015) describes as post-coding transitions, where we move to code mapping. This can be awkward as we change physical or mental perspective. Here we work with categories and codes to synthesize concepts. Code mapping will be used to synthesize codes into concepts. This method follows four steps; (1) list all codes, (2) categorize codes, (3) categorize earlier created categories and lastly (4) create three major themes. After step one we had identified a total of 206 codes.
When we completed step four we had identified three themes and 18 categories. With the categories and themes orienting the analysis into perspective we went through the collected data again to see if we had missed any important details.

While sitting with the data we encountered a challenge. At first we had technical and social infrastructure and barriers as themes, however it was there that we encountered a challenge; where do we place the local versus national interest of municipality and business, at the time coded as *LocalVsNational* It is a barrier, but only expressed in the relation of the two actors. First, we created two new themes; one for *infrastructure* and one for what we perceived to be *harmony* issues. We continued to code and categorize to soon find that *harmony* did express the concept we were looking, but had difficulties capturing differences in acceptable minimum open data definitions. After some contemplation, we noted that there were different levels between the two actors, local versus national, now versus future, benefit versus profit, etc. With this, we renamed the *harmony* theme as *balance.*

If after the first coding cycle it proves challenging to identify or synthesize concepts or theory, Salaña's (2015) second coding cycle will be applied and will focus on pattern coding. This will likely change depending on the context. Beyond what has already been mentioned, analytic memos will be used to support the analysis process (Saldaña, 2015).

2.5.4. Cycle Two

As this analysis step was never conducted, we won't go into it in any greater detail. It was created as a backup plan if everything else failed. The plan here was to use theoretical coding to create a core category (Saldaña, 2015). With this, we would be able to filter out less important data and codes to focus on something central. Some possible categories are collaboration, conflict, and benefits.

2.6. Creation of Theoretical Framework

In this section we will briefly discuss the process behind the creation of the theoretical framework (See section 3.6 for result). Starting with selection of theories and lastly the role of the theoretical framework in the study. We only include some of the existing theories on open data, and we have excluded open data theories not supporting the understatement of the phenomena and

analysis. Some of the theories excluded were open data portal assessment methods (e.g. Lourenço, 2015), frameworks for comparing policies and their impacts (e.g. Zuiderwijk & Janssen, 2014), technical structures of open data (e.g. Shadbolt, et. al. 2012), and e-government theories (e.g. Layne & Lee, 2001). We focused on theories that would give insight into the phenomena under study, explain it and give us a foundation for analysis and explanation (See chapter 3 for selected theories).

For the analysis (See section 2.7), we need a way to discern what is of importance, but also give us room to explore the unknown. Unlike quantitative research with a deductive approach, we do not have a hypothesis or variables to formulate around (Myers, 2013). We use a qualitative research with inductive approach, listening and observing reality to make theoretical generalizations (ibid.). As the gap we are exploring is lacking in-depth exploration, but has theories in proximity, we can create a theoretical framework that will aim to guide our analysis. Thus, the goal of the theoretical framework is not to create a hypothesis about the relationship, rather form a framework for exploration and explanation that others in the future can use.

2.7. Analysis with Analytic Themes and Theoretical Framework

The executed analysis (See chapter 5) was orientated with the theoretical framework created from identified theories (See chapter 3) describing the phenomena under study. It was conducted in four steps; (1) present findings from the empirical data analysis, (2) use theory and theoretical framework with empirical data analysis findings to analyze the open data ecosystem, (3) use theory and theoretical framework with empirical data analysis findings and ecosystem analysis to analyze resistance expressions inside and between actors, and (4) conclude the analysis with a presentation of the findings, making it easier to read and to grasp the larger analysis.

First, we presented the three identified themes and relating categories, and identified roles. Here we focused on outlining what belongs to a theme and a category, explaining our thinking.

Second, here we used empirical data and theories to expand on the ecosystem model created in the theoretical framework. First on the sub-ecosystem as a whole and later diving into to analyze separately the technical and collaboration infrastructure.

Thirdly, we moved over to analyze the resistance expressions and how they are related to the ecosystem through theories and the newly improved sub-ecosystem. Following the flow open data, going from publisher (municipality) to the relation between the actors and lastly analyzing the user (business).

Last we presented a concluding analysis, lifting the findings in a separate section, focusing on clear resistance expressions and changes to the ecosystem.

This analysis method was not created through any existing theory, rather it grew from the interaction between theories, theoretical framework and empirical data analysis. Making it an analysis method to contact what has been found to that of what has been theorized, putting it as a method close to the data explored. After completion of the analysis (See chapter 5) we could draw a conclusion and answer the research questions.

3. Theory and Previous Studies

In this chapter we will explore the research field of open data; defining and exploring origin and shapes of open data. Moving on, we examine the different perspectives populating the field and stakeholder perspectives. Then we will look at myths, barriers, and benefits for the development of open data. Lastly, we will look at the open data ecosystem and the study's theoretical framework. The goal of this chapter is to build for us and the reader a healthy insight into the field of open data. Theories are proposed explanations of observed phenomena (e.g. Dawes, et. al., 2016) and previous studies brings fourth research results (e.g. Barry & Bannister, 2013), to lessen confusion we will reference both as theories or theory.

3.1. What is Open Data?

In the following section, we will explore the definitions assigned to and around open data. Auer, Bizer, Kobilarov, Lehmann, Cyganiak and Ives (2007) approach to open data is collecting data from a source to make it more available for those that are in need of it while at the same time adding features to process the data in a more complex way for the end-user. The authors never give a clear definition of open data, rather they show a way to implement it, using Wikipedia as a source. We can view this as "defining" open data through the actions and ideas of the actors. Uhlir and Schröder (2007) suggest making research data public in hopes to achieve positive effects in the global world of science. Their use of open data indicates to a belief that there exists data that should be publicly owned, and a need to standardize the process for the creation of open data. Boulton, Rawlins, Vallance and Walport (2011) points to the positive effects of making research information into open data, much like Uhlir and Schröder (2007). They indicate that data should be accessible by all members of society, not only the researcher/s. Both author groups never give a clear definition of open data; rather, it is defined through proposed actions than anything else.

In above examples, we see a theme of knowledge and action. Another theme brought up by Shadbolt, O'Hara, Berners-Lee, Gibbins, Glaser and Hall (2012) is open government data. Governments produce vast amounts of data from different services, measures, and departments. As there is a need for data to be available to the public, they publish it through different channels, making it open data (ibid.). According to the authors, this is increasing in the world.

Open Knowledge (Open Knowledge, 2016) defines and sets out a bundle of principles for open data. They first go out to define open in relation to data and content, stating the following;

"Open means anyone can freely access, use, modify, and share for any purpose (subject, at most, to requirements that preserve provenance and openness)." (ibid.)

After defining open they move over to put it in context with data and defines open data as;

"Open data and content can be freely used, modified, and shared by anyone for any purpose" (ibid.)

With this definition, they go on to set out principles for open data. Open data must be under an open license, be provided as a whole and should be provided through the internet, only have a one-time fee, be machine-readable, and be in an open format. The open license associated with the open data is only viewed as open if it satisfies an open use, redistribution, modification, separation, compilation, non-discrimination, propagation, application to any purpose, and no charge. The license cannot limit the usage of open data (ibid.).

Socrata Inc's (2013) definition of open data follows: *"Making data that belongs to the public broadly accessible and usable by humans and machines, free of any constraints."* (ibid.), and is governmental themed. This is criticized by Barry and Bannister (2013) because of the unclear definition of the word "belongs". Further, we can argue that "broadly accessible and usable by humans and machines" is also unclear, as just publishing human readable text data on a website would achieve this, but the website might not be publicly known. Here, the data is in a state of broadly accessible but not known.

Thirty open government advocates met in Sebastopol, California, and created eight principles of open government data. Only if government data follows these principles should it be considered open (Tauberer, 2016). To summarize them;

- Complete: All data that is not subject to valid security, privacy or privilege limitations shall be made public.
- Primary: Data is collected at the source in none aggregate or modified forms, with the highest possible granularity.
- Timely: To preserve the value of the data is has to be made available as quickly as possible.
- Accessible: Data should be made available to the widest range of users and purposes.
- Machine processable: Data is structured in a way that allows automated processing.
- Non-discriminatory: Without a requirement of registration data is available to anyone.
- Non-proprietary: No entity has exclusive control over the data availability.
- License-free: Data is only restricted by reasonable privacy, security and privilege restrictions. It cannot be restricted by copyright, patent, trademark or trade secret regulation.

Tauberer (2016) also proposes 7 additional principles that might have been considered by the representatives;

- Online & Free: Data should be published online closest possible to no fee.
- Permanent: Data should be made on the internet and in a stable format.
- Trusted: Data should be digitally signed or in another way validate its integrity.
- A Presumption of Openness: Government and other parties should act in an open way.
- Documented: Open Data's format and meaning should be documented.
- Safe to Open: Open data formats should avoid executable content.
- Designed with Public Input: As the public is going to use the information, they are the best to give input.

The Obama (2013) administration defines open data as the following:

"For the purposes of this Memorandum, the term "open data" refers to publicly available data structured in a way that enables the data to be fully discoverable and usable by end users." (p. 5).

With this definition also comes a collection of principles that should be adherent to:

- Public: Agencies should act in favor of openness in limitation of law, privacy, confidentiality, security and other valid restrictions.
- Accessible: Open data should be made available to *all* in a way that is modifiable and convenient. Over the open data formats, the user should be able to retrieve, download, index, and search its contents. The open data formats should also be machine-readable and provided in multiple forms for consumption.
- Described: Open data should be documented to explain its strengths, weaknesses, analytical limitations, security requirements and how to process it. This includes metadata, documentation of data elements, data dictionaries and descriptions for the purpose of the collection, population of interest, sample characteristics and method of collection.
- Reusable: Open data is under an open license, that places no restriction on use.
- Complete: Open data is made available in the most primary form. Data that has been published in an aggregated or derived form must reference the primary source.
- Timely: Open data needs to be up to date and should, therefore, be published as soon as possible.
- Managed Post-Release: Open data should have a support point that assists with use and handles complaints about adherence to open data requirements.

Vinnova, the Swedish innovation agency, simply put open data as information that is accessible without restrictions in the form of payments or intellectual property rights (Myrehed, 2016). The agency also refers to the principles presented by Tauberer (2016). For further reading, they point to the *Öppna data* article on Wikipedia ("Öppna data," 2016). What is interesting is that they do not make an exact definition of what open data is, rather, they leave it open to interpretation and refer to others' works. This creates room for crowdsourcing, but also makes it hard for actors to fast communicate ideas around open data. This can also lead to uncertainty for newcomers as they can perceive open data too abstract to grasp.

Above, we can see many different perspectives on open data; from exact to abstract, and even references to others. According to Barry and Bannister (2013), it is not abnormal for open data to be used in a loose and undefined way. In the above we have brought up many definitions; even though they exist, it doesn't automatically mean people will use them. What we found interesting amongst the definitions was the importance of theming. For example, if open data is put in relation to governmental or research context, this can be viewed as it will always come with subjective placement in the world for a given individual. When looking at the meaning of open data we can see that it can be directly defined, described through principles, or exist through personal actions and ideas. For us this means that we cannot listen to just the words of a single individual; we have to be open for descriptions and principles of open data, as well as the action related to the promotion.

In short, definition, description, and actions correlated to a theme create open data in our minds, meaning that we can analyze these aspects between actors to find differences between perspectives on open data. This also means that we cannot, at the moment, take for granted an assumed definition of open data. Rather, we will have to listen to the world around us.

3.1.1 Shapes of Open Data

In the above we discussed and presented definitions for open data, while remaining unaware of the shape it holds in reality. This is not abnormal for the theories on the subject, as they abstract away from the shapes to focus on the more complex technical and social structures. This is not saying that the shapes open data takes are not complex. In this chapter, we will explore open data's channels and shapes from a technological perspective. We will not explore all of the possible shapes, just enough to give the reader a grasp.

As open governmental data is part of open government and it's digitalization, it seems that there is a silent agreement that the main channel of open data is the internet. The channels often take the form of websites (e.g. "data.gov.uk", 2016, "Öppna data - Open Stockholm", 2016) referred to as open data portals (Lourenço, 2015). On this, we can find references to open data in different formats, everything from an API to a pdf file. These websites can aim to be a collective hub for a country, e.g. CKAN (2016), or more local and just represent a municipality e.g. "Eskilstuna kommun - Fakta om Eskilstuna - Öppna data" (2016). Lourenço (2015) has created a model to assess different open data portals.

Another way to view open data channels is to perceive the other side. Rather than having a governmental website as the main supplier of open data, people could work as the transportation. Anokwa, Hartung, Brunette, Borriello and Lerer (2009) have created a software for easy rich data sharing between individuals in developing countries, where information infrastructure isn't as developed as in industrial countries. Their research focuses more on open source data collection then open data itself. This is of interest as it indicates a way to collect and spread open data through individual collaboration. This could be used to spread open data to remote areas inside a country.

Berners-Lee (2015) have created a five-star scale to assess linked open data, where the later levels are dependent on the earlier. For the first star; the data is available on the web with an open license and in any format (e.g. PDF). For the second star; Open data is now machine-readable structured data (e.g. Excel). For the third star; Open data is now published in a non-proprietary format (e.g. CSV). For the fourth star; Open data uses open standards from W3C that allows to identify it, so that people may reference to the data (e.g. RDF and SPARQL). The last and fifth star; Open data is now linked to other data sources to provide context. In the examples we see different formats that the open data can use and that it can have properties such as linked. Linked-data is not an unexplored subject (Shadbold, O'Hara, Berners-Lee, Glaser & Hall, 2012, Vander Sande, Dimou, Colpaert, Mannens & Van de Walle, 2013, Ding, Lebo, Erickson, DiFranzo, Villiams, Li & Flores, 2011, Zuiderwijk, Jeffery & Janssen, 2012). With linked open data we can also use metadata to describe the open data (Zuiderwijk, Jeffery & Janssen, 2012); one such format is DCAT-AP (CKAN, 2016).

3.2. Open Data Origins

In this section we will explore the origins of open data from ancient times and how it has come to be in Sweden. The concept of open data is not as new as we might expect; we can view it as one of those human concepts that has always been around in one form or another, interwoven and formed with the evolution of social structures; evolving from one state to the other, giving form to new ideas and actions. Further, we have to consider that definitions of *open data* vary between individuals, making it hard to pinpoint an exact point in space and time where it all started. When we break down open data we can note it is related to opening something. In this study, we focus on open data in relation to government. If we follow the historical exploration of Tauberer (2012) we find the idea of openness is an ancient concept. The author remarks to an ancestor of open data in the 6th century BC Athens, colonial America, Visigothic Europe, 1700th century China, and lastly 1766 Sweden. In the earliest examples (first three) we find a theme of focus on scribe laws while in the later (last two) we find inspection of the government to be more central. Tauberer (ibid.) anchors the origins of open data in ancient philosophical concepts of open governmental systems. We can argue that the author points more to an age old tradition to widen the government for practicition and, rather than finding the origins of open data, he uncovers the origins of open government that later on leads to open data. Open data is a part of the open e-government philosophy (e.g. Bernd, Birkmeyer, 20015, Sandoval-Almazan & Gil-Garcia, 2015, Jansen, 2011, Weizhang & Jiefang, 2010, May) and sometimes it is viewed as synonymous with open government (e.g. Harrison, Pardo, & Cook, 2012).

For Sweden, the access of governmental data is not new. On December 2th, 1776, *Tryckfrihetsförordningen*/Freedom of the Press (Nordin, 2016) was enacted. Later, on March 23rd, 1949, it was revised to become constitutionalized, and with it, a principle of public access to official documents came (Tryckfrihetsförordning, 1949:105). These laws are not, per say, open governmental data, but an earlier form of it's release. The principle gave citizens rights to, when they like, study public documents, and in doing so be able to monitor and criticize the actions of the government.

In USA, the idea of an open government is not new. Parks (1957) states the importance of opening the government to balance the power distribution in a democratic system. He views this as central to make a democracy successful. Sometime later in 1966 USA enacted their Freedom of Information Act (FOIA) which applies only to federal agencies, making it possible for any person to acquire federal agency records (Freedom of Information Act, 1966). This was not inspired by the European Enlightenment, rather it was a reaction to the growth of the federal government during and after WWII, based on the resulting record-keeping and bureaucracy, as well as the increased skill of propaganda to the country's own public (Tauberer, 2012).

Both the Swedish and USA's policies point to an opening of the government to the wider public. Open data has not yet come into the picture at this point in time, as it is part of the digitalization of the government . This comes from the fact that the technology needed to support open data had not yet come into widespread use, but this soon changed with the invention of the personal computer and the internet. The call for open data didn't just come from the invention of technologies; it actually started a bit earlier, at the end of 1980s (Janssen, 2011). This movement lead to the EU directive 2003/98/EC that focuses on the re-use of information rather than on the access of the information for citizens. It is also known as the PSI-directive (European Parliament and Council, 2003).

In 2005, the first open definition was created by Open Knowledge (Tauberer, 2016); what is important to note is that this definition is in relation to data and content, not openness in a general sense (Open Knowledge, 2016). The work to define open data continued. On December 7-8th, 2007, eight principles of open government data were created by thirty open government advocates meeting in Sebastopol, California (Tauberer, 2016). According to Lee (2014, October), most of these principles are still in use today and more recent principles around Open Data have their origins in this list.

On January 21st, 2009, the Obama administration issued an Open Government Directive. It aims to make executive departments and agencies conduct specific actions to implement three principles; transparency, participation, and collaboration. One of the actions was that agencies shall identify and publish online open data in 45 days (Obama, 2009). Later that year on February 4th, Tim Berners-Lee, the inventor of the internet, participated in a Ted Talk encouraging publication of raw data, moving from a Web of Documents to a Web of Data (Tim Berners-Lee, 2009, February 4).

In January 2010, London launches their open data site Data.gov.uk officially (Davies, 2010). On July 3rd, later that year, the earlier EU introduced PSI-directive encouraged Sweden to create the PSI law; Lag om vidare utnyttjande av handlingar från den offentliga förvaltningen, 2010:566 (PSI-Datakollen, 2014). The purpose of the law is to foster the development of an information market by easing the individual's use of documents provided by agencies. 2010:566 will, from here on, be referred to as the PSI-law. In the same year, the Swedish Parliament opened their databases for the public (Swedish Parliament, 2016).

In 2011, Stockholm city published their open data through their website. Since then, they have published datasets about environmental statistics, streets, parking spaces, maps, airplane pictures, population statistics, activity data, and user surveys (Stockholm Stad, 2014). One year later, OpenData.se was developed as a virtual platform for the intermediation of open data and a portal for innovation (CKAN, 2016). On March 11th, 2013, Lundblad, et. al, (2013) released a guideline rapport to work with open data. The rapport introduces open data to the reader and how to publish it. It brought up challenges and solutions, and is aimed to support the development and mature rate of open data in Sweden. Later that year, on May 9th, the Obama (2013) administration issued a memorandum about the work with open data, giving definition to many terms and guidelines around the open data subject.

In 2014, Eriksson (2014), a journalist, released the book *öppna myndigheten* through one of the organizations supporting Swedish governmental agencies and municipalities. The book helps governmental agencies to become open and see the benefits in doing so. The same year *oppendata.se* achieved 111 datasets (Arwidson & Kolsjö, 2016). Two years later, on March 20th, 2016 it reached 329 datasets. On February 21st, 2014, PSIdatakollen.se was published (Borälv, 2014). The site displays information about the PSI-directive and how well different public organizations follow it. Today (2016 March 20) 177 of 655 public organizations follow the PSI-directive (PSI-Datakollen, 2014). In 2015, the NODS project started. This project implemented a prototype that would help municipalities or other sources publish data into a conversion system, where the end-user would have access to a standardized output (Eriksson, Hammarsten, Melin, 2014).

From history, we can see that the origins of open data come from the ancient idea of open government, starting with a distribution of laws to society and the inspection of governmental hierarchy. As we approach modern times, it gains more focus on access to any kind of governmental information. Today, the digital government is focused on fast and easy access to information. Therefore, open data itself is not open government, rather, an expression of the concept in today's society. An expression that has, in some form, been with us from ancient times.

3.3. Perspectives on Open Data

In this chapter, we will discuss different perspectives existing on open data. Open data is not a one-sided perspective approach with easy implementation or just a series of policies, both research and the practical empathises different subjects (Gonzalez-Zapata & Heeks, 2015, Dawes, Vidiasova, & Parkhimovich, 2016). Between two actors we can find differences in perspective; we only need to look back at open data's definition (See section 3.1) to see this. To understand resistance expressed between two actors we will have to understand their perspectives on open data. If their perspectives are the same we can focus on barriers, while if they are different we will have to analyze those differences and see how they affect resistance.

Gonzalez-Zapata and Heeks (2015) have identified bureaucratic, technological, political and economic to be perspectives of different stakeholders in a Chilean governmental context. While Dawes, Vidiasova, and Parkhimovich (2016) have found that focus perspectives of research and practical guidelines can be divided into data-oriented, program-oriented, use- and user-oriented, scorecard and impact, and network and ecosystem approaches. Both are different perspectives on what form open data takes in reality, is it something technological, a service or even a system of impacts (See table 3.4).

Table 3.4: Summary of perspectives

Gonzalez-Zapata and Heeks (2015, p. 3)	Dawes, Vidiasova, and Parkhimovich (2016)
Bureaucratic focuses *"on policies of data regulation, strategies, and processes within government system."* and seeks *"improvements in public services through greater efficiency and effectiveness of data management"*.	Data-oriented: Places focus on the data itself, such as quality, properties and availability of datasets. Policies for publication. This is the perspective that addresses what is open data.
Technological encapsulates *"a technological innovation within government systems"* and *"improved government data infrastructure"*.	Program-oriented: Focuses on open government data portals, such as purposes, features, structures, operations, and properties of these platforms. This perspective addresses the channels and homes for open data, but also open data governance and policies and strategies.
Political cares about *"a right of free access to public sector data."* and seeks *"better*	Use- and User-oriented: Encapsulates, on a social level, uptake by individuals,

governance through increased transparency, accountability, participation, and empowerment".	businesses and civil society users, user capabilities and business models for data reuse. While on the more technical it covers data usability, technical support, and services for data users.
Economic perceives open data as *"a mechanism to generate data-base economic value."* that can be achieved *"... through new products, services, revenue, profits, and jobs".*	Scorecard and impact: Approaches open data in a more holistic view and tries to address the wider array of considerations that are believed to influence how and the success of the initiative. These can be policies and best practices around open data. Where on the technical side is a focus on technology factors that influence value creation and technical implementation processes.
	Network and Ecosystem: This perspective tries to understand the dynamic relationships that influence an open governmental data programs performance. Through dynamics over time, interactions and interdependencies, feedback and communication among stakeholders, sustainability, government intervention, environmental influences and enabling actors.

Gonzalez-Zapata and Heeks (2015) provide a framework for analyzing different stakeholders and their perspectives in a given context. In their case, it is the country of Chile and the context of open data. The framework can be used to identify identity, power, motivations, and worldviews of key actors. Thier research comes from a question regarding who the stakeholders are, what meanings do they assign to open data, and why do they give open data these particular meanings. As their research focuses on Chilie, the result cannot be directly applied to Sweden, and there is a need to explore differences. Their methodology can be integrated into answering any questions shared with the authors. Here exists a chance for deeper analysis to identify differences and develop a more robust framework for stakeholder analysis in the future. The authors have forgotten the perspectives of the private sector, they have forgotten one of the main users of open data; this is a weakness in the research, but not something fatal, as it leaves space for others to expand upon for further research as they verify the findings. Two perspectives we believe can be found in the private sector is that of creativity and informing. In the first the actor views open data as something that can be used as a creative release, to create something new for personal development and fun. In the second the actor perceives open data as something that can bring clarity to unknown factors, not something that brings direct economic value, but fills out gaps in personal knowledge.

For Dawes, Vidiasova, and Parkhimovich (2016) approaches the data-oriented focus towards understanding the technical and how it is affected by policies, moving with the orientations gradually we find a change in perspective from technical towards social elements that support the process. What we can see is how the first approach is more technologically focused and towards the details while the last is holistic and sociotechnical orient. Only in the last perspective, network and ecosystems, do we find room for the complex expression of social systems on a higher level that, in the end, will support technical and social systems in the implementations of open data in society. This becomes important as it will leave room to explore potential gaps in the supporting social structures around an open data ecosystem.

The two viewpoints towards approaches can in combination with each other create a deeper insight of the perspectives towards open data. These combinations will later be used in the theoretical framework (See section 3.6).

The bureaucratic and technical perspectives engulf both the data- and program-oriented approaches as they together touch on policies, strategies, and regulation on a social level while both also makes concerns about the technical through to understand what is open data and seeks to improve their data management and infrastructure. This can be viewed as the municipal perspective or approach towards open data.

The political and economic binds together with use- and user-orientation and scoreboard and impact approaches as politicians want to achieve better governance through transparency, accountability, participation, and empowerment. Meaning that they perceived use and impact as important were they want to achieve certain properties in reality. Even if they enact policies they are created to achieve these outcomes, making it lean towards scorecard an impact rather than data-oriented approaches. This creates a political perspective or approach towards open data.

The economic and technical perspectives would create an approach where new products, services, revenue, profits, and jobs are achieved by implementing the technical level open data. Meaning that this would cover data- and program-oriented approach leaning towards use and impact. This creates a business perspective or approach towards open data.

The last important combination is that of the political and economic, were use- and user-oriented merges with scorecard and impact to be supported by portal focus, to form the citizen perspective or approach towards open data. Where open data is a way to achieve societal value, but also gain insight into the affairs of the government.

Lastley, Gonzalez-Zapata and Heeks (2015) describe an "inwards and upwards" pattern of open government data, where it is more formed by the government than other factors. The authors also mention that there is a gap between reality and implementation, as the government focuses more on the end result than the first step (ibid.). Here we are given a cultural social structure that can be compared to the Swedish government's interaction with open data and can help find differences in the approach to the subject. From the identified gap we can also take a more critical approach and ask if different stakeholders prioritize different areas inside of open data.

With both the different perspectives and the identified gap we have two important sources of resistance. Different perspectives can lead to different implementations that, in the end, can cause conflict between actors while the reality gap can also result in hasty decision making that skips important elements in the development of an open data ecosystem. In the above perspectives we find politicians and citizens focus more on the results than the journey, while both municipalities and businesses need that journey to happen for them to make society reach the goals. With a strong focus on the goals the journey is forgotten and those progression is lost.

3.4. Open Data's Myths, Barriers, Benefits, and Impact

We know the definition, origin and shapes of open data, but there are still some crucial parts left; the myths, barriers and benefits surrounding it. In this chapter, we will explore these areas, lifting cases with benefits and two theories; one about barriers, and the other about myths.

3.4.1. Benefits and Impact of Open Data

To fully understand how ecosystem elements, affect benefits, we first need to know what they are and how they impact society. Through this we can see what actors want to achieve, but also put resistance in a context. This grows to cover the relationship as different goals can collide between the actors to create resistance friction.

In a broad spectrum, benefits can be categorized as (1) *political and social*; more transparency, democratic accountability, and public engagement, (2) *economic*; stimulation of innovation, development of new products and services, and use of the wisdom of the crowds, and (3) *operational and technical;* the ability to reuse data, access to external problem solving capacity, and creation of new data based on combining data (Janssen, Charalabidis & Zuiderwijk, 2012). The benefits lifted by the authors are broad and can be challenging to apply in situations where one "benefit" covers multiple areas, making the definition too abstract to be useful in such a situation. It is not that the categorization is lacking, it is just that we are missing ways to measure the impact in separate categories, and in so make deeper comparisons. If we focus on the abstraction level we see that the categories catch all the benefits of open data in three categories, making it too applicable, as it will bundle about anything inside one category, forcefully removing any strong context bound to it. The categorizations, for example, transforms newly developed products into economic, saying nothing about the actual benefits of the product in society. Making the categorizations only one step benefits categorization, meaning that we are losing benefits later down in the chain. If we include these benefits we are back at square one, one "product" filling all the benefits, telling us nothing about the actual benefits. For examples in each category see annex 6.

3.4.2. Publication and Adoption Barriers

Resistance towards the development of a full open data ecosystem can take the form of barriers; something that creates a hindrance to achieve a certain goal. In theory, we found barriers for the publicizing and adopting open data. This will help to identify expressions of resistance towards a fully developed open data ecosystem.

Janssen, Charalabidis and Zuiderwijk (2012) have identified institutional, task complexity, use and participation, legislation, information quality, and technical as adoption barriers. Barry and Bannister (2013) have identified 20 publication barriers to make data open in Ireland from a central and local governmental perspective. Their barriers are divided into six categories and follow risk, cultural, economic, technical, legal, and administrative. Five of the barriers were more prominent than others; organizational culture, data protection act, control/power, resource constraints, and fees/funding model. The complete publication barrier list is as follows (ibid. p. 140);

Risk

- *Data Protection Act*
- Abuse and fraud
- Misinformation
- Misinterpretation
- Trust
- Errors
- Consequences

Cultural

- *Organizational culture*
- *Control and power*
- Performance measurement

Economic

- *Fees and funding*
- *Resource constraints*

Technical barriers

- Technical capacity
- Standards

Legal

- Legislation
- Litigation and liability
- Licensing

Administrative

- Policy
- Security
- Leadership
- Business case

Barry and Bannister's (2014) publication barriers are well developed. The main weakness is its focuses on the governmental perspective, that creates the perception that if we only solve these barriers open data will easily be used in society. This is one of the myths about open data (See 3.4.3). From Janssen, Charalabidis and Zuiderwijk (2012, p. 262-263) we have the adoption barrier list;

Institutional

- Emphasis of barriers and neglect of opportunities
- Unclear trade-off between public values (transparency vs. privacy values)
- Risk-averse culture (no entrepreneurship)
- No uniform policy for publicizing data
- Making public only non-value-adding data
- No resources with which to publicize data (especially small agencies)
- Revenue system is based on creating income from data
- Fostering local organizations' interests at the expense of citizen interests
- No process for dealing with user input
- Debatable quality of user input

Legislation
- Privacy violation
- Security
- No license for using data
- Limited conditions for using data
- Dispute and litigations
- Prior written permission required to gain access to and reproduce data
- Reuse of contracts/agreements

Use and participation

- No incentives for the users
- Public organizations do not react to user input
- Frustration at the existence of too

Task complexity

- Lack of ability to discover the appropriate data
- No access to the original data (only processed data)
- No explanation of the meaning of data
- No information about the quality of the open data (see category "Information Quality")
- Apps hiding the complexity but also potential other use of open data
- Duplication of data, data available in various forms, or before/after processing resulting in discussions about what the source is
- Difficulty in searching and browsing due to no index or other means to ensure easy search for finding the right data
- Even if data can be found, users might not be aware of its potential uses
- Data formats and datasets are too complex to handle and use easily
- No tooling support or helpdesk
- Focus is on making use of single datasets, whereas the real value might come from combining various data sets
- Contradicting outcomes based on the use of the same data Invalid conclusions

Technical

- Data must be in a well-defined format that is easily accessible: while the format of data is arbitrary, the format of data definitions needs

many data initiatives
- No time to delve into the details, or no time at all
- Having to pay a fee for the data
- Registration required before being able to download the data
- Unexpected escalated costs
- No time to make use of the open data
- Lack of knowledge to make use of or to make sense of data
- Lack of the necessary capability to use the information
- No statistical knowledge or understanding of the potential and limitations of statistics
- Threat of lawsuits or other violations

to be rigorously defined
- Absence of standards
- No central portal or architecture
- No support for making data available
- Lack of meta-standards
- No standard software for processing open data
- Fragmentation of software and applications
- Legacy systems that complicate the publicizing of data

Information Quality

- Lack of information
- Lack of accuracy of the information
- Incomplete information, only part of the total picture shown or only a certain range
- Obsolete and non-valid data
- Similar data stored in different systems yields different results

- Unclear value: information may appear to be irrelevant or benign when viewed in isolation, but when linked and analyzed collectively it can result in new insights
- Too much information to process and not sure what to look at
- [Essential] Information is missing

While Janssen, Charalabidis and Zuiderwijk (2012) do lift both the user and publisher, the list is on a very basic level and, in this, they experience the same problems as their earlier mentioned categories (See 3.4.1). It is easy to group barriers into the list without saying anything about the actual challenge. It is also uneven in the abstraction; for example, just in the institutional category we will find Barry and Bannister's (2014) economic, culture, risk, and administrative. While the categories of task complexity, information quality, use, and participation are not rediscovered to a larger degree in Barry and Bannister's (ibid.) barriers. Janssen, Charalabidis and Zuiderwijk (2012) barriers do put a larger focus on the user than the government.

While Barry and Bannister (2013) focuses on barriers for publication of open data from a governmental perspective; Janssen, Charalabidis and Zuiderwijk (2012) focus on barriers for adoption of open data in society. Both parties mention that budget cuts could have affected the results. Barry and Bannister (2013) bring up that the current events of budget cuts and reduced staff in Ireland could have affected the result, making resource constraint more prominent; this is a way to show how context affects the different variables. Both authors never explore the relation and interaction between barriers.

If we compare the two barrier theories brought up above we note that Barry and Bannisters (2014) is more developed than those of Janssen, Charalabidis and Zuiderwijk (2012), many of the later theories' barrier categories can be broken up into those mentioned by the first. What is interesting though is that the later have noted that the perspective on the users' perspective on open data can be a barrier. The challenge here is that we have one theory that accurately describes properties of phenomena, but only focusing on one side of the relation and another theory that is data-oriented in the categories focusing on both sides. Both theories do give us support in our analysis and the generalization possibilities of the study's results, as we can synthesize common challenges between the cases.

This becomes clearer when we put the barriers in contrast with the approaches of municipal, political, business, and citizens (See section 3.3). On an organizational level Barry and Bannister (2013) aims to understand why municipalities cannot achieve open data publication with their social and technical systems, by studying them through a *use- and user-oriented* and *scorecard and impact* approach. The technical data- and program-orientation are suppressed to lift the reasons behind. For Janssen, et. al. (2012) on the other hand, they study adoption barriers from the perspectives of citizens and business from a data- and program-oriented approach, while grouping almost all the challenges faced by the provider into one category. Leaving the reasons behind to focus more on the actual issues. As Barry and Bannister (2013) are covering the governmental organizations, but not reaching outside the actor and Janssen, et. al. (2012) focuses on data- and program-orientation, the relationship between municipalities and businesses are open for exploration through a network and ecosystem approach. What both cases also opens, that is not explored in this study, are barriers for technical implementation inside of municipalities and social barriers for users and businesses in contrast towards open data.

3.4.3. Open Data Myths

Janssen, Charalabidis, and Zuiderwijk (2012) describe myth as a legendary or traditional story that is missing a basis of proof or evidence. They exist as fictional or unproven, but individuals act upon them as if they are the reality. This becomes important in understanding resistance towards a goal as actors can act on unfounded beliefs, resulting in unknown consequences and risk. The authors have identified five myths about open data;

Commonly found in the debate around open data is a belief that just making data public will yield benefits. This brings with it many problematic aspects where the publishers avoid barriers for the use of the data. Just publishing huge amounts of data without the tools to process it will only result in the inability to make conclusions and lowers the trust in the provider. There is a need for the users to have access to tools and infrastructure that will make it easier for them to work with and interpret the data (ibid.). The authors focus on the human use of the data and are missing the inclusion of the machinery use of data. A good visualization for humans can be hard to interpret for technology. This means that we cannot only think about suppliers and users, but we also need to include the machinery in between, and they have also not mentioned where this myth originates from. We belive it grows from ideology and theoretical promises.

While we might discuss stakeholders' relation to data, we cannot forget the content of open data itself. It is common for policies around the subject to be generic and aim to achieve publishing of

data. Here we often find the belief that everything needs to be published, a task both resource taking and daunting to suppliers, developers, and users of data. This can, in some cases, collide with existing laws (ibid.). The authors also argue that there exists data that is useless to publish through the open data process; this can be true for some data. In other cases, data only gains value in relation to other existing data. This property of the data can make it hard to know what needs to be published or not.

In the topic of publishing data, there is a belief that it is a simple matter to publish public data. This means just pushes out the data to the public without editing, cleaning, modifying, or verifying a dataset. This is problematic, as it makes it hard to work with the datasets and almost impossible to search through the vast amount of data (ibid.). To continue on what the authors noted on datasets, by not processing the published data, the government makes each user "reinvent the wheel" to work with the information. This will make anything built around the data unattractive, as a missing standard leads to difficulties automating any process around its usage.

After data is published, it is often thought that everyone will be able to use it. This assumes that every user have some understanding of statistics and experience in working with vast amounts of data. The basic assumption here is that every user has experience, knowledge, resources, and capabilities to make use of the data (ibid.). To build on the earlier argument in the paragraph above, if we just publish data and just assume that everyone can use it, we assume a world where everyone has the same knowledge as the producer of the data. This is, of course, not true.

The last myth about open data is that the publication of it will result in an open government. The pure vast size of data can make it impossible for users to gain any insight into the government. Also, if there is no way for the users to give feedback to the data found, there only exists one-way communication that cannot be considered open according to the authors. For the government to open up, there needs to exist a way for users to give feedback (ibid.).

While myths might be actors acting on unfounded beliefs, it can also be symptoms of a barrier. For example, lacking knowledge about open data can result in publishing with an assumption of automatical benefits, while the lack of processes and insight can result in the publication of everything without cleaning it. A libertarian and open government ideology can push an agenda resulting in the belief that everyone can understand open data and that it, in turn, will result in a more open government. From this we will not perceive the myths as unfounded actions, rather built on the lack of certain knowledge or a strong push from others. This means that a symptom is only a myth as long as we cannot discern its origin, but the above myths, rather, are symptoms that are not fully understood, therefore, if they are encountered in our case, they must be fully explored.

3.5. Open Data Ecosystems

Open data is more than the government releasing data and the free market reusing it for the benefits of society. It contains mobilization of social structures and the standardization of technical structures. This can be viewed as a technical and sociotechnical system (Davies, 2011) or be studied as information ecology, where the interactions between people, IT, and information environment are central (Weizhang & Jiefang, 2010, May). Another way to view open data systems are as ecosystems. This is not something new, as we can see through the expression of Pollock (2011). Pollock criticizes the one-way street approach of the basic model for data processing and pushes for a feedback system between consumers and publishers. In an open data ecosystem both the publisher and user can gain benefits by using two-way communication. The user can develop new products that impact both the publisher and user in a positive way. It is not expected that the government should do this, rather it should work to increase the interest and appetite for government services and data. Ideas and feedback from users can help the publisher develop their processes (Harrison, Pardo & Cook, 2012).

In a coarse way, we have open data as a resource, data publishers, data intermediaries, and data users in one interconnected system. Open data is created by data suppliers, and data intermediaries refine the data for data consumers (Heimstädt, Saunderson & Heath, 2014, May). The resulting social systems around actors create an ecosystem in two parts; the social and technical (Davies, 2011). The technical and social systems around open data do not contain one single ecosystem, rather they consist of several ecosystems as different agencies, municipalities, and organizations populate the active space. The three main actor domains are government policies and practices, users, businesses, and civil society, and innovators. Through their actions, they affect the evolution of the open data ecosystem (Harrison, Pardo & Cook, 2012). These actors exist in an ecosystem that can express properties similar to being cynical, sustainable, demand-driven environments oriented around agents and mutually interdependent in the delivery of value (Heimstädt, Saunderson & Heath, 2014, May). Other characteristics of an open data ecosystem are design, context, interdependencies and interaction, participants, data and resources, and tools (Zuiderwijk, Janssen & Davis, 2014). As reality consists of multiple practical ecosystems, existing in a constant overlap, it can be challenging to separate and study single systems and chains of effects. For example, we could have a municipal that releases data that a business transforms for another municipal, and in so affecting another ecosystem. In theory, we can still study one generalized open data ecosystem.

3.5.1. To Build an Open Data Ecosystem

An open data ecosystem doesn't just sprawl from the ground, it needs action and resources. It needs to expand, as was brought up above, on both a social and technical level. To create an open data ecosystem at least four key features, need to exist (Zuiderwijk, Janssen & Davis, 2014);

1. Releasing and publishing open data on the internet
2. Searching, finding, evaluating and viewing data and their related licenses.
3. Cleaning, analyzing, enriching, combining, linking, and visualizing
4. Interpreting and discussing data, and providing feedback to the data provider and other stakeholders.

To support the features to act as a whole inside the ecosystem there is a need for three additional features (ibid.);

5. User pathways showing directions for how open data can be used.
6. A quality management system
7. Different types of metadata to be able to connect the elements.

While the elements above only bring up important properties for an ecosystem, it is still in need of a progression path. The steps to reach a complete open data ecosystem can be summarized as follows (Lee, 2014, October):

1. Create an inventory of all the data inside the organization.
2. Select data for publication.
    a. Upgrade already existing data to open data.
    b. Follow international best practice.
    c. Follow a demand-driven approach.
3. Publish address and map data.
4. Before publishing any more data ensure that processes for data privacy are in place. We do not want to publish data that breaks the rules of data privacy laws. Data should never be able to be linked back to an individual.
5. Associate the open data with an open license.
6. Ensure that the data is of high quality. It should be open, machine-readable, modeled after accepted standards, have standardized metadata, and utilize unique identifiers.
7. Make the data available through API and bulk form. Keep it up-to-date and keep the API well documented.
8. It must be possible for the users to find the data in an easy way; a search engine could be such a solution.
9. Dedicate public bodies to engage with potential users, identify requested datasets, clean-up data, maintain data, and respond to queries about the data.
10. Engage the data users. Make open data be user-centric, even if it is easier to be data-centric. Different channels and methods for user engagement include;
    a. Demand-driven release of data
    b. Feedback on data published
    c. Consultation
    d. Social media
    e. hackathons/innovation-days
    f. Existing groups
    g. Competitions
    h. Tutorials
    i. Evangelism
    j. Internal promotion
    k. Traditional media
11. Encourage economic reuse through targeted engagement. Explore the needs of business re-users.
12. Lastly, evaluate the progress and impact of the open data initiative.

The public leaders of this development need to engage in strategic ecosystem thinking and need to identify the people and organizations that are essential elements. They need to understand the nature of transactions that take place between those entities, and they need to recognize

what resources are needed by each entity in order to engage with each other in transactions of value. Lastly, they need to observe the indicators that signal the relative health of the ecosystem as a whole (Harrison, Pardo & Cook, 2012). The public managers should focus on three primary interacting concerns; intentionality, value creation, and sustainability. The interaction between these parts defines the dynamic of the ecosystem (Harrison, Pardo & Cook, 2012).

In the above theories, the social aspects of open data enter the arena on a late note. This can create challenges; if we, for example, follow the steps of Lee (2014, October), we can end up with a useless amount of published data as the businesses' opinions are acquired at step nine and later. What is interesting is that Zuiderwijk, Janssen, and Davis (2014) brings up important elements of a complete open data ecosystem, while Lee (2014, October) focus on step progression and Harrison, Pardo and Cook (2012) focus on the leader perspective. What becomes clear is that either it is perceived as a complete system or a serial step guide to the goal. It would be more effective to start the nine to eleven steps at the same time of the first. This would open a chance to create a deeper iterative process between the growing social and technical structures.

3.5.2. The Open Data Ecosystem

In this section we will bring fourth the appearance of a complete open data ecosystem. Dawes, Vidiasova, and Parkhimovich (2016) have created a model for a complete open data ecosystem (See Figure 3.1). To simplify the explanation for the model we have chosen to start with how global & national influences and competing demands can affect motivation for open government data (OGD) development. For example, in Sweden, one global influence factor could be Obama's memorandum, and the current immigration influx could compete for the OGD motivation for development.
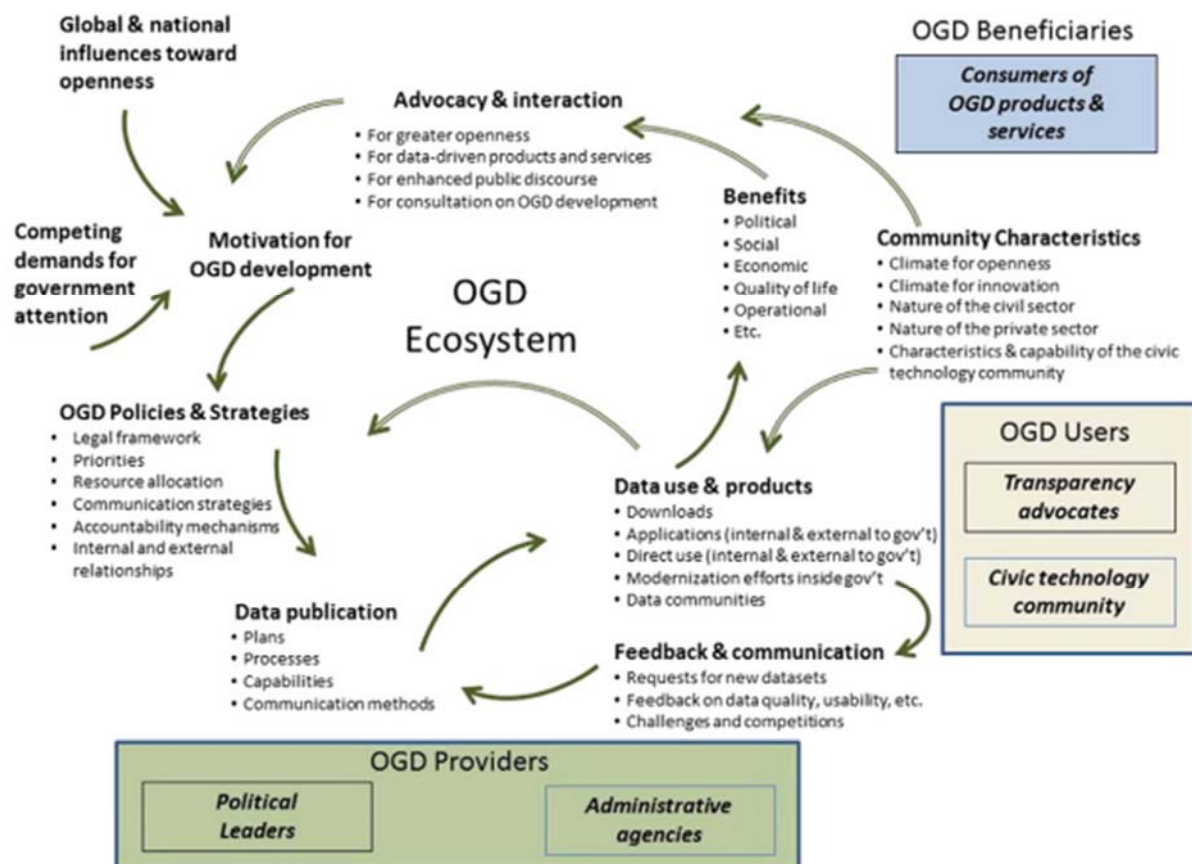
Figure: 3.1: An ecosystem model of open government data (OGD) programs. (Cited from Dawes, Vidiasova & Parkhimovich, 2016, p. 25)

The motivation for developing OGD results in action that results in policies and strategies. This can take the forms of legal frameworks, priorities, resource allocation, communication strategies, accountability mechanisms, as well as internal and external relationships. In the case of Sweden, they implemented a law that put open data on the priority lists of all agencies and municipalities. Even if this happens we still have to take into account competing demands that can lower the priority, and we also have to include the culture inside of organizations.

The OGD policies & strategies, in turn, affect data publication, and in so the planning, processes, capabilities, and communication methods. This could, for example, be the selection of what data to publish first, as was the case of geographical data in Lee's process (2014, October), or where the data ends up on Berners-Lee (2015) five-star scale. Data publication will affect data use & products, and how it is expressed through downloads, applications, direct use, modernization efforts, and data communities. This could be applications such as Uruguay's A Tu Servicio (Dietrich, Gray, McNamara, Poikola, Pollock, Tait, & Zijlstra, 2016) or Open Duka in Kenya (Verhulst & Young, 2016). In turn, the data use & products affect OGD policies & strategies, feedback & communication, and benefits. Feedback & communication expresses itself as requests for new datasets, feedback on data quality, usability, etc, challenges, and competitions. This affects data publication. For example, this could be a company contacting an agency about a dataset or a civilian giving feedback on a broken dataset. It also includes challenges and competitions such as hackathons. Data use & products create benefits that can be political, social, economic, quality of life, operational, or other in nature. Some of these could, for example, be The New York City Atlas from US (Verhulst & Young, 2016) or a CIO that saved the government 4 million pounds in 15 min (Dietrich, et. al., 2016). The benefits result in advocacy & interaction, often for greater openness, data-driven products and services, enhanced public discourse, and consultation on OGD development. This, in turn, will affect the motivation for OGD development. The idea is that when civilians notice the benefits of open data they will want more, as it is bringing positive changes to society.

Data use & products, and advocacy & interactions are both affected by community characteristics. The properties of community characteristics are cultural in nature and express a climate for openness and innovation, nature of the civil and private sector, and characteristics & capabilities of the civic technology community. These are cultural aspects of how society views openness and innovation. It could, for example, be old laws or ways they treat alternative media. Inhabitants of the open government data ecosystems are providers, users, and beneficiaries. A provider could be an agency or municipality. The user could be companies developing software based or around open data, or they could be civilians interested in the developments of the government. The beneficiaries can be civilians, agencies, municipalities, companies, or other countries. The provider could publish data that the user refines (and/or) that an agency becomes a beneficiary of.

The model might need further testing, but it gives us a good indication on how elements work and interact inside an open data ecosystem. For example, the interaction between municipality and business can be found in data publication, data use & products, and feedback & communication loop. Something that is missing is how benefits and data use & products affect community characteristics. The model is also missing the social aspects of open data such as marketing through hackathons, and dampening elements such as disadvantages. Another part that is still lacking is the assumption of a sequence relationship that abstracts away elements and events executing at the same time.

3.6. Theoretical Framework

In this chapter we have explored the definition of open data, it's origin and shapes, and the myths, barriers and benefits surrounding it. Even the perspectives existing inside the field both practical and theoretical. At the last step of our journey, we conquered the holistic view of open data ecosystems and gained insight in its creation and dynamics. It is now time to combine what has been gathered into one theoretical framework that will help us explore the relationship between municipalities and businesses in an open data ecosystem. The theoretical framework finds it roots in the ecosystem created by Dawes, Vidiasova, and Parkhimovich (2016), with the sociotechnical approach towards the study of information systems (Sawyer & Jarrahi, 2013), interwoven with Davies (2011) attention to the importance of both social and technical layers. The sociotechnical approach is selected as it is used by Dawes, et. al (2016) to bring easier synchronization between their and our study.

Sociotechnical approach to research is a way to study IS and ICT, where we have social and technological systems interdependent and inextricably from each other. It is more than the study of both in separation, where the approach lays focus on phenomenon emerging from the interaction between social and technological systems. In this approach exist three important elements; mutual constitution, the view of context, and collective action (Sawyer & Jarrahi, 2013). With mutual constitutions, we view both humans and technologies having some ability to act in a given situation where these actions are dependent on the situation. The two systems co-evolve together and we can see their interdependency through material triggers, actions of social groups, pressures from contextual influences, and the complex processes of development, adaptation, adoption and use of technologies in humans social worlds; in this directionality is part of the situation (Sawyer & Jarrahi, 2013). In the view of context, technology is socially situated, meaning that IS or ICT are embedded into a social context. Here we find the social context to be adapted to and reshaped after the technical systems through design, development, deployment, and uses. The surrounding dynamical context is important to study and the researcher should, therefore, aim to examine all contextual factors (Sawyer & Jarrahi, 2013). Amongst organizations, we find that there is a pursuit of goals, without implying a positive or negative outcome, that can create conflict. This is part of the collective action. Some of the goals are shared amongst different parties, but not all, and the end result is their embroidery in the context and technological elements. From this, there is a tendency for the researcher to focus on more complex processes than the simpler (Sawyer, Jarrahi, 2013).

Open data only gains value from the interaction of human and technology, especially two groups interacting to create value. The maturity of open data is also based in this interaction, that creates interdependencies between groups, here we also find varying background and goals. For this reason, the approach brought up above is in harmony with the study of open data. Lastly, we can quote the authors on the matter of the sociotechnical approach;

"The sociotechnical approach eschews simplifying rationales that seek a single or dominant cause of change. Sociotechnical researchers focus attention to the heterogeneous networks of institutions, people, and technological artifacts that together play roles in the design, development, deployment, takeup and uses of any particular IS." (Sawyer, Jarrahi, 2013, p.6)

Both the theories and approach make it easier to analyze technological and social systems, but we can never fully separate them from each other as they are co-dependent. Inside this we find actors filling the *roles* of providers, users, and beneficiaries. These actors work to exchange information through social and technological means, where the central resource is open data in different formats (Dawes, et. al., 2016). Resistance is created when ecosystems evolve from child to adulthood and is expressed in different ways by its carriers, the actors. The open data ecosystem is not creating its content, instead it is reversed, where the actions of actors slowly makes the structure come into existence and it is solely artificially built and those dependent on humans (Lee, 2014, October). Inside the realm of actors, we find barriers, myths, and conflicting perspectives as expressions of resistance to achieve societal benefits and impact (See chapter 3) for its inhabitants that, in the end, is a threat to the very existence of the ecosystem.

From the above we have divided the framework into *ecosystem* and *actor*. The element binding actors together with the ecosystem into one complex structure is the relations between the elements. Actors' relationships affect the ecosystem and, as actors fill different roles inside, they create a life-giving flow, while the ecosystem in itself is the final representation of a chain of effects and events. We will continue to explore *ecosystem* and *actor*, and interaction in the upcoming sections.

3.6.1. Ecosystem

From the open data ecosystem model created by Dawes, Vidiasova, and Parkhimovich (2016) we have limited our framework. Aiming to explore the relationship between municipalities and businesses, because of this a subpart of their model has been selected (See Figure 3.4); selected ecosystem parts were policies & strategies, data publication, data use & products, feedback & communication, and benefits, and their relationships between each other.
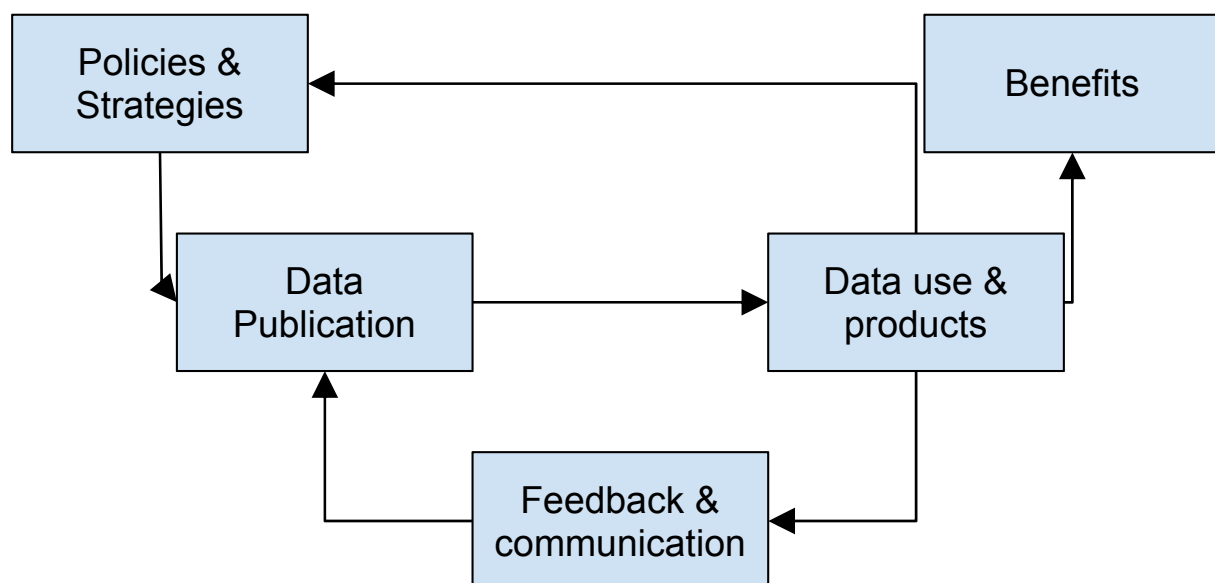

Figure: 3.4. The open data ecosystem perspective, created from subloop inside Dawes, Vidiasova, and Parkhimovich's (2016) model

Inside the ecosystem we find the roles of providers, users and beneficiaries are all strongly bound to its parts, some are even born from interaction. Providers bound to data publication,

users to data use & products, and beneficiaries to benefits. Policies & strategies effects providers in the selection of data for publication, while feedback & communication is created from the one-way social interaction between user and provider (ibid.).

Providers data publication is influenced by policies and strategies affected by perceived benefits that will, in turn, impact users. The strong one-way technical dependency between provider and user cannot be ignored in such contexts (ibid.). The ill deceived actions of one user can, in the end, harm hundred other users. The one-way social street from user to provider creates challenges of communication and collaboration.

With Lee's step guide (2014, October) and Zuiderwijk, Janssen and Davis' (2014) essential elements we can analyze the ecosystem and its parts to find lacking structures, but also analyze the growth of such a system. We can bind roles to ecosystem elements and in so see how interaction and action enhance the ecosystem and how it in turn affects its inhabitants.

3.6.2 Actor

As we are studying municipalities and businesses they become two central actors for the framework, and we can use the municipal perspective and business perspective (See section 3.3), but beyond these, we have to recognize that there exist humans that, in private, can be users or beneficiaries of open data, government agencies, and other organizations. Any social unit becomes an actor in an ecosystem when they fill one or more roles that in turn are integrated with the ecosystem elements.

These rolls are providers, users, and beneficiaries (Dawes, et. al., 2016). For example, a municipality can publish data that a company transforms into benefits for the citizens. Dawes et. al. (2016) binds the roles to certain stakeholders, limiting the application of the theory, whereas in reality we find that the relationship between actor and role is more complex. For example, a municipality can gain benefits from data provided by them that is transformed through the actions of a business. This means that a role is not bound to a certain actor because if it's inherent qualities, rather roles are born from actor's action and integration.

When it comes to the actor themselves we will have to realize that they do not solely fill a role in the ecosystem, they also have roles and responsibilities outside. For example, a municipality might be a provider of open data, but also needs to sustain a democratic process. This means that dedication to accepted roles can vary between actors.

For the single actor (See Figure 3.2) we will find a personal experience bound to their development with open data, where some traits are shared with others. Here we will find barriers, challenges and myths (See section 3.4) creating resistance for them to be able to accept an active role and in those become a functioning element of the ecosystem. In this, they can have goals created by themselves or others that are aimed to be obtained; according to the sociotechnical approach some of these goals can be shared or in conflict with others.
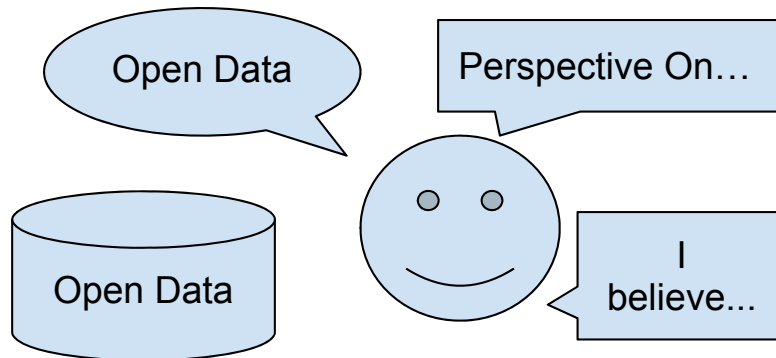
Figure: 3.2. The personal perspective

The relationship between actors becomes important as they are dependent on each other to fully create an ecosystem; this means that resistance can be expressed in the relationship between the two. For example, varying definitions of open data can exist; a municipality publishes excel files and a company gets angry as the data is not machine-readable, both of their perspectives on open data differ. It's important to know how different actors inside the ecosystem view and act upon open data, as it will affect focus and interaction. Open data is created in our minds through definition, descriptions, and actions correlated to a theme (See section 3.1 & 3.3). Therefore, the perspective on open data can vary, and we believe that this can lead to resistance.

Another resistance expression could stem from actor's perspective on another, as it can determine if a relationship will be engaged or declined. For example, if the government is perceived as unstable or down prioritizing open data it can be a demotivating factor for businesses.

Further, resistance expressions can come in the form of barriers (See 3.4.2) that exist on a social, technical, or both system levels between or inside actors with varying approaches to how they can be interpreted and connected. As we study resistance expressions with a sociotechnical approach, meaning that resistance expressions will be connected to other phenomena, resulting in interconnected systems where resistance expressions are symptoms of a complex series of negative effects.

3.6.3. Holistic View and Keywords

When we bind actors and ecosystem together into one picture (See Figure 3.3), it becomes vibrant, more alive, and suddenly we can study the actors' relationship to each other, their roles, and how they affect ecosystem elements that, in turn, affects others. In the following section we will summarize important keywords for the framework;
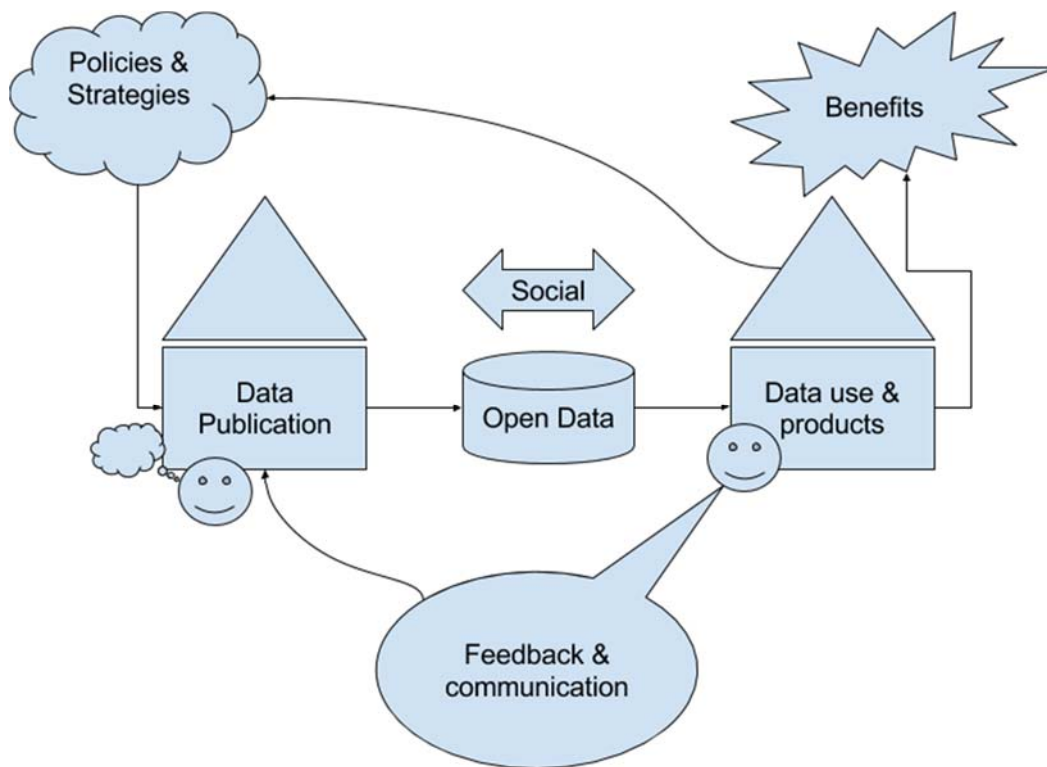
Figure: 3.3. The theoretical framework perspective.

Resistance is what hinders an open data ecosystem to function properly and effectively, to achieve its full potential, and is expressed through inhabiting actors. In abstraction, we can view resistance as what hinders some to achieve or reach a certain goal. Expressions of resistance can be barriers, myths, conflicting beneficial goals, and perspectives.

Actors are the inhabitants of the ecosystems who possess one or more roles. They can be anything from a municipality, a business, or a single individual, and represents a single social unit. To be included in the ecosystem, they need to fill one or more roles. We will focus on a municipal and business approach (See section 3.3).

Relations are both formed between actors and ecosystem parts. For the nature of this study we have compressed them into one, and this results in that we only focus on relationships that are revolving around open data. These relationships can be technical, social, or both in nature. Relations are strong definers for the meaning of a role.

Roles are different sets of responsibilities and actions that actors fill. In the end, they represent ways to interact with other actors as well as create ecosystem elements. In this framework, we

are using Dawes et. al. (2016) roles; providers (Publish open data), users (Transforms open data), and beneficiaries (Enjoying the benefits of open data).

Ecosystem elements are a conceptualized part of the ecosystem. It reflects some important aspects of the survival or functioning of the ecosystem.

Ecosystem is created from the interaction of actors and their social and technological systems. In abstraction, an ecosystem is built from the relations between and constituting elements, while in practice it is found in relations between the actors.

4. Case Study

Municipalities, businesses, and individuals have been given fictional names in this study, and their residing locations. A total of three out of 290 municipalities ("Kommuner och landsting", 2015) and six businesses participated in the study. Some of the participating actors didn't have a commercial relationship, which is with standard accordance to the standard approach of open data in Sweden. Municipalities release the data so that others can use it, but they do not know who is using it. We have to note that the maturity and size are important factors in this as well. In this chapter, we will go exhibit the collected data. This chapter will start to outline the main stage of the actors and the country they inhabited, Sweden. After that, we move over to those that represent the country, the municipalities, and then over to the businesses that are in some way correlated to open data.

As we explore the relationship between municipalities and businesses, we have to recognize that the government can affect this relation through laws and policies, and the EU can, in similar ways, do the same. This case is centered around the study of the relation and, therefore, recognizes external forces but does not delve deeper into the matter as it is out of scope. In future studies, a more complete case can be built around the organizational, governmental, and international level. For now, we concentrate on the organizational level and only recognize the governmental.

All quotes have been translated from Swedish into English.

4.1. Case Context: Sweden

Sweden was founded in 1397 ("History of Sweden", 2016) and became a full democracy in 1921 ("Riksdagens historia - Riksdagen", 2016), with a history of transparency since 1776 (See section 3.2). The country consists today of 21 counties, 290 municipalities, 340 agencies, and has a business registry containing 1 177 761 businesses (SCB, 2016).

The Swedish government is not unknown to the question of open data. Agencies and municipalities are working with the matter on different priorities. On the political level, there have been moves like the PSI-law and two interpellation debates between Ardalan Shekarabi (S) and Erik Ottoson (M) in 2015 and 2016. The debates expressed a need for Sweden to move faster and to put more focus on the matter of open data.
In an open data maturity report about EU, Sweden came in as a middle follower and had almost the lowest readiness for open data, with only Belgium and Slovenia being below (Carrara, Fischer & van Steenbergen, 2016). It has been noted by some interviewees that we are losing ground and need to accelerate our progression.

In this section, we will bring up central agencies, websites, organizations, and literature from the collected data. This is not an all-inclusive list, but was mentioned by interviewees and had an impact on the relation. The purpose of this chapter becomes two-fold as it supports the study and it brings up existing data sources for further research.

4.1.1. Agencies

Vinnova, Verket för Innovationssystem (Swedish Agency for Innovation), was founded in January 2001 and has about 200 employees. The agency is subservient to the Ministry of Enterprise Energy & Communications and is the national contact agency for the EU framework programme for R&D. They are the Swedish government's expert agency of innovation policy. Their goal is to improve conditions for innovations to promote sustainable growth, as well as fund needs-driven research. Each year they invest around 2.7 billion SEK in various initiatives (Myrehed, 2016).

Riksarkivet was founded in 1618 and has between 500 and 1000 employees. The agency is subservient to the Ministry of Culture. The agency handles the governmental archive operations, issues, and storage in (Sweden Riksarkivet, 2016). They receive documents from both governmental agencies and other types of organizations. On the 9th of April, 2015, the Swedish government gave Riksarkivet a mission to investigate issues relating to the government's goals for a more open administration that supports innovation and participation. The agency concluded that there is a need for one agency to handle the operations around a national open data portal. They also suggested that they should handle the administration of the national open data platform and guidance around open data (Riksarkivet, 2015). At that time, Vinnova managed the national open data platform (ÖppnaData.se) and E-delegationen was responsible for guidance around open data. They strive to provide digital information without a cost for reclamation and processing of information, and encourages and supports it.

4.1.2. Organizations
E-delegationen ("E-delegationen", 2016) was a committee under the Ministry of Enterprise and Innovation that had the mission to drive the e-government development in the public sector. The mission has been achieved and the organisation has been closed. In their mission, they created guidelines for publication of data, and recommendations about the re-use of public sector information.

SKL ("SKL - Sveriges Kommuner och Landsting", 2016), Sveriges Kommuner och Landsting is an employer and interest organization. It is an organisation for all municipalities, counties, and regions that has a mission to support and contribute to the development of members operation. They act as a network for knowledge exchange and coordination, and the role they fill includes giving services and professional advice to all the issues their members work with.

OpenGov.se (OpenGov.se - Din ingång till värdeskapande genom transparens & öppenhet!, 2016) is an open collaboration project that collects resources, organizations, and people to increase the openness and transparency of the Swedish public sector. Their site contains explanations, reports, services and tools, cases, find data, and about us sections.

4.1.3. Websites
ÖppnaData.se (CKAN, 2016) is Sweden's national open data portal and was released after a governmental mission in 2012. It contains the features to search in datasets, newsfeeds, user handling, view registered organizations, and a short about section. On April 13 2016, the site had 320 datasets and 631 organisation. There is a decrease of 9 datasets; the site does not explain why. More visual features include graphs for the number of datasets, weekly activity, and any increase in a certain category.

Vidareutnyttjande.se ("Vägledning för vidareutnyttjande", 2016) is a Swedish web portal that is administrated by E-deligationen. The site contains guidelines for the re-use of public sector information. It is divided into three sections; law & recommendations, create & publish open data, and about guidance. The site also contains links to other sites that contain important information about open data, such as 5stardata.info.

Psidatakollen.se (PSI-Datakollen, 2014) is a Swedish web portal that gives an indication of how successful organizations are following E-deligationens guidance. On April 13 2016 April, 178 of 655 public organizations fulfill the recommendations. Here we can also find which organizations are following the DCAT-AP standard that is recommended from the EU. The website is both from Vinnova and E-delegationen. At public organizations that are fulfilling the recommendations, users can type /psidata or /open after website's URL to access open data collections. Often Kolada numbers can be found here. Examples of addresses are eskilstuna.se/psidata or linkoping.se/open.

4.1.4. Literature

SKL have published a framework for open data (Nordh, 2016). With the published framework a summarized version was also released (SKL, 2015). The guidance consists of five steps that lead to the publishing of open data. (1) Start up and organize, (2) analyze & assure, (3) establish a technical solution, (4) publish and (5) administrate, market & follow up.

Eriksson (2014) has released a book that aims to give a holistic view on the Swedish e-government. The book is not treated as a theory as it is lacking references to academic literature, and it is more aimed to leaders in the Swedish government structure as it contains law references. It gives guidance on how to open up an agency and, in that, also to release open data in the most holistic perspective. The literature was identified while searching for literature; it has never been referred by any of the interviewees but showcases that there is activity around open data outside businesses and municipalities.

4.2. Municipalities

In this section, we will explore the three municipalities all participating in a common open data project. We will clarify their size, maturity, state and development, mission and concentration, needs and supports, barriers and challenges, and lastly perspective on companies. All data presented is collected from interviews conducted with individuals at the organization.

4.2.1. Cornflower Village

The municipality Cornflower Village is the smallest of the participating municipalities with a population around 20 000. Their IT unit can be considered small as it only consists of 12 people, and they handle both development and maintenance. Activities around open data are fairly new and have only existed for less than a year. The mission of open data has been assigned to the organization's IT-leader as an extra task rather than a full mission, with a low priority. It has not actively been down prioritised. In this timeframe, they have fulfilled the PSI recommendations from E-delegationen and published key numbers from Kolada. This was perceived as an easy task.

The interviewee did not express an exact definition of open data, rather they gave a description;

> *"When I think about open data is that you have an interface directly against business systems in some way. Providing menus to display, which formats are available. There, of course, can flagged data that do not appear, which may be confidential and stuff. Within municipalities data is very much public, while the entire health care sector there is, very high confidentiality requirements."* (IT-manager, 2016-04-11).

Open data is perceived as something positive that can bring people to the municipality and put Cornflower Village on the map. It is something that can result in fun and new applications.

The current goals of Cornflower Village are to create guidelines for their work with open data and decide who should lead the development. They want to develop open data with other municipalities and achieve the same progression as them. They are unsure what data will be published next.

They do not perceive that there is any special need for open data development as there are a lot of tools already created. It is more central that a strategy is created to aid the development process. Other than what has been mentioned there is a need to be supported by others.

Their main barriers and challenges have been resources and prioritisation of other tasks. They also perceive that making open data publication automated will be a future challenge. Inside the organisation, they perceive that it will be challenging for the operations to go through data for prioritisation and selection, as well as how they should do it and who should do it.

Cornflower Village didn't express any clear direct perspectives on businesses and rather they perceive them as experiencing the same challenges.

4.2.2. Russula Town

The municipality Russula Town is of an average size of the participating municipalities with a population around 135 000. Their IT unit is fairly large and consists of around 100 people that handle maintenance, and only the IT-leader handles development. They started to work with open data about a year ago and have released Kolada key numbers, school food, air quality, and food control data. School food data is the only one with a reusable interface. The development of open data has been assigned to the IT-leader and is down prioritized in the current unfolding IT-strategy.

The interviewee did not express a definition of open data rather gave a description;

> *"I view open data as all information that is not confidential. That we go out with and share."* (IT-strategist, 2016-03-14).

Open data is also perceived to be automated. By combining different datasets, new services can be created that cannot be imagined by the municipality.

Open data is just one small part of the whole digitalization mission in the municipality. The end goal is to publish and identify more open data in hopes to create more e-services, though it is not a top priority inside the organisation. With this, they also need to clarify information ownership and identify technical and economic models.

Russula Town is also in need of more resources to develop and handle open data. To be able to publish data they need financing. The common open data project has helped create an automated process for publishing open data. There is a deeper need to understand the whole open data process, financing, development, and benefits. Any data published must stay up to date, so automated maintenance is needed. There is also a need to spread open data knowledge to all the layers of the organization and here they seek a business case to support it.

The municipal operations do not see the value of open data and the sheer amount of other tasks overflow the possibilities to work with open data. There is a danger of publishing open data, then just checking it off and leaving it alone. To motivate the organization, there is always the need to come with a bag of money. Another challenge is that there is only one person working with this inside the municipality; one person can only achieve so much and the perspectives encountered cannot see the value with it.

The municipality does not gain signals about the need for open data each day, and it is perceived as a low interest to the business sector. Open data can, in the municipality, be perceived as not a big thing for us or them. The thought with open data is that the municipalities release the data and businesses create services that they cannot imagine for the benefit of organizations and citizens. One of the main properties of open data is that municipalities deliver open data that businesses use, but there is no insight to who those businesses, in the end, are.

4.2.3. Mute Swan City

The municipality Mute Swan City is of the largest size of the participating municipalities with a population around 150 000. For them, open data development started with a political mission to create an open data platform in 2012 (Eriksson, Hammarsten, & Melin, 2014). They continued the work with open data into the new NODS project where they focused on promoting other municipalities' open data development. They view themselves as a front runner of open data in Sweden, as they have both conducted the NODS project, developed an open data platform, and released many different kinds of open data. Their IT-unit consist of 150-160 people with different backgrounds, and works to deliver IT-services and IT-knowledge. The NODS project aims to ease the conversion of different file formats into a unified standard. This works to ease the friction between municipalities and businesses. This comes from the fact that the municipalities can still use their organisational standards while the businesses only have to work with one standard for all the participating municipalities. They have conducted collaborative work around their open datasets with a huge company, and the resulting effort proved to the municipality that they can send data to others for processing and gain something back, which they thought was impossible.

The municipality associates open data with transparency, effectivity, openness, and innovation. Businesses and citizens can create things that they could never dream off. A visualisation of some data is not completely open data, meaning that there is a need for the user to access it in

a raw format. When they publish open data there is a focus on the re-user that could be someone inside the organization.

The current mission is to coordinate other municipalities in their developing of open data. They want to create something that is useful to all of Sweden in the development of open data. They have developed NODS and are also looking for where to place the platform for maintenance and further development. As pointed out by the interviewees one municipality cannot support a platform for all other municipalities. There is also a vision to keep the municipality's city as a frontrunner of innovation. When it comes to the development of the open data itself they believe that the next step is including visualisation on the open data platform. Data should flow between actors to create more value that can create open data from open data. Businesses can develop applications that are better than what any municipality could develop and that is for many different users in the nation.

A platform like NODS is needed for the municipalities to more effectively publish open data and there is a need for someone to maintain and develop the platform for further use. The internal drive force is still too low and there is a need for it to increase; even if they have come far, they need others to come even further. There is also a need to develop open data platforms faster so that the generational experience stacks up faster. The biggest need is that they do not want to develop everything from scratch and instead they want to be able to select between different standards and solutions that should be implemented.

It is easy for parts of the organisation to publish data as open data and then be proud of it, even when it has not met the basic standards or will soon be forgotten. It is hard to know if the published open data and used platform meet the needs of the re-users. Employees of the municipality do not have the time, the competence, the resources, or the mission to open up open data. The IT-deliverers do not want to open API for their systems as they want to make money on integration modules. Sometimes it is not only the deliverers, but it can also be the sub-organizations inside the organization making money from certain data, and they do not want to lose that income. In summary, there are some challenges to open data, such as systems that are too human dependent, economic, technical, and law obstacles.

Businesses can create applications and data that is more useful for society than what we have resources for. The request for data from businesses is not high and not that many can know about open data. The businesses that have been in contact are interested in detailed plans for development. The collected impression of businesses is not that strong or active, meaning that there is some activity but the relation is otherwise very calm, even when they are participating in hackathons.

4.3. Businesses

In this section, we will present the data collected from the participated businesses. *Fictional names have been used*. In the upcoming sections we will present size, application of open data, maturity, development, definition, mission, concentration, need, support, barriers, challenges, obstacle, and lastly their perspective on municipalities, Swedish agencies, and government.

4.3.1. Food AB

Food AB is a small company with a few employees that don't directly work with open data, rather one of their employees works with it to sustain personal development and knowledge. In the future, it could become more central to the organization, but at the current time, there is no business model or profit anchored in the software, though it is based on open data. This application has existed for about 2-3 years.

The development of the application came to be when an individual from a state-owned administration expressed a need for support in their work, and the company decided to develop an application to fill the need. In that way, Food AB was introduced to open data, but they never had thought of or encountered that subject before. It was expressed that one of the main motivation factors was that there existed a case. Today it doesn't prioritise the development of the product and it is viewed more as a hobby project, but it is released for both citizens and municipality to use. The developed product itself is not something innovative or complex as it only displays information gathered from municipalities, where the only complexity lies in the data collection. The application receives a low even amount of downloads each month, and it is perceived that the app is not the greatest hit in the app store.

For the participant, open data is associated with agencies and other public governance. Open data is public information that can easily be accessed either through the web or internet and is machine readable. It is easy to access the information without any obstacles. It is important that the publishers have thought through structures and methods as someone is actually going to use the information. Open data is part of the democratization of society and something that is free of charge.

At the time of the interview, the application was a hobby project, but there are future plans to keep developing the application and make it cover as many cities and platforms as possible. The project was executed more for fun than any business reason. The developer likes the technical challenges and believes that anyone has the right to access the provided information.

In the interaction with municipalities, the interviewees have encountered many nice and pleasant officials, and they have been extremely accommodating with giving information, even in cases where they cannot actually help. Food AB expressed a general request that more municipalities should work with this, especially with publishing more information, structuring the data in an intelligent format that makes it possible for machines to read it, and take the matter of open data more seriously.

Food AB has encountered technical challenges with developing their product; varying development, technological capacity, limitations, quality, and standards of open data between municipalities. When difficulties arise to access open data on a technical level it has been coming from missing infrastructure on the side of the municipality. Because of the creaking quality of the data, the business had to take risks to make the application functional. In the beginning, Food AB did have a collaboration with a municipality but the bureaucracy was too resource consuming, and the perspectives differed; Food AB wanted to make a product for Sweden while the municipality only wanted a local product. Food AB didn't see any potential to earn profit from the developed product and they perceived the value of the application as low.

One perspective is that if others could earn a profit on open data then municipalities would feel obligated to publish data. An encountered obstacle between different municipalities is that, depending on the actor, payment might be needed to accesses open data. Locating open data on both the social and technical level was perceived as one of the main challenges. At the moment, they have searched municipalities and governmental agencies site by hand, and it would support them to have one location for open data. Lastly, some municipalities have released what they call open data, while Food AB does not perceive it that way, as what they released is not machine-readable.

Food AB perceives that there is a difference in treatment of open data, an element of sporadicity, where some municipalities are using thought through solutions while others just put anything out there, and some don't publish anything at all. In the end, some will share anything for free while others are entrenched in old ways of thinking, demanding fees for sought after data. This is seen as depromoting the usage of open data and therefore lowering its priority, even if they perceive that the municipalities believe in open data. There are some cases that make it feel like the municipality is just making it hard for Food AB to collect the needed data, but at the same time, they would be surprised if someone from a municipality said open data was a bad idea. Food AB feels that the development of open data is very dependent on the individual, even if there is political will. In the end, everything is believed to have its foundation in lacking leadership, resource shortages, technology, knowledge, priority, and interaction.

4.3.2. Safety AB

Safety AB is a sub-unit of a vast business, and the size can only be described through the words of an interviewee: *"The company is so big that two different subunits can compete for the same contract without knowing."* (Senior Engineer, 2016-03-21)*. Inside the business, there are only a few employees working with open data. For them open data as a concept has been much a test with many different projects and they are just starting to explore the business arena. Early on they have conducted collaborations with municipalities and universities, some around open data, mostly demonstrations of usage and benefits. From this, they have noted that geographic and demographic data are key values in the development of open data products, and has also developed a method to easier initiate collaboration relationships with municipalities, and increase their understanding. At the moment of the interview, no product based on open data was for sale, but they have used open data to complement existing products.

Safety AB have come to define open data as data that is published gratuitously, and might include requirements for the registration of usage. However, according to the rules of open data, it should be under an open license. With their activity around open data they have come to perceived it to be social with open data. This goes in hand with their current focuses on complementing existing products with open data, and educating municipalities on the subject. For the future, their main mission is to develop civil security, but the potential of open data brings thoughts of the next democratic revolution. They see further possibilities for collaboration between universities, municipalities, and themselves, but they also expressed a need for a forum where strategies and feedback could flow between municipalities and businesses, where the main goal would be to create solid collaboration. If universities were to be included it would create connections to big data, processes, optimizing and the like. Supporting the innovation process.

When it comes to challenges, Safety AB perceived the vast variation in technology as a challenge. Sometimes the formats and publications processes vary, the quality is poor and is experienced as lacking planning, or the data is static and outdated. Safety AB perceives future barriers to be changing format, structures, administration, internal political conflict, fees, laws, lacking knowledge, and varying insight. On the social level, Safety AB experienced challenges in identifying data, communication, misunderstanding of the value of giving, and coordination at the current time. Multiple times the company mentioned that municipalities experienced challenges with what data could be transformed into open data, and this creates challenges, in the end, for them. When it comes to low prioritization the company was more understanding as expressed by the interviewees; *"The government has a lot to think about…"* (Senior Engineer, 2016-03-21), but it was experienced that the government doesn't understand how open data could ease those thoughts. In collaboration with municipalities, many of the experienced challenges did come from regulations, a will to not open up, and a need to see proof of the possible benefits.

Safety AB perceives that municipalities don't fully understand the benefits or potential of open data, even if in some cases it has shown growth. The perspectives and approaches vary and there is a lack of leadership and direction. Inside the municipality, there is believed to exist lesser conflicts between management and IT on what can be published, where overprotection exists and has over complicated the process. It is thought that the municipalities main challenges are resource shortages, leadership, planning, and coordination.

4.3.4. Transport AB

Transport AB is a small company that is working with making transportation of goods more efficient, with this open data comes as a natural information source for decision making. They have a long history with solving complex problems, where they have worked with rhetorical technology. About three years ago they restructured the company and is today working with vehicles.

To be able to give their services information is central, this means that they are on a constant search for more and better information. This makes open data quite important as it will give access to a whole new kind of information that before were hard to access. This information can be used to make certain processes more efficient, but also opens up for research to support different decisions. In the end, open data is part of a new application that works to achieve environmental and economic benefits.

For them open data is data that is made accessible in the right way, this means; That someone publishing this data for consumption. Open data is just another information set.

In short terms, the company has a problem that needs to be solved smoothly, and open data is one possibility for this, while in the long term more information release is needed and they are not interested in personal identity, rather they are more focused on further exploration and possibilities. Because of this, the quality of data becomes important, as it lies as a foundation for decisions.

When it comes to the identification of open data, noise is one of the main challenges and they are therefore in need of services that helps them filter and subscribe to certain information set

categories. It is perceived that we are stuck in old habits without new information. The information accessed through open data makes it possible for them to create new services that would have been impossible without it. In the end, open data makes their work easier.

As expressed above, filtering is important as without it becomes impossible to handle the share amount of data made accessible. It is also hard to search for data as there doesn't exist any exact keywords; while searching you can gain more than 200 hits and only have time to explore the first ten. Moving away from the technical challenges there is aims to identify a business case to generate money for their lack of resources. They have also come to the insight that by combining certain data sets they can break the PUL law or threaten the country's security, this a challenge for both municipality and businesses in the end, from factors like this and others it is perceived that society becomes more vulnerable as we open more data.

The company believes that the municipality stands in for many challenges such as information ownership, but they are also lacking in trust towards others, as they do not have control over the usage of released data. Municipalities are facing difficulties seeing the possibility to give-and-gain, give open data to gain improved information. In the end, they are releasing data to make it possible for developers to create products that are better than what they could have achieved, in the end, the goal is to give benefits to citizens.

4.3.5. Freedom AB

Freedom AB is a small company founded in 2010. At the current time, they had contracts with 67 municipalities covering all of Sweden. They estimate that 65% of their work is focused on open data. One of the developed products is based 100% on open data and is a civic orientation service. From what they have seen, they are the only business that has been able to sell products based solely on open data. As stated by one interviewee: *"I would say that we are light years ahead of everyone else"* (CEO , 2016-04-07). They work closely with municipalities to find out what open data they have and are one of their customers. The municipalities can gain a personal presence in the solution if the follow certain criteria.

For them, open data is something that can download, usurp and freely use that comes from municipalities, governmental agencies or anything approximate. The benefits of open data are challenging to measure as it affects other parts than just the publishing source. Open data can be combined to achieve new innovations.

They are aiming to continue their development of civic orientation service applications and have already expanded into England where they collect open data from the countries open data platform. To change things is one of the strongest forces behind their work. It is not about the money, while at the same time the business does need money to survive. In the end, it is important to change a process and create something revolutionary that will make things better. To achieve this, open data would be of central support. To continue the development they are always looking for new sources that can help add benefits to the individual.

On of the most expressed needs was for municipalities to develop an API, and with that they estimate that their work would go 90% faster. It would help developers if municipalities defined problems that need to be solved and bring forth open data as possible resources for this solution.

When they extract data from publishers they use a range of tools, one of these tools being scraping, that is both costly and hard to maintain. If the source changes the information structure the implementation has to be updated, which is costly. This comes from the lack of an API and this results in many different approaches to data collection. As one interviewee expressed "*We do not have their energy for you [municipalities] to have 48 thousand different formats*" (CEO , 2016-04-07). On the social level, it is perceived that the communication is characterized with a "*we and them*" and "*not invented here*" way of thinking (CEO , 2016-04-07). This makes it hard to establish stable relationships. In cooperations, the business encounters a silo culture with a local way of thinking and sometimes experiences that their innovation is perceived as a threat for the municipalities. Municipalities are afraid to loosen their power grip. Another challenge is to identify who is in charge of open data inside a municipality. Sometimes there is someone that can answer questions but often you end up bouncing between individuals only to find yourself at the end hearing that they are working on the matter and nothing more.

The government is perceived as powerless and undedicated as there will only be rhetoric, they have no real power to enforce open data on municipalities. There is a lack of national vision and action to mature open data.

Municipalities are perceived as not understanding the benefits of open data, and are trapped inside a thought box, but at the same time, they know that open data can be used by others to create better citizens e-services. Municipalities and Swedish agencies don't understand the power of open data and how it will create efficiency for them and the citizens. The only thing that motivates them is the threat from ministries as it is perceived that open data is forced upon municipalities. When interacting with municipalities they don't put obstacles to stop interaction, they just don't care about the company. It is perceived that less than 10% of the Swedish agencies are working with open data, and at the current moment, only one of their collaborators have a functioning API. Freedom AB expresses a need for a forum or meeting place between actors to open up and develop open data.

When it comes to the data processed by the Freedom AB it is experienced that governmental agencies and municipalities don't want to reuse the created information, resulting in a feeling of enclosure. The age old technology used inside municipalities is also perceived as a barrier for the publication of open data. The degeneration of technology inside municipalities and Swedish agencies is perceived as a political risk as it can result in the fact that evidence-based decisions are done erroneously. It will also cost them more money as the developers and maintainers of the systems are getting rare because of the fast development.

There are too many different individuals within the municipalities resulting in varying implementations and maturity rates. There is a need for a common leadership. It is believed that successful municipalities don't share their experiences with each other, rather they see it as a threat to share experiences. There exists intern conflicts inside municipalities and governmental agencies about the development of open data.

The business doesn't believe in the hackathons arranged by different actors that some municipalities participate in as data sources. Municipalities and governmental agencies are perceived as doing the same thing over and over again hoping to achieve different results.

4.3.6. Travel AB

Travel AB is a small three-person company that is mainly developed on the spare time of one of the founders. The team members are each an expert on one subject; programming, customer, and interaction. Their product came into existence through a hackathon, that they also won, three years ago. Since then, they have continued the development and are today aiming to create a new innovative product. Their products aim to support users with disabilities in their everyday life and today they have about 10,000 users in Sweden. Through the years, they have applied to different financing options and won different prizes, even VINNOVA and a team of researchers have followed and supported their development. The company has gotten a wide user base and attention from VINNOVA and researchers, and even if it is only treated as a hobby project by the core team for the current time, there are plans of developing for the future. Further, their product is free without commercials and aims completely to fulfill the needs of the user.

Open data is defined as something that is collected and owned by an organisation or company but made available to outsiders in a meaningful way. It is also perceived that it is possible for actors to claim an open archive is the same as open data, this is two separate objects. It is central for open data to be easily accessible, free to use and usable for outsiders, especially developers. It is experienced that this is the minimum definition for open data and anything below is as the interviewee would put it *"completely useless"* (IT Consultant, 2016-05-09).

The current goal is to keep the development going, but the lack of published standardized open data results is putting many of the projects on hold. Rather than viewing open data as the starting point of products, they take a problem and try to solve it, this often comes to involve open data. According to IT Consultant (2016-05-09) they are not alone in the wait for better open data technological infrastructure.

When developing their products, it has been perceived beneficial when publishers warn them about upcoming changes to standards and API's, as this will help them plan a response and fix when the switch happens. Furthermore, the social network created with the victory in the hackathon have been of importance to their success, as it makes personal contact possible between user and publisher.

The most encountered challenges while developing products revolve around the technological and variation. Where different and changing API, stability, formats, standards, and documentation implemented by a variety of actors, consumes resources that else would have gone to developing beneficial functions for the end-user. Here it is also damaging when the collected data is out of date, is not updated, not guaranteed, lacking in quality, and content. The interviewee (IT Consultant, 2016-05-09) lifts an example where such an error results in an end-user visiting a church rather than going to a subway station.

The role of data owners (e.g. municipalities and governmental agencies) is that of infrastructure creators and maintainer, where they publish open data in API format rather than using their data to make visualisations. It is believed that data owners have a tendency to mix up how they should make data accessible to the user. In the end, it is perceived that municipalities are driven by seeing their data being used in innovative and creative ways, resulting in direct benefits for

their region (e.g. job creation). The challenges experienced by the company are, to some degree, believed to be shared with the municipalities, as the governmental organization has to convert varying technical infrastructure to fit the new open data infrastructure, were the leaders on the top often lack the needed knowledge for this kind of task.

5. Analysis

With the analyzed empirical data and theoretical framework, we have built a foundation for further analysis, but we have not answered the research questions. The first section of this chapter will present three themes and 18 categories identified from the empirical data analysis, including identified roles. In the second section will analyze the open data ecosystem elements surrounding and constituting the relationship between municipalities and businesses, here we will work to break it apart, to really get to its core and connect it to identified themes and categories. Thirdly, we will analyze how and why are resistance towards a fully developed open data ecosystem expressed in the relationship between municipalities and businesses, looking at internal and external expression binding them to identified themes and categories. In the last section of this chapter, we will make a concluding analysis binding the ecosystem together with the relationship giving us insight and conclusion.

Before we can start the process, it is important to note that the sheer amount of municipalities and businesses puts them into groups of reference by the interviewees. This means that when a business references municipalities there is a tendency to refer to their general experience gained from all interactions, and the reverse is equally true for municipalities. In the end, this means that inside the collected data we can find conflicting realities. One such conflict is the development level of Mute Swan City and the NODS-project versus businesses perception of low-developing municipalities. Also, while analyzing we noted that earlier collected theories and previous studies were not covering some new encountered topics. These topics were so rare, that theories were only included at those instances and we perceived it not to be fruitful to bring them up in chapter 3.

5.1. Analytic Themes and Categories

While conducting the empirical data analysis we proceed from the initial cycle to cycle one (See section 2.5.1), and with these selected data collections for further analysis. As we are looking at resistance expressions by municipalities and businesses it became clear that we need to study the code collections; barriers, missions, needs, and how the actors perceive each other. We also brought in open data definitions, relationships, and perspectives to gain further insight into the relationship. Development, Swedish maturity, state, attitude, and role were not selected as we didn't find enough data to fully explore and understand the phenomena in question through these. State were lifted in chapter four as it gave a clear background for the actors and it continues to influence their experiences, we do not code this, rather we work to lift it in in this chapter. In the empirical data analysis, three themes and 18 categories were identified, we will in the following subsections present each theme with its corresponding categories. Last in this section we will also lift identified roles, outside of those identified in theory. In later sections (See sections 5.2 and 5.3) we will bind our themes and categories to answer this paper's research questions.

5.1.1. Barriers

While working with the data certain anti-forces to the development of the ecosystem started to pop up, such as lacking political initiative, knowledge and communication channels, similar to Janssen, Charalabidis and Zuiderwijk (2012) adoption barriers and Barry and Bannister (2013) publication barriers, it became natural to look at these anti-forces to the development towards open data ecosystem as barriers. We could argue that this would build us a though box, but as both the theories are so different, approaching the phenomenon from different angles, we believe they gave creative freedom. Categories are descriptive properties of a phenomenon rather than a bucket for certain phenomena to inhabit, in the end, this will help us understand the chains binding municipalities and businesses. Below we will present the identified categories;

- Collaboration: expressions of resistance can be found in or towards the collaboration between municipalities and businesses. This hindrance the further development of a healthy open data ecosystem.

- Culture: The least encountered barrier was that of culture and was often expressed towards other parties. Cultural barriers can be assumptions, stereotyping and traditions.

- Data/Product market: With the publication of open data there is the creation of two markets; Data market, with demand and supply of open data sets. Product market, with demand and supply of products created on open data. Here we find barriers that hinder the existence and growth of such markets.

- Knowledge: With something as complex as open data there is a need for certain knowledge, without such knowledge action and implementation becomes impossible.

- Legal: Legal barriers are those of law, legal processes, and responsibility, one of the least experienced barriers.

- Political leadership: Lacking political leadership leaves actors to fend for themselves and in a state of disarray. This barrier is expressed in forms of lacking strategies, policies, governmental agencies, and goals.

- Resources: Everything needs energy to function in today's world, for the actors this energy takes the form of resources. For example, such as time, money, equipment and hardware.

- Risk: The perception that the consequences of an action are likely and larger than the benefits gained. This is often created by lacking knowledge and insight.

5.1.2. Balance

While conducting a participant observation (2016-03-10) we encountered a difference in objectives, creating expressions of resistance in the collaboration between municipality and businesses, an offset in the balance between the actors. This pattern amongst the actors continued to pop out, for example, differences in the number of roles adopted, varying definitions and knowledge, and local versus national interest. In the theme of balance, we find resistance expressions coming from unbalanced parts inside actors and their relations. Below we will go into identified balanced categories;

- Acceptance: The minimum shared acceptance level of certain actions and implementations. For example, the minimum acceptable open data definition for implementation.

- Approach: Approaches to the open data ecosystem. For example, if it is life sustaining or just another part of the work order.

- Conformity: The degree to which conformity is excepted and possible amongst the actors. For example, standardization amongst municipalities.

- Effect Distance: The distance between an actor and their role towards the effects coming from open data in the ecosystem. For example, municipalities are farther away from effects of open data in a technological perspective that businesses.

- Goal: The differences in goals can create unbalance or conflict between actors, for example, one actor aims for profit while the other aims for societal benefits.

- Interest: The differences in interest can create expressed resistance. For example, one actor could aim to achieve local development, hindering national development and, with this, hinder another actor to act.

5.1.3. Infrastructure

Open data just doesn't flow around like spring pollen in the air with the wind, something carries it, transforms it, upholds its ecosystem, these parts are the infrastructure. In the data, we noted that there were strong opinions of the current technical infrastructure, especially its shortcomings. We separate barriers and infrastructures as we view barriers to exist inside of the ecosystem, while infrastructure carries it, keeping it all together. Below we will bring up four important identified infrastructures, but will explore technical and collaboration infrastructure deeper in section 5.2;

- Collaboration Infrastructure: The collaboration infrastructure are communication channels built with social and technical systems. An example would be call centers.

- Innovation Infrastructure: These are social and technical systems that support innovation processes related to open data. This could, for example, be a hackathon.

- Political Infrastructure: Here exist social and technical systems that create a sense of direction, leadership and centralization. e.g. a governmental agency.

- Technical Infrastructure: Technical infrastructures are in reality servers, network cables, other hardware and software implemented to support the open data.

5.1.4. Roles

Lastly we worked to identify certain important roles inside of the data, here we found politicians, publishers, software suppliers, users and beneficiaries to be important for a functioning open data ecosystem.

- Beneficiary: Beneficiaries are those that are affected by the products released by users. Politicians and publishers are interested in these as they will work to prove the benefits of open data. While the beneficiaries are likely not to know that they are using open data.

- Politician: Leaders and decision makers, allocating resources and assigns missions, they regulate the development of open data and in this all the infrastructure around it.

- Publisher: Supplies the ecosystem with open data and is also responsible for all infrastructure, except political, around the local data market.

- Software Supplier: Creates software that publishers use to make data open, but they are also implementing systems that only they can open.

- User: Users takes the open data supplied and uses it into some kind of product. For example, an application that helps people with everyday challenges or information that is the foundation for important decisions.

5.2. Ecosystem

- What are the open data ecosystem elements surrounding and constituting the relationship between municipalities and businesses?
    - How and why do they affect open data development and resulting benefits?
    - Is the existing ecosystem sufficient and, if not so, why?

In this section we will analyze with the objective to answer the first research question given in the introduction chapter, to be supportive we have included the question above. We will first explore the elements surrounding and constituting the relationship between municipalities and businesses, looking for missing elements and their relation, giving us a mapped out context around the relationship. After that we move over to analyze the technical flow between municipality and business, focusing on technical infrastructure. Lastly, we will analyze the social communication between municipality and business, associating it with infrastructure and roles.

5.2.1. Sub-Ecosystem: Data Market

In the theoretical framework we concentrated on (see Figure 5.1) a subpart of the ecosystem, here policies & strategies influence data publication that in turn will affect data use & products resulting in benefits, in the end, looping back to policies & strategies. We also have the feedback & communication between data publication and data use & products. With the roles data publisher, user and beneficiaries. This model is, to its core, simple and revolves around the *data market*.
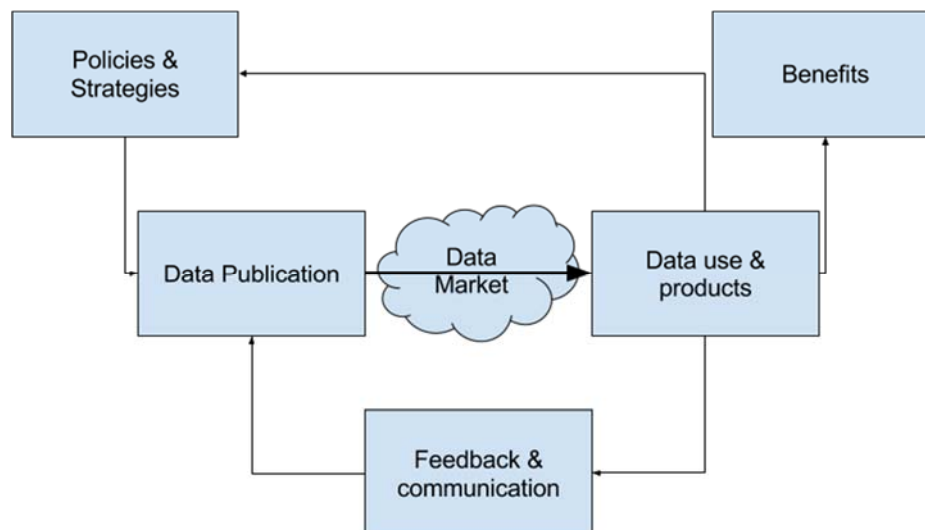
Figure: 5.1. The open data market, created from subloop inside Dawes, Vidiasova, and Parkhimovich's (2016) model.

We can easily connect the data publisher to be the municipality with the ecosystem element of data publication. The business is the user, bound to data use & products. The end-user is the beneficiary gaining the benefits from data use & products. When we lift governmental agencies such as VINNOVA we soon encounter difficulties, were does this actor find its role and respective element. They are working from policies & strategies, but they do not publish data. The same challenge comes with the software supplier that affects the data publication but does not act on their policies & strategies. Businesses have strategies and goals with the open data development and usage, that will affect their data use & products.
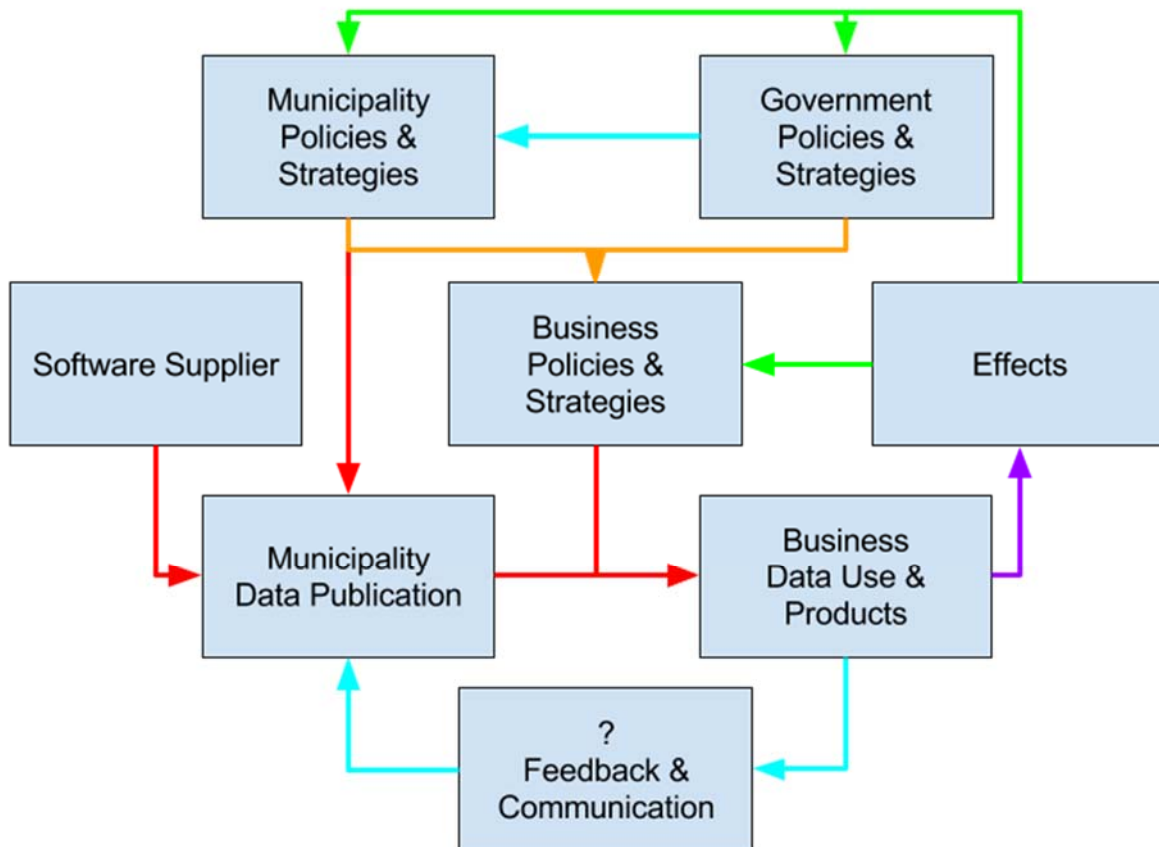
Figure: 5.2 The open data sub-ecosystem, created from Dawes, Vidiasova, and Parkhimovich's (2016) model. Soft dependencies (Light blue), hard dependencies (Red), Regulation dependency (Green), connections to other parts of the ecosystem (black), unknown dependency (Orange), and interest dependency (Purple).

Grouping *Policies & Strategies* into one element can only stay true if the government has the power to order municipality and businesses; in our context this is false and we, therefore, have to split the ecosystem element into three; *Government Policies & Strategies*, *Municipality Policies & Strategies*, and *Business Policies & Strategies*. From Dawes, Vidiasova, and Parkhimovich's (2016) model we know that Policies & Strategies were dependent on the data use & products. In collected data we noted that actors policies & strategies are more affected by the perceived results of the data use & products, will say, they are interested in the benefits but also consequences, the *Effects* (See green arrows in Figure 5.2).

● The element *Government Policies & Strategies* consists of the government, Vinnova, SKL, PSI-law, and E-delegationen. They are the main drive forces and supporters for open data development in the country. It is also here we find political leadership, resources and legal barriers and the political and innovation infrastructure. Here lies to the ability to regulate resources amongst the municipalities. Here we also find individuals with a political perspective.

● *Municipality Policies & Strategies*, as municipalities are self-governing they will have the option to create their own strategies and implementations. We can view it as freedom of interpretation, implementation, and direction. Here we find municipality administration leaders and politicians. Central to this element is collaboration and technological infrastructure as it has power to strongly regulate these. Here we also find individuals with a political and municipal perspective.

- *Business Policies & Strategies* encapsulates the leaders and decision makers of businesses. They are interested in the strategies and policies of municipalities and governments as it will help them plan for the future. They have direct control over how open data is translated into effects and lack the ability to create an infrastructure with the same capabilities as municipalities and other governmental organizations. Here we find individuals with business perspective.
- *Effects* is the benefits and consequences of different business products have on citizens and society. We changed it from benefits as it would more fully represent impact. Here we will often find different perspectives, but one of the more common is citizen perspective.

From *"if they [municipality] would arrange an information meeting, I believe many would come."* (Enterprise architect, 2016-04-08) we know that there exists an interest to know more about open data inside of municipalities and there was an expression for needing to know the direction of open data in Sweden. From this we know that *Business Policies & Strategies* are affected in some way by *Government Policies & Strategies* and *Municipality Policies & Strategies* as there are no systems in place to handle this, we cannot state if the dependency is hard or soft (See orange arrow, Figure 5.2). For example, if there are weak regulations to control open data publishing and implementations, the municipality can act in any way they want, this creates a strong dependency between municipality and business, as they have to follow the strategies and policies of the publisher. While on the other hand if there are strong regulations to control data publication in a municipality, the government's strategies and policies can become more important to follow. From these examples, we see that strong dependencies will be towards the one with power over data publication and implementation.

If we turn our attention to the municipality we have found that they consist of *Policies & Strategies* strongly affecting *Data Publication*, but there is a shadowy figure not mentioned by Dawes, Vidiasova, and Parkhimovich's (2016) model, the *software supplier* (See Figure 5.2). Their role is to develop software for municipalities to use, but they can also develop and sell software that makes up the technical infrastructure. For them, there is a possible profit when the municipalities need to publish data as they can sell integration modules or software to support the process of publication. This makes municipalities strongly dependent on these roles as they can put the minimum cost for publication and implementation if there is a dependency.

- *Software Suppliers* develops software for the municipality and technical infrastructure supporting the open data ecosystem. If their software is developed by municipality there might be no software supplier dependency. They often intake a business perspective towards open data.

Municipality Data Publication is affected by their *Policies & Strategies* but also the *Software Supplier*. In turn, the ecosystem element in combination with *Businesses Policies & Strategies* affects *Data use & products*. For example, if there is a limited amount of open data released this will first affect the data market then put constraints on the following product market. If the government, used loosely here, put forwards insecure plans on the future of open data businesses will not make grand design software as there is a risk for more resources to enter then comes out.

- *Municipality Data Publication* is part of a municipality, often controlled by the IT-unit. They publish open data; they have control over the technical infrastructure. Here we find individuals with a municipal perspective, leaning towards implementation and maintenance.
- *Business Data Use & Products* is part of the business development and supply of products, here we will find developer units. Here we find individuals with a business perspective focused on implementation and transformation.

While exploring the ecosystem and its elements we never encountered *Feedback & Communication*, instead, in its absence we found many different approaches ranging from absolutely nothing to full collaboration around one project, NODS as an example for open data publication and collaboration between municipality and software supplier. Because of this, we couldn't gain insight into how this element affects the rest of the system, one of the interviewees admitted that the only way to gain access to the correct information were through private personal contacts, something that admittedly was perceived to be the wrong system (Enterprise architect, 2016-04-08).

- *Feedback & Communication*, elements for feedback and communication in the case were not found, but the need for such elements was expressed as strong. Here a possible new role and perspective could exist, one working with a holistic perspective.

We took the theoretical framework figure (See Figure 5.1) and applied our collected data to gain more insight into the relationship between municipality and business (See Figure 5.2). With this, we have answered the first half of the research question and we have pointed out a missing ecosystem element, but not explained why it is missing. In the following two sections we will; first, explore how ecosystem elements around the relationship between municipality and business affect the development on a technical level. Secondly, we will explore the lacking social level and how this affects the ecosystem.

5.2.2. Technical Infrastructure

In the simplest form, we find that municipalities publish open data for the business to use and make products from (See Figure 5.3), creating a simple technical infrastructure. As municipalities are not strongly dependent on their own open data publication, while businesses are, we can find a stronger reaction from the later. In reality, this relation is more complex, by looking at Zuiderwijk, Janssen and Davis (2014) seven features and Lee's (2014, October) twelve steps we gain direction. In this section, to help us analyze, we will focus on the three first features and third to eighth steps, bringing up a combination below, as the rest are beyond the current technological state of this ecosystem and are enough to give us an idea of the current development level, we will meld them into a three-part analysis; publication, availability, and quality.
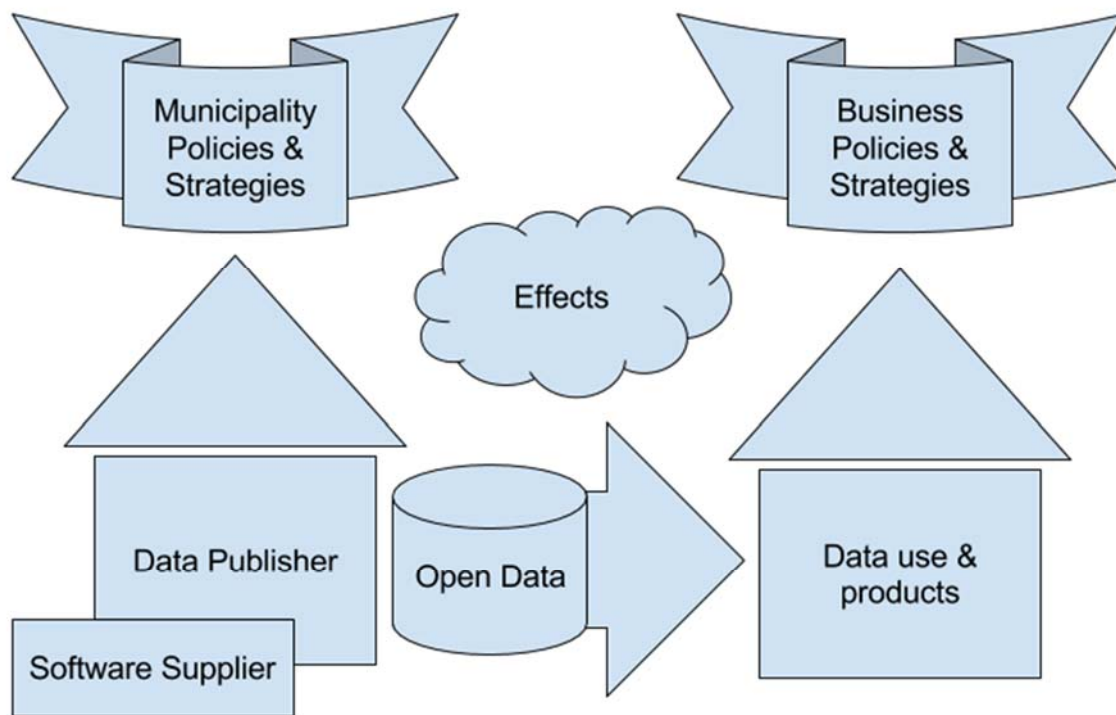
Figure: 5.3. Abstraction of the technical flow between municipality and business.

For the publication of data, we find it to be one of the core concepts of both Zuiderwijk, Janssen and Davis (2014) and Lee (2014, October) while the later author further expands on this telling us that map and address data are especially important. In the processes, there is a need to abide by the laws surrounding individual privacy (ibid.). We can further expand on this with the amount and rate of publication.

The importance of map and address data is reflected in the data sample, only one business didn't use map and address data in an active way (e.g. binding some value to a dynamic geographical position), they used it in a more static way (e.g. address of certain important buildings). Not all municipalities have published this kind of information and one of the businesses even admitted that he had to buy the information (Senior Engineer, M.Sc., 2016-03-21), resource barrier leading to less participation in the data market.

If we turn our attention to the amount and rate of publication, we note that all businesses want more data to be released. While municipalities don't know what to publish as they are sitting on vast amounts of data, they work to publish anything that is already on their websites, taking individual privacy serious (Knowledge and legal effects data market through municipalities). Because of this we can note something interesting, businesses don't directly know what data municipalities are containing, here we find a belief that it is just for municipalities to publish data and that they are too careful and slow, but, if they are doing a good job with their publishing; all data they are releasing is following the expected standards. This means that if municipalities are conducting themselves in a certain way (by culture & legal) they can make outsiders, such as

business, perceive all data to be safe data while unsafe data is out of vision and those affect collaboration and data market. One of the businesses is even sitting and waiting for open data to be published (IT Consultant, 2016-05-09), where progression is experienced as slow, creating a perceived disbelief culture in businesses that hinder collaboration. Basically, municipalities have vast amounts of data to sift through, lacking knowledge for selection and only "law abiding" data can be released, for businesses the released amount is can be perceived as small and makes the municipality be perceived as slow, hindering the will to collaborate.

Moving over to the availability of open data we find that there is a need for tools that support searching, finding, evaluating, viewing data and their related licenses (Zuiderwijk, Janssen, and Davis, 2014). Here Lee (2014, October) stresses the importance for open data to be associated with an open license and it must be easy for the user to find data.

Businesses perceived identifying open data as a huge challenge, and here we have two barriers in the technical infrastructure; find correct data in a vast sample (*task complexity* according to Zuiderwijk, et. al., 2014) and municipalities who have published data. As businesses cannot find the open data, evaluating and viewing data and their related licenses becomes impossible. Here the problem lies in the nature of variation and individuality; in Sweden, we have 290 municipalities that are all going their "own way", there is no central initiative or portal making municipal data accessible. The resulting consequences for the data market come from a lack of knowledge, political leadership, and resources. The municipality doesn't have the knowledge on how to implement or what to select, they don't have the resources to release, there is no leadership giving them collective direction, and there is no mission plan on how to reach the goal. For municipalities, open data is a far away dream that businesses want to achieve today, but there is no road to ride, and this creates a barrier towards the open data market.

Lastly, we have quality, here cleaning, analyzing, enriching, combining, linking, and visualizing open data are important (Zuiderwijk, Janssen, and Davis, 2014). Lee (2014, October) further expanded on this data should be open, machine-readable, following accepted standards, has metadata, utilise unique identifiers, comes from a well-documented API, can be collected in bulk form, and be kept up-to-date.

From the collective experience of businesses, the quality in the open data varies more than the existing number of dog breeds. Some municipalities are still using "open papers" while others are releasing open data through APIes. This creates vast problems for businesses as between two municipalities releasing the "same" data there can be huge variation, now increase this number to 290, only one business perceived this not to be a problem and they used the data to support their operations, but they didn't want to visit all municipalities to ask them questions about their open data (Enterprise architect, 2016-04-08). Businesses facing challenges with this have to move resources from benefit developing to data conversion functionality, and in this we negatively affect the data market and resources, making products "fail" from resource constraints before even researching the end-user and spreading their benefits to society.

In the end, variation, individuality, knowledge, politics, resources, collaboration and data market barriers exist in the current state of technical infrastructure. The first two are not direct barriers, rather they are just variables that make certain symptoms become more prominent. We can view this as hundred coughing man and one healthy man, where we will strongly note the caught, but

if it were reversed we wouldn't give notice. Individuality and variation as barriers grow from a lack of knowledge, political leadership, resources and collaboration, not the other way around. This directly affects businesses through the technical infrastructure, making it perceived that the hundred men are the problem rather than the cough that can be treated with medicine and, in the end, this is creating a data market barrier. To an end, we ask if we should remedy symptoms in singular or plural medicines.

5.2.3. Collaboration Infrastructure

In the current collaboration infrastructure (See Figure 5.4), municipalities work to not know who is using their open data, this is done for transparency and there doesn't exist a common forum for the municipality to communicate with businesses, this affects the collaboration in a negative way. The resulting wall of fog created from this situation shouldn't be taken lightly as it forces one side into passive and defensive behavior with perceived greater risks. The solution is not to break the law of transparency rather we can work with social systems and collaborative infrastructure to create a safer data market for both parties, the first steps could be some kind of business relationship between actors.
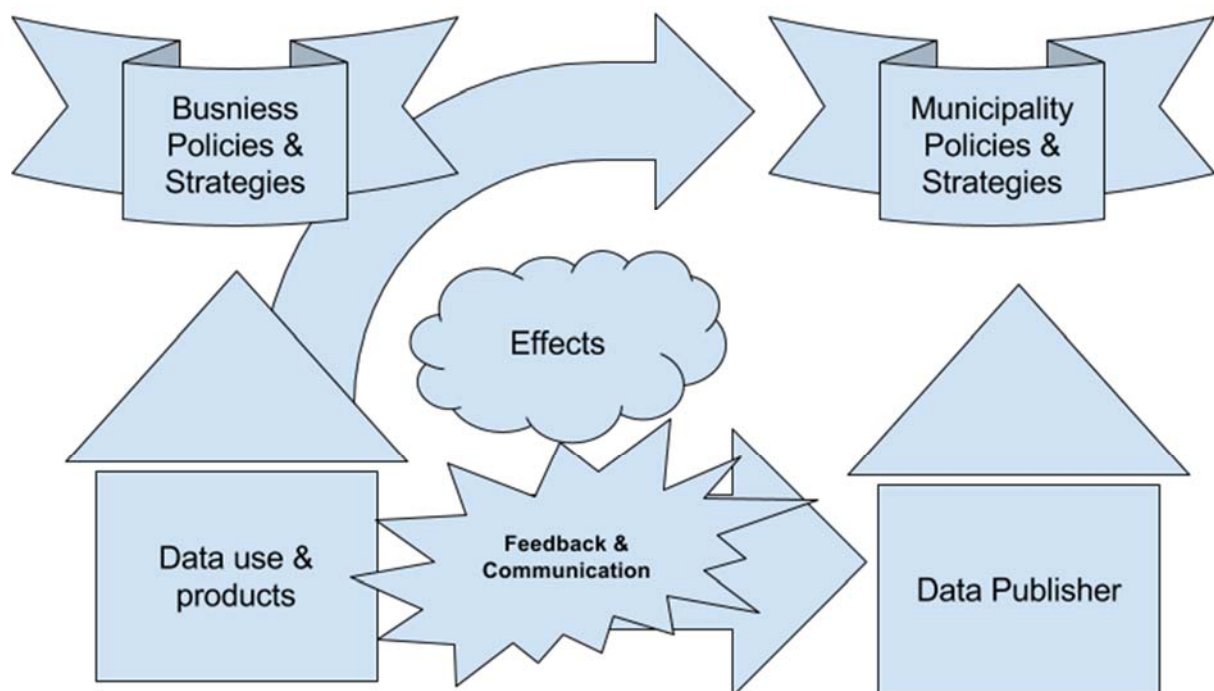
Figure: 5.4. Abstraction of the social communication between municipality and business.

Before we continue the analysis it is worth to note that none of the earlier barriers from theory (See section 3.4.2) are mentioning social infrastructure or barriers. The institutional *No process for dealing with user input* could be the closest created by Janssen, Charalabidis and Zuiderwijk (2012), but it is aimed at input process and not towards collaboration infrastructure.

From the business side we perceive a wall of municipalities; one vast amount of possible collaborators. We also have to include that businesses need some kind of relationship with their customers as well, but their relationship with municipalities can have more consequences than

that one with a single customer (A municipality stopping the release data can hinder normal product behaviour and those affect all the business's customers). Amongst the businesses there were expressed that no clear communication channel existed (e.g. no call center, no personal contact), this means that the *feedback & communication* ecosystem element doesn't exist in the current infrastructure, they cannot express challenges to municipalities, damaging both data and product market and collaboration. In the current state of infrastructure, we only have a *release-to-use* culture, were parties isolates themselves not by choice but by structure, creating perceived risk and negative cultures towards collaboration.

From this we open for the question; *is it in the role of the municipality to handle communication and collaboration around open data development in Sweden or should it just be based in their local region?* At the current state of barriers and infrastructure the answer is leaning towards a national solution, as the municipalities are lacking both resources and knowledge to handle this, and imagine the resource bleed when we have 290 municipalities implementing collaboration infrastructure in Sweden, this will just enforce the wall of municipalities perceived by businesses. One solution to achieve effectiveness would be to bind municipalities into bigger clusters that collectively handles collaboration and communication around open data, but that can result in conflict between the cluster, what happens if one cluster agrees to something that goes against another clusters well-being or agreements. The more centralized we make the communication channel or any infrastructure, the more distant the municipality becomes to the effects of their open data release as they become more of *one-of-many* for the channel; creating effect distance.

If we look at Lee's (2014, October) eleven methods and channels for user engagement we soon note that the above analysis, might consider both municipality and business, but it is stuck in a one solution thinking. Turn our attention to the data sample we identified that lack in collaboration infrastructure needs communication channels but more importantly their functionality is central. Here we can group them into five groups; enter, exchange, publication, direction, and effects.

One of the main barriers for collaboration are few and opaque communication entrances for businesses to enter the municipality. If they cannot connect with municipalities they cannot initiate collaboration, while also we have to note that this would take resources from the municipalities other roles if solved. For businesses a municipality is just a wall with small slips where some information exchange can happen. This comes from the low political prioritization and leadership. This could take the forms as call centers or clear roles of responsibility for the development of open data. One business expressed that there is a need for solid social interaction were they would have an anchor point in the vast social system of a municipality, this could be the expression of a risk barrier, were businesses doesn't want to lose access and control over collaboration.

Businesses showed interest to know what data municipalities have in their systems, but also a need to express their challenges. In the collaboration infrastructure, there is a need for both groups of actors to be able to express information sets and challenges around and in infrastructure, making exchanges. This could be symptoms from lacking political leadership and foundation for data market. One business was even willing to pay for municipalities to come to them and inform them about their data. There is no lacking drive force from the market, the

willingness is there but obfuscated by barriers towards collaboration and underdeveloped collaboration infrastructure, a solution could be to create different forums or conventions.

Municipalities don't know what to publish, but the businesses can see problems that can be solved with certain information, for the solution to become obvious they need to know the data. This creates a circle of dependency where both are hindered by a lack of knowledge. With the above forum solutions, this could, to a degree, be solved, but what if the municipality is lacking the resources, political leadership, or cultural insight? Then negotiation could be a solution where businesses can enter into contracts or pay municipalities to release open data. In the end, a *pay-to-release* culture could be created driving up the market product prices. This can both be positive and negative; if other municipalities notice that companies are willing to pay for open data release, no open data might be released for free and the government might not give extra resources to municipalities.

Both actor groups are constantly working forward, but neither has a clear direction on where the whole is propagating, and this can be viewed as the actors "driving a car without a known destination or driver". It is a journey without destination, meaning that a goal can never be achieved nationally. This, in the end, is a strong barrier created from political leadership down prioritization of open data, or is it just an illusion, without channels that communicate plans and direction municipalities and businesses cannot find motivation and can view any perceived risk larger than it really is. Therefore, this kind of channel would benefit both groups of actors.

Lastly, municipalities are interested to know what happens with their data, the effects in society, as businesses don't actively work to tell their end-users about their use of open data, therefore, it is hard to gain insight on effects that way. Here we find a need for a communication channel where municipalities can see effects of open data and possibility for businesses to present their products to the user. Such a channel could be a convention or app store, it could also be resolved in the technical infrastructure, but that would break the idea of transparency. This could possibly be achieved by some of the above solutions, meaning that resource effectiveness can be attained if the correct communication channel is selected and implemented.

If we take a step back, we can note that political leadership, resources, and knowledge are main barriers. If we look past the relationship between municipality and business we have the government, they allocate money, create policies, directions, and visions, handling the big picture. What is interesting is that it can be perceived as political powers are believing that it is just a small matter to publish open data, there are no major resources or missions put on the municipalities, but yet again we have to remind ourselves that the government cannot order actors into action, this could be a system that makes one of the Janssen, Charalabidis, and Zuiderwijk (2012) myths emerge outside of direct actions of actors, created from the complex sociotechnical system. Taking focus on the policies and legal matters around open data we note that they are generic and aim to publish open data, leaving municipalities in a knowledge void, with no clue what to publish and in following what standards and formats, creating challenges for the technical infrastructure, also resulting in a belief that it is simply a matter to *publish-and-use*. This is another of the authors' myths (ibid.), the last myth captured by a few of the interviewees were that of open data leading to an open government. Can it be that the political motivations drive on and create myths about open data usage, coming from both a lack of knowledge and immature understanding? This is outside of the study to answer, but it needs to be brought up as it creates resistance in the developing of the open data ecosystem. A result from this could be

that we prioritize the technical infrastructure challenges rather than everything around it, and in the end, this could result in the government working to solve problems rather than creating a data and product market.

5.3. Resistance Expression

- How and why is resistance towards a fully developed open data ecosystem expressed in the relationship between municipalities and businesses?
  - How and why is resistance expressed in actors?
  - How and why is resistance expressed between actors?

In this section we will analyze with the objective to answer the second research question given in the introduction chapter, to be supportive we have included the question above. This means that we move away from infrastructure and ecosystem parts to the content of such systems. We have divided this section into three parts. Firstly, we will explore the resistance expressed in municipalities. Secondly, we will analyze the resistance expressed in between municipalities and businesses. Thirdly, we will explore the resistance expressed in businesses. This follows the flow of open data, from publisher to user through the open data market, from the publisher to the beneficiary through the product market, as barriers have a tendency to affect the next link in the chain of open data usage we follow the flow (See Figure 5.5).
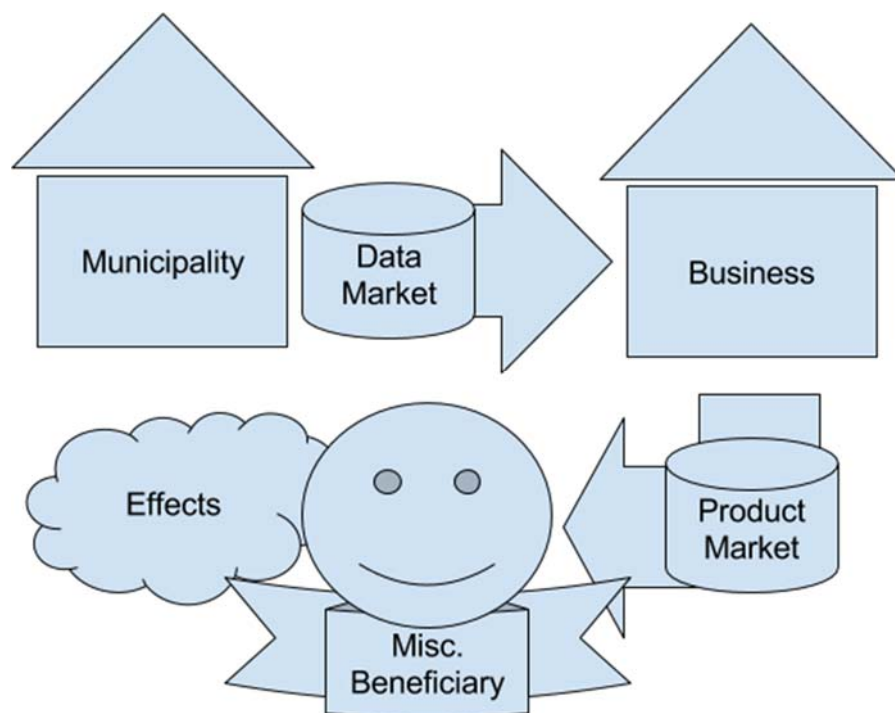

Figure: 5.5 Relationship between municipality, business and effects.

5.3.1. Municipality

In this section we will analyze resistance expressions inside of a municipality towards a functioning open data ecosystem, meaning that we will explore the barriers expressed. Here we will have to note that amongst the municipalities, Mute Swan City was in the forefront while Russula Town and Cornflower Village were both followers, with the latter being the smallest municipality of the three. Here we find a clear pattern of resources, the bigger a municipality is the more resources it has leftover to use on open data implementation. This uneven collaboration creates a leadership alliance, and this could be a way for municipalities to fill the lacking political leadership, putting Mute Swan City as the leader they can follow. To continue the analysis, we will dedicate one subsection for each of the barriers below;

Collaboration
Open data in abstraction is just a release-use relation that is a reflection of strong focus on technical infrastructure that is central to a functioning open data ecosystem, but it forgets the surrounding communication channels needed to sustain collaboration. This follows the mythical pattern of *just release open data and gain benefits* (Janssen, Charalabidis, & Zuiderwijk, 2012). This can come from the abstract law (2010:566), transparent thinking, and lacking political leadership, where the lack of focus is reflected into the municipalities. The consequences of this is that municipalities forget to implement communication channels and the result is that they do not have the infrastructure to support collaboration between publishing and use in the data market. This concentration on the technical and open data in such a state is reflected in municipal and political perspective, where collaborative infrastructure stands in absentia. Further, Melin (2016) has noted the importance of internal alliances to motivate open data; in our case we see this stretch out and cover the alliance of municipalities where weaker resource lacking municipalities can find motivation through the help of a "big brother". Here, we will find a future barrier, where municipalities will have to work with collaboration on three levels; internal, between municipalities, and between businesses. Without a proper communication channel and political leadership, these will be resource consuming, which can result in power struggles and divided action.

Culture
Organization culture is complex in nature and can be perceived to be a hindrance from both the outside and inside of an organization. This can, for example, be noted through the statements of *"I believe generally that I have, me and Samuel especially, have a much more open view, than what we encounter around the municipality, I think absolutely"* (IT Consultant, 2015-02-26) and *"Communication and dialog with governmental agencies and municipalities is rather interesting, it is characterized by an 'us and them' mindset."* (CEO, 2016-04-07). Both of the statements point to the belief that there exists an isolationist attitude inside of municipalities that hinders both internal and external development, resulting in a perception that they do not trust businesses. Where this culture is coming from has not been identified, but it is not an unknown barrier for publication of open data (Barry & Bannister, 2013). In one case, an interviewee wished that his organisation could be more like another organisation that had vast amounts of innovation (IT Strategist, 2015-03-09). This could reflect that the culture of municipalities is not leaning towards innovation and more towards sustenance. This could explain the low activation level amongst municipalities and the strong dependency on others.

Knowledge

"I do not believe that they really understand this, what is open data, they don't. … do you say open data, they don't understand" (IT Consultant, 2015-02-26) because of this lacking knowledge, there exists a barrier that stems from the youth of open data, but it is further supported when the complexity of open data is not seriously acted upon. This means that open data is approached in a simplistic manner where it is assumed that no education or training is needed for the whole municipality from the political leadership. This results in ineffectiveness where personnel working with open data have to constantly inform and educate, taking away precious resources and making knowledge uneven in the organization, which creates an opening for misinterpretation. As expressed by an interviewee; *"There exist some knowledge transfer when you talk about benefits, what data can you retrieve, that becomes an aspect, but secondly, is to drive a pure dedicated project and get some operations to work with these questions."* (IT Strategist, 2016-03-14). This dedicated project is probably hindered by the lacking knowledge of open data and the nonserious approach; if we do not understand how to implement it and its final benefits, it is hard to act upon it.

Legal

From the perspective of municipalities, legal matters were not highly expressed as barriers. They expressed that Personal Data Act needs to be maintained, and this low manifestation could come from the fact Mute Swan City, as expressed by the following statement, *"... we have done it very easily, we take such things that is already out, so, there will not be any issue..."* (IT Strategist, 2015-03-09) has already solved the matter for the time. Their solutions resemble the Lee's (2014, October) strategy to *upgrade already existing data to open data*. The strength is that municipalities can publish data and, therefore, create internal motivation to publish more while the weakness is that they, in the future, will have to grapple with harder data implementations that need more resources. From the above collaboration, we can see the benefit of alliances between municipalities where strategies and results can be shared between actors to increase the publish rate and lower or remove legal barriers for a time.

Both Barry and Bannister (2013) and Janssen, et. al. (2012) mentioned licensing as a barrier, this was not mentioned by participants as a hindrance. Instead, when asked for an alternative to the NODS-project, one of the alternatives was expressed as; *"... an open source solution with other and released accessible."* (IT Strategist, 2016-04-11). This indicates that the interviewee has insight into what open source is and might therefore be familiar with the term "open". Municipalities already understanding the term "open" could be one reason why licensing was not mentioned as a barrier.

Data Market

Municipalities have strong control over the data market, as they can decide what to publish in what quality and form, because of this, any challenges in the municipality is likely to propagate towards the data market. After a business realized they needed a set of open data, they contacted a municipality: *"the answer was a bit surprised, as they didn't know who was interested in the data, and because of that they hadn't published it"* (Enterprise architect, 2016-04-08). Because of the lacking communication channels and knowledge municipalities don't know what to release, where the current state and strategy can result in a release of worthless data, for the sake of release, where demand and supply becomes unsynchronized. This becomes strongly enforced as resources are moved to more important tasks leaving open data development forced to publish easy access data.

Political leadership

"Politically we have not have this as priority." (IT Strategist, 2016-04-11) is showcasing the lacking political leadership municipalities that affect the development of open data. This lack of leadership results in a lack of direction, low prioritization, and resource shortages. One of the business interviewees expressed *"the government have a lot to think about, immigration, everything, trouble and mess.*" (Senior Engineer, M.Sc., 2016-03-21) This reflects the current state of Sweden on the movement and, more importantly, that open data is not actively down prioritized; other things are just perceived as more important. With the focus turned away from open data and a lack of knowledge; roles and responsibilities become unclear where friction is created between businesses and municipality, especially when the first perceives that the later overstep their boundaries. This category of resistance expression can be linked with Barry and Bannister's (2014) administrative category towards the barriers of leadership and policy, as they are both lifting lacking policies and leadership from politics.

Resources

With political focus turned away from open data and onto other matters, no resources are allocated to the furthering of open data, which is strongly expressed in the smaller municipalities where one role with multiple responsibilities was to handle open data development. It is not only the resource shortage that is a barrier, *"... [Economy] is one aspect we must take regards to, that they [governmental organization] have an economic loss, in some cases it can be big, in others small, so we have to compare benefit versus loss…"* (IT Consultant, 2015-02-26). When a municipality is already under resource shortage such losses are not attractive.

Further on, "*We need soon to be there, we cannot put much more time on this, is this really this important, can others see this good, and it doesn't, compared with other things, we can create transparency in other ways."* (IT Strategist, 2015-03-09) said an interviewee to point at ineffectiveness in the resource-to-effect conversions. This lowers morale and motivation to continue their workings with open data; this can come from activities perceived not belonging to them, lacking knowledge and resources.

Both Barry and Bannister (2013) and Janssen, et. al. (2014) perceived that resources were a challenge towards publication and adoption. In the study not only did we find more evidence for this to be true, but that it encapsulates more than monetary resources and needs to include human resources and time.

Risk

Because of accepted transparency policies distance is created between municipality and business where the first is perceived to vulnerable. Further, it also makes the business actors faceless, hindering collaboration and challenging to "control". Risk becomes a fear of the unknown, but it also becomes the fear to not have achieved something in the correct way, in the end, risk is the fear to act as consequences are too high from the perspective of the actor.

Barry and Bannisters (2014) risk categories were all found in the study for the municipalities to varying degrees, where they were more lifted by the leading municipalities rather than the two followers. This could indicate that risk barriers are perceived to be handled by the leader rather than the followers.

Jansen et. al. (2012) made an interesting observation in their institutional category *Risk-averse*

culture (no entrepreneurship) and, was to a degree, rediscovered. When talking about misuse one of the interviewees mentioned;" *[current solutions] doesn't stop them from doing it [Misuse, abuse or misinterpret information] now"* (IT Consultant, 2015-02-26), this means that knowledge about criminal or negative behavior around open data is lacking and, therefore, perceived to be larger than it really is. Rather than the Jansen et. al. risk-averse culture we find that municipalities are not acting because of a lack of knowledge, but also the lack of legal processes; How will open data crime be processed by the legal system? Is it in the role of the municipality or the government?

5.3.2. Municipality and Business

In this section, we will explore the resistance expressed between municipalities and businesses in the form of balance. Municipalities are interested in the benefits and would be motivated if they could see proof of such, guiding them to know what data is the most important. For business to be able to give the proof of benefits, they need data to start off with; if they do not know about the data they cannot act on it. This dependency is a deadlock, where the municipality will have to act first and cannot sit and wait, and it can be perceived as resistance in the expression of inaction, whereas in actuality, it is a combination of barriers leading to this state, created from opaqueness and individual barriers. To continue the analysis, we will explore balance resistance expressions between municipality and business.

Acceptance
With goals and actions, a minimum acceptance level exists. For example, if a municipality is not caring for its region it does not meet the minimum expectancy of the inhabitants and can, therefore, face criticism.

This was rediscovered as a resistance expression between municipalities and businesses where the municipality implements technical infrastructure that isn't up to the minimum acceptance level of businesses, creating irritation and anger in the later. This is can be expressed as *"...there are many that have misunderstood, they have missed the three stage rocket; open up data, let an innovator do something with data, that might make it useful, they [data publishers] shouldn't make graphs over their own data and make…"* (IT Consultant, 2016-05-09). This is pointing towards a knowledge barrier, but both municipalities and businesses have a definition or sense of open data. Rather, we found that there were different levels of acceptable open data definitions, and the resistance is best expressed through: *"Open data is meaningless if you do not have my definition."* (IT Consultant, 2016-05-09). Both parties have the knowledge about open data, but their minimum acceptable definition varies, where the providers level is lower than users. It can be perceived that the interviewee's statement is aggressive, but we will have to look at root causes; resource and data market barriers result in a loss of possible projects and resources, slowly grinding the business away, which means that differing definitions result in different degrees of implementation that harm businesses. If we turn it around, there is a minimum acceptance level for the application of provided data in a municipality as they don't want the information to misguide citizens or, in other ways, harm society. As this minimum cannot be controlled or enforced, the perceived risk is large.

This difference in acceptance of a minimum term of open data could be that the term is currently expanding to become fully defined and functioning. Francoli and Clarke (2014) have studied the concept of open government and noticed that there is a trend to put it parallel to open data,

something they considered not to be true, and from this we can see the conceptual term of open data growing to express exact technical details, and because of this, conflict arises when traditional thinking comes in contact with the new and innovative. It can be that the ecosystem is trying to identify acceptable levels between the actors.

Approach
Municipalities have more roles than just those associated with open data. They are more than publishers; they are caretakers of a region. While businesses might have different roles, they are forced to put a bigger weight on their role as users as their livelihoods are dependent on open data through their products.

Here we find a broad versus focused approach to roles associated with open data and their importance inside. This creates collaboration barriers for both parties; municipalities don't want to do more than their responsibilities tells them to which a *not invented here* culture barrier, while for businesses it can be perceived as a risk to make a larger product on open data, threatening their resources and, to an end, their existence. For the municipalities to put focus on open data and release more there is a need for a *business case*, while for the businesses to succeed there is a need for quality infrastructure and actually published data, a foundation for a healthy data and product market. These two kinds of approaches create a *deadlock* that can only be broken if municipalities turn their attention and resources towards open data. In turn, this is stopped by resource and knowledge barriers, but also responsibility; should municipalities be those to develop and create new standards and formats or should they be those that just implement them? A question of *division of labour*.

Earlier (See section 3.3) identified approaches to the matter of stakeholders could help us evaluate the approach of municipalities and businesses. Inside of municipalities, we found varying degrees of existing perspectives where focus was leaning towards municipal perspective but more toward other responsibilities. For businesses, we identified the business perspective. What was more identified was that businesses also approached open data with an information perspective where open data was a part of a solution or to improve existing products. The difference between economic and information perspective is the dependency and focus on open data, where the first revolves around it and the later only see a part for problem solving. They also view the product market as different, where the economic view a new market of products based on open data and the later approaches open data as a new part of the old product market. There could be conflicts in the approaches towards open data, that cannot easily be perceived.

Conformity
The least expressed unbalance was expressed by one municipality, but we can see, in the context of Sweden, how it is important. The government cannot directly order municipalities, and this creates a challenge to implement infrastructure such as standards. Here we find standardization versus municipality individuality to be a central factor, where too much personality can harm the data market and collaboration while collective solutions can be impossible to enforce and maintain. Therefore, we do not view this as a barrier, rather it is a challenge that needs to be taken into consideration. It is a question about conformity; how much adoption must happen between the both actors to each other, and where is the perfect balance? Conformity is based in Barry and Bannister's (2014) barrier *control and power*, bound to both

actors rather than just one, where neither want to lose freedom. This results in a new barrier existing in *Use and participation* (Janssen, et. el., 2012).

Effect Distance
It is a constant struggle for municipalities to decide between personal and societal benefits, struggling with the effect distance, and this becomes extra challenging with lacking political leadership and resources and an expectancy to release, resulting in a dire situation. Here, the choice is between putting resources on helping their region or developing open data, something they might not gain benefits from. Without knowledge, selecting the correct action is even harder to enact. This is reflected in Barry and Bannister's (2014) *control and power* barrier; a fear of the publisher losing control over data and power, as information is often synonymous with power, creating a perception of *risk.* We believe that this to be true and further enforced by the effect distance and a belief that by releasing the data municipalities lose control over their own destiny. In short effect distance is the distance between an actor and the effects of open data.

Early in the data collection we encountered a challenge for contacting and identifying possible business for interviewing; this came from the fact that the municipalities interviewed didn't have direct contact with businesses using their open data. While conducting interviews we encountered this answer to one of our add-on questions;

"Interviewer: Do they [customers] know they are using open data?
Interviewee: No, they believe that is we who create all traveling suggestions." (IT Consultant, 2016-05-09)

From both of these, a distance is created between the provider and end-user. The actual effects of open data are further away than we can see in the ecosystem model (See section 3.6.1). If these chains cannot be followed forward or backward it is impossible to sustain multiple reuse and processing of open data; if an earlier link breaks only an empty void will be encountered. Any type of error searching will be slow and resource consuming. The feedback system suggested by Zuiderwijk, et. al. (2014) would create a communication channel, but it wouldn't resolve the power distance. Rather, it would work to enhance it; one-way communication that puts the publisher under more focus surrounding improvement and critique. If we were to include richer communication combined with the Zuiderwijk, et. al. element we would get Dawes, Vidiasova and Parkhimovich's communication & feedback element (2016). Together with feedback and communication around open data usage and implementation, the perceived effect distance would be lowered.

Goal
When it comes to businesses and municipalities we have to recognize a very important distinction; businesses need to work hard for their resources and municipalities aim to give their region the best possible benefits. This conflict can be seen in local versus national interest (See below), but we also find an imbalance in the goals between municipalities and businesses where profit versus benefits becomes reality, or by the benefit categories of Janssen, et. el. (2012) *political and social* versus *economic* with a support of *operational and technical* benefits. This unbalance was encountered while conducting a participatory observation, where a software supplier was aggressively trying to sell a product that was not adapted to the needs of the municipality. *To clarify, both can aim to make societal benefits, but the prioritization may vary.*

Not all of the businesses prioritized economic benefits, and rather they had the goal to solve a complex problem with open data; something that is not expressed in Janssen, et. al.'s (2012) benefit categories. Overall, businesses were searching for a business case or profit model, showcasing the need for profit to develop a product and, in the end, economic benefits. One interviewee expressed that he wanted bigger societal benefits (Senior Engineer, M.Sc., 2016-03-21),; he belonged to a large business where the size could make it possible to prioritize goals other than profit, but he admitted there was a search to identify some kind of core business.

Interest
"My thought with the product were that it should exist for all of Sweden and the end-user could select interesting cities, but the municipality just wanted it for their region." (IT Consultant, 2016-03-21) this is one of the clearest expressions of a local versus national interest. It is understandable that the municipality wants what is best for the region, as their main objective is to be a caretaker of it. While for the business the greatest benefit and resource profit comes from the national level. This creates a conflict of the interests between the two actors, where the biggest loss is for the business and society as a whole. This interest can also work to support collaboration with both parties expresses to support both sides.

Interests are closely related to goals, as seen with the municipalities' need for local benefit and businesses' need for national profit. Goals are more of an aimed position for a certain practical outcome, "we aim to achieve this", while the interest is limiting factors; where, how, and when. We could argue that we could merge interest and goals, but that would make us lose the ability to compare and relate between these two categories.

It becomes clearer if we look at a national solution, we can note that it makes the effect distance between a local municipality and national end-users larger while for a local solution the effect distance is smaller. While, in both cases, profit and benefits can be found to be resolved to some degree, the bigger national solution goes against the interest of the municipality and the local solution against the interests of the business. This means that interest decides where, goals decides what, and together they create effect area and impact for the *Effect* ecosystem element.

5.3.3. Business

In this section, we will analyze the resistance expressed through barriers inside of businesses toward a functioning open data ecosystem. Because of the strong dependency business products have on the open data published by municipalities their barriers lean easier towards the data market when anything is out-of-order; this release-to-use perspective is not unknown to research (e.g. Heimstädt, Saunderson & Heath, 2014, May, Harrison, Pardo & Cook, 2012 and Zuiderwijk, Janssen & Davis, 2014). To deepen the analysis, we will explore the expressed resistance barriers.

Collaboration
"Now I have done it [Contacted a municipality and got an open data set published]. And then my client told me I can go to the rest of the municipalities in Sweden, to make them open up all the places so we can have. We shall see if someone takes the bait. I will not do it; someone else will have to do it." (Enterprise architect, 2016-04-08), this sends a clear message that businesses

don't have the resources to contact and collaborate with 290 municipalities. Neither of the two parties have the resources to enter into close collaboration with every other actor; there are just too many of the two parties. Moving over to contacting a municipality for information on open data we find two very different experiences;

"If I call in and ask; I would like to talk with the one responsable for open data? Then you can count with that you will travel from high to low, there is no answer there, in the end you will talk with a tired IT-guy, that will tell you; you know what, we are currently looking on this, bye, click." - (CEO, 2016-04-07).

"The cases where there have been hard to access information it has been because they are lacking the solutions, they would want to do it, but are lacking the resources and priority. " - (IT Consultant, 2016-03-21).

The difference between two interviewees is that the first is asking more generally while the later knows what information he is after. It showcases that if you know exactly what information you are seeking from the municipality you can get concrete answers. But, if you are looking to gain insight into their open data repository, you will encounter challenges. As expressed by another interviewee *"... I would like to have a forum, for tighter collaboration."* (Senior Engineer, M.Sc., 2016-03-21) This enlightens us to the need for a common communication channel for open data between municipalities and businesses.

Culture
With the study, we didn't get the chance to study the internal organization culture workings of businesses, but we gained access to their perspective on municipalities. *"There are these administrative barriers in form of that they do not want [to publish open data], they are holding on their data sets and thinks it is sensitive and secret"* (Senior Engineer, M.Sc., 2016-03-21), *"They are isolated, they sit behind their firewalls and then have a little hole in it, where you send in information and they send it back through the same hole."* (Enterprise architect, 2016-04-08) and *"it feels more like an effort is made for it to be difficult [Gain access to open data]."* (IT Consultant, 2016-03-21). In conclusion, municipalities are perceived as defensive and evasive, while business consider themselves to be innovators and creators.

Knowledge
As business products are dependent on open data there is a tendency for the actors to set the minimum standard for the information. At the current stage of development, it is hard to say if their minimum standard is lacking as it is expressed towards the technical infrastructure more than specific details. One of the interviewees lifted an important insight *"They [municipalities] are the experts on their systems and knows how it looks, they are experts on the protocol, we could take them in and pay them a hour fee or cost, then they could help us alot"* (Enterprise architect, 2016-04-08) From this we know that businesses need knowledge about the workings of the technical infrastructure, and from this we also know that municipalities are also experts on their own data sets. The technical knowledge shortages can come from lacking documentation while the open data set insight can come from bad search engines or other barriers to identifying open data in Sweden.

Legal
Business had insight and understanding of the Personal Data Act (PDA) and didn't perceive it as a barrier, rather it creates more of a challenge for the municipalities. Only one of the businesses stated that they have had legal problems and that was towards public procurement, expressed as following *"The business logic doesn't necessarily work, when you have rules around contracting and such. Those things I do not have time to goo with, then I skipped it. "* (IT Consultant, 2016-03-21). Outside of this, legal matters were not a central topic and we believe that laws are perceived as standards to follow rather than challenges, but it is hard to gain insight due to the lack of data. It also could be that some barriers are so large that they shadow other barriers, making them "disappear".

Data & Product Market
With the lacking technical infrastructure on the side of the publisher, open data becomes harder to access, meaning that developers have to move resources from product development to adoption solutions, increasing both cost and development time. As expressed by an interviewee *"If information is hard to access, it requires a strong commercial interest in order to work with."* (IT Consultant, 2016-03-21), an interest hard to find. This results in both a loss in benefits and an increase in needed profit to return investment, which discourages businesses to use and develop on open data.

The varied implementation of technical infrastructure amongst data providers results in black spots where no data is or can be released, resulting in that national open data products are impossible.

The low amount of released open data sets results in waiting periods for businesses that have ideas for solutions, but also hinders further experimental development of open data. Businesses with tight collaborations with a municipality gain a competitive edge over others that can only be applied in that municipality's region. As this limits the data market it ends up limiting the product market.

The current tactic of releasing open data that is already on websites can result in a situation where data is not used by businesses, as demand and supply is not actively understood. Because of the lacking communication channels, it is impossible to know if released open data is the same as demanded or needed data. This can drain resources and, in the end, motivation to further develop open data infrastructure.

Political Leadership
The current state of political leadership can be seen in the expression; *"I'm a little annoyed that it is so different, it is hard to execute joint operation on things, this governance is a little hard still, I would like to see firm action high from high above, where they [the government] go out and tell this how things should be… [Referring to technical infrastructure]"* (Senior Engineer, M.Sc., 2016-03-21), this is further developed with *"today we have a number of small popes in each state administration"* (CEO, 2016-04-07). Both of the statements refers to the lack of coordination between municipalities and a central leadership. For businesses there exist 290 municipalities that want to implement open data in their own personal way and in some cases don't even care; this is a wall of chaos that cannot be dependent upon. This results in that they cannot express their challenges and needs in a way that is caught by all, not only hindering them

from further developing open data products, but it also creates a undefined and opaque direction where the government can say one thing and, because of wild municipalities, another is perceived.

Resources
In the current state, it seems to be that every business needs to enter in a close technical collaboration with each municipality, creating adoption solutions to their personal solution. In some cases, businesses have even been known to pay municipalities to release data. Imagine we as a business have a skilled worker, costing 800€ each week and, in that time, can make one data set available. With this, we assume that each municipality has actually implemented open data in some manner. This means that if we want to develop a national product based on an open data set for the benefits of the public, it would take 290 weeks and cost us 232000€ just to make one open data sets available for our product. Available for integration into the product, not have it used in the product, and therefore not accessible as a beneficial feature on the market. This would double if we wanted to use two sets and, if a municipality changes their technical infrastructure, we would have to first identify which of them, costing resources, and then update our adoption solution. Just imagine if we had 290 businesses; the cost would be 67.28 million euro, resources moved away from actual development of products that would bring benefits. Now we have not even included the cost for each of the municipalities developing their own open data solution for one set. If we have ever found a black hole the above is it; an insanity beyond reality.

Risk
290 municipalities without political leadership, resources, and knowledge are set on the path to open their data individually. Some of them might create alliances, but they still don't know what open data is needed by businesses. This brings me back to the old saying *"too many cooks in the kitchen"*; there is so much chaos. The whims of a municipality can cost a business a lot of money when updating open data formats. There is no infrastructure for communication, so needs and challenges are isolated, municipalities do not know what happens to their data, and there are no legal processes for the data market. The risk barrier comes from all the uncertainty with lacking political leadership, resources, knowledge, and legal processes.

5.4. Concluding Analysis

In this, the last section, of the chapter we will conclude and summarize our analysis, to bringing up the findings of the study. With our theory (See chapter 3) we have built a stable foundation to analyze the first research question (See section 5.2) from both municipal and business perspective, while for the second question (See section 5.3) we noted a clear trend where theory got harder to apply and find the further away we went from the municipality and came closer to businesses. This comes from the separation of technological infrastructure and barriers, if we turn our attention to Janssen, Charalabidis and Zuiderwijk (2012), we can note that the authors have included anything challenging with the technical infrastructure in their barriers while we have separated, this explains our findings. Further, we will bring up resistance expressions identified (See table 5.1, 5.2 & 5.3) and the further developed sub-ecosystem data market. In the tables we have noted important details and conclusions with comments.

Table 5.1: Summary of resistance expressions from barriers.

Barriers	Municipality	Business	Comment
Collaboration	The focus on technical infrastructures results in forgotten communication channels.	Forgotten communication channels result in challenges and needs not being heard.	This also inflates the perceived risk amongst the actors. Coming from lacking resources and knowledge.
Culture	Lacking collaboration infrastructure results in a perceived isolationist attitude, that is enforced by risk-avoidance culture and ignorance in knowledge intake.	Bad experiences with municipalities pile up to create a culture that perceives the other side as ignorant and non-trustworthy.	-
Data & Product Market	Lacking technical & collaboration infrastructure and knowledge results in a descending data market.	Because of lacking technical infrastructure businesses have to move resources from products to adaptation technologies. In the end, damaging the product market for open data applications.	Lacking technical infrastructure include no central national platform for all municipalities, standards, APIes, documentation, and identification.
Knowledge	Open data is viewed in a simplistic manner and the complex technological infrastructure is easily forgotten.	Businesses don't know what data municipalities have and can therefore not request for them to release it or create products on it.	-
Legal	Legal barriers were not highly expressed as strategies already existed to handle them, though, only in short term.	Law on procurement deters collaboration and makes municipalities be perceived as slow.	-
Political Leadership	No political priority, resulting in lacking resources, direction, and prioritization.	Do not know where the development of open data is heading in the country. Perceives municipalities as chaotic.	The governmental inaction in leadership removes motivation for actors.
Resources	Lacking resources on all level of open data makes it hard to implement it with needed complexity to	High development cost to gain profit. Moves resources from product to adaption technology.	Essentially, lacking resources propagates through the ecosystem and affects, in the end, the product market.

	the satisfaction of the user.		
Risk	"Loses control" over their data to "faceless" individuals with unknown intent, coming from ignorance and lacking technical and collaboration infrastructure.	Risk is created from lacking political leadership, resources, knowledge and legal processes.	Because of lacking technical and collaboration infrastructure the perceived risk is inflated.

Table 5.2: Summary of resistance expressions from balance.

Balance	Municipality	Business	Comment
Acceptance	Do not meet the minimum acceptable implementation and definition of open data.	No way for municipalities to control or enforce a minimum acceptable level of application.	-
Approach	Municipalities fill more than one role and their responsibilities are broad. Municipal perspective (See 3.3).	Businesses have to focus their roles after dependencies of products. Business perspective (See 3.3).	Municipal and business perspectives both lack approaches to collaboration infrastructure.
Conformity	Municipalities prioritizes individuality over standardization.	Businesses do not have the resources to handle variation complexity.	How much should each actor need to conform to the other in the end?
Effect Distance	Farthest away from the effects of open data, resulting in low motivation and high perception of risk.	Dependent on business, they isolate (not intentionally) the end-user from the provider.	-
Goal	Aims to gain the most organizational and societal benefits.	Aims to profit, solve complex problems and innovate.	-
Interest	Thier interest lies with the region they are responsible for.	Thier interest lies with the nation, as it contains the most profit and customer base.	-

Table 5.3: Summary of resistance expressions from infrastructure.

Infrastructure	Municipality	Business	Comment
Innovation	-	-	Mentioned by interviewees, but no resistance expressed.
Political	There is no central governmental agency to handle open data questions and surrounding infrastructure.	There is no forum for discussing direction, challenges and needs on a national level.	-
Collaboration	No common forum to express problems, plans, or existing data that could be open.	No common forum to express challenges and needs. No location to show they are using open data.	Does not exist in the Swedish context, slowing down the development greatly.
Technical	Lacking resources and knowledge creates barriers to implementing correct technical infrastructure. With no standards and centralization, municipalities are either fending for themselves alone or in smaller groups.	Because of lacking technical infrastructure, it is impossible to develop any major products on open data. With no central point for discovering open data, where all municipalities exist, businesses are further discouraged.	NODS is only one solutions towards a centralized platform that could solve many of the problems that current municipalities and business are facing. More importantly, such solution would allow resource reallocation for both municipalities and businesses to open data as a resource, instead of focusing on solving infrastructural problems.

By combining ecosystem with infrastructure and barriers we gain a complete insight into the relationship between municipality and business on an open data level (See Figure 5.6). The government enacts political infrastructure that will affect both businesses and municipalities policies & strategies through governmental agencies, strategies, policies and laws. This continues to affect the data market through data publication and perceived risks, but will also bring forth certain traits in the technical and collaboration infrastructure, such as joint forums and standards for data. This will, in turn, limit what products businesses can develop and sustain given technical infrastructure and their policies & strategies. For municipalities to know what to publish and needs improvement they need collaboration infrastructure. The effects from open data products will shape and form thoughts, directions, plans and strategies surrounding the ecosystem.
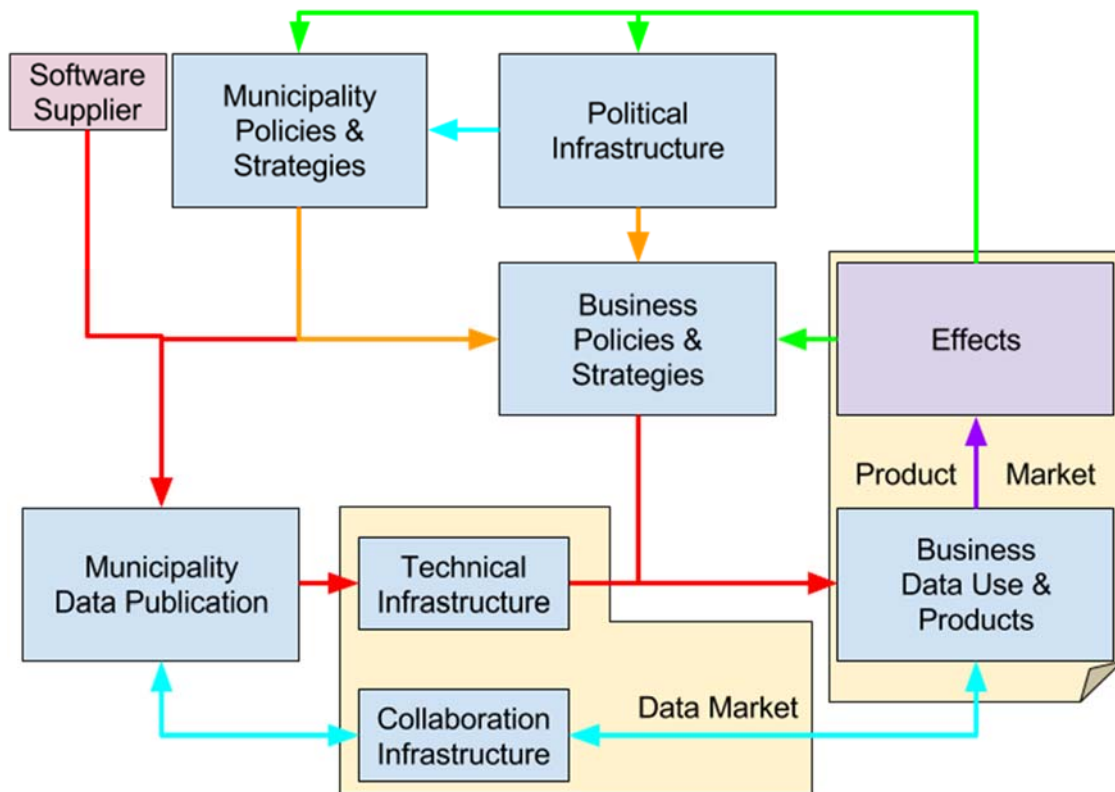
Figure: 5.6 The sub-ecosystem surrounding the data market. Arrows: Soft dependencies (Light blue), hard dependencies (Red), Regulation dependency (Green), connections to other parts of the ecosystem (Black), unknown dependency (Orange), and interest dependency (Purple). Backgrounds: Ecosystem elements or infrastructure (Blue), benefits and consequences (Purple) and markets (Yellow).

At the current moment, the lacking political leadership, knowledge, collaboration infrastructure, and technical infrastructure are smothering the ecosystem. If these resistance expressions are not solved the ecosystem will never be able to achieve its full potential. There are two important ecosystem elements that are non-existent in the current ecosystem; *effects-to-"strategies & policies"* for the actors and collaboration infrastructure. The element by which we measure effects of open data products and use.

6. Conclusion

The background for this study was to explore the relationship between municipality and businesses in relation to open data and what hinders it to develop into a functioning open data system. In theory, this gap has not been explored (See section 1.1) and in practice there is resistance towards progression. To do this, we had to first understand the technical and social systems surrounding and constituting the relationship, after that we could explore the resistance expressions existing inside and around the relationship.

With the study this we achieved three objectives; First, expanding the ecosystem model created by Dawes, Vidiasova, and Parkhimovich's (2016) to include a richer relation between publisher and user, that accounts for its complexity. Secondly, we have identified resistance expressions between and inside the two actors, making it possible to lower future resistance towards development and usage of open data. Both the first and second objective were achieved through answering our research questions (See section 6.1). Thirdly, we opened for research on how open data policies transforms into effects through municipalities and businesses and research on the data market concept (See section 6.2 and 7.3). In this chapter we will present the conclusion from the analysis, by bringing fourth the studies contributions, implications, and lastly generalization and knowledge contribution.

6.1. Contributions

In this section we will give answers to the study's research questions, starting with the first and moving over to the second. This gives us a good grasp of the context of these resistance expressions. To support the reader, we have chosen to present the research question and then the answer with a summary.

- What are the open data ecosystem elements surrounding and constituting the relationship between municipalities and businesses?
  - How and why do they affect open data development and resulting benefits?
  - Is the existing ecosystem sufficient and, if not so, why?

In our study we focused on a sub-ecosystem, that was named the data market, from Dawes, et. al. (2016) open data ecosystem, we concluded that there exist two markets, one for data and another for products, not brought up by theories. The product market already exists and can be seen through app-stores and other markets for trades of products, while the data market created from the supply of open data and the users' demand for data to their products. It is possible that this is not brought up as there could be a cultural fear of having the government control an entire market. For us, the data market is of interest as it is central to the relationship between municipality and business and consist of infrastructure for technology and collaboration while its contents are actors with roles and other social and technical systems.

As we just mentioned the relationship centers around a data market, where data providers (municipalities) implement a technical infrastructure that handles the open data resource. They

can be in collaboration with or dependent on a software supplier, that helps or hinders open data publication. Supplied open data is used by data use & products (businesses) if technical infrastructure meets acceptable standards. Both parties communicate through collaboration infrastructure, either sustained by the data provider or another governmental body. Here businesses can request open data sets, give feedback and express challenges, but the provider can also see how open data is used, lowering the effect distance between provider and effects. Publishers and users are affected both by internal policies & strategies, but also governmental policies & strategies and political infrastructure. Were actions of the publisher is strongly regulated by resources and missions allocated. In the end, all parties are interested in the effects of open data.

The technical infrastructure between publisher and user exists in a release-to-use state, where user is strongly dependent on the publisher. If publishers are lacking knowledge, resources, and mission the technical infrastructure is hindered in development. The collaboration infrastructures are dependent on both publisher and user, as both are needed for collaboration. It is needed to move the ecosystem and relationship towards a functioning and vibrant life. Both of the infrastructures creates a smaller circular system in the ecosystem. Where the data market is most strongly affected by changes and implementations in the technical infrastructure. While the resolution of resistance, barriers, and challenges are strongly affected by existing collaboration infrastructure.

In the Swedish context, we found that the collaboration infrastructure or communication & feedback ecosystem element were not existent creating a strong unbalance in the system were challenges and barriers piled up on the user side without the knowledge of the municipality. When municipalities published everything on their websites as open data, the lack of communication resulted in a stop in the progression of data to publish.

In summary we have found;

- The ecosystem consists of infrastructure, roles and content, interwoven in complex patters of interdependencies.

- The relationship between providers and user centers around data market, were providers supply and users demand the resource open data. Where all parties are interested in the product market and effects from usage.

- Users are mainly dependent on publisher through technology, while publisher is dependent on user through collaboration.

- Technical infrastructure supports the open data ecosystem, while collaboration infrastructure further it's progression.

- The Swedish open data ecosystem is no sufficient as it lacks infrastructure.

- How and why is resistance towards a fully developed open data ecosystem expressed in the relationship between municipalities and businesses?
  - How and why is resistance expressed in actors?
  - How and why is resistance expressed between actors?

Resistance expressions are not a simple matter where we can take a phenomenon and label it as a pure type of barrier, rather there exists complex chains of technical and social systems, were unbalanced levels can hinder progress. It is not an easy matter to handle, where we can approach the open data in different ways both practically and theoretically (Janssen, Charalabidis & Zuiderwijk, 2012, Barry & Bannister, 2013), same can be said about an open data ecosystem (Davies, 2011, Weizhang, Jiefang, 2010, May, Pollock, 2011, Harrison, Pardo & Cook, 2012, Heimstädt, Saunderson & Heath, 2014, May, Zuiderwijk, Janssen & Davis, 2014, Lee, 2014, October). This is especially evident with the different approaches to open government data programs (Dawes, et. al., 2016) where we find everything to be centered around open data, this is understandable, but the market created from the release-to-use relationship between publisher and user is forgotten or ignored.

With the data market and infrastructure noted, we identified a pattern in the barriers lifted by Barry and Bannister (2013) were they focus on the supply of open data into the market, while Janssen, et. al. (2012) focused on both the supply-and-demand and open data as technical infrastructure with a leaning towards the demand side with task complexity, use and participation, technical, and information quality. Our barriers; cultural, legal, political leadership, resources, and risk, were all found amongst the barriers mentioned by Barry and Bannister (2013) and Janssen, et. al. (2012). While the barriers knowledge, collaboration, and data/product market were not found. The first can be viewed as a legitimate barrier as it has a clear area of application while the two latter are more of concepts or collections. When analyzing the Janssen, et. al. (2012), we noted an unevenness amongst the categories were institutional captures any challenges a publisher is facing while task complexity, technical, use and participation and information quality are leaning towards the supplier. The later barriers are not exclusive to the users. Both actors can be faced with legislation challenges. What we noted were that some barriers such as resources, knowledge, political leadership were dependency based, meaning that if they are not solved, no progression can be made in a positive manner. These could, in turn, create barriers in use and participation and risk, leading towards barriers in collaboration and data/product market. This means that we have base barriers, reaction barriers, and conceptual barriers, where the base creates reactions that affect the concepts of collaboration and market that are expressed through the infrastructure and contents.

In turn, these chains of phenomena, were some wear properties of barriers, exists in the ecosystem, binding the reality of the ecosystem together with barriers. By combining resistance expressions with the active circular complexities of an ecosystem, and we start to note that certain resistance is expressed towards the infrastructure or roles, and others to the indwelling content. For example, municipalities resources dependency hindrance knowledge gain and technical infrastructure development. While the lacking knowledge results in the municipality to implement something that businesses consider to be out of publisher role, resulting in lessening (transforms in a negative way) business motivation. When businesses approach municipalities about this and the lacking technical infrastructure, non-existing collaboration infrastructure makes it impossible and resolution dissipates.

Here we found that differences in both sides created balance barriers for the further positive progression of the open data ecosystem. Alone these difference were not a barrier for the single actor, only in combinations with others could resistance be expressed. For example, lacking knowledge about standards and implementation in the municipality when implementing technical infrastructure for open data didn't affect them, rather it would be businesses who were trying to use the infrastructure that experienced the lacking knowledge, creating an unbalance in what is the minimum acceptance level of open data implementation. Further, as municipalities were lacking collaboration infrastructure, challenges experienced couldn't be conveyed, creating a deadlock, but also municipalities found it challenging to identify data for publication that were of value to the user. For businesses on the other side, there existed a challenge to identify data as no central location with all data sets from all municipalities did not exist, resulting in that data can be published but might never be used.

The above circular problem creates a barrier towards the progression of the open data ecosystem, where the open data supplied does not meet the standards or content of the demand, creating a *deadlock* (Chandy, Misra, & Haas, 1983). Difference between the technical and reality is that computers can freeze while reality doesn't, this means that even if a deadlock exist actors can still act, but will be strongly hindered. If this deadlock is not solved, we will be in a self-propelling circle where researches have to bridge the division between publisher and user to identify the next upcoming action. When that challenge is resolved, other challenges will come forward that will further investigation. From this, we see that technical and collaboration infrastructure is essential for the survival and functionality of an open data ecosystem, where communication and feedback shouldn't be on the data itself but also all infrastructure, challenges, needs, and future direction.

Resistance expressions in the ecosystem could take different themes such as barriers, balances, infrastructure and roles. For barriers, we identified collaboration, culture, data & product market, knowledge, legal, political leadership, resources and risk. For balance, we identified acceptance, approach, conformity, effect distance, goal, and interest. While in the infrastructure we uncovered collaboration, technical, political and innovation infrastructures that were populated by roles with different responsibilities.

Inside the municipality, enacting the role of provider, we noted that lacking knowledge, political leadership and resources resulted in badly implemented technical and nonexistent collaboration infrastructure. This comes from lacking political action were open data is treated in a simplistic manner to the likeness of the myth of *it is a simple matter to publish public data* (Janssen, et. al., 2012). This also brings up if it is in the role of the municipality to implement and maintain a larger open data infrastructure, that could make both collaboration and usage of the data market hard.

Inside the business, enacting the role of the user, we noted that lacking technical infrastructure made it impossible to develop products or even identify open data while any resistance expression couldn't be answered by providers as there was no collaboration infrastructure. Those businesses that managed to develop products noted that resources were moved away from effects towards adoption technologies, making it even harder to achieve any profit. Lacking both legal regulation and political leadership using open data in a larger product becomes a risk as technical infrastructure could change on the whims of the provider.

Between the two actors, the roles provider and user, we noted that combination of barriers and other factors such as lacking infrastructure created issues in balance. Providers implemented unacceptable technical infrastructure coming from lacking resources, knowledge and decentralized, resulting in product development barriers for users. This continued with different approaches were municipalities seemed disinterested through their actions and users' livelihood hangs on the technical infrastructure. With the lacking infrastructures, effect distance became large for publishers as there was no collaboration; this results in higher risk perception. Lastly, we found differences in interest and goals for the actors, were municipalities wanted societal benefits for their region while businesses aimed towards the national for maximum profit.

Then we have conformity, both actors' freedom is important and it becomes challenging to see who should make adopts for a functioning open data market. With this we also have to lift in the responsibilities of roles, were at the current time, providers have to develop infrastructure. Something that, in the end, is not sustainable as seen in above barriers. We will have to separate the technical infrastructure in the publisher and the market, where there is a strong need for a governmental agency to implement centralized technical and collaboration infrastructure. While keeping the freedom of providers and users. This could be partly achieved with a project as NODS, were such a solution would let municipalities to put more resources on releasing open data sets than developing new infrastructure that they lack knowledge for. A national solution would let municipalities to move resources from development towards making their data market attractive, actually aching the political goals set with innovative products and new jobs. Further, it is important that municipalities can release data outside of the national solution, so that they might become the next new heaven for innovation, that can both develop new products, but also the next standards for data sets.

In summary we have found;

- Resistance expressions are complex chains of technical and social systems
    o Can be expressed towards infrastructure, roles or ecosystem content
    o Chains can create deadlocks, were no actor will act and solutions are based on outsiders

- Resistance expressions in the ecosystem can take on different themes such as barriers, balances, infrastructure and roles

- Barriers hinders progression
    o Can be base, reaction or conceptual in nature

- Unbalances drives conflicts

- Without proper infrastructure there is not skeleton or support for an open data ecosystem

- Open data is treated in a simplistic manner

- Data market created from the release-to-use relationship between publisher and user is forgotten or ignored.

6.2. Implications

Resolving the flaws of collaboration infrastructure will not make the ecosystem healthy, rather both technical and collaboration infrastructure must be taken into account when working with the ecosystem, as the technical makes open data usage possible while collaboration continues its development and growth. Implications from the study can be broken into two; theoretical and practical. We will start with the first and then move over to the second.

For future research we need to take into account both providers and users when exploring barriers (e.g. Janssen, et. al., 2012), but create theories that labels barriers from both perspectives rather than finding its stance in one such role (e.g. of single role; Barry and Bannisters, 2014, Gonzalez-Zapata and Heeks, 2015). Here we need theories that better explains how barriers for one role results in barriers for the others, inside and outside of certain contexts such as technical infrastructure, helping us to understand the real challenges for open data ecosystems and create more customized solutions. In this paper we focused on a local government level, something that was noted as uncommon through our theoretical exploration. From result and theory, we see the importance for future research to include all levels of government to include the variation complexity existing in the open data market.

The standard approach to look at the relationship between provider and users as a singular provide-and-use (e.g. Dawes, et. al., 2016, Lee, 2014, October) to the degree that it simplifies away the variation and multiplicity of organizations that will release open data in a country, abstracting away the data market that contains a supply-and-demand, where multiple different organizations meet to interact. This is something that must be included in theories, else complexities coming from variance is lost.

The practical implications of the study go in hand with the theoretical. In Sweden, 655 public organizations are capable of publishing some kind of open data, but only 185 are (PSI-Datakollen, 2014), we also know that of those 290 are municipalities, sitting on similar data. These municipalities are motivated to publish open data individually, creating a large variation of standards and implementations, resulting in a chaotic data market.

Here exists a need to centralize, or businesses will never be able to create applications for the nation, only small applications for local needs that will slowly wither away as development costs money that cannot be gained from market size, these also means that the full potential is never reached for open data. If we also take into account that the lacking collaboration infrastructure needed, many small municipalities will not have the resources to handle it, but also, businesses will never have resources to collaborate with or develop towards 290 municipalities. There is a need for a centralized organization to take care of open data market technical and collaboration infrastructure, leaving the municipality technical infrastructure to follow certain expectations (publish up-to-date, standardized and complete data to one source).

For municipalities this means they can participate in hackathons as data sponsors, rather than focusing on to making users develop products using their data for their regions, they can focus to be a seat for future businesses and present problems to be solved, were innovation in one

region can spread to the nation. It is important to note that there is a need for municipalities to be able to publish data outside of a standard dataset so that they can become attractive for experimentation and business, making room to further develop the open data market.

6.3. Generalization and Knowledge Contribution

In this section we will discuss generalization and knowledge contribution. Starting with the first, moving over to the last. As expressed through the words of Myers (2013, p. 9): *"A major disadvantage of qualitative research, however, is that it is often difficult to generalize to a larger population"*. This is also the case of this study, even if we selected a large variety of municipalities and businesses, we still only selected organizations in the Swedish context. Making it challenging the generalize the results to the larger population of the world. What we can do, according to Myers (2013), is to generalize towards a theory. With the strong theoretical foundation (See chapter 3) used in combination with analysis (See chapter 5) we synthesized a stable theory (See section 5.4). By using theories, we were able to lift the analysis a level that makes it easier to generalize. This creates a way to both validate other researchers work and at the same time identify what phenomena exists in multiple contexts. For example, we know that economic and risk barriers exist in other contexts (Janssen, et. al., 2012, Barry & Bannister, 2013), while we also found that procurement legal and knowledge barriers were brought up by the authors. For this reason, we believe that by mixing existing theories with the analysis made the results from the study more generalizable, that without, but that the result is best used in the Swedish context.

Moving over to knowledge contributions. The study conducted exists inside the field of open data, meaning that the knowledge generated aims towards researcher studying this field. We explored a fragmented gap existing in theory (See chapter 1), making the knowledge contribution multifaceted as we both verified existing theories and worked to fill out an existing gap. It is important to note that we aimed towards generating and expanding upon the knowledge existing about the relationship between municipalities and businesses in the context of an open data ecosystem. This means that we didn't actively work to verify certain theories. Therefore, we believe that this study contributed to the field of open data in three ways;

First, we mapped out the relationship between local level government organization and businesses, by expanding an existing ecosystem model. This give insight into the complexities of the relation and what researchers in the future have to include as important elements. With this we verified and expanded Dawes, et. al. (2016) open data ecosystem model. Secondly, we mapped out resistance expressions between local level government organizations and business in the context of an open data ecosystem. Adding knowledge as a resistance expression, not earlier discussed in theories. Here we verified and expanded both Janssen, et. al. (2012) and Barry and Bannister (2013) theories on barriers. Thirdly, we identified that resistance expressions are both bound to and between ecosystem elements, infrastructure and actors in forms of barriers and balance issues. Something that have not earlier been expressed in theory, especially the balance issues. This means that we have combined two perspectives (actor and ecosystem) to generate a new idea for the whole, and with this identified an important new way of perceiving challenges for the development of an open data ecosystem.

7. Reflection and Future Research

In this, the last chapter, of our thesis we will reflect over our findings, execution of method and analysis, and future studies. Starting with discussion validity and relevance, after that we move over to ethical dilemmas, continuing with evaluation of method and analysis, and lastly, discuss possible future research.

Mays and Pope (2000) lifts two broad criteria to assess qualitative research; validity and relevance. Where validity treats triangulation, respondent validation, clear exposition of methods of data collection and analysis, reflexivity, attention to negative cases and fair dealing. While relevance focuses on adding or increasing the confidence with existing knowledge, it also brings up if the findings can be generalised beyond the context in which it was generated. We have chosen to extend relevance with meaning and consequences, as we see these as important parts of something to be relevant.

As we interviewed municipalities with different open data progression, we managed to capture a complete state of different challenges in each step. As they were in collaboration around the same open data project, certain challenges could be verified as true for the group, but it could be that they all participated in the same project because of they faced similar challenges, this means that other groups of municipalities don't necessary have to face the same challenges. The project started in 2014 with the leading municipality, where the mid-developed municipality joined in 2015 and the smallest joined 2016, meaning that they are not fully synched as of the time. This could indicate that it will be hard to apply their challenges to all municipalities. As it were impossible to identify businesses in collaboration with municipalities in relation to open data, we interviewed any business that worked with open data. This resolved the problem with selecting three close municipalities as businesses had worked towards many different public organizations. We perceive that data collected and the analysis conducted to be credible, as all participants had experience of open data and triangulation of phenomena were created through selected participants.

In interviewees when we had formed a mental model of their current situation we asked them about it at the end of the interviewee, so that we wouldn't pollute their understanding of the phenomena. The questions would be formed generally in a sense and be asked in a way open for critique often leaving exact details out so that the interviewee could fill them out. This made our study successfully achieving respondent validation without affecting their answers.

When presenting the used methods for data collection and analysis (See chapter 2) in the study we worked to make a clear description by using images and summaries. Where we even present the initial used codebook for reuse by others. We will continue to evaluate the data collection and analysis methods further down (See section 7.2).

Reflexivity means sensitivity to the ways in which the researcher and the research process have shaped the collected data, including the role of prior assumptions and experience, which can influence even the most avowedly inductive inquiries. Personal and intellectual biases need to be made plain at the outset of any research reports to enhance the credibility of the findings. The

effects of personal characteristics such as age, sex, social class, and professional status (doctor, nurse, physiotherapist, sociologist, etc) on the data collected and on the "distance" between the researcher and those researched also need to be discussed.

Reflexivity was one of the biggest challenges. The study used an ecosystem-oriented perspective meaning that we do not concentrate on data usage and specific technical implementations. We try to understand why barriers are expressed towards something instead. While conducting the study we encounter a lot of critiques specifically bound to a data-oriented perspective and interviewees with experience with software implementation; this neatly binds to earlier experiences with deep knowledge of the software developing. Here, we could relate to the challenges faced by the developers. We worked hard against an internal bias to change the orientation from ecosystem to data and to lean with the software developers. By creating the theoretical framework and bring in theories from the open data field we could analyze data in a broader perspective, not letting orientations none central to the study take over. With this, we believe that reflectivity was taken into account when conducting the study.

When encountering conflicting statements between interviewees we were careful to bring them up and analyze them separately and together, trying to explain and understand their contradicting existence. We often noted that they shared common sources or were based in different perspectives (e.g. see collaboration, in section 5.3.3). We, therefore, believe that we handled negative cases in a proper way to strengthen our validity.

To ensure that a wide variety of group perspectives were included in the study we interviewed both municipalities and businesses, with a focus on people with experience relevant to the study. We further used coding on collected data to create collections of statements that would come to represent a category, making the voice of the many be heard. With this, we were able to treat all involved groups in a fair way and in such achieving fair dealing.

Moving over to relevance, the study aims to add knowledge about a gap in the existing theories (See section 1.1 & 1.2), that is something have been achieved through the study, we also bound it to relevant theories with the result through the analysis.

The usability of the results (See section 6.2) varies as it applies to both the theoretical and practical. The theoretical implications can be further used in other research, where it works to guide future research on resistance expression, while the more practical implications are bound to the context to Sweden, with a few exceptions, were the importance of both collaboration and technical infrastructure must be taken into account in any implementation of an open data ecosystem.

For practice we hope to see an increase in attention towards the development of open data development in Sweden, both treating publisher and user in a serious manner, where both parties have challenges and needs that must be met. This study also points to a need to study the open data markets demand-and-supply where there is a tendency to view the concept in a simplistic manner.

Consequently, this study is just one part of a flood of literature, to understand the phenomena of open data, future studies have to be more critical towards theories and inclusive towards

different actors. If we cannot find users when exploring publishers habitats that might be an indication to that something wrong and missing in the whole. We also have to look at different levels of barriers just not put focus on those that are technical in nature.Our study works to prove that there is more than technical infrastructure in an open data market.

We view the findings of the study to be relevant to both answering the research questions, give insight into the relationship between publisher and user, and their respective roles, and understand resistance expressions. We believe that they can help future researchers in the field and support the development of open data on a practical level.

7.1. Ethics

While conducting the study we encountered two ethical dilemmas, first one participant had a strong agenda that were pushed forward and the NODS-project worked to solve many of the barriers expressed in the collected data. We will discuss each dilemma in order and how they were handled.

While searching for participants we came in contact with an individual on the business side that was eager to talk about the phenomena of open data and voice opinions about the subject. Here we noted an agenda for speeding up the progression of open data development in Sweden, that can be seen as understandable, as their product were dependent on the resource and the current infrastructure didn't treat the company in a fair manner. Here we noted harsh words and direct criticism with emotional responses. To handle this we had to look at the actual source of such behaviour and what it is actually saying. For example, if the interviewee pointed out flaws in an organization we had to understand what he/she is criticising in a general context not them as persons and why. We often found that lacking knowledge and political leadership were behind the stronger emotional responses and a risk to the company's product.

In the second case, we had the NODS-project that was developed to resolve certain issues with the current technical infrastructure by the leading municipality. Here we found ourselves, with the data from the businesses criticising all problems that were to be solved by the NODS-project. Therefore, we noted earlier in both analysis (Chapter 5) and case (Chapter 4) about the wide range of municipalities that exists in the Swedish context. To put the dilemma in perspective; *We see someone clean their room and we critique them for not cleaning their room*. This dilemma created a double edged sword. First, we could see that there existed knowledge about the challenges for businesses and how they could be resolved, will say we can see problems through solutions. Secondly, as we oriented the study towards ecosystem rather than data we had to be constructive critical to the relation between infrastructure, content and ecosystem, and what is to be achieved by implementations.

Beyond these two ethical dilemmas, we encountered a smaller one with companies not wanting to reveal their competitive edge. It was easily resolved by stating at the beginning of an interview that if they felt that a question touched on company secrets they could tell us and describe the answer towards challenges with open data.

7.2. Evaluation

In this section, we will evaluate and reflect on data collection and analysis methods starting with data collection, then empirical data analysis and end with analysis (Conducted in chapter 5).

7.2.1. Data Collection

In our study we used interviews as our primary tool of data collection, this means that we also need interviewees; that was one of the more challenging aspects. Coming in contact with municipalities for interviewees was not challenging because of the NODS-project, where the leading municipality and an involved researcher could give us references to who to contact. After that came the tricky part, that consumed a lot of time and phone calls. It was an interesting experience talking with so many individuals about the research to end up with just five businesses for interviews after weeks of searching. When conducting the interviews, because of the stable theoretical foundation (See subsection 2.4.1), no challenges were encountered and we could easily study the phenomena through the eyes of the participant. To be critical against the method we will have to turn our attention towards the interview guides, were we had three parts; personal, organizational and ecosystem. The first two could easily be answered by the participants and their statements were often long and filled while the last were often filled with shorter answers. We believe this comes from the current state of the open data ecosystem, as it has not left the crib, we often found that only the three first questions and the last questions could be answered by all the participants. Those that were not answered were those of collaboration, communication, and contact. Here we had the opportunity to ask about this behaviour and present our mental models. This creates challenges later on that will be lifted in the next subsection.

For the majority of the cases, we used interviews, but when studying the leading municipality, we reused two interviews conducted by other researchers. The drawback with this is that they didn't answer the questions given in the interview guide (See annex 1), but this was complemented with participant observation were we could gain deeper insight into the phenomena. Here we had the opportunity to study interaction inside the municipality and towards other actors. The problem is not that we used different data collection methods for the leading municipality and other actors, the challenge is that we couldn't conduct such fieldwork with the other actors. The participant observations have deep insight into the phenomena that interviews couldn't recreate, and through it, we know that there exists a richer world inside each of the actors that were not explored fully by this study. This clearly points out the weakness of using only interviews, through this drawback existed, we could fully collect data about the phenomena of study and gain insight by using triangulation through interviewing many different participants. To supplement for the interviews, we used documents, only two of the participants could offer documentation about earlier open data projects or strategies, this was a weakness as a whole but was explained by interviews that such documents have never been created. Further, we used actors' websites to collect data about their context, history, and current state.

Documents (PDF & Websites) and debates were further used to understand the Swedish context, to study different governmental agencies and the government itself. Here we worked with references from interviewees and following an open government forum on Facebook (resulted in the discovery of debates). We did by coincidence discover a book written by

Eriksson (2014, see subsection 4.1.4) that were aimed towards governmental agencies and open government. This book would have been used in the study analysis if it had references to the theories it was using; it was not written to follow an academic standard and could therefore not be trusted. As none of the municipalities referred to the book when asked different things that have helped them in open data development, it was also removed from the analysis and became a pure part of the context.

7.2.2. Empirical Data Analysis

As data were collect it was transcribed and coded into buckets referred in the initial cycle (See section 2.5), created from a bright creative idea, if the data amount had been larger this would have been a perfect step, but as the data amount were small and time very limited this cycle can only be described as a little monster. It ate valuable time and were hard to use when data collection and coding were iterative through the whole research. If we collected data it had to be initially coded before it could move over the cycle one coding; this was an unnecessary step that was discovered too late in the process. The strength with the extra cycle is that we could easily view what areas were most statements were mentioned and gain a broader oversight of data coverage. If you are going to replicate the study and have a small amount of actors or use software that can handle the complexity, skip this step, we used NVivo Pro 11 and it didn't agree with this empirical data analysis. Because of this, we had to go back and recode some statements as they had been lost in the process, this consumed more time as we had to do it carefully, we couldn't miss anything important. A lot of time were consumed because of this.

After we had select buckets for further analysis in the coding process, we started the cycle one analysis, this went fast and was incredibly easy to use. Divide the buckets into smaller codes following versus, descriptive, and value coding, sorting these codes into categories, and create three major themes. So good in fact that we didn't have to use cycle two to discover any themes. Here we will have to note the horrible nature of the monster makes any challenges with the first cycle pale in comparison, this has strongly colored our perception.

To be critical at the result of the coding, it is uneven and groups barriers towards current technological implementations and communication channels into two categories (technical and collaboration infrastructure). This is also a result of the ecosystem orientation selected for this study, where we move away from looking at the directly technical to grasp the whole instead. This makes such barriers challenging to understand at a deeper level. Janssen, Charalabidis, and Zuiderwijk (2012) does a better job to explain the technical infrastructure barriers, where they lift up direct barriers. What we gained from this was a more abstract way to look at how barriers and phenomena were interdependent, we could put focus on why these barriers existed and how they intermingled, putting focus on what needs to be done to solve them. If this study were to continue we would have to split the infrastructural categories into more self-explanatory categories.

7.2.3. Analysis

Moving over to evaluating and reflecting on the analysis (See chapter 5) it was based on a theoretical framework (See section 3.6) where we brought in the identified themes and categories to first analyze them on ecosystem level and then move over to analyze resistance expressions between and inside municipalities and businesses towards a functioning open data ecosystem. Ending with a concluding analysis.

Before we can deep dive into the evaluation, we need to reflect on our perspective on open data. Through the study we were introduced to open data and as we familiarized ourselves with the subject we soon viewed it as another resource, something like coal, uranium or oil, where we perceive effects and usage to be of more central interest than the resource itself. We perceive the success of open data to hang on the use of the resource and perceived effects of products. With Sweden current open data maturity its success is hanging by the thread.

While conducting the analysis of the ecosystem (See section 5.2) we didn't encounter any challenges as there existed enough theories to explain, explore and analyze the phenomena. What we now note after completion is that we didn't analyze innovation and political infrastructure as they do not exist inside of the relationship between publisher and user, rather it exists outside and were, therefore, data that was not collected to enable any deeper analysis. Because of this these infrastructures becomes part of the outside, literally, were governmental organizations and the government are grouped into one infrastructure where we only know about integration towards the internal elements. The innovation infrastructure is hard to do any statements about, some interviewees were critical, others liked them and some were neutral. For the purpose of the analysis this part were successful and we could gain deeper insight.

Turning our attention towards the resistance expressions we soon encountered a few problems, theories identified didn't cover barriers existing for businesses. Barry and Bannister (2013) covers publication barriers for publishers that were used, but didn't include users, while Janssen, Charalabidis and Zuiderwijk (2012) approached the matter from a data oriented perspective. Including both actors. First assumption were that out theories were lacking so we went out on Google Scholar and our universities library to search. Here we used these keywords alone or in combination; open data, business, company, barriers, challenges, hindrance, and resistance. Those turned out with nothing of usage, to continue our search we look at articles citing the work of Janssen, et. al. (2012), a total of 278. We now know how to predict war with open data (Whitmore, 2014), but do not have insight into barriers existing for business at other levels than data-oriented. With this we had to analyze the resistance factors with the best of our ability and finish the study. To be critical, if there were more time we should have worked to bring in research from corresponding fields. The strength is that we have conclusions that are strongly bound to the open data ecosystem, while no further explanation of behaviours existing inside.

Even with the later theoretical weakness in the resistance expression analysis we have a strong case in ecosystem and it's element and as we are biding the two together we still view the results as valid. We are the first to analyze this kind of behaviour and present it to the world.

7.3. Future Research

The future is a magical thing built of many unknown factors that exists to be explored both by researcher and layperson. In this section, we will lift further themes and research questions that needs to be explored. Starting with the themes and ending with some important research questions.

While exploring our study and theories we noted a lack of viewing open data through a market perspective, especially in the ecosystem orientation, this theme needs further exploration to understand supply-and-demand, but also open data as a resource. With this, we would turn away from viewing open data as something that automatically brings benefits and would be able to view the effects of open data on society and business. Were different types of resources can lead to different effects depending on how it is used and provided, we can move away from businesses as black boxes to concentrate on transformative processes.

Lastly, from our study we have noted a few new research questions that needs to be answered in the future;

- How and why do businesses adopt their organizations to open data development and use?
  - How does adaptations differ in relation to size, usage and application?
  - What are the different adaptations between businesses founded on and integrating open data?

- What is the turnout rate of innovation infrastructure for open data usage?
  - Can the process be improved or further be developed?
  - How and why not does businesses integrate or use open data?

- How and why does politicians, publishers and users interplay inside an open data ecosystem?
  - How does actions of one actor translate into reaction in another?
  - What is important for each actor and how is this reflected in the ecosystem?

- How and why does technical and collaboration infrastructure integrate and coordinate inside an open data ecosystem?
  - What are the main elements on a practical level?
  - Who are the actors and why are they assigned different roles?

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Annex 1: Municipalities Interview Guide (Swedish)

Anledning	Mål och ämne	Format
Estimerad Tid	Sekretess	Inspelning, Om lov, Lyssnar
Fråga om något är oklart	Kan säga nej till en fråga	Chans att ställa frågor

Förberedelser inför intervju

Person
- Vad är din bakgrund (Utbildning, arbete, liv)?
    - Roll och hur länge har du haft den? Vilka är dina arbetsuppgifter?
- Vad är din definition av öppna data?
    - Varför tror du man arbetar med öppna data?
- Vad är din erfarenhet med öppna data?
    - Är den lång/kort? Händelse rik? Utmanade?
    - Vad är din roll o relation till öppna data?
- Vilka arbetar du med runt öppna data?
    - Är det samma som i vanliga fall? Om inte, varför?

Öppna Data (Andra = personer i organisationen eller i samarbete med organisationen)
- Vilka är organisationens mål för öppna data?
    - Kortsiktiga/Långsiktiga
- Vilka är dina mål runt öppna data?
    - Kortsiktiga/Långsiktiga
- Hur tycker du andra arbetar med öppna data inom organisationen?
    - Hur tror du de ser på öppna data?
- Vad motiverar utvecklingen kring öppna data för dig/andra?
- Vad hindrar utvecklingen av öppna data för dig/andra?
- Vilka utmaningar har du upplevt finns? Vilka utmaningar tror du andra har?
- Vad har hjälpt dig i arbetet kring öppna data? Vad tror du har hjälpt andra?

Öppna Data Ekosystem (Kommun & yttre organisation)
- Vart är ni just nu i utvecklingen av öppna data i relation till andra?
- Hur arbetar ni kring etablering av öppna data? Hur attraherar ni "användare"?
- Vilka former av data erbjuder eller tänker ni erbjuda? Varför?
- Vilka externa parter arbetar ni med? Företag och dyl.
    - Vilken data efterfrågar dom?
    - Hur kom ni i kontakt med varandra?
    - Varför valde ni att behålla kontakten?
    - Vem samarbetar ni mest med? Varför?
    - Har någon blivit avslagen? Varför?
    - Vilka utmaningar har funnits i denna form av samarbeten?
- Blir ni ofta kontaktade? Om ni blir kontaktade om öppna data,
    - vilka är de vanligaste frågorna?
    - vilken är den vanligaste efterfrågade datatypen?
    - brukar ni få feedback kring eran data? Vilken form?
        - Om inte, varför inte?
- Vilken nytta upplever du att andra har av öppna data? Har du något exempel?

Slut
- Finns det något du vill tillägga eller något jag borde ha tagit upp?
Finns det någon du skulle rekommendera för en intervju?

-

Annex 2: Business Interview Guide (Swedish)

Person (Del 1)
- Vad är din bakgrund (Utbildning, arbete, etc)?
- Vilken är din roll inom företaget?
    - Hur länge har du haft den?
    - Vilka är dina arbetsuppgifter?
- Vad är din definition av öppna data?
- Varför tror du att regeringen arbetar med öppna data?
- När du arbetar runt öppna data,
    - vilka arbetar du med?
    - vilken roll har du då?
    - Är det samma som i vanliga fall? Om inte, varför?

Öppna Data (Andra = personer i organisationen eller i samarbete med organisationen)
- Vilka produkter har ni utvecklat som använder öppna data?
- Vilka är organisationens kortsiktiga och långsiktiga mål med öppna data?
- Vilka är dina personliga mål runt öppna data?
- Hur tycker du att andra arbetar med öppna data inom organisationen?
    - Hur tror du de ser på öppna data?
- Vad motiverar utvecklingen av öppna data för dig?
    - Vad tror du motiverar kommuner och andra företag?
- Vad hindrar utvecklingen av öppna data för dig?
    - Vad tror du hindrar kommuner och andra företag?
- Vilka utmaningar har du upplevt finns?
    - Vilka utmaningar tror du kommuner och andra företag står inför?
- Vad har hjälpt dig i arbetet med öppna data?
    - Vad tror du har hjälpt kommuner och andra företag?

Öppna Data Ekosystem (Kommun & yttre organisation)
- Vart är ni just nu i utvecklingen av öppna data i relation till andra?
- Hur arbetar ni kring öppna data? Varför?
- Vilka datamängder använder ni? Varför?
- Vilka externaparter (T.e.g. Kommuner eller East Sweden Hack) ni med kring öppna data?
    - Varför?
- Hur kom ni i kontakt med varandra?
    - Varför behöll ni kontakten?
    - Vem samarbetar ni mest med? Varför?
    - Vilka utmaningar har funnits kring denna form av samarbete?
    - Har någon extern part nekat samarbete med er kring öppna data? Varför?
- Blir ni ofta kontaktade av användare i relation till öppna data?
    - Vilka är användares vanligaste frågor, klagomål eller åsikter?
- Vilken nytta upplever du att andra har av öppna data och eran produkt? Har du något exempel?

Slut
- Finns det något du vill tillägga eller något jag borde ha tagit upp?
Finns det någon du skulle rekommendera för en intervju?

-

Annex 3: Data Sources

The data sources have been given fictional names to keep them anonymous.

Fictional Name	Role	Stage	Date	Notes
Samuel Adams	IT Strategist	Mute Swan City	2015-03-09	External
John Hancock	IT Consultant	Mute Swan City	2015-02-26	External
James Madison	IT Strategist	Russula Town	2016-03-14	Internal
Alexander Hamilton	IT Strategist	Cornflower Village	2016-04-11	Phone Internal
Open University	Participant Observation	Capital	2016-03-10	Mute Swan City & Brits.
Open Valley	Participant Observation	Innovation	2016-03-16	Mixed, release event.
Open Future	Participant Observation	Innovation	2016-03-23	Mute Swan City & Co.
Open Reflection	Participant Observation	Innovation	2016-05-03	Mute Swan City & Co.
Jeremy Bentham	IT Consultant	Food AB	2016-03-21	Phone Internal
Adam Smith	Senior Engineer, M.Sc.	Safety AB	2016-03-21	Internal
Douglas Engelbart	Enterprise architect	Transport AB	2016-04-08	Internal
Norman Abramson	CEO	Freedom AB	2016-04-07	Internal
Douglas McGregor	IT Consultant	Travel AB	2016-05-09	Internal
Municipality websites	Support	Internet	2016	Document
Business websites	Support	Internet	2016	Document

Annex 4: Email Interview Guide (Swedish)

Person (Del 1)
Vad är din bakgrund (Utbildning, arbete, etc)?
Vilken är din roll inom företaget? Hur länge har du haft den? Vilka är dina arbetsuppgifter?
Vad är din definition av öppna data?
Varför tror du att regeringen arbetar med öppna data?
När du arbetar runt öppna data, vilka arbetar du med? Vilken roll har du då? Är det samma som i vanliga fall? Om inte, varför?

Öppna Data (Andra = personer i organisationen eller i samarbete med organisationen)
Vilka produkter har ni utvecklat som använder öppna data?
Vilka är organisationens kortsiktiga och långsiktiga mål med öppna data?
Vilka är dina personliga mål runt öppna data?
Hur tycker du att andra arbetar med öppna data inom organisationen? Hur tror du de ser på öppna data?
Vad motiverar utvecklingen av öppna data för dig? Vad tror du motiverar kommuner och andra företag?
Vad hindrar utvecklingen av öppna data för dig? Vad tror du hindrar kommuner och andra företag?
Vilka utmaningar har du upplevt finns? Vilka utmaningar tror du kommuner och andra företag står inför?
Vad har hjälpt dig i arbetet med öppna data? Vad tror du har hjälpt kommuner och andra företag?

Öppna Data Ekosystem (Kommun & yttre organisation)
Vart är ni just nu i utvecklingen av öppna data i relation till andra?
Hur arbetar ni kring öppna data? Varför?
Vilka datamängder använder ni? Varför?
Vilka externaparter (T.e.g. Kommuner eller East Sweden Hack) ni med kring öppna data? Varför?
Hur kom ni i kontakt med varandra? Varför behöll ni kontakten?
Vem samarbetar ni mest med? Varför?
Vilka utmaningar har funnits kring denna form av samarbete?
Har någon extern part nekat samarbete med er kring öppna data? Varför? T.e.g. ni har frågat om en kommun kan publicera en datamängd och de har sagt nej.
Blir ni ofta kontaktade av användare i relation till öppna data?
Vilka är användares vanligaste frågor, klagomål eller åsikter?
Vilken nytta upplever du att andra har av öppna data och eran produkt? Har du något exempel?

Slut
Finns det något du vill tillägga eller något jag borde ha tagit upp?
Finns det någon du skulle rekommendera för en intervju?

Tack för att du har deltagit!

Annex 5: Initial Codebook

Table 2.2: Initial Codebook

Parent code	Child code	Description
Open Data		General statements on open data.
	Definition	A collection of actors definitions of open data.
	Application	Application areas of open data, with examples.
	Key Attributes	Key attributes and factors for the development with and on open data.
Development		General statements on open data development inside the organisation.
	Challenges	Challenges faced while developing with open data.
	Opening Methods	Different methods used by organizations to transform data into open data.
Sweden Maturity		General statements on Sweden's maturity around open data.
	Evaluation	Statements about Sweden's maturity current maturity, more direct than parent code.
Relationship		General statements on the relationship between different actors.
	Collaboration	Statements on collaboration between actors.
	Demonstration	Demonstration of relationships.
	Leaders	Attributes of the leaders in the relationships. Leaders of open data development.
Perspective		General statements that

		point to certain perspectives inside the organisation.
	Benefits	Statements that point to a beneficial perspective.
	Citizens	Statements that point to a citizen perspective.
	Economic	Statements that point to an economic perspective.
	Future	Statements that point to a future perspective.
	Technical	Statements that point to a technical perspective.
Actors - Municipalities - Business - Government - University		General statements on all actors. The four selected actors can be seen to the left. Each actor has the codes below.
	Barriers	The barriers an actor is facing.
	Perceived	How the actor is perceived by others.
	Mission	The actor's mission with and around open data.
	Need	The actor's need to develop open data.
	State	The current state of the actor.
	Insight	The actor's insight around the relationship and development of open data.
	Attitude	Attitudes displayed by the actor.
	Role	The role of the actor in relation to open data.

Annex 6: Open Data Benefit Examples

To gain any kind of insight of the benefit categories we need to mention the impacts contained inside. For this we have selected the works of Verhulst & Young (2016) and Dietrich, Gray, McNamara, Poikola, Pollock, Tait, & Zijlstra, (2016) that are not published in peer-review journals. They are not used as a basis for theoretical models. Rather, we are using them to give context to the earlier mentioned categories. To put it in perspective, if the pieces of literature were plots of land, we wouldn't build our homes on them, rather we would take a stroll; take the view to expand creative boundaries and perspectives. Both of them work to show that there is nonacademic work on the subject of open data trying to influence open data development.

Verhulst & Young (2016) report that the key findings of open data impact case studies. The report is not published in a peer-review journal but has gone through an open peer-review processes with 29 reviewers. It is also missing references, meaning that it can use theories from other authors without giving them credit for their conclusions and, in worst cases, they can enact plagiarism. The number of peer-reviewers can be viewed as wide. The open peer-review process might be a way for them to compensate for not being in a journal and their multi-varied backgrounds are a way to bring legitimacy to the study, but from what we see it can also bring certain bias, as the reviewee may know the author or they may want the material to be successful. The open peer-reviewed process can be viewed as containing an amount of uncertainty as the end average population of reviewers can be anything from pre-students to experienced researchers. This can also lead to inconsistencies in the research process; the researchers let different reviewers review different cases and their final product. They have done this in the true spirit of openness and have gained some legitimacy. As the report is missing correct references, we will view the source as nonacademic, even if the authors have an academical background. The problem is that we cannot discern what is their theories and what statements have been tested by who. The absence of references can come from that they want the text to be easy to read. The report concludes that the impact of open data can be divided into categories of improving government, empowering citizens, creating opportunity, and solving public problems; this comes from studying 19 cases. Dietrich, et. al., (2016) have created the Open Data Handbook, and in this literature, we find 12 valuable stories written by other authors. The source has not been published in a peer-reviewed journal, and it uses references in a few cases but not all. Verhulst and Young (2016) and Dietrich, et. al., (2016) provide a total of 31 cases. We will use some of them as examples fitted into Janssen, et. al. (2012) categories. Three examples from both sources will be provided in each category (See table 3.1, 3.2, and 3.3).

Table 3.1: Examples of political and social benefits

Verhulst & Young (2016)	*Dietrich, Gray, McNamara, Poikola, Pollock, Tait, & Zijlstra, (2016)*
Openaid.se is a data hub based on open government data. The website displays when, to who, and why aid funds have been given. It helps to create more transparency and tackle corruption. It created democratic accountability.	In Uruguay an application called A Tu Servicio (In English: "At your service") was developed in a partnership between a business and government. This was not a contract or a paid partnership. The government provided quality data about different healthcare services that were provided to citizens while the application summarised and let the user compare and more easily select healthcare services based on individual needs.
Open Duka in Kenya developed by the Open Institute. The platform provides citizens, journalists, and civic activist with information about the relationships and connections of those in and around the public arena, making the government and corporations more accountable and transparent.	After many years of fighting in 2014, a website called Budget Key was released, letting the citizens of Israel inspect budget spendings over the years. The website came with tools that allow the user visualise the budget and explore the spendings. It has been argued that if the government releases the next budget before it gets voted in, more people would enter the debate and the government would be able to take more informed actions.
Shule and Education Open Data Dashboard are two portals in Tanzania that provide citizens with data on examination pass rates and other forms of information related to school performance. These portals help improve education and the social mobilization.	By making individual clinical outcomes public it was possible to dramatically improve survival rates; more than a third of patients are living when they previously might have died. The total sum is that there are 1000 fewer deaths in English heart surgery each year.

Table 3.2: Examples of economic benefits

Verhulst & Young (2016)	*Dietrich, Gray, McNamara, Poikola, Pollock, Tait, & Zijlstra, (2016)*
The OS OpenData platform from the UK supports industries or activities that rely on maps. This could, for example, be urban planning, real estate development, or utilities. The platform is self-financing and uses a mixed-cost model where some data is free and other costs money. It is estimated to have delivered between a new 13 to 28.5-million-pound increase in GDP over its first five years.	Properati sells real estate in an innovative method, allowing clients and customers to work more dynamically together. With the help of open data, Properati displays distances to schools, transports, and compares similar product prices in the area. One of their outstanding mini-apps is displaying the location of trees that cause allergies, helping future home buyers, pedestrians, and cyclists.
The New York City Atlas from the US is a platform created to alleviate the market research information gap between small and large businesses. The platform gives businesses access to information about economic conditions in a given neighborhood.	Google uses open transport data in a GTFS (General Transit Feed Specification) format in their Google Maps product. This allows users to plan their trips using public transport. Yelp uses municipal health inspection data to inform users about the hygienic quality of a restaurant. The application works to connect people to restaurants and businesses. The two above examples use open data to improve the quality of their existing services; this is not something unique.
With NOAA in the US, weather data has become open data. This has significantly lowered the weather related damages through forecasts; enabling the development of a multi-billion-dollar weather financial industry dependent on seasonal data.	Prescribing Analytics revealed that the UK could save over 200 million pounds in National Health Service if just some branded drugs were replaced by generics. The benefit here is that through open data we can compare existing product prices inside one country, as well as between countries. This could help southern Africa save up to 62 million dollars for their pharmaceutical savings.

Table 3.3: Examples of technical and operational benefits

Verhulst & Young (2016)	*Dietrich, Gray, McNamara, Poikola, Pollock, Tait, & Zijlstra, (2016)*
Sierra Leone's National Ebola Response Centre, the United Nations Humanitarian Data Exchange, and the Ebola GeoNode are three platforms that significantly improved the accessibility and quality of information used to handle the Ebola outbreak that occurred in West Africa 2014.	Opening up the departmental silos with open data, governmental bodies can use that data to easier complete their job. In the greater Manchester area, they have estimated that 600 public officials a day are unable to find or use data that they require for their jobs, resulting in costing the authorities over 8.5 million pounds yearly. When the government of British Columbia released their open data portal, around one-third of the visits were from the government itself.
A devastating earthquake killed 185 people in Christchurch 2011, New Zealand. In response volunteers and officials at the recovery agencies used open data, open source tools, trusted data sharing, and crowdsourcing to created a range of services and products that are needed for a quake response. An app called Christchurch Earthquake GIS Clusters was developed and obtained 70 000 visits within 48 hours.	The Danish opened their address registry to the public in 2002. Eight years later in 2010 address data was delivered to 1236 parties, of which 70% were from private companies, 20% from the central government, and the last 10% from municipalities. One year earlier a consultant firm had estimated the value of the data source between 2005-2009 to be 62 million Euros. In 2010, they expected it to be 14 million. The cost of implementing the system was around 2 million while in 2010 it was expected to cost 0.2 million. The release has removed duplication of address registries, improved public service coordination, and resulted in higher quality data and standardization. The primary objective behind this move was to improve the IT-coordination between different agents, such as police and other emergency services.
Mejora Tu Escuela, a platform developed in Mexico, supplies citizens with information about the performance of schools. This helps parents choose the best school for their children, making it possible to demand higher-quality education.	This story shows that the biggest beneficiaries of open data can be the government itself. In an old system, CIOs would have to communicate with each other through different manual channels about resource duplication, taking months to conduct, or approaching infinity as some wouldn't respond. By making the finances open data, one CIO could, in 15 minutes, make a search for a research report and see that there were duplicated procurements, resulting in a cost of 4 million pounds.