# Mobilizing the Smart City

An inquiry into the transferal, articulation and effects of the Smart City

Kevin van Engelshoven
S4073347
Radboud Universiteit Nijmegen
Master Economic Geography
Under supervision of Freek de Haan
24 – 3 – 2016

## Toestemmingsformulier tot beschikbaarstelling van een scriptie in de Radboud Scriptierepository

De Radboud Universiteit Nijmegen (hierna de Radboud Universiteit) heeft een scriptierepository opgezet waarin de Radboud Universiteit scripties die door studenten in het kader van hun studie zijn geschreven, worden opgenomen en toegankelijk gemaakt voor derden. Hierdoor wordt het proces van creatie, verwerving en deling van kennis binnen het onderwijs mogelijk gemaakt en ondersteund.

De in de scriptierepository opgenomen scripties zullen gedurende minimaal zeven jaar in de scriptierepository worden opgenomen en toegankelijk gemaakt voor potentiële gebruikers binnen en buiten de Radboud Universiteit. Om opname en beschikbaarstelling mogelijk te maken dient dit Toestemmingsformulier.

Door opname en beschikbaarstelling in de scriptierepository wordt het auteursrecht niet overgedragen. Daarom kan de student zijn of haar toestemming tot het beschikbaarstellen van zijn afstudeerscriptie te allen tijde intrekken.

**Rechten en plichten student**

Hanin van Erpshaar (hierna de student) verleent aan de Radboud Universiteit kosteloos de niet-exclusieve toestemming om zijn afstudeerscriptie getiteld

Mediating the Smart City: An inquiry into the transformal articulation of effects of the Smart City

binnen de scriptierepository beschikbaar te stellen aan gebruikers binnen en buiten de Radboud Universiteit. Hierdoor mogen gebruikers de afstudeerscriptie geheel of gedeeltelijk kopiëren en bewerken. Gebruikers mogen dit alleen doen en de resultaten publiceren indien dit gebeurt voor eigen studie en/of onderwijs- en onderzoeksdoeleinden en onder de vermelding van de naam van de student en de vindplaats van de afstudeerscriptie.
De toestemming om de afstudeerscriptie aan derden beschikbaar te stellen gaat in per de op dit formulier vermelde datum.

De student geeft de Radboud Universiteit het recht de toegankelijkheid van de afstudeerscriptie te wijzigen en te beperken indien daar zwaarwegende redenen voor bestaan.

De student verklaart dat de stagebiedende organisatie dan wel de opdrachtgever van de afstudeerscriptie geen bezwaar heeft tegen beschikbaarstelling van de afstudeerscriptie in de scriptierepository.

Verder verklaart de student dat hij of zij toestemming heeft van de rechthebbende van materiaal dat de student niet zelf gemaakt heeft om dit materiaal als onderdeel van de afstudeerscriptie op te nemen in de scriptierepository en aan derden binnen en buiten de Radboud Universiteit beschikbaar te stellen. Ondergetekende vrijwaart de Radboud Universiteit Nijmegen van claims van derden dienaangaande.

De student geeft de Radboud Universiteit het recht de afstudeerscriptie in de scriptierepository ter beschikking te stellen voor een periode van minimaal zeven jaar.

**Rechten en plichten Radboud Universiteit**

De door de student verleende niet-exclusieve toestemming geeft de Radboud Universiteit het recht de afstudeerscriptie aan gebruikers binnen en buiten de Radboud Universiteit beschikbaar te stellen.
De Radboud Universiteit mag de afstudeerscriptie, conform de reglementaire vereisten, voor een periode van minimaal zeven jaar opnemen in de scriptierepository.

De Radboud Universiteit mag verder de afstudeerscriptie voor gebruikers binnen en buiten de Radboud Universiteit vrij toegankelijk maken voor een gebruiker van de scriptierepository en mag deze gebruiker toestemming geven om de afstudeerscriptie te kopiëren en te bewerken. Gebruikers mogen dit alleen doen en de resultaten publiceren indien dit gebeurt voor eigen studie en/of onderwijs- en onderzoeksdoeleinden en onder de vermelding van de naam van de student en de vindplaats van de afstudeerscriptie. De Radboud Universiteit zal ervoor zorgen dat vermeld wordt wie de schrijver is van de afstudeerscriptie waarbij zij tevens aangeeft dat bij gebruik van de afstudeerscriptie de herkomst hiervan duidelijk vermeld moet worden. De Radboud Universiteit zal duidelijk maken dat voor ieder commercieel gebruik van de afstudeerscriptie toestemming van de student nodig is.

De Radboud Universiteit heeft het recht de toegankelijkheid van de afstudeerscriptie te wijzigen en te beperken indien daar zwaarwegende redenen voor bestaan.

**Rechten en plichten gebruiker**

Door dit Toestemmingsformulier mag een gebruiker van de scriptierepository de afstudeerscriptie geheel of gedeeltelijk kopiëren en/of geheel of gedeeltelijk bewerken. Gebruikers mogen dit alleen doen en de resultaten publiceren indien dit gebeurt voor eigen studie en/of onderwijs- en onderzoeksdoeleinden en onder de vermelding van de naam van de student en de vindplaats van de afstudeerscriptie.

| | | |
|---|---|---|
| Datum | : | 25-5-2016 |
| Naam student | : | Kevin van Engelshoven |
| Studentnummer | : | 4073347 |
| Faculteit | : | Managementwetenschappen |
| Opleiding | : | Human Geography - Economische Geografie |
| Afstudeerrichting | : | Economische Geografie |
| Handtekening | : | K. van Engelshoven |

## Outline


| | | | | |
|---|---|---|---|---|
| **Chapter 1:** | | **General Framework** | | |
| | 1.1 | Introduction | P. | 1 |
| | 1.2 | Research objective | P. | 2 |
| | 1.3 | Research question | P. | 2 |
| | 1.4 | Relevance | P. | 3 |
| **Chapter 2:** | | **Theoretical framework** | | |
| | 2.1 | An introduction to the smart city | P. | 6 |
| | 2.2 | Exploring various perspectives of the smart city | P. | 12 |
| | 2.3 | Conceptualizing the mobilization of the smart city | P. | 17 |
| **Chapter 3:** | | **Methodological framework** | | |
| | 3.1 | Establishing a research method | P. | 23 |
| **Chapter 4:** | | **Findings** | | |
| | 4.1 | Transferring the smart city | P. | 30 |
| | 4.2 | Articulating the smart city | P. | 41 |
| | 4.3 | The effects of the smart city | P. | 56 |
| **Chapter 5:** | | **Conclusion** | P. | 60 |
| | | **Reflection and Recommendations** | P. | 63 |
| | | **Literature overview** | P. | 65 |

Before we start off with our exploration into the topic of the smart city I would first like to take this opportunity to express a word of thanks to the individuals which have been of great importance to me throughout this research.

First of all I would like to thank Freek de Haan, my supervisor throughout this process. He has assisted me to carve a path through the muddle which is the notion of the smart city and, on more than one occasion, has introduced new concepts which have, without a doubt, enriched this research.

I would also like to thank Brigitte Hulscher, who played the role of guide and supervisor throughout my internship with the municipality of Utrecht. Our partnership was truly a great and meaningful experience and her guidance was key in helping me understand what the notion of the smart city truly entails.

A thank you to Hetty van Veen for helping me learn the ropes throughout my internship and always taking the time to help me when I needed it.

And last, but certainly not least, a big thank you to the rest of the individuals who have contributed to this research, whether that be the respondents who provided the data needed to carry out this research or my friends and family who provided both moral support and an opportunity to unwind every now and then.

## Summary

Even though neither an exact definition nor a clear understanding of the attributed elements of the notion of the smart city has been established, there has been an increase in the design and implementation of policies which are based on the notion throughout recent years. Within the academic literature one can find a variety of perspectives which seek to address the nature of the notion of the smart city. The most commonly advocated perspective is the rational perspective which pleads that the notion should be regarded as a solution towards a variety of issues which affect urban areas. The critical school provides a contrasting perspective in which the notion of the smart city falls in line with forms of domination exerted by the capitalist system. Within this research a less commonly utilized perspective will be adopted, that being a relational perspective in which the interactions which occur between actors are the object of study.

The goal of this research is to shed light on the manner in which the notion of the smart city is mobilized. Within the context of this research mobilization entails the manner in which the notion of the smart city is transferred to, and subsequently articulated in cities and the effects which this adoption has brought about within cities.

The transferal of the notion of the smart city is examined through the notion of policy transfer. Within the field of geography policy transfer is engaged with the manner in which urban policy makers transfer policies from one place to another by scanning the political landscape for processes and consequently adopting these processes within their own policymaking process. The cases examined within the context of this research, those being the cities of Heerlen and Utrecht, vary in their motives as to why they have adopted the notion of the smart city. Whereas the city of Heerlen faces the risk of losing businesses as a result of a process of brain-drain and a mismatch between the supply and demand of personnel, the city of Utrecht seeks to fulfil its ambition of Healthy Urban Living as well as prepare for the demographic growth which the city faces. This research indicates that there are a variety of mediators in play which enable the transferal of the notion of the smart city to take place. These mediators vary from brokers, individuals who act as an intermediary between a place where particular knowledge is needed and the place where the knowledge is available, to national and international organizations which establish knowledge sharing networks. The content which is being transferred through the notion of the smart city includes particular knowledge, for instance data and schematics which describe the manner in which a particular initiative is developed and implemented, as well as a revision of the mindset with which municipal governments operate.

The articulation of the notion of the smart city is examined in terms of rationalities of government, the upheld ideals to which a particular governed entity is shaped, and technologies of government, the concretization of the ideals articulated within the rationalities of government. This research indicates that the rationalities which cities adopt are not part of a set of predetermined rationalities but rather are dependent upon the socio-spatial context of the particular city in the sense that the adopted rationalities are based on what is deemed of importance in the specific place at the time. The use of technology, in the sense of technological equipment, which is often considered to be at the core of the notion of the smart city cannot be considered a rationality, but rather should be considered a means to an end. In order to concretize the established rationalities cities make use of various practical technologies of government such as the establishment of a business case as well as the establishment of pilot projects. In addition, a synergistic mindset is adopted which seeks to abolish the hierarchic silos which are present within governmental

institutions and replace them with a form of collaboration in which the various actors within the city actively participate and fulfill distinctive roles in the articulation of the notion of the smart city.

In a relational sense the process of effect assessment seeks to examine the manner in which the actors which are engaged with a particular topic shape the process of effect assessment and the effects which these actors identify themselves. In the case of the notion of the smart city the process of effect assessment is concerned with the effects of individual initiatives rather than the notion as a whole. The standards with which these individual initiatives are assessed are based on the policies which the initiatives are part of and generally comprise of hard data such as (monetary) profit or changes in efficiency. In addition, the policy which the particular initiative is part of also dictates the standards with which it can be determined whether the initiative can be considered smart or not. In terms of the actual effects of the adoption of the notion of the smart city the effect are considered limited, especially when taking into consideration the expectations which were established beforehand.

# Chapter 1: General Framework

### 1.1 Introduction

"By 2050, seven out of ten people will live in cities, which will account for six billion people living in urban areas. That phenomenon is central to all the challenges humanity faces. If there is an issue to be addressed, then it is certainly happening in cities…" - Eduardo Paes, Mayor of Rio de Janeiro (2013).

Up until the year 2009 the majority of the world population had always resided in rural areas, it was however in this year that a shift took place in which the number of people living in urban areas had, for the first time in history, surpassed the number of people living in rural areas (United Nations, 2010). In 2015, 6 years after this shift has taken place, an estimated 54 percent of the world population is living in urban areas such as cities and towns. Contemporary demographic data and prognoses indicate that the process of urbanization will continue in the future due to continued processes of urbanization in the West, rapid economic growth and urbanization occurring in booming economies such as India and China and the rise of processes of urbanization in Africa. As a result the number of urban dwellers is expected to rise to an estimated 66 percent of the world population by the year 2050 (United Nations, 2014). The increase and spatial concentration of urban dwellers which results from processes of urbanization unfortunately brings forth a set of issues within cities. These issues either directly emanate from processes of urbanization such as a rise in traffic congestions, an intensification of air pollution, an increase and spatial concentration of resource and energy consumption and strains being put on waste management systems, or will become more apparent within cities due to processes of urbanization, including challenges regarding the scarcity of housing and the unequal access to education and public transport, especially for the poor (Alawadhi et al, 2012; Nam and Pardo, 2011; Harrison and Donnelly, 2011).

As a response to these emerging issues, and in an attempt to make urban development more sustainable, the concept of the smart city was developed (Nam and Padro, 2011). At least that is the conviction that is generally presented. Some researchers however adopt a more critical view towards the development of the smart city and believe that the smart city serves a different goal, namely to ensure the continued dominance of particular ICT-firms within the world market (Hollands, 2008). While the discussion regarding the nature of the smart city continues there are many that are still attempting to define what exactly a smart city is. Although it is generally agreed upon within the academic literature that a smart city seeks to make use of developments in information and communication technology to advance innovative urban processes, there are nevertheless an abundance of beliefs and interpretations on what exactly constitutes a smart city (Hollands, 2008, Caragliu, 2011). The lack of a single definition has however not prevented an increasing number of cities, as well as international institutions, from developing and implementing strategies and initiatives under the banner of the smart city.

This research is however not concerned with raising discussion regarding the exact definition of the smart city, nor does it take upon itself to (dis)credit a particular perspective regarding the nature of the smart city. Rather, the goal of this research is to examine the manner in which the notion of the smart city is being mobilized, that is how the notion of the smart city is transferred to cities, how a city subsequently articulates and puts into practice the notion of the smart city and the effects which the adoption of the notion has brought about within these cities.

### 1.2 Research objective

The main objective of this research is to bring to light the manner in which the notion of the smart city is being mobilized. Within the context of this research mobilization of the notion of the smart city is defined as the manner in which the notion of the smart city is being transferred to cities and the manner in which this notion is subsequently articulated by cities. In addition, this research seeks to examine whether the adoption of the notion has brought about any effects within cities. This has led to the establishment of the following research objective:

*The aim of this research will be to clarify the manner in which the smart city as a notion is being mobilized, that is the manner in which the notion of the smart city is transferred to, and subsequently articulated in cities and the effects which this adoption has brought about within cities.*

In order to add to the feasibility, as well as to further indicate and clarify the aim of this research, the main research objective can be divided into three smaller research components.

As a starting point this research will examine the manner, that is the motives, mediators and content, in which the notion of the smart city is being transferred between a variety of actors and the interactions through which the notion ultimately reaches a particular city. The main point of focus here, and throughout the entirety of this research, will be the municipal government as the municipal government can be considered the actor which is mainly responsible for the (official) implementation of policies and strategies within a city. However, when relevant, other actors present within the city will be included in this research as well.

The second research component will be the manner in which the city and city officials articulate and give shape to the notion of the smart city. This is done by examining the specific smart city vision which a particular city has adopted. Doing so will not only provide an indication on the various ways in which the notion of the smart city can manifest itself within a city, but will additionally grant an indication on the role which various actors fulfill within a smart city and accentuate some of the similarities and dissimilarities that can occur between varying cities in their adoption of the notion of the smart city.

As a final and conclusive component the focus within this research will shift towards some of the effects that the adoption of the smart city has brought about, examining some of the concrete effects which are attributed to the adoption of the notion of the smart city.

### 1.3 Research question

The main research question that can be derived from the research objective established above is the following:

*In what manner is the notion of the smart city being mobilized?*

The main question can be divided into several sub-questions which will be used to further structure this research. The sub-questions are the following:

1. In what manner is the notion of the smart city being transferred to a city?
2. How is the notion of the smart city being articulated within cities?
3. What effects has the adoption of the notion of the smart city brought about within cities?

**1.4 Relevance**

Before this research sets off to explore the manner in which the notion of the smart city is mobilized it is worth elaborating upon why the smart city should be considered a subject relevant enough to warrant this research and what this research will contribute to existing knowledge. In order to provide an answer to these questions the societal and scientific relevance of the smart city, and this research, will be made explicit in the section below.

*Societal relevance*

Since the introduction of the notion of the smart city two decades or so ago an increasing number of actors, ranging from individual cities to overarching international institutions, have sought to apply the notion in one way or another. The smart city for instance constitutes one of the key components of the innovation-model established within the United States in the early 2000's, is a component of the Europe 2020-strategy and has since 2009 been incorporated as an official policy instrument for development within the European Union (Caragliu, 2013). The Dutch city of Amsterdam has since 2009, as the first city within the Netherlands, been carrying out a smart city initiative through a collaboration between the Amsterdam Innovation Motor, the local municipality and the Dutch utility company Liander, in which the focus is put on the local development and implementation of innovative technologies, the encouragement of behavioural changes amongst the citizens of Amsterdam in regards to energy usage and the establishment of sustainable economic investments through the establishment of various public-private partnerships (AgentschapNL, 2011).Within other European cities such as Stockholm, London, Dublin, Tallinn and Reykjavik, to name but a few, smart city strategies and initiatives have also been developed and implemented, or plans and preparations are being made to do so in the near future. In the United States cities such as San Francisco, Toronto and Vancouver are undergoing a similar process (Hollands, 2008).

The development and implementation of smart city strategies and initiatives is not a process that is strictly occurring within Western cities such as those located within the European Union or the United States. The Chinese cities of Beijing, Shanghai and Guangzhou are also developing and implementing smart city strategies and initiatives in their cities. These cities are carrying out smart city measures in order to tackle some of the issues that are being caused by the rapid economic growth and urbanization rates that have characterized these cities in the past years (Kang-juan and Liu-qing, 2012). The South-African city of Johannesburg is developing a smart city roadmap aimed at the transformation of the city towards a smart city by the year 2040. This roadmap is aimed at contemporary issues and goals such as for instance the improvement of public safety through surveillance with the use of innovative technologies (IBM, 2012).

In order to bring about smart city strategies and initiatives a considerable amount of resources are being invested and allocated within cities. The Dutch city of Eindhoven has for instance recently been appointed as one of the participants in the European Commission led Smart Cities Horizon 2020 initiative. In the spirit of this initiative developments are being made in the fields of energy, mobility, innovation and data. In order to be able to fund developments within these field the European Commission has provided the city of Eindhoven with a subsidy of 6.4 million Euro's, which is expected to cover (part of) the developments that are being made for the coming 5 years (Gemeente Eindhoven, 2014).

Not only are the resources being invested in the smart city already substantial, but they are also increasing throughout the years. An indication of this growth can be given by taking a look at

one of the main European-led smart city initiatives, that being the Smart Cities and Communities European Innovation Partnership. This partnership, which focusses on the development of smart city technologies and the encouragement of partnerships between governmental institutions and market actors, had a budget available of 81 million Euro's in 2011, in 2013 this budget had increased to 365 million Euro's (EUSmartCities, 2014).

Finally, there are many different stakeholders involved in the development and implementation of smart city strategies and initiatives, these include not only a variety of governmental actors which operate on either a local, regional, national or international scale, but also the actors which are present within a particular city such as the local entrepreneurs, knowledge institutions and the city residents (Holler et al, 2014 ; Casi, 2014). By adopting a relational perspective this research seeks to examine the role which these various actors play within the mobilization of the notion of the smart city.

In addition, within the Netherlands research conducted in regards to the notion of the smart city is generally aimed towards the cities of Amsterdam and Eindhoven. This research seeks to broaden the scope and, through the utilization of a comparative approach, highlight some of the similarities and dissimilarities in regards to the mobilization of the notion of the smart city of other cities which are engaged with the topic of the smart city.

*Scientific relevance*

Over the course of the last few years the discourse surrounding the term 'smart' has gained considerable attention within the academic literature. It can be considered as one of the most recent notions within a series which also includes other concepts such as creative, wired, cultural, innovation and intelligent (Hollands, 2008).

A few years ago Hollands (2008) stated that it was difficult to determine whether the discourse surrounding the term smart, and closely linked to it the smart city, was simply a hype, a notion that gains considerable attention within a short time span, but will slowly recede and eventually be replaced by another discourse, or that the discourse would continue to remain relevant. Hollands noted that an issue in regards to the usage of the term smart is that it is often an alluring term to be used for purposes of city branding. The discourse surrounding smart can, and often is, used simply to create a favorable image of a city rather than developing (governmental) strategies or initiatives which can actually be regarded as being part of the smart city discourse (Short et al., 2000). However, at the present day researchers such as Söderström, Paasche and Klauser (2014) believe that the smart city has become an integral part of the vocabulary used within the fields of, amongst others, urban management and development in which it is employed in order to frame how cities are understood, conceptualized and planned.

Within the academic literature one can find a multitude of beliefs on what exactly constitutes a smart city, see for instance Zhiyang (2014), Giffinger et al (2007), Komninos (2006) or Caragliu, Del and Nijkamp (2011) for various interpretations of the smart city. The lack of a single definition has resulted in a situation in which the smart city is being applied in various ways by different (sets of) actors. The European Union for instance uses the term to refer to a particular strategy of urban growth which is shaped through innovative urban processes which are interwoven with developments being made in the field of information and communication technology while local policymakers use the term as a way to label developments in the fields of energy, mobility, economy or the environment (Caragliu, 2011 p. 67; EUSmartCities, 2014).

When addressing the question why cities want to become a smart city several distinct points of view are advocated within the academic literature. A common conception is a rationalistic one, in which it is stated that cities turn to smart city practices as a result of the various issues that follow the process of urbanisation. In order to cope with these issues, and in an attempt to make urban developments more sustainable, the concept of the smart city was developed (Nam and Padro, 2011). Other academics however refute this problem-oriented perspective towards the smart city and adopt a critical perspective. Researchers such as Bell (2011) and Söderstrom (2014) for instance argue that the smart city is not being implemented (solely) in an attempt to solve the issues caused by urbanization, rather the smart city is implemented in an attempt to link urban developments and progress within the urban realm to the provision of technological solutions for urban issues. Within this viewpoint it is believed that technological solutions are provided for by large IT corporations in order to secure and bolster their market positions. Hollands (2008) adds to this by stating that during this process actors are actively downplaying and disregarding some of the detrimental outcomes of these new technologies.

Research conducted in regards to the notion of the smart city is generally not concentrated on the manner in which cities transfer the notion of the smart city but rather the manner in which they articulate or give shape to the notion of the smart city. The role which various actors play within this articulation, and the interaction that takes place between actors in order to articulate the notion of the smart city is however underexposed. The same can be said in regards to the ideals on which the articulation is based and the concrete actions with which these ideals are realized. In addition, although the actual effects of the adoption of the notion of the smart city are frequently depicted, the effects, as well as the process of effect assessment, identified by actors themselves are not. This research seeks to add to the existing pool of knowledge by examining these aspects of the mobilization of the notion of the smart city.

# Chapter 2: Theoretical framework

*Introduction*

Within the academic literature one can find various theoretical perspectives which reflect on the 'nature' of the smart city. These perspectives seek to address the reasoning and motives behind the original design and subsequent adaptation and adoption of the (notion of the) smart city. Before this research seeks to address some of these perspectives it is however first important to know what exactly we are referring to when we are discussing the topic of the smart city; what does a smart city entail and what are the elements that constitute a smart city?

The latter questions will be addressed in the first section of this chapter, after which the theoretical perspectives regarding the nature of the smart city will be discussed in the second section of this chapter. In the third and final section the theoretical concepts with which the three components as identified within the research objective and research question, those components being the transferal, articulation and effects of the smart city, will be addressed.

## 2.1 An introduction to the smart city

Throughout recent years there has been an increase in the design and implementation of urban and regional policies which adopt within them, or are even entirely based upon the term 'smart'. Two policy concepts generally take centre stage within these policies, those being the concepts of smart specialization and of the smart city (Caragliu, 2013 p. 2). This research is concerned with the latter of these concepts, that of the smart city and the manner in which it is transferred to, articulated in and has an effect on cities. However, before we delve deeper into these elements we should first acquire some basic knowledge on the smart city. This will not only help us better understand what exactly a smart city is, but will also help to avoid confusion in regards to what we are referring to when we use the term smart city. Such a basic understanding of the smart city can be acquired by discussing where the concept of the smart city stems from, what exactly the smart city entails and what the basic elements that constitute a smart city are.

### *2.1.1 A short history of the smart city*

Within the academic literature one can find a variety of conceptions of the city which prelude and can be related to the smart city, however there are generally two main conceptions of the city which are regarded to be the conceptual predecessors of the smart city, those two being the wired city and the intelligent city.

The wired city is a conception of the city which stems from the 1960's and 70's. It was within these decades that the ideal of a 'Great Society' was brought forward. This ideal sought to provide an answer to the entirety of (social) issues which plagued urban areas at the time. This would be accomplished through, inter alia, the development and usage of communication technologies to further innovate public communication systems as a way of providing new services towards urban residents and entrepreneurs (Dutton, 1987). The ideal was to bring forward an integrated and universal electronic communication system which relied on a two-way cable layout, which was considered revolutionary at the time. This meant that services provided through the communication system would not simply be limited to one way traffic, such as for instance television broadcasts in which the consumer only acts as the receiving party, rather, it would form an interactive system that would work through a satellite network through which city residents could connect to other

residents and make use of, and simultaneously provide for, an array of services, in a sense working such as the Internet works today (Dutton, 1987).

Although at the time the wired city was considered a failure due to the lack of citizen interest the ideas adopted in the notion of the wired city did bring forth a realization as to the importance that forms of communication, and in extent information- and communication technology, would play within society in the near future, which in turn brought forward a number of other conceptions of the city (Dutton, 1087). One of these conceptions is the intelligent city, which is considered to be the conception of the city which is most closely related to that of the smart city (Komninos, 2002). Komninos (2002) describes the intelligent city as a city in which there is an adaptation, integration and usage of various forms of electronic and digital technologies. These technologies are used to redefine and transform urban life, networks and employment. An important factor within the intelligent city is the usage of technology to provide services which alter the city's basic (physical and digital) infrastructure in order to improve the effectiveness of services and the range of service provision, but also to lower the costs of service provision, including both monetary as well as other forms of costs such as effort, time etc. The intelligent city seeks to accomplish this by integrating ICT within the urban realm in such a way that citizens and entrepreneurs can utilize their creativity and knowledge by continually providing feedback, innovate and improve upon the services provided, thus contributing to solving urban issues and improving the quality of urban life. Within this context governmental institutions provide the necessary digital and communicative infrastructure which is needed to fully utilize the knowledge and creativity of the citizens and entrepreneurs within the city (Berthon, 2011).

Although the above conceptions of the city are regarded to be the conceptual predecessors of the smart city, the exact origin of the smart city is difficult to determine. Some credit the origin of the smart city to the innovation-model which was established within the United States in the early 2000's. Within this model the smart city, alongside the notion of smart specialization, was considered to be a key factor towards innovation and economic prosperity (Caragliu, 2013). Others such as Bollier (1998) state that the smart city has its origin in a (social) movement termed 'Smart Growth' which in the 1990's advocated reforms in urban planning policies. One could also argue that technology companies such as IBM and Cisco truly gave shape to the smart city as we know it today, as these companies termed their attempt to integrate information systems in the urban realm as 'smart city developments' (Harrison, 2011).

*2.1.2 Defining the smart city*

Regardless of the exact history or origin of the smart city, since its introduction the notion of the smart city has been further developed both in the academic fields of, among others, urbanism, geography and sociology, and in light of governmental policy (Hollands, 2008). These developments have however yielded little consensus as to the specific elements, or a single definition, regarding what exactly constitutes a smart city.

- Komninos (2006 p.1) for instance sees smart cities as "…territories with high capacity for learning and innovation, which is built-in the creativity of their population, their institutions of knowledge creation, and their digital infrastructure for communication and knowledge management".
- Caragliu, Del and Nijkamp (2011 p. 70) state "We believe a city to be smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance."
- Lastly, the smart city is defined by the European Commission (2014) as "a place where the traditional networks and services are made more efficient with the use of digital and telecommunication technologies, for the benefit of its inhabitants and businesses."

So what exactly is then a smart city? In their assessment and ranking of the degree of 'smartness' of European medium-sized cities Giffinger et al. (2007) attempt to provide an answer to this question by designing and putting into practice a model of the smart city which comprises of the basic elements of the smart city found within the literature at that time. After the conception of this model it has oftentimes been used by researchers as a basic vantage point from which to view the smart city, for examples see for instance Lombardi (2011) and Nijkamp et al. (2011). Although in recent years the correctness and robustness of this model has come into question (for a critical assessment of the model see Mundula and Auci (2013)), it can nevertheless provide us with an initial indication as to the elements that constitute a smart city.

Giffinger et al define a smart city through the elements that, they believe, constitute it, "a city which aims at stimulating innovation and technological progress within six overarching sectors of city policy, those being smart forms of economy, people, governance, mobility, environment and living. " In a similar fashion to, and building further upon Giffinger et al., urban strategist Boyd Cohen has, in cooperation with some of the leading smart cities in the world, constructed what he terms a 'Smart Cities Wheel'. This wheel is a framework which covers the elements of the smart city. The various elements of the smart city as identified by Giffinger et al. and Cohen are shortly elaborated upon on the following page through the use of Giffinger et al. (2007, 2009), Cohen and Ahmed (2014).

.

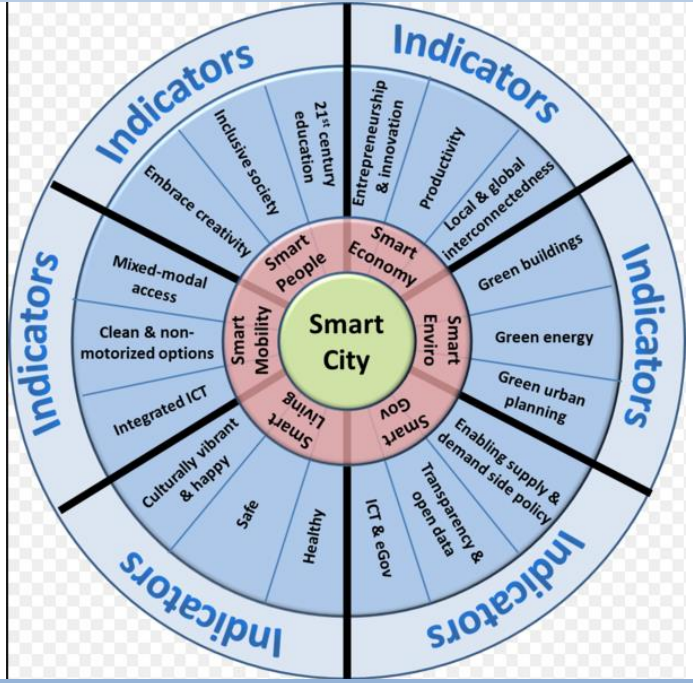


Figure 1: The Smart Cities Wheel
Source: Cohen, B www.boydcohen.com/smartcities.html

| *Smart economy* | *Smart residents/people* | *Smart governance* |
|---|---|---|
| A smart economy is regarded as an economy in which there is a stimulation of an alternate economic pattern, in the sense that a focus is put on the stimulation of innovation and the production of ICT-related products. These sectors of industry are subsequently privileged above other sectors in regards to subsidies and policy making. Additionally, local governmental institutions actively make efforts in order to retain the local talent, that being highly-educated workers, while simultaneously attempting to attract such talent from other places. | Within the context of the smart city it is not only the city itself which is considered to be smart, the city houses smart residents as well. This element of the smart city entails that residents within a smart city are continuously working on expanding their capacities and skills through education. This process does not simply end when a resident graduates, rather this learning process is considered to be a life-long development. Governmental institutions facilitate this process through the provision of qualitatively good public schools and the stimulation of forms of e-learning to develop and be adopted within the city. | Governmental institutions which act in accordance to the element of smart governance typically spend a larger share of their governmental funding towards the development and implementation of innovative technology and services within the urban realm. In addition, they seek to improve the public services they provide through the usage of ICT, an important element of which is the utilization of ICT to establish an e-governance system which stimulates a greater degree of communication to take place between city-residents and local governmental institutions and allows for the governmental institutions to provide a range of public services for its citizens through the use of a digital network. |
| *Smart mobility* | *Smart environment* | *Smart living* |
| Smart mobility is primarily concerned with both physical as well as digital forms of infrastructure. The central points within both of these types of infrastructure are accessibility and connectivity. Within the realm of digital infrastructure these terms entail that citizens of a smart city are able to access the digital infrastructure through Wi-Fi hotspots located throughout the city, and both governmental institutions as well as private actors provide a range of interconnected mobile services. The physical infrastructure within the context of the smart city refers to the provision of an integrated transport network which connects multiple forms of transportation, this network being available to all residents. | The aspect of a smart environment covers both the living environment as well as the built environment of a city. The living environment refers to the (natural) surroundings of a city in which the emphasis is put on interaction with these surroundings in a sustainable manner, thus decreasing the dependency on nature and increasing the creation and maintenance of green space. Within the realm of the built environment sustainability also plays an important role, here a greater usage of renewable energy sources and improvements within the operational efficiency of a city is emphasized. | The element of smart living covers a wide variety of aspects within the smart city such as the provision of health services, both in the physical as well as the digital realm, through the availability of digital health records, the possibility for digital appointment making and remote patient monitoring. Another aspect is the provision of cultural facilities within a city, the total supply of which should be diverse in nature and accessible to all residents. A third aspect is that of safety, including the enhancement of personal safety for inhabitants through ICT applications. |

*2.1.3 The smart city within the Dutch context*

The first city to officially adopt a smart city strategy within the Netherlands, and arguably even the first city to have done so in Europe, was the city of Amsterdam. The smart city strategy of Amsterdam, titled the Amsterdam Smart City Initiative, was implemented in the year 2009 through a partnership of the Amsterdam Innovation Motor, the municipality of Amsterdam, several knowledge institutions and Liander, a Dutch utility company. The strategy was initially incorporated as a reaction towards the environmental targets set out in the European Union's 2020 Climate and Energy Package in an attempt to go above and beyond the environmental targets established by the European Union, reducing even further the environmental impact exerted by the city of Amsterdam. This would be accomplished by making municipal organizations carbon-neutral, greatly reducing the city's overall $CO^2$ output and promoting and adopting a greater usage of renewable energy (Bigliana, 2009). The Amsterdam Smart City Initiative started off as an assortment of pilot projects which would be used for demonstrative and testing purposes (ASC, 2014). The Initiative has since then grown out to be a platform with over a hundred national as well as international partners active within a large variety of sectors and projects (ASC, 2014).

Since the initial adoption of a smart city strategy by the city of Amsterdam other Dutch cities have sought to develop and implement their own smart city strategy. An example of a specific interpretation of a smart city strategy is the city of Roosendaal which identifies and profiles itself as a 'Smart Retail City', putting its developmental focus towards innovations and improvements in the shopping- and catering environment of the city (Gemeente Roosendaal, 2014). Another example is the city of Eindhoven, which, with the help of electronic concern Philips, is developing itself as a 'Smart Lighting City', not only innovating in public lighting, but also researching various ways in which lighting can affect a city and its residents (Rob van Gijzel, personal communication, Smart City Lighting Event 25-6) (for more examples see figure 2).

In addition, an increasing degree of attention is being paid towards the stimulation of innovation, and with it the smart city, on a national scale within the Netherlands. In accordance with this development multiple learning networks have been established under supervision of and in cooperation with the national government. An example of such a network is the Digitale Steden Agenda, which is a collaboration between the national government and a multitude of cities and organizations located within the Netherlands. The aim of this network being the optimization of the opportunities that are provided for by the use and implementation of ICT through the establishment of a network-relation in which cities and organizations can share their knowledge and experiences with each other supplemented by national governmental data in order to stimulate a digital transition which helps cities take full advantage of innovations provided for by developments in ICT (Bigliana, 2009; ASC, 2014).

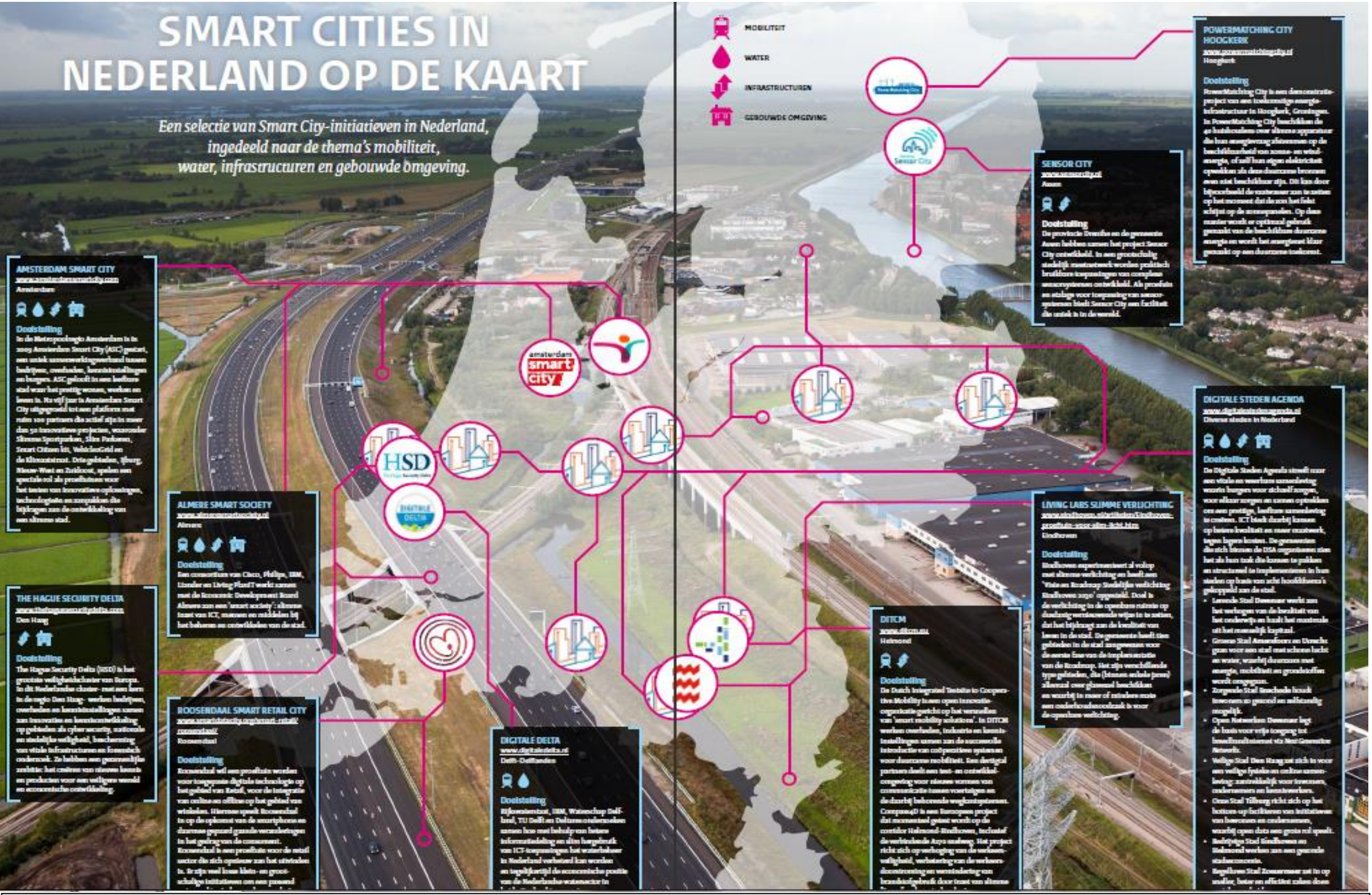


Figure 2: Smart City Initiatives in the Netherlands. Source: Ministerie van Infrastructuur en Milieu (2014)

## 2.2 Exploring various perspectives of the smart city

In the first section of this chapter a basic understanding regarding the origin and elements which constitute a smart city has been established. In this second section we will go one step further and explore why cities choose to adopt the notion of the smart city. Within the academic literature one can find various, moreover discrepant, perspectives which seek to address the reasoning behind the adoption of the notion of the smart city, the two main perspectives of which are the rationalist and critical perspective. There is however a third, generally less portrayed, perspective towards the adoption of the (notion of the) smart city, that being the relational perspective. These three perspectives will be illustrated in the section below.

### *2.2.1 A rationalist perspective towards the smart city*

The most commonly advocated perspective towards the development and adoption of the smart city is the rationalist perspective. Within the field of geography the rationalist perspective seeks to apply an objective and rational approach towards urban planning. Here issues within the urban realm are scientifically examined and defined after which city leaders and urban planners (but also other actors such as businesses and knowledge institutions) attempt to identify all possible solutions towards the issue, of which ultimately the best-fitting solution is chosen and implemented (Hostovsky, 2006; Shelton, 2014).

Within the context of the rationalist perspective the smart city is often linked to the processes of urbanization and the issues that are paired with it. This perspective is based on contemporary demographic data and analysis which indicate that since 2009 the number of urban dwellers has steadily increased from 3.4 billion to 3.8 billion in 2014. It is expected that this process of urbanization will continue in the future and that in the year 2050 the number of people living in urban areas will have increased to 6.3 billion, an increase of 66 percent in comparison with 2014 (UN-DESA, 2010, 2014). These numbers also indicate that, paired with the absolute increase of urban dwellers, an increasingly large percentage of the world population will be living in urban areas. Whereas in the year 2015 an estimated 54 percent of the world population is living in urban areas, this number is expected to increase to an estimated 66 percent by the year 2050 (United Nations, 2014).

In the present day cities already form important sites in respect to issues surrounding natural resource consumption and green-house gas emission, whereas cities constitute merely two percent of the earth's landmass, they are the sites in which over three quarters of the world's natural resources are consumed, and the main emitter of green-house gasses (Marceau, 2008). The process of urbanization will not only further reinforce these issues through an additional increase and spatial concentration of resource and energy consumption, but will also bring with it a set of new issues that cities will be confronted with such as a rise in traffic congestions, an intensification of air pollution and strains being put on waste management systems, additionally other issues will become more apparent within cities due to processes of urbanization, including challenges regarding the scarcity of housing and the unequal access to education and public transport, especially for the poor (Alawadhi et al, 2012; Nam and Pardo, 2011; Harrison and Donnelly, 2011). In addition to seeking possible solutions towards the diverse set of issues which stem from urbanization, city leaders are also exploring ways to bring about long-term strategies and visions which contain improvements within the urban realm " (…) smart cities are fixes for the dumb designs of the last century to prepare them for the challenges of the next, a new industrial revolution to deal with the unintended consequences

of the first one. Congestion, global warming, declining health - all can simply be computed away behind the scenes" (Townsend, 2013 p. 8). Within their pursuit city leaders are however restricted by the limited resources which are available to them (Cosgrave, 2012). Within the view of rationalism the smart city is regarded as providing the best-fitting solution towards the issues that accompany urbanization and providing a possible approach to meeting the goals established within the cities long-term strategies and visions (Cosgrave, 2012).

Another concrete example of the rationalist perspective can be given through the adoption and adaptation of the notion of the smart city by the European Union. In the case of the European Union it is often stated that the incorporation of the smart city is directly related to the detrimental effects brought forth by the financial crisis that came into being and plagued the world market in the year 2008. The financial crisis produced a series of issues related to increased rates of unemployment and an escalating public debt within both individual countries and overarching institutions such as the European Union (van Ark, 2008; Caragliu, 2013). Roughly around the same time researchers within the European Union also brought to light that the innovation-targets established within the Lisbon agenda, and later on reiterated within the first drafts of the Europe 2020-strategy, were not being realized and that the overall innovative capacity of the European Union was lacking. This consequently led to doubts being cast on the ability of the European Union to become innovative in the near future and thus produce innovative technologies, which in the knowledge based economy is often equated to competitiveness (Caragliu, 2013).

In order to pull the European Union out of this slump European policy makers began to seek for answers elsewhere. They eventually found a solution in the smart-innovation model that had since the early 2000's been adopted within the United States, and which had brought about considerable economic prosperity. At the core of this innovation model lie the policy concepts of smart specialization and smart cities. Due to this success European policy makers ended up adopting and putting to use a considerable part of this model. Since the introduction of this smart-innovation model within the European Union it has gained considerable traction within urban and regional policies throughout European member states, its integration and application being primarily driven by the European Commission (van Ark, 2008; Caragliu, 2013).

### *2.2.2 A critical perspective towards the smart city*

Other researchers within the field of geography do not regard the concept of the smart city as providing a solution towards the current and impeding issues which cities (will) face. This group of researchers adheres to the framework originally provided for by critical theory, which was devised by a group of German philosophers and social theorists organized within the Frankfurt School (Barnett, 2010; Bohman, 2005). Critical theory seeks to identify the various dimensions of domination which suppress individuals within modern society, and subsequently liberate them from these forms of domination (Bohman, 2005).

The subfield of critical geography devotes its attention towards forms of domination conceived by, and exerted through the neoliberal discourse. Neoliberalism here is regarded as an ideational project which is inherently characterized by geographically uneven outcomes due to a shift away from the focus on collective interest towards a focus on private interests (Barnett, 2010). A driving force behind the neoliberal discourse is competition. Competition within the context of the neoliberal discourse does not only occur between corporations but between cities, both on a

national and an international scale, as well. The goal of cities, much like corporations, is to secure profit and attract business and investments by improving upon their competitive position, partly by means of innovation. In order to stimulate innovation (public) resources are being reallocated away from social services towards innovation and private interests (Busch-Hansen and Wigger, 2011; Townsend, 2013)

Within the framework of critical geography the notion of the smart city is regarded as an attempt to establish a relation between urban- developments and progress and the provision of technological solutions towards urban issues. Here the smart city is regarded as a concept which is devised in a select few places and by a select few individuals and consecutively dispersed towards other places by large IT corporations. The discourse of the smart city is driven forward by these IT corporations in order to establish themselves as a central actor within urban developments and thus secure and bolster their market positions (Bell, 2011; Söderstrom et al, 2014). As is stated in a research conducted by Pike Research (2011) "With a potential market of more than $100 billion through the end of the decade, many of the world's largest companies are jockeying for position around smart cities". Local governmental institutions and processes of city governance are regarded by these IT corporations as a potential long-term market for their products, "IBM set its sights on government as a huge, untapped market and cities as a particularly high-growth segment". (Townsend, 2013, p.64).

The critical perspective thus advocates that IT corporations actively cooperate, design and implement a smart city in cooperation with local governmental institutions in order to secure their market share instead of doing so in order to improve the quality of life within the city (Kitchin, 2014). During this process these corporations are actively trying to downplay and disregard some of the detrimental outcomes and effects which the development and implementation of new technologies is having on the urban realm and the quality of life within the city in order to protect their sales (Hollands, 2008). These detrimental outcomes are related to the form of governance that is adopted with the implementation of the smart city. Critics argue that in regards to the implementation of the smart city the government adopts a technocratic form of governance. Whereas other forms of governance generate data through a diverse range of public political opinions, practical considerations such as the available funding and resources, a diverse set of choices and constrains and ethical considerations all of which are open to influence from a wide variety of actors, a technocratic form of governance is very limited and functionally oriented. A technocratic form of governance is based on a very limited set of technologically oriented data, which often fails to take into account the influence of culture, existing policies and forms of politics that shape city life. The technological solutions provided for problems within the city within forms of technocratic governance often do not provide any solutions towards the real (social) causes of issues within the city (Hill, 2013; Kitchin, 2014). An added possible concern here from a critical perspective is the creation of a monopoly within the city by the IT corporations by linking the city to certain technological platforms or innovations which they would become dependent upon for an extended period of time thus establishing a path dependent and technology dependent situation (Hill, 2013).

Another critical perspective provided for by critical theory is in regards to the data flows employed within the smart city in order to improve the connectivity within the city. This consists of data flows provided for by, amongst other things, camera feeds, queries employed through mobile apps and GPS feeds. Critical theorists claim that the acts of collecting, processing and analyzing this data are

generally portrayed as, but are not truly, beneficial towards the city as they provide more insight towards the city and make the city more manageable in addition to being employed in order to provide better security, a greater efficiency or contribute to sustainability (Kitchin, 2014). The critical perspective argues that the collecting, processing and analyzing of this data may be neutral and without ulterior motives when regarded as a process in and of itself, however the individuals who assign and conduct these processes are not without intention and may thus use this data for their personal benefit while neglecting the welfare and preferences of others and the city (Rosenberg, 2013; Ribes, 2013). An additional point of critique in regards to the data-harvesting methods employed within the smart city is in regards to the increased level of surveillance which takes place using the data flows. The emphasis here is put not only on the misuse of the collected data by certain actors, but also on the process of data-harvesting itself in which critics emphasize the possibilities this data has for the surveillance and privacy of individuals, being able to track down and trace particular individuals, monitor their actions and interactions and collect data on a variety of subjects, such as transactions, through personal devices containing personal information (Kitchin, 2014).

*2.2.3 A relational perspective towards the smart city*

A far less commonly advocated view towards the notion of the smart city, at least in comparison to the rational and critical perspectives, is the relational perspective. A relational perspective seeks to examine how a particular entity is constituted through the relations and interactions that take place between various actors rather than assuming that an entity is constituted through a general pattern or framework or the dispersal and adoption of a definitive central concept, such as for instance capitalism. So unlike the rationalist or critical perspective a relational perspective does not seek to provide an explanation or provide a critical view towards the emergence and adoption of an entity, but rather seeks to examine how the entity is being constituted through the relations and interactions of various actors (Sunley, 2008). Additionally, within the relational perspective the assumption is made that an entity does not possess any inherent characteristics that define its nature or the manner in which the entity manifests itself. The relational perspective therefore ascribes the adoption of an entity to a specific context which is contingent on time and space rather than following predetermined structures or patterns (Boggs and Rantisi, 2003; Jacobs and Lagendijk, 2014).

As a basic starting point the relational approach thus argues that all entities (within the social realm) are constituted through the interpersonal and interorganizational relations and interactions that take place amongst actors. The relations and interactions which are maintained by various actors constitute the dynamics within a particular entity as well, whereas continuous relations and interactions bring forth processes of stability, disruption of existing relations and interactions or adding new elements to a relation leads to processes of change within a particular entity. It is however not the case that a relational perspective only takes into consideration the role which individual agents play, otherwise known as agency. Rather, the relational perspective also takes into account more general laws or patterns, and thus structure. This is due to the fact that agents are never truly free, they still operate within a particular context and are thus bound by norms, laws and rules which ultimately shape their behavior, relations and interactions, thus in the end the relational perspective accentuates both agency as well as structure (Boggs, 2002).

Throughout recent years the relational approach has gained considerable traction within the field of (economic) geography due to the developments that have taken place within the capitalist

model, in which businesses have begun externalizing previously internal tasks establishing so-termed 'linkages' between businesses. This process of externalization is no longer contained towards arms-length trade aimed at achieving a reduction of costs, which was almost exclusively the case beforehand. Rather, the aim of externalization has extended towards processes of sharing and making use of (expertise) knowledge and innovative resources with the aim of establishing a comparative advantage within a region (Boggs, 2002). Innovations within the field of communication technology have contributed to the rise of the relational perspective within the field of (economic) geography as well. The digital networks which are established through the use of these communication technologies function as channels through which new relations and interactions between actors can take place. These digital networks do not only fulfill a complementary role, enabling digital relations and interactions to take place next to the existing face-to-face relations and interactions, but some researchers even argue that these digital networks can acts as a substitute the existing face-to-face relations and interactions (Graham, 1998).

From a relational perspective the notion of the smart city should not be seen as a centrally designed concept that is dispersed towards regions and cities through the use of a definitive pattern or framework, nor should the notion be regarded as being characterized by a predetermined set of elements which constitute it. Rather, the notion of the smart city should be regarded as being constituted through the interactions of a variety of actors, including both governmental as well as non-governmental actors, and the manner in which the notion of the smart city is given shape within a particular city or region is dependent upon the specific spatial-temporal context of that geographical entity. Governmental authorities, urban planners and other actors thus shape the notion of the smart city, and with it their smart city strategy, within a unique context, that of a particular city or region, and the challenges and opportunities which they face are dependent upon the context of the city or region, including for instance the socio-economic circumstances, the present infrastructure, the technological capacity, the local businesses and the demographics (Cosgrave, 2012; Nam, 2011). In addition, a particular city or region, and with it the process of strategy formation, is often subjected to a diverse range of policies which originate not only from the cities' or regions' policy makers themselves, but from a variety of scales and levels of governance ranging from the local to the national and even international (Nam, 2011).

### 2.2.4 *Adopting a perspective*

Now that the perspectives with which the notion of the smart city can be interpreted and further analyzed have been addressed it is time to determine which of these perspectives will be utilized within this research in order to examine the manner in which the notion of the smart city is being mobilized.

Within the context of this research the choice has been made to incorporate a relational perspective in order to examine the manner in which the notion of the smart city is being mobilized. That is to say, this research will examine the manner in which the notion of the smart city is being mobilized through the interactions which take place between a variety of actors. Adopting a relational perspective will provide us with insight into which actors play a role, and which role, within the mobilization of the notion of the smart city and the interactions which take place between these actors in order to mobilize the notion of the smart city.

## 2.3 Conceptualizing the mobilization of the smart city

After having covered the perspectives with which the notion of the smart city can be interpreted in the second section of this chapter, this third section will cover the theoretical concepts which will provide for the body and conceptualization of the mobilization of the notion of the smart city. Within this section we will elaborate on what exactly is meant by the mobilization of the notion of the smart city and give shape to this thought through three general concepts, those being the manner in which a notion travels or is transferred (2.3.2), how a notion is subsequently articulated (2.3.3) and the effects which the transferal and articulation of a notion can bring about (2.3.4).

### *2.3.1 Clarifying mobilization*

The term mobilization is in practice generally used in order to indicate the process of mustering support towards achieving a particular goal. For instance, the Social Sciences and Humanities Research Council utilizes the term mobilization in order to identify a process which they dub knowledge mobilization, that is 'moving knowledge into active service for the broadest possible common good' where the available knowledge regarding a particular topic is accumulated, compiled and put into active use to achieve a particular goal (SSHRC, 2008). The term mobilization however has a variety of applications. Therefore, before this research discusses the concepts which will be utilized in order to examine the manner in which the notion of the smart city is being mobilized it is necessary to elaborate first on what exactly is meant by the term 'mobilization' within the context of this research.

Within the academic field of policy science mobilization is linked to the study of policy networks and the actors which operate within these networks (Peck and Theodore, 2010). Within these networks a (global) circulation of policy takes place in which policies, and in extent the notions to which these policies are linked such as sustainability or the notion of the creative city, travel from one place to another, this process being termed policy mobility (Temenos and McCann, 2013). The policies which are subject to policy mobility however do not (generally) retain their original form, rather the policies transform while they travel and thus differ from place to place. This transformation of policies is attributed to the fact that policies generally do not travel in their entirety or as comprehensive bundles. Rather, policies travel as individual, or small groups of, concepts and ideas, thus the places which are on the receiving end of a particular policy adopts only a small section of that policy rather than the policy in its entirety. Subsequently, places which receive a section of a particular policy shape and articulate this policy through the attributes that characterize the place, in other words the 'local and sometimes immobile or fixed aspects of a place interact with policies mobilized from elsewhere' (Temenos and McCann, 2013). In a similar sense to the examination of policy networks this research seeks to examine the manner in which the notion of the smart city is mobilized. In order to do so this research will make use of three concepts, those concepts being the manner in which a notion travels or is transferred (2.3.2), the manner in which a notion which is received by a particular place is subsequently articulated (2.3.3) and the effects which such a notion can bring about (2.3.4).

### 2.3.2 *Transferring the smart city: The traveling of concepts*

Within the academic fields of social sciences and liberal arts Edward Said is considered to be one of the pioneering researchers in regards to the transferal, or 'traveling', of ideas. Within his work Said (1983) notes that theories constellated within the social sciences and liberal arts can engage in a journey in which these theories are transferred, and subsequently shaped and reshaped throughout time and space by the specific spatial-temporal contexts of the places through and to which they travel. This entails that, although a theory is historically shaped, it does not have a definite (political) meaning. Rather, a theory is open to (re)interpretation; a theory is constantly being shaped and reshaped throughout its journey by either replacing certain aspects of a theory by other aspects which are better suited for the specific local conditions, consciously omitting certain aspects of a theory as they are not suitable for the local conditions or (unknowingly) only partially adopting the intended body of a theory as certain aspects of that theory were abandoned or altered during its journey (Frank, 2009).

Much like Said before her, Bal (2002) is interested in the way in which an idea can be transferred and travel across space and time. Contrary to Said, Bal focusses on the traveling of concepts rather than the traveling of theories. A traveling concept, a term originally introduced by Bal in 2002, refers to a concept which can quickly become associated with, and manifest itself through a variety of phenomena through the distinct contexts in which these phenomena take place. Furthermore, the exact definition and underlying elements of the concept often vary amongst disciplines, thus individual scholars or fields of study can present distinct interpretations of the concept, which can again differ depending on the specific context, place or time period. Like Said Bal argues that the specific spatial-temporal context of a place can contribute to the further development of a concept and urban policy makers can choose to only adopt certain aspects of a concept for distinct reasons.

The fundamental distinction between the notions addressed by Said and Bal lies in the fact that whereas Said focusses on comprehensive, and oftentimes grand theories which consist of a plurality of interconnected concepts, Bal on the other hand focusses on individual concepts. The main point of difference in regards to their ability to travel lies in the fact that the individual concepts addressed by Bal are able to move much faster and more easily between distinct places than the theories addressed by Said. This is mainly due to the fact that a single concept can be more easily isolated from its original theoretical environment, it is far more difficult to transfer grand theories, whether in their entirety or partially, as they consist of a set of interconnected concepts which are all linked to the theoretical environment in some, oftentimes distinct way. Individual concepts can thus also be reintegrated into a new context with fewer alterations being necessary, as the only alterations have to be made within that single concept as opposed to various alterations being made in a set of concepts (Frank, 2009; Bal, 2002).

Within the field of political science researchers are also engaged with the manner in which a theory or concept can travel. Whereas researchers which adopt a rational perspective within this field seek to examine how a particular theory or concept travels or is transferred to a place to achieve a particular goal, researchers which adhere to the critical perspective seek to examine how the transferal or travel of a particular theory or concept brings forth new, or sustains established, forms of domination (Temenos and McCann, 2013; Dolowitz and Marsh, 2000). When adopting a relational perspective the focus is generally put on the manner in which a particular policy is established within

a place and how such a policy is transferred from one place to another and the actors which enable this process to take place. During this transferral it is oftentimes the case that policies are altered either by removing or substituting certain elements of a policy or adding entirely new elements to a policy. This field of research is often labelled as policy transfer (Dolowitz and Marsh, 2000). Dolowitz and Marsh (2000, p. 5) define policy transfer as a process by which 'knowledge about how policies, administrative arrangements, institutions and ideas in one political setting (past or present) is used in the development of policies, administrative arrangements, institutions and ideas in another political setting'.

In recent years the topic of policy transfer has extended beyond the field of political science and as such has become eminent within the field of geography often being referred to as policy mobility rather than policy transfer. Within this field of study geographers are primarily concerned with the manner in which urban policy makers transfer policies from one place to another by scanning the political landscape for innovative processes and consequently adopting these processes within their own urban policymaking process (McCann and Ward, 2012). The underlying assumption that is being made within the field of geography in relation to the entity of the city is that the transferral of a policy from one city to another, and subsequently the integration of this policy within that city, is influenced by policy networks consisting of various actors and agents cooperating with each other through a relational network, thus stating that cities are constituted through their relations with other places and scales (Cochrane and Ward, 2012; Massey, 1991).

*2.3.3 Articulating the smart city: rationalities, programs and technologies.*

In order to address the manner in which policy makers, urban strategists and city officials and other actors articulate the notion of the smart city this research will make use of two of the three dimensions of governmentality as identified by Miller and Rose (1990, 1992). The concept of governmentality, originally conceived by Michel Foucault, examines the manner (or mentality) in which entities, that being a single individual, a group of people or an entity such as a society or city, are governed in practice. Building further upon the concept of governmentality Peter Miller and Nikolas Rose seek to analyze the exertion of political power in (at the time) 'advanced liberal democratic societies', and the manner in which problems are conceptualized and addressed by authorities through the process of 'problematisation'. The concept of problematisation, in a relational sense, indicates that problems or issues (within an entity such as for instance a city) should not be considered a pre-given; problems and issues are not constituted in a natural manner, they do not simply 'come into being' awaiting to be coincidently uncovered as is assumed to be the case within the rational and critical perspectives. Rather, problems and issues have to be constructed, that is to say a particular phenomenon has to be identified as being harmful, undesirable or troubling. Subsequently, that phenomenon has to be depicted or characterized as being such in the conviction of the general public or target audience (Miller and Rose, 1990, 1992). Miller and Rose (1992, p. 181) consider the functioning of a government as being a process of problematisation in the sense that the tasks which are considered to be part of the governmental job responsibilities are generally termed in the problems, or discrepancies between reality and an ideal, and the discrepancy is what the governmental institutions seek to address.

In order to give body to the process of problematisation Miller and Rose identify three dimensions within the concept of governmentality, those being *rationalities, programs* and *technologies* of government.

- *Rationalities of government*, otherwise termed *political rationalities,* are considered to be the upheld ideals to which a particular governed entity, such as for instance a society or an economy, should be shaped by the hands of authoritative figures, for instance governmental institutions or rulers, or as Miller and Rose (1992, p. 175) articulate it alternatively "the moral justifications for particular ways of exercising power by diverse authorities". Common examples of such rationalities are freedom, justice and growth (Miller and Rose, 1992, p. 175). As can be derived from the examples of such rationalities it is possible for multiple rationalities to exist and co-exist within a governed entity, collaboratively shaping the ideals to which the entity is governed. In addition, rationalities often coincide with commonly upheld norms within a society, their functioning being based on acceptance and support originating from the governed entity (Radcliffe, 1998).
- *Programs of government* constitute the second dimension of governmentality as identified by Miller and Rose and essentially form the ground between the rationalities and technologies of government. Programs of government articulate the characteristics and (socio-economic) circumstances of both the governed entity (city, society), the entities within such an overarching entity (for instance the demographic characteristics of citizens within a city) and the identified issues which are prevalent amongst these entities in comprehensible written reports, graphs, statistics and drawings in proposals and white papers. The goal here is to offer an accurate representation of the situation and its characteristics so that the situation can be interpreted by anyone and an assessment or decision, which is generally not made on-site, can be made (Miller and Rose, 1990, p. 7). In addition, the programs of government cover and translate the ideals (rationalities) into (general) ambitions and goals which are formulated by decision makers with which governmental institutions seek to guide the behavior of individuals in order to realize the ideals as articulated in the rationalities (Miller and Rose, 1992). The programs will only be incorporated within this research in order to provide relevant background information.
- The final dimension of governmentality is articulated in the *technologies of government* (also referred to as techniques), these technologies represent the concretization of the ideals articulated within the rationalities of government; the strategies, techniques and procedures which operationalize the established programs and which are required in order to attain the established rationalities (Miller and Rose, 1990 p. 12, 1992 p. 183). Miller and Rose (1990, p. 8) define these technologies as 'the actual mechanisms through which authorities of various sorts have sought to shape, normalize and instrumentalize the conduct, thought, decisions and aspirations of others in order to achieve the objectives they consider desirable.' Common examples of such technologies are is the establishment of regulations, the provision of subsidies and the establishment of guidelines.

### 2.3.4 *Identifying the effects of the smart city*

As a final and conclusive step this research seeks to identify and describe some of the effects which the adoption of the notion of the smart city has brought about. Here a distinction will have to be made between the *effectiveness* and the *effects* of the adoption of the notion of the smart city, this research being concerned with the latter. Effectiveness refers to a performance assessment, examining the degree to which policies are able to achieve, or contribute to, often predetermined policy objectives. Effects, both intended as well as unintended, are generally linked to a process of causality in which case a particular action, such as the implementation of a policy, brings forth a cause and effect situation. Here the specific action can be directly related to a certain impact such as for instance a change occurring in the state of being of an entity (Pintér et al. 2007).

*Various perspectives towards effect assessment*

The rational, critical and relational perspectives, which have been addressed in section 2.2 of this research, have distinct interpretations regarding the process of effect assessment. In order to identify and examine the effects of the adoption of the notion of the smart city this research will make use of the process of effects assessment from a relational perspective. However, this section will shortly explain the interpretation of effects assessment for all three perspectives as to provide a better understanding of a relational perspective towards effect assessment by comparison.

A rational perspective towards effect assessment relies greatly on empirical enquiry, that is observing that which is available to and observable by the human senses, and deduction, by which conclusions are made based on logic and reason rather than relying on forms of speculation when determining effects (Schub and Barab, 2007). Moreover, the rational perspective argues that the (social) world, and its phenomena, exist 'out there'. This entails that a particular (social) phenomenon can exist even if there is no human knowledge regarding that particular phenomenon. Researchers are however capable of observing, measuring and testing aspects of these unknown phenomena and thus acquire knowledge and uncover previously unknown phenomena. This is possible due to the fact that this world is an objective being and is thus subject to general laws from which cause and effect can be derived (Schub and Barab, 2007). In simple terms this process of uncovering unknown phenomena within the rationalist perspective indicates that only phenomena or aspects of the world which are observable, measurable and testable by individuals can be considered valid or true, and thus be added to the pool of overall knowledge (Markie, 2015). In terms of effect assessment this then indicates that only effects which are observable and measurable and which can be directly related to particular causes (causal relation in which the implementation of a policy brings forth a particular effect) can be seen as valid, true or as being effective.

A critical perspective towards effect assessment distinguishes itself from the rational and relational perspectives by adding a critical social-ideological element to the process of effect assessment. A critical form of effect assessment does not only examine the effects which the adoption of a particular policy has brought about, but also the power struggles and power structures which are underlying such policies and which are at play in society's status quo. These power struggles and structures are often linked to forms of domination which are, according to the critical perspective, brought forth by the neoliberal economy of today (Potter, 2006). The attention paid towards power struggles and structures entails that political and participatory aspects of a policy or strategy are taken into account even if the implemented policy is not explicitly aimed at having effects on such elements (Potter, 2006; Bohman, 2005).

A relational perspective towards effect assessment is, unlike the positivist and critical perspectives, not so much interested in the exact effects which a particular policy brings forth in and of itself. The relational perspective does not seek to determine whether or not a phenomenon can be considered true or valid, neither does it seek to examine the degree to which a policy is working as intended nor does it seek to examine the social-ideological elements of a policy in terms of power struggles and structures. Rather, a relational form of effect assessment seeks to examine the interactions between various actors and the manner in which these actors shape the process of effect assessment, that is to say how do the various actors determine the effects of a policy, so how do shape the process of effect assessment, and what are the effects that these actors identify themselves (Pintér et al. 2007). A relational form of effect assessment thus adopts an emic approach, that is an approach in which it is not up to a researcher, an outsider, to utilize theories and concepts in order to determine effects, but rather the effects are determined by insiders, the actors involved within the process and their personal descriptions and accounts of the process (Lett, 1990).

# Chapter 3: Methodological Framework

Now that we have established the general and theoretical frameworks in the first two chapters of this research, this third chapter will provide for the methodological framework which will be utilized. Within this chapter we will discuss the research and data collection method and determine the unit of analyses.

### 3.1 Establishing a research method

In order to examine the manner in which the smart city is transferred to, articulated in and has an effect on cities this research will utilize the relational perspective as addressed in section 2.2 of this research and add to it a comparative element thus establishing a relational comparative approach advocated by researchers such as Nijman (2007) and Ward (2010).

Within the field of urban studies a comparative approach generally aspires to produce knowledge regarding the prevalence or singularity of particular phenomena or entities and compare individual entities or phenomena based on their characteristics (Nijman, 2007). An example of an application of such an approach is to examine whether a particular characteristic only applies to a single city located in a specific place at a specific time or whether this characteristic is prevalent within all (but a few) cities from a particular sample and the extent to which this characteristic is similar or dissimilar within these cities.

For some time during the 1970's and 80's it seemed that the comparative approach had dissipated from the field of geography, however with the recent debates concerning globalization there has been a resurgence in the use of the comparative approach (Nijman, 2007). Within the discourse of globalization the comparative approach is especially concerned with issues surrounding government and governance, and addressing the peculiarity in that globalization simultaneously acts as a process of homogenization of global cities in which cities are becoming increasingly similar regardless of their location, and a heterogeneous process in which globalization impacts cities in a particular way due to the specific geographical context of a city (Nijman, 2007).

The discourse surrounding the comparative approach within the field of geography is composed of various strains of thought, the two dominant strains being the Chicago school of thought and the Los Angeles school of thought. The Chicago school of thought adopts a modernist view in which the city is regarded as a single entity. Here the city plays a central role within a regional network and functions as a coordinator for its hinterlands. A linear evolutionary vision is applied in which the historical choices made by the city explain the contemporary urban conditions and spatial layout of the city. The Los Angeles school of thought presents a contradictory view from that of the Chicago school in which it is stated that the peripheries, or hinterlands, manage what remains of the city center. Individual decisions originating from an isolated city center are not at the base of the cities' evolutionary path, rather the city functions as an actor within a global network of connectivity which codetermines the urban conditions and spatial layout of the city (Dear, 2005).

Ward (2010) argues for a comparative approach that explicitly incorporates a relational element in that any city-related study should take into account the territorial as well as the relational history of a city, thus adhering to the principles of both the Chicago and the Los Angeles school of thought. This means examining the path-dependent trajectory as well as the specific spatiotemporal context of a city but also the relations that a city establishes with other cities and governmental institutions. Within this research the relational comparative approach as defined by Ward is adopted.

*3.1.1 Multiple case study method*

Due to the comparative element that is incorporated within this research in which the manner in which the notion of the smart city is transferred to and articulated in cities is examined and compared this research will make use of a multiple case study. Similar to a singular or instrumental case study a multiple case study approach selects and explores a single phenomenon. However, whereas a singular case study employs a single case in order to explore and illustrate a phenomenon, a multiple case study employs two or more cases in order to do so (Creswell, 2012). An added benefit of the multiple case study in comparison to a singular case study is that a multiple case study is able to showcase different perspectives of the same phenomenon if the various cases which are examined possess distinct characteristics. This entails that a multiple case study permits not only a comparative element to be added to a case study, but also what Santos and Eisenhardt (2013) term 'extension' to take place, in which the usage of multiple cases permits the uncovering of complementary aspects of the phenomenon which would not have been exposed within a single case study, providing more robust results. Baxter and Jack (2008) add to this that a multiple case study enables the researcher to examine and compare a particular phenomenon within different settings, and consequently, as is the case for a comparative approach, allows the researcher to indicate the similarities and dissimilarities of the phenomenon within these different settings, although it has to be noted that this does not imply that generalization is in place.

The utilization of a multiple case study design will provide us with an opportunity to establish a context in regards to the transferral, articulation and effects of the smart city and allow us to compare, and perhaps even indicate some of the similarities and dissimilarities in regards to these elements between the cases. It should be noted beforehand that, aligned with the principle of extension, this research does not seek to generalize or draw general conclusions based on the cases which are studied, rather this research seeks to set the cases as examples of how the notion of the smart city can be transferred to, articulated in and effect cities, highlighting some of the similarities and dissimilarities which are found along the way. The cases, and with them the results, which are presented do not form an absolute truth, they are mere examples of how the transferal and articulation of the smart city can be shaped and the effects which this might have.

*3.1.2 Case selection*

An important step to undertake when structuring any case study is to determine and define the unit of analyses (Baxter and Jack, 2008). The unit of analysis defines who or what will be examined within the context of a research, and should be defined as precisely as possible. As this research aspires to examine the (notion of the) smart city and its transferal, articulation and effects, it is key that these elements be present within the unit of analyses. The unit of analyses within this research will therefore be cities which have adopted and implemented or are currently active in the process of developing and implementing a smart city strategy. Defining the unit of analyses as such ensures that the elements of transferal, articulation and effects are present as cities are currently engaged with the concept of the smart city, transferal has therefore taken place and articulation has either taken place or is currently taking place, and (preliminary) effects can be deduced from the implementation of the strategy.

For this purpose two Dutch cities, those being the cities of Heerlen and Utrecht, have been selected to function as cases within the context of this study. Stake (2013) identifies three key

questions which should be utilized when identifying cases within a case study. One the basis of these key questions the cases of Heerlen and Utrecht will be elaborated upon in the section below.

*1. Are the cases relevant to the topic?*

As a first note in regards to the relevance of the selected cases it should be noted that the aim of this research is not to determine whether or not a certain city can be considered a smart city. The cities of Heerlen and Utrecht have therefore not been chosen based on an official smart city label granted by institutions such as the European Union nor have these cities been chosen on a predetermined set of characteristics which are present. Rather, these cities have been chosen based on the fact that they identify and position themselves as being a smart city and have developed or are currently actively developing and implementing a smart city strategy.

*The city of Heerlen*

An indication of the active engagement with the notion of the smart city in the case of the city of Heerlen can be given through the development of the Smart Services Hub within the city. A significant section of the aspirations and developments in regards to the smart city are articulated within the establishment of a Smart Services Hub and the development of smart services (these developments will be further discussed in chapter 4) (Huppertz, personal communication, 2015). The future aspirations and developments of the Smart Services Hub, which includes the development of the Hub, and the city, up until the year 2020 are articulated in the Masterplan Smart Services Hub, which functions as an official smart city development strategy (2014).

Another indication of the active engagement is the fact that the city of Heerlen has since 2013 been the host of an annual smart city event named 'De Drie Digitale Dagen', in 2015 the German city of Aachen and the Belgium city of Genk joining in on the Drie Digitale Dagen as co-hosts (http://www.heerlensmartcity.eu/).

*The city of Utrecht*

Currently no officially established document containing the smart city strategy is present within the city of Utrecht. This however does not mean that the city of Utrecht is not engaged with the notion of the smart city. Although not formally articulated within a document the municipality (city) of Utrecht aspires to develop itself as a smart city specifically in the domains green, focusing on the urban environment and sustainable forms of mobility and energy, healthy, aimed at improving the overall health of the citizens of Utrecht and smart, focused on the application of new technologies within the city. In addition, the city of Utrecht has been proclaimed the winner of the 'Slimste (Binnen)stad van Nederland Verkiezing', a competition amongst Dutch cities to identify best practices in the area of smart city projects and visions, in which case the city of Utrecht won the award for the city with the best vision (Domein Slim, personal communication, 2015).

*2. Do the cases provide diversity across contexts?*

In order to determine if the cities provide for diversity across contexts we can examine the demographic and characteristic features of the two cities.

*The city of Heerlen*

From a historic perspective the city of Heerlen can be considered a relatively young city; it was not until the 20th century that the title of city was officially bestowed upon Heerlen. This entitlement was mainly a result of the exponential population growth that occurred within the period of the year 1900 to 1965. Within this period the amount of residents within the city increased from a mere 7.000 up to 75.000 people. This growth was almost entirely due to the establishment and subsequent development of the mining sector within the now-city. During these growth-years the physical and social composition and development, as well as the economy of the city was almost entirely based upon the mining sector, and the city was thus also highly (economically) dependent on any changes occurring within this sector. Due to the high degree of dependency the closure of the mines in the late 60's had severe detrimental effects on the city, casting it into an economic as well as social crisis characterized by high degrees of unemployment (Gemeente Heerlen, 2008).

With the help of both the Dutch government and the European Union a solution to this crisis was devised. The economy of Heerlen shifted from a focus put solely on the mining sector towards an economy which was, and still is, much more multidimensional and balanced, attracting and transferring several large Dutch corporations towards the city such as the Central Bureau of Statistics, the Tax Authorities and pension fund APB (Algemeen Burgerlijk Pensioenfonds) as well as the Open University. This has led to an economic restructuring within the city in which a workforce which was almost entirely based on manual labor and services supporting the mining sector has shifted towards a workforce which is now, to a large extent, working office jobs.

The problems which the city of Heerlen faces have however not been completely abolished. The city, much like the majority of cities within the Netherlands, is characterized by an aging of the population. The case of Heerlen, and with it the other cities within the Parkstad-Limburg region, can be distinguished from other cities as these are the first cities within the Netherlands which are facing an aging of the population as well as a process of depopulation, which has characterized the region since 1997. In addition, Heerlen has a disadvantage in regards to entrepreneurship, level of education, safety-perception and income when compared to the national average (Gemeente Heerlen, 2008).

In recent years the city of Heerlen has indicated its ambition towards the establishment of a 'Smart Services Campus' (and with it the Smart Services Hub). This campus, which was completed in September 2012, is to be established alongside the two already established campuses within the Parkstad-Limburg region, those being the Chemelot Campus in the city of Geleen which focusses on the chemical industry and the Health Campus located in the city of Maastricht, which is aimed towards the biomedical industry, an provide 'smart services' based on technological innovations within the region and beyond (Smart Services Hub, 2014).

*The city of Utrecht*

The city of Utrecht is the fourth largest city in the Netherlands and is part of the Randstad region, a metropolitan region of great importance to the economic prosperity of the Netherlands. Utrecht takes on the function of an important nodal point within the Netherlands, both in terms of public and

private transport. The importance of this function will further increase in the future as it is expected that in 2020 an average of 370.000 people will be passing through Utrecht Central Station on a daily basis. In the year 2013 the region of Utrecht was named the 'Most Competitive Region of Europe' leaving behind it regions such as the London area (including Bedfordshire, Hertfordshire and Essex), the region of Paris, the region of Amsterdam (including Noord-Holland and Flevoland) and the region of Stockholm. The title was bestowed on Utrecht based on the Regional Competitiveness Index which has been developed by the European Commission. This index is designed to measure the regional competitiveness of a region, which is defined as 'the ability to offer an attractive and sustainable environment for firms and residents to live and work' (Annoni, 2013). The index is comprised of a set of 73 indicators covering topics such as innovation, education, infrastructure (both physical as well as digital) and human capital (Annoni, 2013).

The main challenge which will present itself to the city of Utrecht is a demographic one and differs greatly from that of many of the other cities within the Netherlands, including Heerlen. In the near future the city of Utrecht will be experiencing a (rapid) growth of its population. Prognoses show that Utrecht will be one of the, if not the fastest growing city within the Netherlands, and will, without a doubt, be the fastest growing of the four large cities within the Netherlands. Compared to the year 2013 the population of Utrecht will have grown by an estimated 18.3% in the year 2025 whereas the other large cities are expected to show growth indicators of 9.5 (Amsterdam), 5.4 (The Hague) and 4.9 (Rotterdam) respectively (CBS, 2013). This growth will put strains on the resources and capacities of the city.

*3. Do the cases provide good opportunities to learn about complexity and contexts?*
As discussed in the previous question the contexts between the cities of Heerlen and Utrecht (at least in a demographic and characteristic sense) vary greatly. However, the cities also share common influences in regards to the development of the smart city as national and international (European) laws and regulations will impact the development of the smart city equally, at least initially. As the elements which will be examined within the cities (the transferal, articulation and effects) are identical, it will allow us to both compare the cities and learn about the complexity of the smart city.

*3.1.3 Data collection methods*

A case study generally makes use of multiple qualitative data collection methods through a variety of sources in order to collect the necessary data. The various data sources ensure that the phenomenon or case which is examined within the research is not explored through one lens, but rather a variety of lenses which allows for multiple facets of the phenomenon or case to be revealed and understood (Creswell, 2012). To ensure that this will also be the case in this research multiple data collection methods will be utilized.

- The first data collection method is interviews with personnel who play, or have played an active role in the adoption, adaptation and development of the smart city strategy within one of the cities which will be incorporated as a case within this research. Within this context personnel refers to city officials such as policy makers, but may also include other actors who have played an active role. The conducted interviews will be composed of three sections, each section covering one of the three elements (transferal, articulation, effects) as identified within this research. Furthermore, the interviews will consist of semi-open questions. The choice has been made to incorporate semi-open questions rather than open- or closed questions for the reason that semi-open questions incorporate within them a degree of openness which allows the respondent to add context and additional (semi-) relevant information rather than strictly sticking to the question posed, while still also guiding the respondent towards a particular specific topic or a selection of answers which to choose from.
- Secondly, data will be collected through fieldwork in the form of observations and an internship with the municipality of Utrecht. This internship will focus on, and will be undertaken in the Department of Economic Affairs, in the section Smart City and Innovation. An important source of data and information during this internship will be the bi-weekly meetings termed 'Domein Slim', which will be referred to throughout the remainder of this research. These meetings are oriented around the notion of the smart city, the ambitions in regards to the smart city as articulated by the municipality of Utrecht and the articulation of the notion of the smart city into concrete initiatives. In addition, these meetings oftentimes include guests and experts on the topic of the smart city from outside the municipal organization of Utrecht.
- The third data collection method which will be utilized is the act of attending various conferences and exhibitions on the topic of the smart city. These will provide not only general information regarding the smart city, but also city-specific information on the adaptation and articulation of the smart city. In addition, these will provide opportunities to ask questions to and get in touch with smart city experts.
- Fourthly, policy documents and roadmaps regarding the adoption, adaptation and development of the smart city within a particular city will be employed as these will provide us with the necessary background information as well as the determined goals and ambitions which cities have in relation to the smart city. The examination of such types of documents will also provide us with background information during the interviews and allow us to be able to ask more specific questions during the interviews.
- Finally, although not incorporated as a primary source of data collection but rather as a last resort, this research will make use of questionnaires in case an individual is impeded by time, location or other factors that hinder them, and are thus not available for an interview.

*3.1.4 Data analysis method: Atlas.ti*

In order to analyse to collected (raw) data this research will make use of the software program Atlas.ti. Atlas.ti is a qualitative analysis tool with which data, in the form of text, images and audio, can be analysed. In order to analyse such data Atlas.ti provides the researcher with tools which can be utilized in order to code data. By coding data, in the case of this research that being primarily textual data, a data file can be divided into singular units of data. These units can subsequently be classified through the provided classification system and associated with other (singular) strains of data in order to forms specific (sub)categories of data (Smit, 2002). Within the context of this research individual strains of data (words, sentences) can for instance be classified as being part of the content which is transferred through the notion of the smart city. Subsequently overarching categories can be assigned, the content of transferal can act as a subcategory of the transferal of the notion of the smart city, which acts as the overarching category and which also covers the subcategories of motive and mediators of transferal. Through the use of coding and with the practical tools provided for by Atlas.ti a researcher can establish data categories, search for and establish relations between individual strains of code, visualize the relations between individual strains and evaluate the importance of individual strains of code. An added benefit of the use of Atlas.ti is that it provides the researcher with a database where all relevant data files (images, transcripts, audio files) can be stored and connected with each other, this database being referred to as the hermeneutic unit (Smit, 2002).

## Chapter 4: Findings

Now that the framework which will be utilized in order to determine the manner in which the notion of the smart city is being mobilized has been established, this fourth chapter will present the empirical findings of this research. The findings will be structured based on the three components as introduced in the earlier sections of this research, those components being the transferal of the notion of the smart city which will form the first chapter, the articulation of the notion of the smart city forming the second chapter and the third and final chapter covering the effects that the adoption of the notion of the smart city has brought about. It should be noted beforehand however that making a clear distinction between these components will sometimes proof difficult and therefore some overlap between the components will be unavoidable.

### *4.1 Transferring the smart city*

As an initial step this research set out to explore how a city, along with its corresponding officials, transfers the notion of the smart city and what characterizes this process of policy transfer. In order to provide an answer to this question, and as a means of introduction, this research will first elucidate the reasoning behind the transferal of the notion of the smart city towards the cities of Heerlen and Utrecht.

#### *4.1.1 The motives behind the smart city*

*The city of Heerlen*

In the case of Heerlen the transferal of the notion of the smart city is related to the development of so-termed smart services and the establishment of the Smart Services Hub within the city. In turn, these processes can be related to a threat that the city of Heerlen was, and still is, facing.

The key factor which lead to the development of smart services and the establishment of the Smart Services Hub within the city of Heerlen was the realization that occurred within the municipal organization that many of the businesses which were established within the city of Heerlen were becoming increasingly footloose. This term signifies the process in which businesses become decreasingly dependent upon or bound to the city due to a decreased dependence on factors such as natural resources or location which the city provides, this in turn means that business are able to relocate or move away from the city with greater ease. Not entirely coincidently this realization was made at the same time that the first businesses within the city started to indicate that they were unable to find suitable personnel in the area, which in term would leave them no choice but to leave the city “I think that for the development of the Smart Services Hub it was important that (…) a few years ago (…) it seemed that the CBS (Central Bureau of Statistics) would be leaving the city. (…) And then the realization came (…) that the large employers within this city are more or less footloose. If a CBS, an APG, if other institutions (…) were to say ‘we are going to close our office’ (…), then we would face an issue here. In addition, an organization such as APG was increasingly indicating (…) that they could not find suitable personnel within the region. So they would have no choice but to move away (…)” (Huppertz, personal communication, 2015).

The municipal organization realized that if this process were to continue, and the businesses would indeed leave the city, it would pose a serious (economic) threat to the city of Heerlen (Huppertz, personal communication, 2015). In response to this (possibly) imposing threat the municipality of Heerlen, with the support of the province of Limburg, initiated a collaboration

between various actors within the city in order to come up with a proposition to solve this issue and strengthen the economic position of the city in the process. As a result of the brainstorming that was done the realization was made that the businesses that were already established within Heerlen had a lot in common in terms of knowledge of service-provision and the collection and usage of sources of Big Data (large datasets containing a variety of information). Subsequently the decision was made to attempt to make use of the collective knowledge and share and utilize the available Big Data sets and cooperatively develop new services which would be termed 'smart services' "And then the municipality did initiate, we are going to pull together and we are going to think of a way to better give shape to the process and make sure that we can retain the already present personnel or are able to attract personnel from elsewhere. And then we found out that there are many similarities in regards to content between the companies and a significant amount of knowledge in the field of Big Data which they shared, but did not know that they were connected to such an extent. And that set the ball rolling and eventually was termed smart service." (Huppertz, personal communication, 2015).

The transferal and adoption of the notion of the smart city, as well as the development of the Smart Services Hub within the city of Heerlen took off after the potential of the development of smart services was acknowledged. In addition, the transferal and adoption of the notion of the smart city can also be attributed to the image that the city of Heerlen wanted to establish, that being a hotspot in regards to the provision of smart services. Smart services were identified as being part of the smart city, if the city of Heerlen wanted to establish an image of being a hotspot for the development of smart services it would also have to adopt the notion of the smart city "De Smart Services Hub originated here. We determined that we want to be that hotspot. And from that position I said 'well ok, but then you have to send out a message which matches that position. And from that point you return to the label of the smart city, then we also want to be a smart city". (Huppertz, personal communication, 2015).

*The city of Utrecht*

In the case of the city of Utrecht the reasoning behind the transferal of the notion of the smart city can be related to a demographic issue that the city expects to face in the (near) future, this issue being interlinked with an ambition which the city has in terms of its future development. Prognoses indicate that the city of Utrecht will become one of the fastest, if not the fastest growing city in terms of population within the Netherlands, the populace of the city increasing to an estimated 400.000 inhabitants by the year 2030, whereas the city currently only has an estimated 311.000 inhabitants. In addition, the city is expected to grow in terms of transportation both for commuting as well as a flow point in the national transportation network, the city already forming one of the most important and extensive, in terms of passengers, transportation nodes in regards to railway traffic (Agenda Stad, 2015; Smart City Utrecht, forthcoming). This relatively strong and short-termed growth is expected to put strains on both the available space as well as the available resources within the city. This is mainly due to the fact that the space and resources which are available within the city are not able to grow as fast as the inhabitants are expected to grow due to, amongst other factors, political constrains and lack of resources in terms of funds and manpower (Agenda Stad, 2015, Smart City Utrecht, forthcoming).

In order to properly accommodate the growth of the city, despite the lack of available space and resources, the city will have to grow in a 'smart' manner (G4 CIO congress, personal

communication, 2015). Within the city of Utrecht this type of growth is given shape in the notion of 'Healthy Urban Living'. The term Healthy Urban Living expresses the essential line of thought in which, together with the stakeholders of the city, those being the businesses, entrepreneurs, knowledge institutions and citizens, the municipality seeks to achieve a healthy, green and vigorous city with a booming economy in which the quality of life within the city is of the utmost importance (Hulscher, personal communication, 2015). The notion of the smart city has been adopted for its potential to contribute towards the notion of Healthy Urban Living in terms of digital and technological innovation which can help achieve the ideal and ambitions established in the notion of Healthy Urban Living (Hulscher, personal communication, 2015).

*4.1.2 Mediators of transferal*

The previous section provided an indication as to the reason why the notion of the smart city has been transferred to the cities of Heerlen and Utrecht. This following section will focus on the 'how', examining in what manner the notion of the smart city is being transferred. This section will illustrate, using the cases of Heerlen and Utrecht, the role which various actors play as mediators, enabling the transferal of the notion of the smart city to take place.

*Brokers*

Within the process of transferal of the notion of the smart city towards the cities of Heerlen and Utrecht certain individuals have taken on the role of broker. A broker is an individual who acts as a facilitator, establishing a connection between an entity (that is for instance a place or actor) where certain knowledge is present and an entity where certain knowledge is wanted or needed, in this case the latter being the cities of Heerlen and Utrecht, ultimately allowing the transferal of the notion of the smart city to take place (Meyer, 2010).

According to a policy officer currently employed with the municipality, in the case of the municipal organization of Heerlen the actual introduction of the notion of the smart city can largely be attributed to a single individual who was formerly employed with the municipality of Heerlen as a project manager of ICT-driven projects. This individual was ahead of the curve introducing, referring to and discussing smart city related concepts and services years before any other employee was engaged with or even aware of the notion of the smart city (Huppertz, personal communication, 2015). When questioned this former project manager, who now has his pursued his passion and started his own technology startup company as well as being the co-organizer of a European startup initiative, indicated that he first gained knowledge of the notion of the smart city circa ten to twelve years ago, before he was employed with the municipality. He was at that time conducting projects in relation to broadband, more specifically projects which were related to laying the foundation for and constructing IT-infrastructure such as glass fiber networks. While conducting these projects he came into contact with technologies and services which were at the time termed differently, but which have now become part of the notion of the smart city. Familiar to him are services within the healthcare sector, specifically services which improve self-reliance through the use of technology, and the relation between technology on the one hand and the economy on the other, in his opinion an element of the notion of the smart city, which were part of the broadband projects as well. During his years working with the municipality of Heerlen he incorporated the knowledge, concepts and services which he came into contact with during those earlier years (Aalders, personal communication, 2015).

The founder of a non-profit foundation oriented towards the development of the smart city within the city of Heerlen, which has close ties with the municipal government of Heerlen, providing advice to and carrying out projects in cooperation with the municipal government, indicates that he first gained knowledge of the smart city through visiting tech-conferences and reading literature on the topic of (technological) innovation. He was inspired by the concept, partly due to his fondness for technology which has earned him the name 'tech daddy', and wanted to investigate the potential of digital developments for society but also wanted to shine light on it from a critical perspective so that the potential threats of the smart city, especially in relation to citizens, would be taken into consideration as well as he felt that these aspects were often left out. With this in mind he founded the smart city foundation and was later on tasked by the municipality to draft a reconnaissance in relation to the implementation of the smart city and has been a steady advisor to the municipality of Heerlen (and other actors) since (van Houtum, personal communication, 2015).

One key figure who enabled the transferal of the notion of the smart city towards the city of Utrecht is the municipal government's Smart City program manager. The program manager first came into contact with the notion of the smart city during a visit to an innovation-exposition in the RAI exhibition-facility in Amsterdam. On display there was a scale model produced by TNO, a primarily Dutch innovation firm, which displayed the air pollution levels within the city of Utrecht in terms of the exertion of greenhouse gasses. The program manager saw the potential benefits that the model, and similar developments, could have for the city of Utrecht and decided to look further into these type of technologies, eventually coming across the notion of the smart city. The program manager subsequently decided to attempt to introduce and develop further the notion of the smart city within the municipality of Utrecht, eventually succeeding and enabling the incorporation of the smart city as an officially adopted topic within the municipal government of Utrecht (Domein Slim, personal communication, 30-6).

A respondent who is part of a smart city collaboration which actively develops and implements smart city initiatives within the city of Utrecht indicated that he first came into contact with the smart city through his personal and work-related interest regarding new trends and hypes that pop up in the areas of technology and media theory. While reading about these topics he simply stumbled upon the smart city, which struck his interest. Later on he hosted an open-invitation brainstorm session and assembled with individuals who were interested in the topic of the smart city as well and decided as a group that they wanted to give body to this subject, which eventually led to the establishment of an organization dedicated to the development of the smart city within Utrecht (van Lunteren, personal communication, 2015).

A respondent employed with the Economic Board of Utrecht, a provincial organization which assists in the development of villages and cities in the province of Utrecht, indicated that to a significant extent knowledge, innovations and new services in relation to the notion of the smart city are transferred to the city of Utrecht, and vice versa from the city of Utrecht to other cities, through collaborations with other Dutch cities such as Eindhoven, Nijmegen, Arnhem and Wageningen "The region of Eindhoven is an important technological region with a plethora of activity in the field of Big Data, Open Data, trying to figure out how technology can be incorporated into this discussion. (…) they established a knowledge centrum Healthy Urban Living, we attempt to let them participate so that the ideas which they came up with can be implemented in the smart city concepts. And of course there is the Wageningense-Arnhem-Nijmegen consideration on food and health, that is an

interesting topic as well, to see in what manner you can combine food and smart city. Well, other regions have got ideas on the smart city in regards to energy reduction, thinking of ways in which to illuminate outer areas for instance. So we try and collaborate everywhere." (van der Weijde, personal communication, 2015).

*Businesses and knowledge institutions*

In general businesses and knowledge institutions contribute to the transferal of the notion of the smart city as well, though generally businesses, and to a lesser extent knowledge institutions, often act in a supply oriented manner, seeking to offer their services. In this context businesses seek to get into contact with a municipal government, oftentimes through simple means such as an e-mail or phone call, indicating they have developed a smart city-oriented service which could be beneficial towards the city. As the municipal government plays an important and overarching role within a city it is regarded as an important potential client. It is also possible that the municipal government acts in a demand oriented manner, requesting actors to develop a new service or solution towards a certain issue or ambitions which the municipality has. Even if the service provided for by the business or knowledge institution is not acquired by the municipal government, interaction with these actors can still lead to new insights as the business or knowledge institution might approach an issue or ambition in a different manner than the municipal government does, therefore orientation-aimed meetings with such actors are alluring to the municipal government. In addition, events such as for instance the yearly reoccurring smart city event 'De Drie Digitale Dagen' which is hosted by the city of Heerlen function as an important mediator of transferal for the notion of the smart city as such events attract and bring together many individuals from governmental institutions, businesses and knowledge institutions alike which are engaged with the topic of the smart city and allow these individuals to engage with one another on this topic and share their visions (van Houtum, personal communication, 2015).

*National collaborations*

On the national scale there are several organizations which aim to enable collaboration and transferal of the notion of the smart city to take place. For the city of Utrecht an important mediator for the transferal of the notion of the smart city is the G4. G4 is the name of the between the four largest cities in the Netherlands, those cities being Amsterdam, Rotterdam, the Hague and Utrecht, in addition to the national government. Several times per year these actors get together in order to discuss the most pressing issues which the cities of the G4 are confronted with. The G4 only includes these four cities due to the fact that their size and population makes them important hubs within the Netherlands where issues affect a large section of the population. In addition these cities face issues which no other city in the Netherlands faces, both in terms of unique issues as well as intensification of common issues. The G4 is aimed towards designing solutions, which in turn prevent issues from occurring in other cities, by initiating collaborative initiatives between the participating cities, knowledge exchange regarding possible solutions and the underlying source of the issues as well as discussing to what extent the national government can play a role in solving the issues by devising legislation. Even though the smart city is not a definite topic within the G4 meetings, it is a topic which is frequently addressed throughout recent years (G4 CIO congress, personal communication, 2015) .

Perhaps the most significant example of an organization which enables transferal for quite a few cities in the Netherlands is the Digitale Steden Agenda, otherwise termed the DSA. The DSA represents a national learning network with 45 partners including municipalities, provinces and knowledge institutions, its aim being to advance the so-termed digital transition, referring to the usage of digital technologies within cities. The DSA aspires to do so by optimizing the opportunities that are provided for by the use and implementation of ICT through the establishment of a network-relation, including an online platform as well as hosted face-to-face meetings, in which cities and organizations can share their knowledge, data and experiences with each other, supplemented by governmental data, in order to stimulate and help cities to take full advantage of innovations provided for by developments in ICT. In addition, the organization of the DSA hosts quite a few nation-wide face-to-face meetups throughout the year, often adopting a specific theme or subject for a meetup and attracting representatives of many Dutch cities. These meetups often take the shape of a lecture where an expert gives an introduction on, discusses and answers questions regarding the specific topic of the meetup followed by a workshop section where the representatives discuss and share their ideas with other representatives in smaller work groups and concluding the meetup with a joint wrap-up section (Bigliana, 2009; ASC, 2014). The goal of such meetups is usually to establish the topics which should be addressed during future meetups, determine follow up actions for the specific meetup and to initiate new initiatives in the form of collaboration between the partners (DSA, personal communication, 2015)

Within the context of the DSA Utrecht takes the role of 'Trekkende Stad'. These are cities which take on the responsibility to act as a foreman in assigning and carrying out (individual) projects which fall into the particular theme they are involved in. It is also the task of the Trekkende Stad to ensure that projects which are carried out within the context of the DSA are standardized, easily up scalable, interchangeable, align with already existing projects and are integrated within the established networks so that other cities within the DSA can duplicate and integrate similar projects in a quick and easy manner if they so desire thus adding to the transferability of such projects. Together with the city of Amersfoort Utrecht takes on the role of Trekkende Stad for the theme Groene Stad (Green City). The theme Groene Stad focusses primarily on three principles, namely the development of smart forms of energy production, the development of sustainable forms of mobility and the establishment of a circular economy (Domein Slim, personal communication, 2015).

Although the municipality of Heerlen is officially part of the Digitale Steden Agenda it does not take upon itself the role of Trekkende Stad for any of the themes within the DSA. In fact, as a project manager employed with the municipality indicates, currently not much use is made of the connections for through the DSA network. This is not due to a lack of interest in the network, on the contrary the network is deemed as interesting and important at least in the future, but rather a lack of time and manpower to properly make use of the network. This is due to a very practical issue, as the employees which work on the development of the smart city within Heerlen are few and the meetings of the DSA are not often held nearby in geographical terms, thus amounting to long traveling times. The ambition for the future is to make available to necessary resources in terms of time and manpower and make more use of the network of the DSA (Huppertz, personal communication, 2015).

Rather than making use of the DSA network, in the case of Heerlen an extensive degree of collaboration takes place with a collaboration termed 'Parkstad Limburg', which is a collaboration between 8 municipalities in the province of Limburg, and other cities located in the province of

Limburg such as the city of Maastricht and Sittard. One respondent regards collaboration as being a necessity for the smart city development of the city of Heerlen, as the city would otherwise be too small to 'compete', or be regarded as relevant on the world stage "Well, see I've personally always been a great supporter of doing things in collaboration. In my opinion Zuid-Limburg is a sort of natural entity, Maastricht, Sittard, Geleen, Heerlen and the overarching entity of Parkstad. That is kind of like a measurement which can be utilized as smart city measurement in the world, anything below that measurement is really to small" (van Houtum, personal communication, 2015).

*International collaborations*

On the international scale a noteworthy collaboration which the city of Utrecht partakes in is the EuroCities collaboration. This collaboration is similar to that of the Digitale Steden Agenda in that it seeks to establish an overarching learning network offering a knowledge sharing platform and stimulating joined activities and projects between 170 European cities. Lot van Hooijdonk, who is the alderman of Sustainability and the Environment within the city of Utrecht is the chairman of the Environmental section within this collaboration (EuroCities, 2015).

The city of Utrecht also partakes in the Open and Agile Smart Cities (OASC) initiative. Within this collaboration the Dutch cities of Amersfoort, Amsterdam, Eindhoven, Enschede, Rotterdam and Utrecht work together with cities from a variety of European, Asian Pasific and Latin-American countries in order to set up concrete collaborative projects. In addition, the OASC assists and ensures that the projects are adjusted or tuned in such a way that it enables the participating cities to apply for EU-funding (OASCities, 2015).

A third initiative in which the city of Utrecht partakes is the CityKeys initiative, an initiative which is part of and subsidized by the European Union led Horizon 2020 program. The goal of this initiative is to, in cooperation with the participating cities, develop and establish a set of performance indicators and data collection procedures. With the use of these indicators and procedures the CityKeys initiative seeks to establish a manner in which to both monitor and compare smart city initiatives which have been established in its member cities. Within the CityKeys initiative there are two established prerequisites which are posed in regards to smart city initiatives initiated by member cities which are of importance to the transferability of the notion of the smart city, those prerequisites being scalability and replicability. Scalability refers to the degree to which an initiative or project devised by a member city can be scaled up, that includes both the act of scaling up in a geographical sense, that is transferring an initiative or project to a different city or other geographical entity, and scaling up in a integrative sense, including a project or initiative in a particular theme or program. The prerequisite of replicability refers to the situation in which scaling in a geographical or integrative sense has taken place, and the chances that the project or initiative can be replicated successfully (Citykeys, 2015).

In the case of the municipality of Heerlen not a large degree of international collaboration takes place with other cities, when it does take place this is usually undertaken with Dutch branches of international businesses or foreign research institutes (for instance the collaboration with the English institute BRE and the French institute BRGM in the spirit of the Mijnwater 2.0 project) rather than foreign cities or municipalities. The exception to this is the economic cooperation that is sought after with the German city of Aachen, which is located just across the border (Huppertz, personal communication, 2015). This collaboration takes place between the city-region of Aachen and the

before mentioned Parkstad Limburg collaboration “So just based on measurement there should be a greater extent of collaboration. Yes, the collaboration across the border for Parkstad is Aachen, the city-region of Aachen is simply very important” (van Houtum, personal communication, 2015). As an example of this collaboration, in 2015 together with the city of Aachen (and the Belgium city of Genk) Heerlen co-hosted its annual smart city event 'De Drie Digitale Dagen'.

An interesting and critical remark can be placed in regards to influences which originate from the national and international scale. Due to the fact that cities are subjected to policies designed and imposed by governmental institutions operating on a national or international level the transferal of the notion of the smart city and transformation from an ‘ordinary’ city towards a smart one can sometimes be an involuntary process. An example of such an involuntary transformation in relation to the smart city is the ‘Directive on the re-use of public sector information’. This piece of legislation, which has been incorporated within European policy since 2003 (but has been revised and more strictly enforced since the 18th of July 2015), seeks to make available to both actors within the public and private sector, on request, data generated within the public sector (for more info see http://open-overheid.nl/eu-richtlijn-hergebruik-van-overheidsinformatie/). This does not only include data generated by governmental institutions operating at various scales, such as the national government or municipalities, but also other public sector institutions such as musea, libraries and archives (although these institutions can refuse to make available certain data, whereas governmental institutions no longer have this choice due to the revision implemented on the 18th of July 2015). In addition, public actors are not allowed to restrict the access to data through unnecessary measures such as for instance a specific time-limit in which the data can be accessed, limiting the amount of data which can be accessed by an individual (organization) or requiring a process of registration prior to allowing access to the data. Although this Directive is not explicitly linked to the notion of the smart city, rather being linked to (economic) transparency and fair competition, the data which is made available is often the basis for smart city applications such as for instance an app displaying the availability of bike parking spots using governmental data regarding public bicycle storage spaces. As can be deduced from this example becoming smarter is sometimes an obligation rather than a choice. “(…) so that is something which you cannot choose, that is something which you have to do. In other words, in many cases smart city is not a choice, it is not a choice due to political administrative decision making” (Aalders, personal communication, 2015).

### *4.1.3 The content of transferal*

The previous sections of this chapter have examined the motivation behind the transferal and through which mediators the notion of the smart city is being transferred. The following section will examine the content of transferal, or the aspects of the notion of the smart city which are being transferred.

The manner in which particular initiatives are designed and the knowledge acquired through the execution of an initiative is part of the transferal of the notion of the smart city. Through the use of modern technology initiatives are devised and documented in such a way that they can be transferred and replicated and the knowledge acquired through these initiatives can be utilized for additional initiatives. An example is the Mijnwater 2.0 initiative of the city of Heerlen which has been incorporated in the European Interreg IIIB program. The techniques and processes utilized in order to

make use of the geothermal energy of the mineshaft and the knowledge regarding usage of geothermal energy which is acquired within this initiative is shared through the Interreg program so that other cities can make use of this information, this being done through the recording and distribution of acquired knowledge, data and schematics through an online platform (ParkStadLimburg, 2014). Through the process of standardization organizations such as the DSA also provide an online platform containing ready-to-use initiatives accompanied by data and schematics which can be applied within cities “Because that Digitale Steden Agenda, you do not have to reinvent the wheel, it contains all kinds of things which you can do.” (van Houtum, personal communication, 2015).

Technology, in the sense of technological equipment, is a topic which is oftentimes addressed when discussing the notion of the smart city, but what role does it play within the transferal of the notion? Although it is undoubtedly the case that certain technologies are transferred, technology is not at the core of the transferal of the notion of the smart city (G4 CIO Congress, personal communication, 2015). This statement can be clarified by the fact that the smart city literally means thinking of ways to make the daily lives of people ‘smarter’, or in other words making the lives of citizens better by improving the livability of the city whether that be through the use of certain technologies or by other means “So image that in some way a certain need is inventoried within the city, and it turns out there is an important bottleneck somewhere, that you don’t immediately say ‘let’s use that that technology, we’ll make use of it and then we’re done’, but rather that you research in a smart manner which parties are involved, which are currently engaged with the subject, what the question really is, and then you make a decision, ok, we can solve this with the use of technology, that’s possible, but it does not have to be the solution. So you utilize technology as a vantage point, but you examine what the real underlying question is” (van Lunteren, personal communication, 2015). Technologies are thus transferred through the notion of the smart city, however these technologies are simply a means to an end in order to fulfill ambitions, solve issues and generally improve the daily lives of individuals (G4 CIO Congress, personal communication, 2015). "Because content-wise the smart city is nothing, it is a very confusing term for many people, it only indicates something about an image of the future. To proceed in a smart manner.” (Aalders, personal communication, 2015).

“One of the biggest challenges regarding smart cities is getting all the right people on board and doing a better job of sharing resources and information. Traditionally, cities operate in separate silos with scarce communication among them. Even silos contain silos. (…) A necessary ingredient for a smart city is agency-wide cooperation and, hopefully, collaboration. (…) Smart cities need bold and overreaching leadership to help bust-up the culture of silo-centric management.” (Shark, 2015).
The notion of the smart city brings with it also a change in the manner in which governmental institutions operate. Traditionally governmental institutions operate in so termed silo’s, which more or less can be defined as departments each of which tasked with their own objective. Communication and collaboration between these various silo’s generally takes place in dribs and drabs or in some cases not at all. The smart city brings with it both a mindset which endorses as well as technologies which facilitate collaboration to take place amongst various silo’s. The variance within the adopted mindsets can be explained through the use of the Marshall Model of Organizational Revolution. Traditionally municipal organizations adopted an analytic mindset. Organizations with an analytic mindset are characterized by their adherence to the notion of Taylorism. The workforce in such an organization is highly specialized in the sense that a particular

individual knows the ins and outs of the tasks that he or she performs but has little knowledge of or involvement with other tasks, the organization is divided in (functional) silos. However, with the introduction of the notion of the smart city organizations shifted to a synergistic mindset. A synergistic mindset characterizes an organization with a flat, rather than a hierarchic, view. Within this mindset the silo's, which are prevalent within the analytic mindset, are (almost) non-existent, indicating that although particular individuals have specific tasks, they are nevertheless involved with other individuals as the synergistic mindset indicates that actors within the organization are interlinked and their tasks co-dependent, all serving a common goal in which effectiveness rather than efficiency is key (G4 CIO Congress, personal communication, 10-11-2015; Marshall, 2010). "Now, with the use of new technologies, we are capable of traversing the silo's and by doing so discover and establish new connections, relations which can be of use to people and improve the quality of life. The end goal of the smart city is of course to improve the quality of life, which of course has many dimensions." (Aalders, personal communication, 2015).

A remark which should be placed in regards to the transferal of the notion of the smart city and which the respondents of this research have expressed repeatedly is that the notion is, in essence, not entirely new. To a certain degree the notion is simply the continuation of existing processes. The argument which accompanies this statement is that the implementation of new technology within the urban-, and more recently, digital realm of the city is an integral part of the notion of the smart city. Cities have however been implementing new technology for decades, if not centuries, think for instance of streetlights or tramways and the operating systems that control them (Aalders, personal communication, 2015). It could also be argued that the roots of the smart city lie in smart (digital) technologies, in which the smart city can be regarded as the application of smart technology to the entity of the city (van Lunteren, personal communication, 2015). In addition, many of the smart city initiatives which cities are currently implementing are remnants of an era before the smart city became a topic on the city's agenda, these initiatives have simply been renamed or rebranded as being a smart city initiative, therefore no actual process of transferal is taking place (Aalders, personal communication, 2015). An example of such renaming or rebranding is the digital map presented by the city of Heerlen which indicates the vacancy within the city. Currently this map is not considered to be a smart city implementation by the municipality, but when this map is of sufficient quality it will be given the label of smart city development (Huppertz, personal communication, 2015). This process of renaming and rebranding is however not entirely unjustified as certain initiatives which were continued from the pre-smart city era contain many, if not all, elements that define a smart city initiative, they simply weren't named as being such (Huppertz, personal communication, 2015).

**Sub-conclusion**

In the section above the manner, that being the motives, mediators and content, in which the notion of the smart city is being transferred has been examined. The cases utilized within this research, those being the cities of Heerlen and Utrecht, had diverse motives as to why they transferred the notion of the smart city. For the city of Heerlen the notion of the smart city has been transferred to act as a solution towards certain issues that the city is facing, namely a process of brain drain in which young, adequately educated workers can no longer be found within the city and a process in which businesses are becoming increasingly footloose and thus less dependent on the city, these

processes leading to a situation in which businesses are threatening to relocate as a result. The city of Utrecht seeks to transfer the notion of the smart city in order to assist in managing the demographic growth that the city is facing in the near future in which the notion of the smart city supports the ambition of Healthy Urban Living, establishing a healthy, green and vigorous city.

Various mediators enable the process of transferal of the notion of the smart city to take place. The first of these mediators are brokers, those being individuals who have acted as facilitators and have established a connection between places and actors where knowledge regarding the smart city is present and their own city (where the knowledge is needed). These brokers have generally come across the topic of the smart city simply by chance, in which case the topic sparked their interest as it could be of use for the city in which the broker resided or worked, which subsequently led to the transferal of the notion taking place. Organizations operating on a national as well as international scale act as mediators through the network which they provide in which various individuals, organizations, cities and other institutions share their knowledge with each other. As a result of the role which organizations fulfill, that is amassing knowledge regarding the notion of the smart city and subsequently standardizing and making available this knowledge, particular organizations could develop into central passage points. This development could potentially be beneficial for the transferal of the notion of the smart city as these organizations can provide quick and easy access to knowledge, but also harmful as the organizations could become an obligatory passage point with a position of power in which transferal of the notion of the smart city is influenced heavily by the organization.

The content which is being transferred through the notion of the smart city by the various mediators varies from knowledge, that being for instance data and schematics regarding the manner in which a particular initiative is designed and implemented so that this initiative may be undertaken elsewhere, to a revision of the mindset with which municipal governments are operated. Although technology, in the sense of technological equipment, does play a part in the transferal of the notion of the smart city and is without a doubt one of the contents which is being transferred, it is not at the core of the transferal. When reflecting on the content of transferal the conclusion can be drawn that that which is transferred in the context of the notion of the smart city is not a grand theory nor an encompassing concept with fixed associations. Rather, that which is transferred are, close to what Bal (2002) describes, individual concepts, initiatives or technologies which comprise (a small) part of the overarching notion of the smart city. Here the notion of the smart city can itself be considered a channel, a path along which certain knowledge is passed from one entity to another, in the sense that through the rationalities which are established in a city and the initiatives which are undertaken in light of the rationalities certain knowledge, the knowledge needed in order to establish rationalities and design and carry out initiatives, is transferred from one entity to another (the city).

## *4.2 Articulating the smart city*

*Introduction*

Within this second section of the chapter the manner in which cities articulate the notion of the smart city will be examined. In order to examine this process two of the three notions of government, as addressed in section 2.3.3 of this research, will be utilized, those notions being *rationalities,* which are the upheld ideals to which a particular governed entity should be shaped, and *technologies,* the concretization of the ideals articulated within the rationalities of government. Note that, unlike the rationalities and technologies, the programs of government, the characteristics of the entities involved in the articulation, will not be covered in a separate subsection, rather the programs of government will be addressed as to provide background information within the sections regarding the rationalities and technologies when relevant.

### *4.2.1 The first step to a smart city*

In order to articulate the notion of the smart city the first step which cities should undertake is the establishment of a vision regarding the goals and ambitions which the smart city should serve. This is not a task of the municipal government alone, rather this vision should be based on an interaction between the municipal government and representatives of the various actors which the city houses, those actors being citizens, knowledge institutions and businesses. Together these actors should discuss their ideal image of a smart city, asking themselves what the future city which they want to work towards is while taking into consideration how each of the actors present within the city, and even the city itself, fits into this ideal "First you have to have an image of what the city of the future is, how do people live within that city and how can you support that image with all kinds of plans and policies." (van der Weijde, personal communication, 2015).

The establishment of such a vision is however an ideal; it is what the first step in regards to the articulation of the smart city should be, not necessarily what it is in practice. In reality it seems to be the case that most cities, at least within the Netherlands, are lacking a clearly defined and fully developed smart city vision. Cities are still in the process of determining what exactly the notion of the smart city entails and the manner in which this notion can be included in the currently established city vision- and plans (Aalders, personal communication, 2015). This seems to be the case not just for the smaller cities within the Netherlands but even so for cities such as Eindhoven and Amsterdam, which many consider to be the frontrunners in regards to the development of the smart city within the Netherlands (van Lunteren, personal communication, 2015). The lack of a clearly defined vision has however not prevented cities from developing and implementing individual smart city initiatives "(…) no context at all for many cities, because there is no context, there is no vision, there is no strategy. So yea, what is it then? That is a process which many cities are still working on, sometimes part of the implementation has been completed, sometimes not all, sometimes implementations have taken place but a strong vision or strategy has not been established yet, it's mixed in all over the place in many areas." (Aalders, personal communication, 2015).

### *4.2.2 Reality and rationality*

Is it true that cities do not yet have a clearly defined vision in regards to the smart city or does it simply look to be so at first sight? And, if it is indeed true that cities do not yet have such a vision then what is it that they do have? The following section will utilize the cases of Heerlen and Utrecht

and examine the manner in which the notion of the smart city has been articulated within a vision whilst identifying the rationalities which have been adopted within the vision.

*The city of Heerlen*

As touched upon in the first section of this chapter, in the city of Heerlen the efforts that are made in relation to the smart city are primarily focused on the provision of so-termed smart services and the development of the Smart Services Hub (Huppertz, 2015, personal communication). Within the context of the Smart Services Hub smart services are defined as 'smart product and service innovations which through the efficient and innovative use of information and data are a source of economic benefit for organizations and their clients' (Smart Services Hub, 2014 p.12). Within this context the term 'smart' not only refers to the use of (information and communication) technology, but also to increased rates of customer satisfaction, a greater degree of efficiency in the provision of products and services and an increase of value within these products and services (Smart Services Hub, 2014, p.12).

In the long run the city of Heerlen has the ambition to establish itself as the national and Euregional hotspot in regards to the provision of smart services, adopting the identity of a smart services campus alongside the already established Health Campus in the city of Maastricht and Chemical Campus in the city of Geleen. The development in regards to smart services does not limit itself to the Smart Services Hub, but rather is a development that will take place within the city as a whole. "(…) that in a couple of years people will say: Heerlen is the hotspot for the development of smart services, and that goes beyond that which happens within the campus, happens within that Hub. In any case our goal is that in a couple of years we can say with legitimacy and pride that we are a smart city, and that that fact is expressed in various fields, for instance outside of the campus." (Huppertz, personal communication, 2015).

As mentioned, an important additional goal with the development of the smart services and the establishment of the Smart Services Hub is retaining the workforce and graduates which are already present within the city , and if possible attract additional workers from elsewhere (Huppertz, personal communication, 2015).The Smart Services Hub is established through a triple-helix network-collaboration between a total of 18 partners. It encompasses knowledge institutions such as the Open University and Zuyd Hogeschool, businesses such as APG and Rabobank and (semi-) governmental institutions such as Provincie Limburg and the Central Bureau of Statistics. As can be deducted from figure X below, the network-collaboration does not only encompass actors situated within the city of Heerlen, but actors operating within the region of Parkstad Limburg and various national actors as well. Together, using the knowledge and expertise of each actor, these actors aim to develop and make available new smart services. Most of the businesses involved within this network are employed within the financial-administrative and data-processing fields, and some such as APG and CBS can even be considered as leading businesses within these fields in the Netherlands. Nevertheless, smart services are also applicable to and will be developed for professional fields such as health-care, retail and energy (Huppertz, personal communication, 2015).

**Kennisinstellingen**
Arcus College
Maastricht University
Open Universiteit
SVOPL
Zuyd Hogeschool

**Ondernemingen**
APG
Betawerk
Obvion
PNA Group
Rabobank

**Overheid**
CBS
Belastingdienst
Gemeente Heerlen
Kamer van Koophandel
Parkstad Limburg
Provincie Limburg

(Figure 3, Partners Smart Services Hub. Source: Smart Services Hub, 2014, p. 17).

Apart from the developments made in regards to development of smart services and the Smart Services Hub, to which the vision is clearly articulated in the Smart Services Hub Master Plan, it seems however that the city of Heerlen does not have a clearly defined vision in regards to the smart city. In the case of Heerlen it is not so much the lack of a vision all together, but rather that the vision which is present amongst policy makers is incoherent and is not publicized leaving the general public in the dark "perhaps it (the vision) is present here and there amongst particular civil servants or political directors, but it is not coherent and it is, in that sense, not expressed in a clear manner. I think that if you were to search smart city on the municipal website, maybe you will find a project here and there, but that is really it (…) Sustainability could be one, energy, mobility. (…) and that you establish policy within these fields, but that is not the case right now. (…) at least not in a structured manner." (personal communication, 2015).

*The city of Utrecht*

In the case of the city of Utrecht there is a central theme on which the overall development of the city is based, that theme being 'Healthy Urban Living'. The term Healthy Urban Living expresses the essential line of thought in which, together with the stakeholders of the city, that being the businesses, entrepreneurs, knowledge institutions and citizens, the municipality seeks to achieve a healthy, green and vigorous city with a booming economy in which the quality of life within the city is regarded of the utmost importance. "The theme Healthy Urban Living embodies the integral belief to, in collaboration with the stakeholders of the city, those being businesses, entrepreneurs, knowledge institutions and citizens, enable the realization of a healthy, green and vital city with a booming economy in which the quality of life is highly valued." (Utrecht Smart City Strategie, t.b.r.).

Although not yet officially established in any document the smart city vision which is adopted by the municipality seeks to support and further enable the notion of Healthy Urban Living. Within this context the smart city is thus defined as a city which enables the growth of the city in a healthy, green and innovative manner, and whenever possible making use of new technologies in order to simplify, accelerate, improve or renew the management of the city, whereby manage does not refer to having direct control, but rather directing or guiding the evolution of the city (Utrecht Smart City Strategie, t.b.r.).

"To us Utrecht is a Smart City if we can enable the growth of the city in a smart, healthy, green and innovative way and where possible make use of new technology to simplify, accelerate, improve or renew the management."(Kreijkamp, 2015). The main characteristic that defines the vision is the adoption of a form of participatory leadership, that being the involvement of stakeholders that reside not only within, but also outside of the city in the process of managing and developing both the city and the articulation of the notion of the smart city (Domein Slim, personal communication, 21-9). Rather than designing and implementing a smart city strategy on its own, the

municipality seeks to do so 'bottom up and in dialogue with the stakeholders of the city', so in collaboration with citizens, knowledge institutions, businesses and entrepreneurs. As the alderman for the economy Jeroen Kreijkamp articulates it "That which characterizes our vision is that we think of plans not from a municipal standpoint, but rather forms coalitions with citizens, knowledge institutions and entrepreneurs." (Kreijkamp, 2015). Within this process the municipality does not seek to collaborate with just one stakeholder, but rather incorporate a variety of stakeholders which all hold an interest and can add new insights or elements to the overall strategy.

Unlike the municipality of Heerlen, which has determined and marked down the developments of the Smart Services Hub in the Smart Services Hub Masterplan, the city of Utrecht does not make use of a pre-established program or agenda. Rather, the municipality makes use of a so-termed rolling agenda. This term signifies an agenda in which long terms goals and ambitions are established, however in their completion these goals are characterized by short term flexibility. This indicates that flexible short-term goals and ambitions can be integrated into and removed from the agenda freely in pursue of the long term goals (Domein Slim, personal communication, 2015).

Utrecht's smart city vision is further articulated into a set of three domains which have been established by the Board of the Mayor and Aldermen. These are the domains green, focusing on the urban environment and sustainable forms of mobility and energy, healthy, aimed at improving the overall health of the citizens of Utrecht and the domain smart, focused on the application of new technologies within the city. Each of the three domains is further articulated into modalities or focus points which provide the domains with more depth and body. A significant distinction between the three domains is that the domain Smart does not only function as its own domain with its own modalities but also functions as a support towards the domains Green and Healthy in the sense that there is a constant search for innovations that can be applied to further stimulate the domains Green and Healthy, as well as providing the necessary prerequisites in terms of skills and knowledge for these domains. In addition, the modalities and ambitions of the domain Smart are entirely based upon the development of the smart city. This is not the case for the domains Green and Healthy, for which the modalities and ambitions are based upon separate programs, which are not all directly linked to the development of the smart city, such as 'Utrecht Energie', 'Utrecht Aantrekkelijk en Bereikbaar' and 'Utrecht Centrum: a Healthy Urban Boost' to name but a few. The modalities, which are drawn from these programs, for the domains Green and Healthy are respectively Energy, Mobility and Sustainability for the domain Green and Care, Cure and Living Environment being the modalities incorporated in the domain Healthy (Utrecht Smart City Strategie, t.b.r.).

In the case of the domain Smart the modalities are the following:

- The first modality indicated in the domain Smart is the provision of i*nfrastructure* within the city. This does not concern standard forms of infrastructure such as roads or bridges but rather forms of digital infrastructure which the various actors need to make use of existing (digital) services provided for in the city, and as a necessity to develop new services on. This includes both forms of infrastructure which are located aboveground such as for instance the routers needed for the Wi-Fi network, but also forms of infrastructure below the ground such as the cables needed for a glass-fiber network.
- Data, in which case there are two sets of datatypes. The first set concerns *big data*, a term used for a very diverse set of data which is acquired in large numbers to the extent that it exceeds the collection capacity of normal means to gather data, and *open data,* referring to

data which is made freely available to all. The second set of datatypes contains both *hard data*, data which is quantifiable, and *soft data,* that being data which is based on feelings and emotions.

- The third modality is that of *E-inclusion,* this modality is based partly on the 'Deltaplan ICT' which contains three pillars, those pillars being the adjustment of the curriculum of MBO- and HBO levels of educations, re-education of unemployed individuals and the introduction of programming as a fixed part of education amongst young people. In addition this modality includes the development of 'digiskills' (digital skills), to ensure that all individuals are able to make use of the digital services provided within the city and are able to digitally participate in society.
- The final modality of the domain Smart is that of *connectivity.* The modality of connectivity is concerned with establishing a connection through the use of modern (communication) technology between both systems, for instance establishing a machine-to-machine communication networks between devices in an Internet of Things network, as well as establishing a connection amongst individuals, for instance allowing individuals to communicate and interact on a certain topic through a digital platform or app.

*4.2.2 Establishing rationalities*

The segment above identified some of the rationalities which have been adopted by the cities of Heerlen and Utrecht, but where do these rationalities stem from?

The rationalities adopted by the cities of Heerlen and Utrecht are not part of a predetermined set of rationalities which are included through the transferal of the notion of the smart city, as a matter of fact there is no blueprint or step-by-step program "but in fact there is no such thing as a smart city blueprint, that does not exist" (Aalders, personal communication, 2015). Rather, the establishment of rationalities is based upon key topics which currently are, or in the future will be, of interest towards the actors within the city. The establishment of rationalities is a process which should not be conducted by the municipal government alone, but rather should include the various actors which operate within the city "have a look at that and pick one or two, engage in conversation with civilians on what they think. Is it more important that we have an app with which we can measure dog poo, on which people can report dog poo, or is it more important that we indeed have a bike services in the city where you can borrow a bike for a day with a municipality-pas. Well that, (…), and that you eventually establish policy based on that" (van Houtum, personal communication, 2015).

The municipal government can of course decide to incorporate rationalities into the vision if it deems them important, in an ideal situation this should however be done in collaboration with the actors present within the city in the sense that a municipality may deem certain rationalities as being important and propose them, however citizens and other actors should still be consulted or be given the opportunity to express their opinion before these topics are officially incorporated into the vision (van Houtum, personal communication, 2015). In practice the rationalities adopted within the smart city vision of cities is generally a continuation of the status quo "There is the wheel of Cohen, the smart city wheel, and it says that smart cities can profile themselves in a variety of ways, there are many variations of smart within a city. And smart cities to me is just a city in which various goals which you normally have within a city are attained through the use of smart services." (Huppertz, personal communication, 2015). This means that cities often build upon rationalities which have

been established before the transferal of the notion of the smart city took place rather than drawing up entirely new topics or rationalities “Most cities, almost all cities are working on projects because those projects stem from the silo’s, certain tasks, often from an era in which there was no mention of a smart city.” (Aalders, personal communication, 2015).

The specific rationalities and topics which are adopted by a city are of course dependent upon the specific situation in which the city finds itself “you specifically look for a solution which works here with water or with specific circumstances which are at play here and you fine-tune yourself towards those circumstances for which you use a piece of technology, so that is actually pretty smart in my opinion.” (van Houtum, personal commication). Within the city of Utrecht the topics of mobility is for instance deemed important as it contributes to the air quality and sustainability and thus the notion of Healthy Urban Living. For the city of Heerlen this topic is however not so important “Mobility is one which is maybe not emphasized as much here because there are not as many traffic jams here, in a moment a ring will be constructed, then there will be no traffic jams at all anymore, so that is a topic which is not as important here.” (van Houtum, personal communication, 2015). Another example is for instance the fact that the city of Utrecht has always had a large presence of Alfa-sciences, humanities and art academies, the smart city collaboration referred to in section 4.1.2 thus focusses more on topics which align with these academic fields rather than ICT-based topics which are more predominant in the city of Amsterdam. “That is the difference between an Amsterdam and an Utrecht, Amsterdam has a lot more ICT infrastructure, many more businesses which can construct that, who are engaged with that. So it makes sense that they are a lot more ICT oriented. Utrecht has always had Alfa-scientists, so it has a lot of Alfa-sciences, humanities, art academies. The same can be applied to the issues, these are present in different areas for each city, I think that is important to take into consideration. But it really differs from city to city” (van Lunteren, personal communication, 2015).

In the section regarding the content of transferal (4.1.3) the role which technology, that is technology in the sense of technological devices, plays within the transferal of the notion of the smart city has been shortly addressed. Here it was stated that technology is, although part of the transferal, not at the core of the transferal of the notion of the smart city. But what role does technology play within the articulation of the notion of the smart city and can it be considered a rationality?

Like in the case of the transferal, technology is not at the core of the articulation of the notion of the smart city and should not be considered a rationality, at least not for the cities of Heerlen and Utrecht. The true goal of the notion of the smart city is more oriented towards providing smart solutions towards particular issues or innovations towards ambitions which are prevalent within society and amongst societal actors "(…) so actually the smart city is more often a kind of social-societal innovation, not so much a technological innovation. So image that in some way a certain need is inventoried within the city, and it turns out there is an important bottleneck somewhere, that you don’t immediately say ‘let’s use that that technology, we’ll make use of it and then we’re done’, but rather that you research in a smart manner which parties are involved, which are currently engaged with the subject, what the question really is, and then you make a decision, ok, we can solve this with the use of technology, that’s possible, but it does not have to be the solution. So you utilize technology as a vantage point, but you examine what the real underlying question is" (van Lunteren, personal communication, 2015). Technology here is thus utilized as a means to an end rather than an end in itself “In the end, the technology makes possible things which were almost

impossible before, we can do that now. Eventually however real changes occur only if people change the way they act. That is where it happens " (Aalders, personal communication, 2015).

*4.2.3 Technologies of government*

When cities have established rationalities they require concrete activities and processes in order to realize these rationalities, in other words they require certain technologies of government. As briefly touched upon in the previous sections, the articulation of the notion of the smart city is not a task which is undertaken by the municipal government alone. Rather, this is a process which involves a variety of actors which are present within cities. Adopting a relational perspective, this section seeks to address the role which various actors within the city play in regards to the establishment of technologies of government. Take note however that the actors described in the section below do not have a fixed role, therefore the role which the actors play can very between individual actors and various initiatives.

*Governmental institutions*

Within the process of articulation of the notion of the smart city governmental institutions occupy a variety of roles. In addition, governmental institutions which influence the articulation of the smart city operate on various scales. This section will cover the governmental institution which is most directly related to, and has the most significant impact on the articulation of the smart city, that being the municipality.

The first and foremost role which the municipality occupies in the articulation of the smart city is that of a *facilitating* party. In the past it was often the case that the municipality adopted a passive form of facilitation. This means that the municipality provided other actors within the city with the necessary support when these actors requested so, most often in the form of financial aids and sometimes in other forms, for instance through the provision of basic infrastructures or a plot on which to develop a project. Not only have the latter, non-financially based, forms of facilitation increased throughout recent years, the municipality has also adopted an active form of facilitation alongside the still existent passive form. An active form of facilitation entails that the municipality actively seeks out the 'energy' within the city, referring to the ongoing initiatives and projects, and with them the relevant actors. The municipality subsequently seeks not only to provide these initiatives with the necessary passive forms of support, but also to facilitate the actors and initiatives in regards to the abolishment of interfering rules and regulation if possible, provide the actors with space, both in a geographical sense as in a performative sense, and to provide them with the means necessary to improve their networks and get in contact with other relevant actors, both within and outside of the city (Domein Slim, personal communication, 2015). For instance, in the case of the Smart Services Hub the municipality of Heerlen provides the hub with the necessary basic infrastructures such as accommodations for the workforce and high-speed internet access, but also seeks to assist in the development of the smart services hub and connect this hub to the (inner) city. "And on the other hand we want to make sure that we enable the infrastructure for the campus development in the vicinity of the campus. And that simply means that you have to facilitate in a variety of ways. (…) And that ranges from offering housing facilities for employees to offering an adequate internet connection and you name it." (Huppertz, personal communication, 2015). Within this context the municipality however also adopts the role of commissioning party in the sense that

the municipality leaves it up to the businesses and knowledge institutions within the hub, and in less extent the city, to come up with new initiatives and activities to further develop the hub and make the connection to the (inner) city possible. “We want that campus, we want to couple it with the inner-city, and then businesses and knowledge institutions, you can show us what you have got.” (Huppertz, personal communication, 2015).

The goal of the municipality is generally to establish a community, or an ‘ecosysteem’, on the basis of an pre-existing or emergent idea, initiative or project containing a variety of actors originating from all sectors (Domein Slim, personal communication, 20-8-2015). The municipality takes upon itself the task to involve other actors within its initiatives so that their interests are also represented within the initiative. The range of actors which the municipality seeks to involve is much wider then for instance the actors involved within a business-led initiative, which generally only acts on the behalf of its shareholders (Aalders, personal communication, 2015). The underlying thought of such an ecosysteem is that this coming together will yield a process of ‘kruisbestuiving’ (cross-pollination), which entails that together these actors can devise a more robust and innovative initiative, meaning that the wants and needs of all actors are incorporated and that the actors can assist each other with issues which they face during the development and implementation of the initiative (Domein Slim, personal communication, 2015). A common form of such an ecosysteem is the establishment of a platform, both an online platform as one in the sense of planned, regular face-to-face meetings. This platform allows actors within the city to easily get in contact and interact with each other. The role of the municipality within this platform is not only to act as a facilitating and participating partner, but also to stimulate the formation of new collaborations between the involved actors, attract additional partners to participate within the platform, stimulate the exchange of knowledge between the involved actors and, if needed, to assist in the development of new services.

Community creation is not something which is restricted to governmental institutions however, other actors within the city, especially businesses and knowledge institutions, can establish communities on their own, a practical example from the city of Utrecht being UtrechtInc and Social Beta being an example from the city of Heerlen. Both of these organizations established a network, UtrechtInc based on startups and Social Beta based on creative and technology oriented initiatives, seeking out, incorporating and initiating collaborations between various actors within the respective cities. Partly due to the formation ability of actors the municipality holds an interest in the establishment of one overarching cooperative platform to prevent the formation of an island structure within the city in which numerous businesses and knowledge institutions take it upon themselves to establish a platform. This process counteracts the goal of the platforms, leading to fragmentation rather than unification of actors within the city. The result of an island structure is that actors often duplicate processes and knowledge which are already present amongst other actors and could easily be shared through a platform, are unaware of the activities and knowledge present amongst other actors, this all leading to a decrease in the overall innovation rate within the city.

In addition, in the case of smart city initiatives the municipality has to be wary in regards to the role it plays. This is especially true when the municipality takes on the role of implementer as the municipality generally lags behind businesses and knowledge institutions in regards to the acquired knowledge, thus it generally lacks the required knowledge and capacity to properly implement a smart city initiative. If the municipality then adopts a leading role it will drag down other involved actors which can be detrimental (relatively) towards its citizens “Because you can want something as

a municipal organization, claim a certain role, but if you don't have the competences in order to do so, then that is a farce and you become a liability to the development of the smart city, because you dictate the pace while being the slowest actor in the whole. And that is detrimental towards your citizens." (Aalders, personal communication, 2015). Therefore collaboration with businesses take place as somewhat of a necessity as they are required to compensate for the lack of knowledge and capacity present within the municipality (Aalders, personal communication, 2015). This does however not mean that governmental institutions should never take upon the role of implementer as there are some initiatives, issues or ambitions which are not of interest to other actors due to for instance expected costs or anticipated persistence of the issue at hand. In such cases governmental institutions will have to take upon themselves the role of implementer (Smart City Workshop, personal communication, 2015).

The second role which the municipality and governmental institutions in general adopt is that of a *protector* of the citizens of a city and the city itself, this is especially the case for smart city initiatives as the outcomes of these initiatives are oftentimes unclear. In projects and initiatives, both those carried out by governmental institutions themselves as well as those which are carried out by businesses or knowledge institutions but in which governmental institutions play a supervising or commissioning role, one of the main objectives of governmental institutions is to establish certain boundary conditions which are favorable for the citizens that reside within the city (Domein Slim, Personal communication, 30-6). An example of a municipality playing such a protective role is the Free-WiFi project within the city of Utrecht. Here a business was, and still is, responsible for the establishment and maintenance of the WiFi network in commission of the municipality. In the public tender the municipality however obligated that the WiFi-network should have certain boundary conditions such as the free access of the network for everyone visiting the city and the open usage of the network to provide developers with a platform to present their develop initiatives and apps, thus imposing restraints on the market function of the business in order to benefit and protect citizens.

The municipality also plays a role as protector in the sense that it takes upon itself the responsibility to guarantee that actors within the city have the possibility to have a say in smart city developments. The city of Utrecht for instance establishes its rationalities through, amongst other measures such as online platforms and door-to-door questionnaires, so-termed 'stadsgesprekken', get-togethers hosted by the municipality on a particular evening for which a randomized selection of people (or representatives of relevant actors) within the city are invited to come to the municipal office and give their opinion and engage with both the municipal government as well as each other on certain topics (Domein Slim, personal communication, 2015).

The third role which governmental institutions play within the smart city is being a *provider* of information and data. Within this role the municipality makes publicly available (parts of) the data it generates through its research and activities. The municipality of Utrecht has already established an 'open data portal' which hosts a wide variety of data on all matter of topics (see https://opendata.utrecht.nl/). This data can then be freely used by other actors to develop new initiatives and innovations. Additionally the municipality takes upon itself to introduce its citizens to the concept of the smart city. The municipality (generally through the establishment of a separate organization) provides the citizens with the necessary tools and information which they need in order to make sense of and reflect on the smart city and its implications, and the manner in which

technology introduced through the smart city will have an impact on the city as the citizens know it (van Houtum, personal communication, 2015). Together with its citizens the municipality can then explore the boundaries of what is possible with the incorporation of the smart city, what the goal of that incorporation is and how this goal should be achieved (van Houtum, personal communication, 2015).

A characteristic technology of government in both the city of Heerlen as the city of Utrecht is the establishment of pilot projects. Pilot projects are temporary and generally small-scale projects, and can even be considered experiments, which serve the purpose of providing information based on practical experience. On the basis of the knowledge and experience gained from these pilot projects the decision is made whether or not to establish a full-scale project. So for instance, rather than implementing a new technology or innovation throughout the entire city this technology or innovation is implemented only in a single neighborhood or street. This testing area provides the municipal government with practical experience and information regarding the feasibility, effectiveness and costs of the project, but also feedback provided by citizens. Based on these results the decision is made to implement this technology or innovation in other sections of the city, or the city in its entirety or remove the technology or innovation in its entirety. Such a pilot project can serve as an experiment not just for the city itself, but even function as such on a national or international scale (Domein Slim, personal communication, 2015).

To illustrate the use of pilot projects one example of a pilot project for both the city of Heerlen and the city of Utrecht will be exemplified. In the city of Heerlen the Mijnwater 2.0 project utilizes the mining tunnels which are remainders of the mining period and lie underneath the city in order to access water reservoirs located deep beneath the surface. These reservoirs are subsequently used as sources of geothermic energy in which the water, which retains a steady temperature is used to either cool down or warm up buildings depending on the season. The Mijnwater 2.0 project is not only an integral part of the city of Heerlen's Energyplan for the year 2040, but also part of the European Interreg IIIB program (European Regional Development Fund) and has been integrated into the Parkstad Limburg collaboration's energy plan. The original pilot of the project included only two buildings to have their temperature regulated by usage of the geothermic energy, those buildings being the offices of the Central Bureau of Statistics and the shopping- and residential complex Heerlerheide Centrum. Throughout the years the buildings which are supplied by the geothermic energy has been steadily expanded to now include also the APG Pension Fund headquarters, the Rabobank facility amongst others. If this pilot proofs to be successful other buildings within the city will be hooked up to this system, as well as the developments being transferred and applied in other mining areas throughout Europe (ParkStadLimburg, 2014).

In the case of the city of Utrecht a good example of a successful pilot project is the Smart Solar Charging project which originates from the neighborhood of Lombok. The Smart Solar Charging project seeks to develop a new type of energy grid or network in which two-way flow solar electric charging stations play an important role. Through the use of real-time data these charging stations supply vehicles with solar energy dependent upon the degree to which the sun is shining, the degree to which other vehicles and supplies which are connected to the grid require energy and the designated time on which the owner of the vehicle indicated that the vehicle needs to be recharged. These charging stations are also capable of withdrawing stored energy from vehicles and supplying it to the net, energy stored within vehicles can thus be utilized to power home appliances. The

municipality of Utrecht did not startup this project, but did however play an important role by granting the initiator of the pilot to place a private charging station in a public area. After the success of the pilot had been indicated the municipality supplied the initiator with additional spots within the city to extend the pilot project (Domein Slim, personal communication, 2015).

The basis of smart city initiatives is the establishment of a business case. In simple terms a business case is a document in which the costs and benefits, both financial and non-financial, as well as the risks of an initiative are described. The business case is often an important factor in the decision whether or not an initiative is worth implementing. The establishment of a business case is not only an action undertaken for initiatives initiated by businesses but also those initiated by municipalities. There is a difference between the two however in the sense that unlike businesses a municipality is a nonprofit-oriented actor and therefore the business case often does not have to yield a profit but rather stay within the established financial boundaries. Aside from rules and regulation one other common obstruction which may prevent new smart city initiatives projects from progressing is the production of a solid business case. A business case is generally a prerequisite to any new initiative, although sometimes proves difficult for smart city initiatives as its effects are oftentimes new and unclear (Domein Slim, personal communication, 2015).

As a final remark to this section and in relation to the process of effect assessment the drafting of business cases, as discussed in section 2 concerning technologies of government, poses an issue related to the innovative and explorative nature of the smart city. At its core the smart city seeks to explore and develop new and innovative processes, technologies and techniques in order to provide new services, provide an answer to certain issues which are at play within cities or to improve the quality of life of urban residents, thus entailing that a certain degree of experimentation will have to take place as the outcome or effect of these processes, technologies and techniques have not yet been established and cannot be determined beforehand. It is therefore difficult to determine beforehand the costs and benefits, both financially as non-financially, a requirement of a business case, of smart city initiatives. If these costs and benefits are not determined the initiative runs the risk of being postponed until additional research has determined the costs and benefits or even called off entirely. The drafting of a business case as a requirement can thus be a restriction towards the articulation of the notion of the smart city (Domein Slim, personal communication, 2015).

*Businesses and knowledge institutions*

It is not only governmental institutions that play an important role in the articulation of the notion of the smart city, other actors which are present within the city do so as well. Within the context of the smart city businesses and knowledge institutions, rather than governmental institutions, are considered to be the main technological developers and innovators. Businesses and knowledge institutions play an important role in the process of valorization, in which (theoretical) knowledge is turned into concrete and applicable products and processes (Huppertz, personal communication, 2015). This is not only true for large scale businesses, which have considerable stocks of human capital, knowledge and innovative capacity, but also for so-termed start-up businesses. Starts-ups are relatively new businesses with only a handful of employees. Due to their small scale these businesses generally seek to tackle one specific issue or develop a specific product which other actors generally do not address, or do address but from a different perspective. Governmental institutions commonly do not take upon themselves the role of innovator, and engage in the process of valorization to a

lesser degree, as they generally do not possess the expertise or technological know-how within the organization, nor do they have the necessary funds in order to do so (Aalders, personal communication, 2015). Additionally, governmental institutions want to prevent a so-termed 'technological lock-in'. This term indicates a situation in which an actor is more or less forced to make use of, or is stuck with a particular technology for a (long) period of time due to the efforts and costs it took to develop and implement the technology, and in which it would be considered a (financial) waste to discard or renew the technology, or the necessary resources to do so are simply not available. Due to their lack of technological know-how and limited resources governmental institutions are particularly affected by such lock-ins, and usually cannot end such a lock-in without assistance from other actors (Domein Slim, personal communication, 2015).

This does however not entail that governmental institutions should partner up with other actors, especially businesses, without any precaution (30-6). This is especially true when seeking to collaborate with (relatively) large businesses as these businesses perceive the city and the (societal) issues which the smart city tackles from a dissimilar perspective then a governmental institution does so. The latter incorporates a perspective which is centered around the wellbeing of the city and its inhabitants (this is generally true for knowledge institutions as well), whereas businesses adopt a more technologically oriented perspective in which not only the wellbeing of the city and its inhabitants play (a relatively smaller) role, but profitability and the acquisition of a market share are also important influencing factors. "The technology giants building smart cities are mostly paying attention to technology, not people, mostly focused on cost effectiveness and efficiency, mostly ignoring the creative process of harnessing technology at the grass roots." (Townsend, 2013, p.118). In addition, larger businesses are more often active within a number of cities, all of which have their own specific context, yet the businesses generally do not design new technology specifically for one city, but rather apply a one size fits all approach in which a standard technology is incorporated within a variety of cities. Contrary to large businesses, small and medium enterprises are generally only active within one or a small number of cities, which means that technological developments and innovations are often tailored to the specific context of a particular city. The downside here being that a technological development or innovation is not suitable for a different city, at least not without alterations being made, then the one it was designed for (van Houtum, personal communication, 2015).

However (in the context of the smart city) businesses may also have motives beyond the commercial ones. As a project manager of one of the largest telecommunication providers in the Netherlands indicates, the commercial aspect still is, and will always be of importance as it is one of the core aspects of running a business. The importance of the commercial aspect does however not exclude other aspects. Businesses are increasingly seeking for opportunities to collaborate with other actors within a city, they are no longer just fulfilling the role of being the provider of a service, but rather a full-fledged partner who is committed to the development and implementation of new technologies and innovations in collaboration with other actors. The goal here is to not only to add value to a specific project, but to add value for the city as a whole, while simultaneously gaining new insights and knowledge from both other actors as well as through the joined development and implementation. Of course this still collaboration also fulfills a commercial role, the knowledge and insight gained provide a comparative advantage for the involved businesses and the city still functions as an important , if not the foremost, market for businesses (Peil, personal communication, 2015).

From the perspective of businesses and knowledge institutions collaboration with governmental institutions is also not a given. Since businesses and knowledge institutions have the resources, both in terms of know-how and in terms of finances, which are required to initiate a (smart city) initiative or project they do not have the need to necessarily collaborate with governmental institutions. At a certain point however collaboration with governmental institutions is sometimes a necessity as these institutions are responsible for the rules and regulations within a city, something which businesses and knowledge institutions cannot change on their own. “If I were to take an example, a connection to the municipality is present, but only afterwards. So really they (initiatives) simply originate from a group, and interesting things emerge, then they are presented to the municipality at some point. Because you enter a phase in which collaboration with the municipality is a necessity. So often that is afterwards, it is rare that collaborative development takes place from the start, I don’t know if that is how it should be. I don’t think the municipality should want that, to start projects on its own. Because I think those initiatives originate from the city, the city can determine what is happening and if, if projects start to emerge in the city, and they succeed in a certain sense, then the municipality knows that it is supported.” (van Lunteren, personal communication, 2015).

When a collaboration between businesses, knowledge institutions and other actors within the city does take place businesses and knowledge institutions do not only function as a partner within this collaboration, but as the main providers of the necessary funds as well. Businesses, which are generally the main fund-providers, often draw upon the funds and budgets which they have available within their business, whereas knowledge institutions gather their funds through subsidies.

*Citizens*

Much like businesses and knowledge institutions, citizens are expected to adopt the role of innovator within the smart city as innovations are oftentimes brought about by individuals facing everyday problems. This can be illustrated by two simple examples, namely the two winners of the Smart Mobility Challenge, which stimulated anyone who had an idea on how to make traveling and transport more comfortable and more efficient, to present their idea. The first is an app which determines the most optimal place for multiple people to meet in person based on the time, energy, cost and emission, the idea of this app being initiated when three individuals wanted to meet up but could not decide on the most efficient meeting place. The second app brings into contact people who make use of electrical charging posts through a simple chat-function, and also provides them with an overview of the availability of the charging posts, this app being brought to life due to the troubles a single individual had with finding an available electrical charging post (Overheid 360 Exhibition, 2015).

This does of course not mean that all citizens within a smart city can be considered innovators which undertake in their own initiatives and projects. Although some citizens might contribute to the development and implementation of the smart city directly through projects and initiatives, most citizens are not capable of doing so themselves. Generally citizens don’t have the capacities to do so as these initiatives and projects require extended technological know-how regarding complex issues or ambitions and large investments, in terms of finances, time and energy, all of which the average citizen cannot muster. The threshold for smart city initiatives and projects are thus so extensive that most citizens will not bother (Aalders, personal communication, 2015).

Citizens should however still be involved within smart city projects and initiatives. Not only can their input bring forth new ideas and innovations, the involvement of citizens can also bolster the public support which an initiative or projects has and prevent a situation in which the outcomes of an initiative or projects oppose the public wants and needs. “There are several studies showing that if you ask experts you have a high number of rather well converged answers, which are relatively high value to solve the problem. But, if you go to the crowds, you actually get from the crowd a higher number of those solutions which are of extremely high value. Of course, from a policy perspective it is very interesting to look at that area of interest where the crowd can provide higher value solutions for the problem than the experts.” (Salmelin, 2015). So rather than depending on citizens to implement a particular project or initiative, it is more commonly the case that the opinions of the citizens are gathered and alteration are made accordingly “(…) predominantly a change of organization, of the societal, total societal field within the city which to a great extent is driven by new technological development. (…) in which case the societal, organizational innovation is brought about by new technological developments.” (van Lunteren, personal communication, 2015). Additionally, citizens also fulfil a signaling role in the sense that it is the citizen which identifies issues which the municipality needs to solve or ambitions which the municipality needs to pursue. It is not the municipal organization that has a need, the city and the citizen has a need (Smart City Workshop, personal communication, 2015).

**Sub-conclusion**

Within this section we have sought to examine the manner in which cities articulate the notion of the smart city in terms of rationalities and technologies of government. We have determined that neither the rationalities nor the technologies of government which cities adopt are predetermined.

Rationalities are based on the ideals which are deemed to be of importance, either now or in the future, to a particular city. The city of Heerlen’s rationalities are based on economic development through the establishment of the Smart Services Hub and the attainment of an adequate(ly educated) workforce. The city of Utrecht seeks to establish itself as a city of Healthy Urban Living in which it values the ideals of a green and healthy city in which the emphasis is put on the quality of life of the citizens. Although rationalities such as thinking of ways to improve the lives of citizens and active collaboration between various actors seem to be of significant importance to both the cities of Heerlen and Utrecht, it is difficult to determine a set of rationalities which can be generally associated with the notion of the smart city as the role which the specific conditions and characteristics of a city play are so significant. It can be determined however that technology, in the sense of technological devices, a topic which is often put in the foreground when addressing the notion of the smart city, should not be considered as a rationality or vantage point but rather a means to an end as technology enables a variety of new processes and initiatives to take place.

In the case of both the city of Heerlen as well as the city of Utrecht the establishment of rationalities within the context of the smart city can be linked to the process of problematisation. Whereas in the city of Heerlen the increasingly footloose businesses and the lack of a particular type of workforce is being characterized as undesirable, as an issue, a similar process is taking place in the city of Utrecht in regards to the impact which the demographic growth will have on the city. Both cities consider, or at least portray, the adoption of the notion of the smart city as contributing towards a solution of these issues.

In order to concretize the ideals articulated within the rationalities of government cities, more specifically governmental institutions, make use of various technologies of government. Both the city of Heerlen and the city of Utrecht make use of business cases, through which initiatives are assessed based on their (prospected) costs, benefits and risks, as well as pilot projects, small-scale field-tests with which the feasibility of an initiative is assessed and the possibilities for upscaling determined. However, governmental institutions are not the only actors which are involved in the articulation of the notion of the smart city. Rather, cities seek to establish what is termed in the Marshall Model of Organizational Evolution a 'synergistic' mindset. Adopting a synergistic mindset means moving away from the historically established and hierarchical functional silo's in which (governmental) actors exclusively perform tasks which are part of their own task packet, with little to no collaboration taking place amongst the various silo's and the actors outside of the institution. Instead, city-wide collaborations are sought after involving not only actors originating from various governmental silo's but actors such as businesses, knowledge institutions and citizens as well (Marshall, 2010; G4 CIO congress, personal communication, 2015). "What is smart about it is that we have to search for, search to a greater extent for cross connections and common goals of parties which have previously not, or not often, or barely sought collaboration with each other to reach a particular goal." (Aalders, personal communication, 2015).

## *4.3 The effects of the smart city*

The third and final section of this chapter will identify and examine the effects on cities which emanate from the adoption of the notion of the smart city. As we have determined in section 2.2.3 a relational perspective towards effect assessment does not seek to present the causal effects which the adoption of the notion of the smart city has produced, nor does it seek to determine the forms of domination which stem from the adoption of the notion of the smart city, the points of view adopted by the rational and critical perspectives respectively. Rather, a relational perspective towards effect assessment seeks to examine the manner in which various actors shape the process of effect assessment and the effects which the actors themselves identify as a result of the adoption of the notion of the smart city. Thus, by adopting a relational perspective the task of assessing the effects of the adoption of the notion of the smart city will not befall upon the researcher, rather the researcher adopts a more modest approach wherein actors themselves are regarded as most capable of assessing their own practices.

### *4.3.1. Effect assessment*

In the case of the effect assessment of the adoption of the notion of the smart city the usage of a relational perspective is quite convenient as, according to our respondents, it will be difficult, if not impossible, to ever truly measure the exact effects of the adoption of the notion of the smart city, at least the notion of the smart city as a whole, as there are no guidelines to make such an effect measurement “Yes, it is very difficult to measure the smart city in itself. Because even if you do become the most competitive region of Europe, which we have been titled, what is the cause of that, (…), is that because of individual projects, is that because of a pile of money which they earned back. So it is very difficult to corroborate that.” (van Lunteren, personal communication, 2015). The only possible manner in which one could come close to measuring the effects of the smart city as a whole is to compose a set of indicators which are deemed to be part of the notion of the smart city, this for instance being achieved through the use of the smart city model as established by Boyd Cohen (section 2.1.1), and through the use of these indicators measure the effects that occurred within each of the individual sectors of the notion of the smart city, which in turn requires examining the individual initiatives, subsequently composing a picture of the cumulative effect by adding up all the individual effects. However, even if these steps would be undertaken it would be disputable whether the cumulative result which is measured is truly a composition of the efforts which are made in regards to the notion of the smart city or whether these results would have occurred regardless “(…) and at a certain point you could say ‘hey, it worked’. But what is it that worked, was it the smart city or was it simply groups which completed a project well.” (van Lunteren, personal communication, 2015; van Houtum, personal communication, 2015).

As a result of the difficulty measuring the overall effect of the adoption of the notion of the smart city the effect assessment in both the city of Heerlen as well as the city of Utrecht generally only measures the effects of individual initiatives (van Houtum, personal communication, 2015). The effects of individual initiatives can be more easily measured in various manners, for instance an initiative on smart forms of mobility can be measured in the degree to which it improves mobility or the profit that the initiative makes "the far-reaching consequences are primarily measured based on projects which have been completed, revenues for the businesses perhaps, maybe improvements of the mobility, actual hard forms of data. And you can measure those.” (van Lunternen, personal communication, 2015).

Contrary to the city of Utrecht, where the individual smart city initiatives within the city have been inventoried (or at least an attempt has been made to do so), in the city of Heerlen the individual smart city initiatives have not been taken stock. When searching for individual initiatives in the city of Heerlen one should thus not only search for initiatives which are defined as being part of the notion of the smart city as many individuals do not realize how 'smart' their initiative really is, and the initiatives are thus not labeled as such. Rather, initiatives throughout the entire (municipal) organization should be examined and assessed on their degree of smartness and if suited be incorporated in the overall assessment "and you shouldn't look for the projects under the heading smart services, but you should look for them throughout the entire organization. And you should say, what you did, that project is actually a really good smart city project" (van Houtum, personal communication, 2015).

It should be noted however that striving to achieve certain effects should not be considered as being a core element of the notion of the smart city, rather the notion of the smart city should act as a mindset which is adopted naturally and promotes smart forms of collaboration between actors "(…) it should predominantly be a plethora of smart collaborations, and some things you cannot measure. It should not be a condition to strive for effects of the smart city, to claim that we want this and that to be the turnout. It should really be more of a mentality." (van Lunteren, personal communication, 2015).

There is however an issue at hand with the effect assessment of individual smart city initiatives that goes against the nature of the smart city. The issue at hand is that the majority of effect assessments exclusively make use of hard forms of data. A concrete example of such an effect assessment in regards to a smart city initiative is collecting data in terms of (kilowatt) hours regarding to what extent various car charging stations throughout the city are utilized. What is generally not measured in such effect assessments is the perception or experience of citizens or other actors which are affected by the initiative, such data being termed 'soft' forms of data. Taking the car charging stations as an example, such an effect assessment would include data on whether or not citizens agree with the placement of the stations in the neighborhood, should they have been placed elsewhere, how does the placements of the stations make them feel, do they like the initiative, do they think that more poles should be placed in their neighborhood and why or why not? "But with projects there is always something which is measurable, that is always possible, (…) that is a hard form of data, nobody wonders how it was, did people enjoy it, and that experience is not taking into consideration. That is often the case in projects, you could state that you have recharging stations which are used to a great extent so it is a success, but nobody is asking people whether they, what they truly think of it, do they consider it a positive development or not. They are just suddenly there and you think 'oh they're there, yes they are there. Yea, I guess that's ok, I guess I could maybe use it'. But whether people truly become enthusiastic by it, things like that are not measured." (van Lunteren, personal communication, 2015).

Attempting to exert influence on these soft factors should be a key task of the municipal government, in which case it should not focus on large scale projects, which is often the case, but rather explore the innovative and contributory potential of small scale initiatives which benefit the citizens "And then you should not focus on projects which make people say 'wow', like the biggest bicycle parking spot or recharge station or whatever. But predominantly small, smart innovations

which do not have cost a whole lot of money but do have a significant effect. And also something which citizens indicate is usefull." (van Lunteren, personal communication, 2015).

According to the respondents of this research in the end effect assessment of smart city initiatives should thus include both hard and soft forms of data, measuring the degree to which initiatives bring forth positive effects within the city and amongst citizens, livability, much like in the articulation of the notion of the smart city, being a core topic. "I think that, in the end, you should measure the positive effects on citizens, and if such a project like the pocketparks reduce the heating emitted by the city, if you measure that, or if from a mine-water project a reduction of energy (…) but in the end it should predominantly be, yea, the lives, the livability of a city and well the happiness, and also a bit of the economic value, it should improve that". (van Houtum, personal communication, 2015).

*4.3.2. The effects of the adoption of the smart city*

In both the city of Heerlen and the city of Utrecht there is a conviction amongst the respondents that the effects of the incorporation of the smart city are, at least to date, quite limited. This is especially true when taking into consideration the grand ambitions and expectations which were established in regards to the incorporation of the notion beforehand. Take for instance the ambitions established by the European Union in regards to cutbacks on $CO^2$ emissions, these ambitions being upwards to 50 percent, of which to date minimal steps have been made "If you take a look at what the expectations of that is then we have a minimal step, yes. Because the expectations of it are huge, considerable $CO^2$ reductions, enormous ambitions, a cute by half, fifty percent. Power generation, the ambitions, many plans are truly grand, what has been realized up to the present point, in many cases that is minimal." (Aalders, personal communication, 2015). Some even suggest that the incorporation of the notion of the smart city is new to such a degree that the effects of the incorporation are not truly measurable yet and that it will take time in order for the notion to take full effect (van der Weijde, personal communication, 2015).

There are nevertheless noticeable effects of the adoption of the notion of the smart city, although these effects might not be very straightforward. One of the identified results of the adoption is that to an increasing extent citizens and other actors are gaining an understanding of what the notion of the smart city is exactly, what the possibilities are in relation to the smart city and what they themselves are capable of in terms of the innovative and contributory role which they can play. In addition, actors such as businesses and governmental institutions are starting to realize that in order to achieve their ambitions or solve the (urban) issues that they are facing and in order to realize the full potential of the smart city they will have to work together as every actor has a piece of 'the solution' "Well those effects are there, you gain a greater sense of understanding on what is possible, what is it that we know and how do we bring those various aspects of a smart city together. Well, that understanding, that appreciation is slowly being achieved and that is a very distinctive process because everyone has a piece of the solution." (Domein Gezond, personal communication, 2015). Collaboration between various actors is seen as being of significant importance to the notion of the smart city "The smart city model is really only effective if you could indicate that a significant amount of businesses and groups and civilians have found each other." (van Lunteren, personal communication, 2015).

**Sub-conclusion**

Within this final section of the chapter we have sought to identify and examine some of the effects of the adoption of the notion of the smart city through the use of a relational perspective towards effect assessment. Here we have examined the manner in which the process of effect assessment is shaped by various actors and the effects which these actors identify as a result of the adoption of the notion of the smart city.

In regards to the process of effect assessment the respondents of this research indicate that it is difficult, if not impossible, to determine the overall effect of the adoption of the notion of the smart city. This is due to the fact that there are no definitive guidelines or standard effect measurements with which to do so. As a result cities usually only assess the effects of individual initiatives rather than assessing the notion of the smart city as a whole. The effects of these individual initiatives are assessed through various standards ranging from a reduction in the monetary costs, the contribution that the initiative has made to the livability within the city and the positive effects which the initiative has had upon citizens within the city, to name but a few. The effects are generally measured in hard, quantifiable forms of data rather than soft forms of data which pay attention to the experience and feelings which the initiative provides for citizens.

Due to the lack of general guidelines with which an effect assessment of smart city initiatives can be made initiatives are generally assessed based on standards which have been established in the particular program or policy which the initiative is part of, the standards within the program or policy also determining whether or not an initiative can be considered smart. Take for instance an initiative which is centered around the placement of green car charging stations throughout the city. This initiative is part of an overarching program aimed at increasing the usage of renewable energy within the city. As the initiative is part of the renewable energy program it is assessed based on standards devised within the program such as the kilowatt hours of green energy which the various car charging stations supply, if the usage of renewable energy is indeed increased the initiative is considered smart. This indicates that instead of assessing the degree to which an initiative can be considered smart based on a predetermined set of standards the notion of smart itself becomes a standard in the evaluation of an initiative.

In terms of the actual effects which the adoption of the notion of the smart city has brought about the responses vary. Some argue that the notion of the smart city has only recently been adopted, therefore it is too soon to tell what exactly the effects are. Others compare the effects which can be identified with the goals which have been established within policies and programs beforehand and argue that the effects have been limited. It can also be argued that, in a sense, the mobilization of the notion of the smart city is an effect in and of itself indicating that as actors are exposed to the notion of the smart city they become involved in the mobilization of the process by for instance transferring knowledge or articulating the notion by establishing rationalities and developing or implementing technologies of government.

## *Chapter 5: Conclusion*

This research set out to examine the manner in which the notion of the smart city is mobilized. Within the context of this research mobilization signifies the manner in which the notion of the smart city is transferred to, and subsequently articulated in cities and the effects which the adoption of the notion has brought about within cities. In order to examine the mobilization of the notion of the smart city this research adopted a relational perspective in which a focus is put on the interactions between actors which are engaged with the mobilization of the notion, as well as utilizing two cases to be studied, those being the cities of Heerlen and Utrecht. In order to discuss the mobilization of the notion of the smart city within this conclusive chapter we will address the research sub-questions which were posed at the start of this research (section 1.3) in the section below.

*In what manner is the notion of the smart city being transferred to a city?*
In order to examine the manner in which the notion of the smart city is being transferred this research has examined the motives, mediators and content of transferal. The city of Heerlen and the city of Utrecht have distinct motives which prompt these cities to transfer the notion of the smart city. Whereas the city of Heerlen is motivated by a process of brain drain occurring within the city in which young, adequately educated workers can no longer be found within the city as well as a process in which businesses are becoming increasingly footloose, these processes jointly creating a situation in which businesses are threatening to leave the city, the city of Utrecht seeks to enable its ambition in regards to Healthy Urban Living and the establishment of a healthy, green and vigorous city through the notion of the smart city as well as managing the demographic growth which the city faces in the (near) future.

Various mediators, including brokers as well as national and international organizations, are in play in order to enable the transferal of the notion of the smart city to take place. Brokers, individuals who act as facilitators and establish connections between places and actors where knowledge is present and there where it is needed, have often, due to unique experiences, come across the topic of the smart city simply by chance. Due to the potential which these brokers saw in the notion of the smart city they decided to transfer the notion to their own place of work or residence. National as well as international organizations act as mediators in regards to the notion of the smart city through the network and platforms which they establish through which individuals, organizations, cities and other institutions are able share their knowledge with each other. Due to the unique and overarching role which some of these organizations fulfill, that is amassing knowledge regarding the notion of the smart city and subsequently standardizing and making available this knowledge, these organizations could develop themselves into central passage points. This development can be both beneficial as these organizations can then provide quick and easy access to an abundance of knowledge, but might also be harmful as these organizations can develop into obligatory passage points which exert excessive influence, and may even establish a monopoly, on the transferal of knowledge regarding the notion of the smart city.

The content which is being transferred through the notion of the smart city includes knowledge, for instance data and schematics which describe the manner in which a particular initiative is developed and implemented, as well as a revision of the mindset with which municipal governments operate. Technology, in the sense of technological equipment, is transferred through the notion of the smart city as well. Technology is however not at the core of the transferal as it is

often attributed to be. Rather, at the core of the transferal of the notion is ways in which to improve the livability of the city. The content of transferal within the context of the notion of the smart city is not a grand theory but rather individual concepts, initiatives or technologies, which comprise (a small) part of the overarching notion of the smart city, in which case the notion of the smart city functions as an all-purpose-word out of which individual elements can be taken. In addition, the notion of the smart city can itself be considered a channel (of knowledge) in the sense that through the rationalities which are established and the initiatives which are undertaken in light of the rationalities certain knowledge is transferred from one entity to another.

*How is the notion of the smart city being articulated within cities?*
The articulation of the notion of the smart city has been examined in terms of rationalities and technologies of government. The rationalities which cities adopt within the context of the smart city are, similar to the technologies which they adopt, not based on a predetermined set of rationalities that are associated with the notion of the smart city. Rather, the rationalities which cities adopt are based on ideals which are deemed to be, or will become, of importance to the city meaning it is difficult, if not impossible, to determine a set of rationalities which can be generally associated with the notion of the smart city. Although rationalities such as thinking of ways to improve the lives of citizens and active collaboration between various actors seem to be of significant importance for the cities of Heerlen and Utrecht in the end the adoption of rationalities is based on the specific characteristics and attributes of the city. The rationalities of the city of Heerlen are based on economic development through the establishment of the Smart Services Hub within the city and the attainment and retainment of an adequate(ly educated) workforce. The rationalities within the city of Utrecht are based on the cities' ambition to establish itself as a city of Healthy Urban Living in which it values the ideals of a green and healthy city in which the emphasis is put on establishing an adequate quality of life standard for the citizens.

The rationalities established in both cities are closely linked to the motivation behind the transferal of the notion and can be linked to the process of problematisation in which issues are socially constructed rather than pre-given. Whereas in the city of Heerlen the increasingly footloose businesses and the lack of a particular type of workforce is being characterized as undesirable, as an issue, a similar process is taking place in the city of Utrecht in regards to the impact which the demographic growth will have on the city. Both cities consider, or at least portray, the adoption of the notion of the smart city as a solution towards these issues.

Various technologies of government are utilized by cities in order to concretize the ideals articulated within the rationalities of government. A business case, through which initiatives are assessed based on their (prospected) costs, benefits and risks, as well as pilot projects, small-scale field-tests with which the feasibility of an initiative is assessed and the possibilities for upscaling determined, are practical technologies of government utilized by both the municipal government of the city of Heerlen and the city of Utrecht. Within the articulation of the notion of the smart city (the use of) technology should not be seen as a rationality or vantage point but rather a means to an end; technology enables a variety of new processes and initiatives to take place.

Governmental institutions are not the only actors which are involved in the technologies of government, rather cities seek to establish what is termed in the Marshall Model of Organizational Evolution a 'synergistic' mindset. Adopting a synergistic mindset means moving away from the historically established and hierarchical functional silo's in which (governmental) actors exclusively

perform tasks which are part of their own task packet, with little to no collaboration taking place amongst the various silo's nor between governmental institutions and other actors. Instead, city-wide collaborations are sought after, involving not only actors originating from various governmental silo's but other actors within the city such as businesses, knowledge institutions and citizens as well. The various actors within the city are thus presented with an opportunity, arguably even expected, to play a part in order to achieve an ideal established within a rationality.

*What effects has the adoption of the notion of the smart city brought about within cities?*
In order to determine the effects which the adoption of the notion of the smart city has brought about this research adopted a relational perspective through which we have examined the manner in which the process of effect assessment is shaped by various actors and the effects which these actors identify as a result of the adoption of the notion of the smart city.

We have stablished that it will be difficult, if not impossible, to determine the overall effect of the adoption of the notion of the smart city due to the fact that there are no definitive guidelines or standard effect measurements with which to do so. Therefore cities generally only assess the effects of individual initiatives rather than assessing the notion of the smart city as a whole. The effects of these individual initiatives are assessed through various standards ranging from a reduction in the monetary costs, the contribution that the initiative has made to the livability within the city and the positive effects which the initiative has had upon citizens within the city, to name but a few. The effects are generally measured in hard, quantifiable forms of data rather than soft forms of data which pay attention to the experience and feelings which the initiative provides for citizens.

As a result of the lack of general guidelines with which to assess the effects of smart city initiatives, initiatives are generally assessed based on standards which have been established in the particular program or policy which the initiative is part of, the standards within the program or policy also determining whether or not an initiative can be considered smart. Take for instance an initiative which is centered around the placement of green car charging stations throughout the city. This initiative is part of an overarching program aimed at increasing the usage of renewable energy within the city. As the initiative is part of the renewable energy program it is assessed based on standards devised within the program such as the kilowatt hours of green energy which the various car charging stations supply. In addition as there are no guidelines with which to assess the 'smartness' of an initiative, the degree to which an initiative can be considered smart is based on the program as well, this then means that if the usage of renewable energy is indeed increased the initiative is considered smart. This entails that rather than assessing the degree to which an initiative can be considered smart based on a predetermined set of standards the notion of smart itself becomes a standard of effect assessment.

In terms of the actual effects which the adoption of the notion of the smart city has brought about no agreement amongst the respondents is reached. Some argue that the notion of the smart city has only recently been adopted, therefore it is too soon to tell what exactly the effects are. Others compare the effects which can be identified with the goals which have been established within policies and programs beforehand and argue that the effects have been limited.

**Reflection and Recommendations**

This section of the research will be dedicated towards reflecting on the steps and choices which were made throughout this research as well as making recommendations for future research. By doing so it will provide future researchers with an opportunity to learn from the experiences which were gained during this research as well as depicting some of the limitations of this research, so that it is not taken for more than it actually is, and preventing the misinterpretation of the research which has been presented.

*General remarks*

That which should be taken in mind above all else is that the notion of the smart city is still very much in development. This indicates that the examination of the mobilization of the notion of the smart city and the results as they are depicted within this research might contain varying elements or outcomes than the mobilization of the notion of the smart city at the time of your reading. As I have experienced firsthand throughout my internship the manner in which the notion of the smart city is transferred and articulated can alter quickly, thus it has to be taken into consideration that this research is only a momentary recording. This then also entails that future research should be attentive when taking (elements of) this research as a basis.

Within the context of this research a framework has been established with which the mobilization of the notion of the smart city can be examined. The notion of the smart city is however one that is very broad in regards to the elements which it incorporates, in addition to the adoption of a relational perspective within this research, which focusses mainly on the manner in which actors perceive or put into practice a notion, this results in a situation in which the mobilization of the notion of the smart city as described in this research are very individual. The transferal, articulation and effects can thus be interpreted very differently from person to person. As an example of this, during the examination of the effects of the notion of the smart city the answers received from the respondents fluctuated, one respondent was convinced that there were no effects which could be related to the notion of the smart city whereas others were able to identify some effects as described in the sections above. Within this research I identified the results of the mobilization of the notion of the smart city as best I could. There is however no doubt that this research does not provide a full overview of the mobilization of the notion of the smart city, and that when conducted elsewhere the results of the mobilization of the notion can differ. This research has however provided, or at least attempted to, a (theoretical) framework with which further examination of the mobilization of the notion of the smart city can take place.

What this thesis has shown is that, in a sense, the mobilization of the notion of the smart city is an effect in and of itself. This indicates that as actors are exposed to the notion of the smart city they become involved in the mobilization of the process by for instance transferring knowledge or articulating the notion by establishing rationalities and developing or implementing technologies of government. In addition, the comparative element, and as a result of it contrasting findings within the cases, incorporated within this research indicate that the mobilization of the notion of the smart city is dependent upon the conditions and circumstances as they are present within a particular city. This research has featured some of the similarities and dissimilarities between the cases of Heerlen and Utrecht and assessed these (dis)similarities from a relational perspective. In addition, the diverse findings present policy makers with an opportunity to reflect on the manner in which they themselves mobilize the notion of the smart city and manners in which they could do so differently.

*Method*

A question that was oftentimes posed to me throughout the duration of this research is why did this research not incorporate the cities of Amsterdam and Eindhoven, which are regarded by many as the frontrunners in regards to the development of the smart city within the Netherlands. The reason why these cities were not incorporated is actually quite simple, that is because the cities of Amsterdam and Eindhoven are considered to be the frontrunners, therefore research regarding the topic of the smart city is oftentimes conducted with these cities functioning as cases. In this research I simply wanted to examine cities which may not be in the spotlight as often as the cities of Amsterdam and Eindhoven but which are still active in regards to the development of the smart city, and which people may not know as much about. In addition, it was beyond the scope of this research to incorporate both the cities of Heerlen and Utrecht as well as the cities of Amsterdam and Eindhoven as this research was already quite extensive in regards to the examined elements and quite intensive in regards to the time and effort which was put into it.

Throughout this research I have also received multiple remarks on how the comparison of the city of Heerlen and the city of Utrecht is not 'fair'. While I fully understand that these two cities have varying characteristics and find themselves in varying circumstances in terms of their economy, demographics, social setting etc. it was not the intend of this research to compare the cities in the sense that statements are made regarding which city is the better smart city or which city is doing it right and which city is doing it wrong. Rather, the cities of Heerlen and Utrecht both function as examples on how the notion of the smart city is transferred, articulated and has an effect on cities. This also entails that the manner in which these cities transfer and articulate the notion of the smart city is not the only way it is done and, although both cities have elements which can be considered good or beneficial, they should not be set as an example on how the transferal and articulation of the notion of the smart city should take place as cities should explore so themselves and base this on their own unique situation. In addition, future researchers will have to take in mind that it will be difficult and 'unfair' to compare any cities as these cities will always have different circumstances and characteristics to some extent.

Because the notion of the smart city incorporates so many elements it was sometimes difficult to interact with certain respondents as I had the feeling we weren't exactly on the same line in regards to what we were referring to when we talked about the notion of the smart city. This led to a situation in which interviews got a little confusing sometimes in the sense that we weren't quite discussing what I thought we were discussing. This was solved simply by establishing what we were referring to when discussing the notion of the smart city beforehand, so simply asking what respondents thought the notion of the smart city entailed and what they thought the elements to it were. Future researchers can thus learn from this and should take the time to establish what the respondents regards as the notion of the smart city before delving into detail.

The last note in regards to the method is that this research incorporated a limited number of respondents, although this can be explained, to some degree, by the fact that the number of individuals within the city of Heerlen and Utrecht which are engaged with the topic of the smart city are quite limited. This however does mean that, although the key individuals were contacted, certain aspects of the transferal, articulation and effects of the smart city may have been overlooked.

***Literature overview***

AgentschapNL. (2011). *Amsterdam Smart City.* Utrecht: AgentschapNL

AgentschapNL. (2013). *Business opportunities in Singapore as a Smart City.* Utrecht: AgentschapNL

Ahmed, D.M., Anguluri, R. (2014). Conceptual Understanding of Smart Cities. *International Journal of Science and Research,* 3, pp. 1470-1473

Alawadhi et al. (2012). *Building Understanding of Smart City Initiatives.* International Federation for Information Processing

Annoni, P., Dijkstra, L. (2013). EU Regional Competitiveness Index; RCI 2013. *JRC Scientific and Policy Reports.* European Commission.

Bal, M. (2002). *Travelling Concepts in the Humanities: A Rough Guide.* Toronto: University of Toronto Press.

Barca, F., McCann, P., Rodríguez-Pose, A. (2012). The Case for Regional Development Intervention: Place-based versus Place-neutral Approaches. *Journal of Regional Science,* 1, pp. 134-152

Barnett, C. (2010). Publics and Markets What's wrong with Neoliberalism? In Smith, S., Marston, S., Pain, R., Jones, J.P. *The Handbook of Social Geography.* New York: Sage

Baxter, P., Jack, S. (2008). Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. *The Qualitative Report,* 13, pp. 544-579

Bell, S. (2011). System city: Urban amplification and inefficient engineering. In Gandy, M. *Urban constellations*. Berlin: Jovis

Berman, P. (1978). The Study of Macro- and Micro- Implementation. *Public Policy* , pp. 157-184.

Berthon B., Guittat P. *Ascesa della città intelligente.* Accenture.

Bigliani, R., Gallotti, G., 2009. *Best Practices: Bringing Stakeholders Together: The Amsterdam Smart City Project*. Energy Insight

Boggs, J.S., Rantisi, N.M. (2003). The 'relational turn' in economic geography. *Journal of Economic Geography,* 3, pp. 109-116.

Bohman, J. (2005). *Critical Theory.* Consulted on 25 January 2015 through http://plato.stanford.edu/entries/critical-theory/

Bollier, D. *How Smart Growth Can Stop Sprawl: A Fledgling Citizen Movement Expands*. Essential Books: Washington D.C.

Brainport Development (2015). *Jaarplan Brainport Development NV 2015. Koersen op extra groei.* Consulted on 13 March 2015 through http://www.brainportdevelopment.nl/wp-content/uploads/2014/12/Jaarplan-2015-def.pdf

Busch-Hansen, H., Wigger, A. (2011). *The Politics of European Competition Regulation A critical political economy perspective.* Abingdon: Routledge

Caragliu, A., Del, C., Nijkamp, P. (2011). Smart Cities in Europe. *Journal of Urban Technology*, 18, p. 65-82

Casi. (2014). *Smart cities as sustainable innovation actors. Insights from and for Portugal.*

Chimezie, A., Osigweh, Y. (1989). Concept Fallibility in Organizational Science. *The Academy of Management Review*, 14, p. 579 - 594

Citykeys. (2015). *Citykeys.* Retrieved on 27-12-2015 from http://www.citykeys-project.eu/

Creswell, C. (2013). *Qualitative inquiry & research design.* Thousand Oaks, CA: Sage

Cochrane, A., Ward, K. (2012). Researching the geographies of policy mobility: confronting the methodological challenges. *Environment and Planning A*, 44, pp. 5-12

Dear, M. (2005). Comparative Urbanism. *Urban Geography*, 26, pp. 247–251

Department for Business, Innovation and Skill United Kingdom. (2013). *Smart Cities Background Paper.*

Dolowitz, D.P., Marsh, D. (2000). Learning from Abroad: The Role of Policy Transfer in Contemporary Policy-Making. *Governance: An International Journal of Policy and Administration*, 13, pp. 5-23

Dutton, W.H., Blumler, J.G., Kraemer, K.L. (1987). Continuity and Change in Conceptions of the Wired City. *The American Cities and Technology Reader: Wilderness to Wired City.* Roberts, G.K. (1999). London: Routledge

Eekeren, van P., Elbrink, R. (2005). Eindhoven, leading in technology. On the fibre-optic networking of a city. *IT Management Select,* 11, pp. 36-46

Eisenhardt, K.M. (1989). Building Theories from Case Study Research. *The Academy of Management Review,* 14, pp. 532-550

EuroCities. (2015). *EuroCities annual report 2014-2015*.

European Commission. (2013). *Smart Cities stakeholder platform 10 year rolling agenda.*

EU Smart Cities. (2014). *Market Place of the European Innovation Partnership on Smart Cities and Communities.* Consulted on 22 December 2014 through http://eu-smartcities.eu/faqs

Evans, D. (2011). *The Internet of Things: How the next evolution of the Internet is changing everything.* San Jose: Cisco

Fernández, A.M. (2011). *Spatial interventions as planning tools for knowledge-based development in the Netherlands.* Paper presented at the 2011 EURA Conference "Cities without Limits" Copenhagen

Foray, D. (2012). *Smart specialization and the New Industrial Policy agenda.* European Commission

Frank, M.C. (2009). Imaginative Geography as a Traveling Concept. Foucault, Said and the Spatial Turn. *European Journal of English Studies*, 13, pp. 61-77

Gemeente Eindhoven. (2014). *Eindhoven door EU geselecteerd voor ontwikkeling als Smart City.* Consulted on 24 September 2014 through http://www.eindhoven.nl/artikelen/Eindhoven-door-EU-geselecteerd-voor-ontwikkeling-als-Smart-City.htm on

Gemeente Heerlen. (2008). *Stadsvisie Heerlen 2026 Energiek Hart van Parkstad*. Gemeente Heerlen: Heerlen

Gemeente Roosendaal. (2014). *Verkenning en scope voor Smart Retail City. Verslag van de verkenningscommissie Roosendaal Smart Retail City.* Roosendaal.

Gemeente Utrecht. (2010). *Gemeenteraadsverkiezingen 2010: Verkiezingsuitslagen Utrecht 3 maart 2010.*

Giffinger et al. (2007). *Smart cities Ranking of European medium-sized cities*. Vienna, UT: Centre of Regional Science

Harrison, C., Donnelly, I.A. (2011). A Theory of Smart Cities. *Proceedings of the 55th Annual Meeting of the ISSS*

Hill, D. (2013). *On the smart city: Or, a 'manifesto' for smart citizens instead.* Consulted on 27-3-2015 through http://www.cityofsound.com/blog/2013/02/on-the-smart-city-a-call-for-smart-citizens-instead.html

Hollands, R. (2008). Will the real smart city please stand up? *City: analysis of urban trends, culture, theory, policy, action,* 12:3, p. 303-320

Hostovsky, C. (2006). The Paradox of the Rational Comprehensive Model of Planning Tales from Waste Management Planning in Ontario, Canada. *Journal of Planning Education and Research,* 25, pp. 382-395

IBM. (2012). IBM's Smarter Cities Challenge Johannesburg Summary report. New York: IBM

Jacobs, W., Lagendijk, A. (2014). Strategic coupling as capacity: how seaports connect to global flows of containerized transport. *Global Networks*, 14, pp. 44-62

Kang-juan, L., Liu-qing, X. (2012). Study on the Smart City and Its Economic and Social Effect Based on the Internet of Things. *Lecture Notes in Information Technology*, 25.

Kitchin, R. (2014). The real-time city? Big data and smart urbanism. *GeoJournal,* 79, pp. 1-14

Komninos, N. (2006). The architecture of intelligent cities. Integrating human, collective, and artificial intelligence to enhance knowledge and innovation. *Institution of Engineering and Technology*, p. 13-20.

Kreijkamp, J. (2015). *Samen Smart City.* In *Smart City and Logistics*, p. 8-9

Lett, J. (1990). *Emics and etics: Notes on the epistemology of anthropology*. In T.N. Headland, K.L. Pike, & M.

Marceau, J. (2008). Introduction: Innovation in the city and innovative cities. *Innovation: Management, Policy & Practice,* 10, pp. 136-145.

Markie, P. (2015*). Rationalism vs. Empiricism*. *The Stanford Encyclopedia of Philosophy*. Consulted on 28-2-2016 through http://plato.stanford.edu/archives/sum2015/entries/rationalism-empiricism

Matland, R. (1995). Synthesising the implementation literature: the ambiguity-conflict model of policy implementation*. Journal of Public Administration Research and Theory,* 5, pp. 145-174.

McCann, P., Argilés, R. (2011). *Smart Specialisation, Regional Growth and Applications to EU Cohesion Policy.* Groningen: University of Groningen.

McCann, E., Ward, K. (2012). Policy Assemblages, Mobilities and Mutations: Toward a Multidisciplinary Conversation. *Political Studies Review,* 10, pp. 325-332

Meyer, M. (2010). The Rise of the Knowledge Broker. *Science Communication*, 32, pp. 118-127

Miller, P., Rose, N. (1990). Governing Economic Life*. Economy and Society*, 19, pp. 1-31

Miller, P., Rose, N. (1992). Political Power beyond the State: Problematics of Government*. The British Journal of Sociology*, 43, pp. 173-205

Ministerie van Infrastructuur en Milieu (2014). *Smart Cities: Naar een 'Smart Urban Delta'*.

Mundula, L., Auci, S. (2013). *Smart Cities and a Stochastic Frontier Analysis: A Comparison among European Cities.*

Nam, T., Pardo, T. (2011). Conceptualizing Smart City with Dimensions of Technology, People, and Institutions. *12th Annual International Digital Government Research Conference: Digital Government Innovation in Challenging Times*

Nota Ruimte (2004). *Nota Ruimte, Ruimte voor Ontwikkeling*.

Nijman, J. (2007). Introduction-Comparative Urbanism. *Urban Geography*, 28, pp. 1–6

OASCities. (2015). *Dutch Cities join Open and Agile Smart Cities.* Retrieved on 27-12-2015 from http://connectedsmartcities.eu/dutch-cities-join-open-agile-smart-cities/

OECD. (2006). *DAC Guidelines and Reference Series Applying Strategic Environmental Assessment: Good Practice Guidance for Development Co-operation*. Paris: OECD.

Paes, E. (2013). *C40 City Diplomacy.*

ParkstadLimburg (2014). *Mijnwater Rapport.* Consulted on 15 June 2015 through http://www.rekenkamersparkstadlimburg.nl/rekenkamer/home.nsf/d29e18d6b25acfd0c1256c110069900b/5e20e3e4f1501e41c12572c3003f549c/$FILE/ATTOKZWD.pdf/Rapport%20Mijnwater.pdf

Peck, J., Theodore, N. (2010). Mobilizing Policy: Models, methods, and mutations. *Geoforum,* 41, pp. 169-174

Pike Research (2011). *Global investment in smart city technology infrastructure to total $108 billion by 2020.* Consulted on 15 march 2015 through http://www.pikeresearch.com/newsroom/global-investment-in-smart-city-technology-infrastructure-to-total-108-billion-by-2020

Pintér, L., Swanson, D., Abdel-Jelil, I., Nagatani-Yoshida, K., Rahman, A., Kok, M. (2007). *A training manual on integrated environmental assessment and reporting.* UNEP

Ribes, D., Jackson, S. J. (2013). Data bite man: The work of sustaining long-term study. In L. Gitelman (Ed.), *''Raw data'' is an oxymoron*. Cambridge: MIT Press

Rosenberg, D. (2013). Data before the fact. In *L. Gitelman (Ed.), ''Raw data'' is an oxymoron*. Cambridge: MIT Press.

Sabatier, P., Mazmanian, D. (1980) The implementation of public policy: a framework of analysis. *Policy Studies Journal,* 8, pp. 538-560.

Said, E. (1983). *Traveling Theory, the World, the Text and the Critic*. Cambridge, MA: Harvard University Press.

Salmelin, B. (2015). *Innovation cannot be controlled.* Consulted on 15 June 2015 through https://ec.europa.eu/digital-single-market/news/bror-salmelin-innovation-can-not-be-controlled

Sheller, M., Urry, J. (2006). The new mobilities paradigm. *Environment and Planning A,* 38, pp. 207-226.

Shelton, T., Zook, M., Wiig, A. (2014). The 'Actually Existing Smart City'. *Cambridge Journal of Regions, Economy and Society*

Short, J.R, Breitbach, C., Buckman, C.S. and Essex, J. (2000) From world cities to gateway cities: extending the boundaries of globalization theory, *City*, 4, pp. 317–340.

Smart Services Hub. (2014). Masterplan Smart Services Hub: Answers to Future Questions. Voerendaal: Schrijen Lippertz

Smit, B. (2002). Atlas.ti for Qualitative Data Analysis. *Perspectives in Education*, 20, pp. 65 - 76

Söderström, O., Paasche, T., Klauser, F. (2014). *Smart cities as corporate storytelling*. Switzerland, Neuchâtel: Institut de Géographie, Université de Neuchâtel.

SSHRC. (2008). *Knowledge impact in society: A SSHRC transformation program.*

Stake, R.E. (2013). *Multiple Case Study Analysis*. New York: The Guilford Press

Stedenlink (2015). Over Stedenlink. Consulted on 11 March 2015 through http://www.stedenlink.nl/index.php?option=com_content&view=article&id=52&Itemid=65

Sunley, P. (2008). Relational Economic Geography: A Partial Understanding or a New Paradigm? *Economic Geography,* 84, pp. 1-26

Temenos, C., McCann, E. (2013). Geographies of Policy Mobilities. *Geography Compass*, pp. 344–357

Townsend, 2013. *Smart Cities: Big Data, Civic Hackers and the Quest for a New Utopia.* W. W. Norton & Company: New York

United Nations. (2010). *Urban and Rural Areas 2009.* Consulted on 20 December 2015 through http://www.un.org/en/development/desa/population/publications/urbanization/urban-rural.shtml

United Nations. (2014). *World's population increasingly urban with more than half living in urban areas.* Consulted on 20 December 2014 through http://www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html

UN-DESA, United Nations Department of Economic and Social Affairs. (2010). *Urban and Rural Areas 2009.* New York: United Nations

UN-DESA, United Nations Department of Economic and Social Affairs. (2014). *Urban and Rural Areas 2014*. New York: United Nations

van Ark, B., O'Mahony, M., Timmer, M. P. (2008). The productivity gap between Europe and the United States. *Journal of Economic Perspectives*, 22, pp. 25-44

Ward, K. (2010). Towards a relational comparative approach to the study of cities. *Progress in Human Geography,* 34, pp. 471–487

Van Winden, W. (2008). Urban governance in the knowledge-based economy: Challenges for different city types*. Innovation: Management, Policy & Practice,* 10, pp. 197-210.

World Bank. (2009). *World Development Report 2009: Reshaping Economic Geography*. Washington, DC: World Bank.

World Intellectual Property Organization (WIPO), Cornell University, INSEAD (2014). The Global Innovation Index 2014. The Human Factor in Innovation. Geneva: World Intellectual Property Organization.

Yin, R.K. (2003). *Case study research: Design and methods.* Thousand Oaks, CA: Sage.

Zhiyang, L. (2014). Origin & Development of Smart Cities. *China Standardization*, p. 44-45.
Critical theory

**Image**
Gerd Altmann, https://pixabay.com/nl/binaire-een-null-continenten-aarde-1414319/.

| *Overview respondents* | |
|---|---|
| *Name respondent* | *Organization* |
| Rob Aalders | Startup Europe and Municipality of Heerlen |
| Maurice Huppertz | Municipality of Heerlen |
| Jelle van der Weijde | Economic Board Utrecht |
| Egid van Houtem | Social Beta and Spark City |
| Frank-Jan van Lunteren | Smart City Utrecht |