Governance Processes in Smart City Initiatives

Exploring the implementation of two Dutch Smart City Projects:
TRANSFORM-Amsterdam and TRIANGULUM-Eindhoven

triangulum

TRANSFORM

TU Delft

*Cover explanation: The implementation of Smart City projects is a social rather than technical thing. The light bulb stands for the Smart City project, in this case it is ‘floating' above the ground, since these projects hardly ever get implemented, not finding ‘solid ground’. The project stays 'intentional' ideas, hence the light bulb as representation The mechanical wheels, in the light bulb, represent the core governance processes, with the most important one in the middle: collaboration. The sky high ambitions of 'improving quality of life' are represented by the light bulbs in the clouds. The term 'lighthouse' is used for the Living Labs, as innovative urban areas, in which these smart city initiatives are placed. The fact that multiple light bulbs are connected, relates to the 'service and application integration’ searched for in these initiatives, or represents the partner cities in these European funded projects. The other light bulbs in the background show the high amount of Smart City initiatives in a city. Data exchange can be seen as 'the cloud', in which information is exchanged. The person in the light bulb represents the crucial social factor for implementing these technological projects.

Colophon

Thesis

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Preface

This thesis has been written at the Delft University of Technology, for the Faculty of Architecture, for the department Management in the Built Environment (MBE). Out of all the master tracks, MBE is the only one focusing on all the phases in the life cycle of urban development, from initiative to use. Or, as described in this thesis, from 'starting' to 'monitoring and evaluation', regarding the implementation of two European funded Smart City initiatives in the Netherlands, focusing on the critical role of governance. It will be presented at the 10th of November 2016 to my first mentor Tom Daamen, second mentor Ingrid Mulder and external examiner Jan Jacob Trip.

This research aims to be a useful guidance for stakeholders involved in (European funded) Smart City initiatives, especially in the Netherlands. In which the revised governance framework will be a guide to improve implementation by focusing on specific governance processes and the embedding of governance success factors and overcoming barriers. In detail the following will be strived for:

- To give insight in the effect of governance factors on Smart City implementation activities;
- To improve the process of implementation by steering on governance success factors and barriers.

As a Smart City initiative cannot be implemented without effective collaboration, so could this work not have been written without the 'champions' who pushed my boundaries. First, I would like to thank Ronald van Warmerdam for the opportunity to get acquainted with this topic, and to gain practical experience as an intern during the Transform project at the Municipality of Amsterdam, on an international level, as well as on a local scale working with Geert den Boogert and Bob Mantel for the Smart Urban Lab in Amsterdam Southeast. Ronald's critical view on this topic, as well as his motivational drive and enthusiasm towards a better world inspired me deeply. Special thanks to Geert who was always willing to answer my newly arising questions, and with whom I've made an amazing business trip to the city of Vienna with as representatives for the city of Amsterdam to discuss international challenges and successes in the implementation of Smart City projects. I am grateful for the transparency in communication with the interviewees from both Smart City projects in Transform and Triangulum, offering me their insights and providing me fine details about their experiences in these complex projects.

This long, often surprising, sometimes mind-blowing, intense learning experience, could not have been done without the ongoing support and guidance from my mentors Tom Daamen, and Ingrid Mulder. I truly enjoyed our meetings, thanks for keeping me on my toes and staying true to this subject. Thanks to Ellen, Mark and Marcel in forming a graduation partnership, providing each other with the necessary feedback. Many thanks to Wibo van Riezen, Selinde Biesheuvel, and Pim Sleeboom, for our discussion on content and process. I would like to thank my dear friends for all the good times. Finally, Special thanks to my family Frans and Willy, Rianne and Richard and my girlfriend Kulani for their infinite love. I could not have done this without you.

Nikander Hartemink

The Hague,

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Abstract

The Smart City concept is becoming a new urban development strategy. Dutch cities, like Amsterdam and Eindhoven, are trying to develop Smart Urban Districts, driven by European funding. In this effort Practitioners and academics notify many barriers towards successful implementation of Smart City initiatives. Apart from financial, technical, management and policy issues, more and more experts indicate governance as the key in realizing these complex projects. Therefore the aim of this thesis is to develop further insights in the governance of Smart City initiatives and the specific processes that can improve implementation. The proposed governance framework is based on the processes: collaboration, leadership and champion, partnership and participation, communication, service and application integration, data-exchange, transparency and accountability. The framework is applied for the analysis of two Dutch Smart City case studies Transform-Amsterdam and Triangulum-Eindhoven. The study concludes that collaboration is the core process of governance, mainly driven by leadership, partnership and participation, on the basis of transparency and accountability, supported by the other governance processes. No additional governance factors have been identified. The governance framework proved to be supportive in getting insight in the different processes of the specific Smart City initiatives. This framework, including the defined influencing processes, their mutual relations and the overview of success factors and barriers can be helpful to plan interventions to improve the critical factor of governance in the implementation of Smart City initiatives. The framework does not offer characteristics of maturity levels for each process.

Keywords: Urban Area Development, Smart City, Smart City Implementation, Smart City development, Governance, Governance Framework, Case Study.

Management Summary

Smart Cities are a new phenomenon in urban development. In academic literature, documentaries, journals magazines, and events, but also in practice through the European funded Smart City programs. This thesis defines a Smart City as “A city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based partnership”. Basically the concept for the Smart City is the representation of integrating the possibilities of ICT within the domain of urban area development (‘the approach’), to realise ambitions on a higher level than ever (‘the essence’), while at the same time adjusting the classic governance to a more open and participating collaboration process between designers, developers, citizens and other city stakeholders (‘the nature’).

The European Union is promoting the benefits of Smart Cities, expecting this leads to a significant improvement of citizens’ quality of life, increased competitiveness of Europe’s industry and innovative Small and Medium Enterprises, and improved sustainability. Today, each city in the Netherlands, individually is experimenting and investing in new infrastructure solutions and applications, in their effort towards becoming a Smart City. In this effort, Smart City projects, in the form of urban development projects, have proven to be ineffective in their implementation. Implementation issues are related to financial and technological uncertainties and the more social aspects like policy, management, and governance.

The integrated framework of Chourabi et al. (2012) is the most complete framework to describe the complexity of Smart City initiatives. They identify eight influencing factors: management and organization, technology, governance, policy context, people and communities, economy, built infrastructure, and natural environment. Although each Smart City initiative will have its own critical bottlenecks, it is clear governance aspects are of great influence and critical importance for the success of a Smart City initiative, due to their ‘nature’. Belissent, 2011b; Alawadhi, 2012; Dameri, 2013; Kogan, 2014; Bylund, 2015; Dameri and Rosenthal-Sabroux, 2014; Kim, 2015, all point at ‘governance’ as a critical factor for Smart City implementation, while all holding different viewpoints to this concept.

Hence, the main research objective of this thesis is to provide insight in the governance of Smart City implementation efforts by identifying a governance framework based on the barriers and success factors found in literature about Smart City implementation. This governance framework is revised by collecting empirical evidence on Smart City implementation in the two Dutch Smart City projects Transform in Amsterdam and Triangulum in Eindhoven.

I define governance as: “the collective governing in complex networks of stakeholders without hierarchical structure and line of command and control, meaning to bundle activities of all relevant parties and create an optimal environment to realize agreed upon objectives”. Based on the Smart City framework by Chourabi et al. (2012), the eight ‘governance’ factors (processes) are: Collaboration, leadership and champion, participation and partnership, communication, data-exchange, service and application integration, accountability, and transparency. For each process a definition is formulated based on the main characteristics, derived from the literature. The relation between the governance processes is presented in a visual model: the governance framework.

Conclusions

I use the conceptual framework of governance processes to give a visual impression of their impact on the Smart City Initiative. Green processes have had mainly a positive influence; orange processes

have had partly positive and partly negative influence; red processes had mainly a negative influence or their influence was largely lacking. The translation from the defined conclusions to this visual representation is a highly subjective one, since there are no objective measuring criteria available to determine the contribution for each process. Being aware of this limitation, the visual offers a view on the strengths and weaknesses of governance in a Smart City initiative, based on the two Dutch cases Transform and Triangulum. It also offers a handle to compare the different analysed initiatives on a higher level of abstraction, concerning the impact of the governance processes.

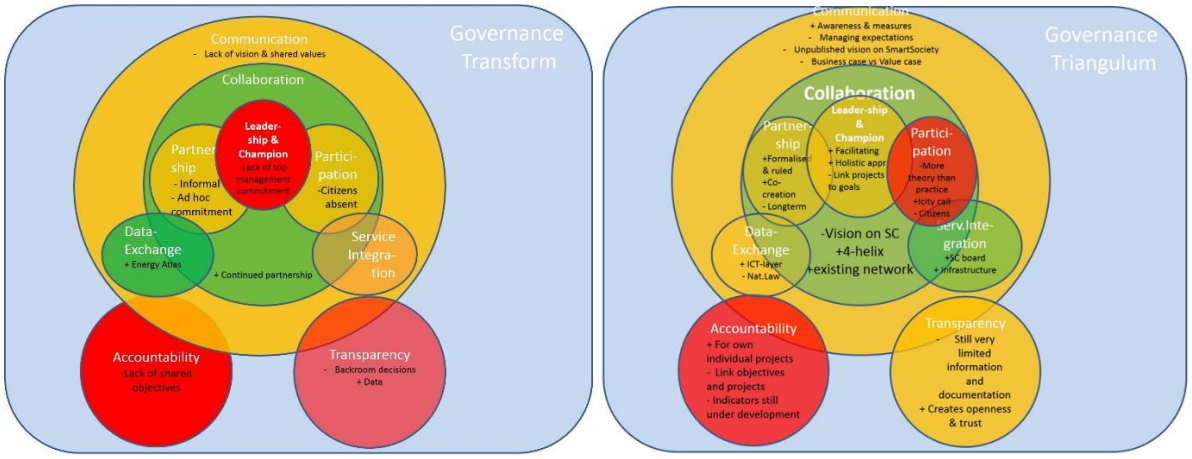

Fig Conceptual Governance Framework: main problematic processes of Transform and Triangulum (in red & orange)

Transform: clear flaws relating to Leadership & Champion and Accountability. Concerning Leadership & Champion, a lack of private and public top management involvement is found, together with a lack of accountability, which corresponds to the set up of this European funded initiative, in which local stakeholders are not directly committed to the objectives for its projects, and a lack of concrete shared objectives and commitment for project plans. As expressed by some interviewees: “nobody is accountable”.

Triangulum*:* Processes like communication, data-exchange, transparency are not optimal, while accountability and participation really need more attention of the partners. Partners, are committed to the project from the start, investing in specific projects themselves, thus they are more aware of the impact of the governance factors.

To describe the two cases Transform and Triangulum, I used the roadmap from Bolici & Mora (2015). There is one clear deviation regarding this roadmap and the two cases described in this thesis. Bolici and Mora use this roadmap to develop an overall Smart City strategy for a city, while the cases focus on developing Smart Districts. Nevertheless, the roadmap has proven to be useful as a description model. Only minor alterations are suggested in continuing using this roadmap: I found it rather short-sighted that Bolici and Mora only defined the step “communicate and promote the Smart City Strategy”, rather than including steps on creating effective communication throughout the process. An extra step should be added after projects are implemented: ‘replicate successful projects and erect structural collaboration’ as a final step in the development phase. Since upscaling of Smart City projects, and the continuation of collaboration define to a great extend the success of Smart City projects.

Revised Frameworks

The experience with the use of the governance framework for the analysis of the two cases leads to a revised framework based on more insight on the relations between the different processes. The three governance factors collaboration, leadership & champion, participation & partnership show to

be apparent in the case interviews, with the main focus on 'collaboration' in both cases. I defined 'Participation' and 'Partnership' as separate processes because they concern different types of stakeholders and different informal and formal forms of collaboration with corresponding rules and policies.

During the interviews, no new governance factors have appeared. The factors communication and data-exchange were less prominent in the cases than expected based on the literature. But in a second round of interviews, verifying results, the importance of data-exchange to successful implement Smart City projects was underlined. Service integration, accountability and transparency are less prominent in the Smart City theory I found, as well as in the practice of the two cases. To my idea the impact of these processes is underestimated in practice. I therefore argue that the processes for accountability and transparency are forming a platform, offering the checks and balances for all other processes to determine whether the appropriate levels of transparency and accountability are realized. This revised governance model, the process definitions, the characteristics per process and the mutually relations between the processes, can be used as the basis for the organization and evaluation of governance in specific Smart City initiatives in the Netherlands. The governance framework presented is positioned as further specification of the integrative framework for understanding Smart cities (fig. 3-5) by Chourabi et al.(2012). In contrast to their framework, I *conclude that 'governance' is not a given contextual factor but an intrinsic part of a Smart City initiative (even part of its nature)* with intense relations to the management & organization, technology and policy factors. Therefore I suggest to revise the model of Chourabi et al. in a format that reflects this core position of Governance in Dutch Smart City initiatives (fig. 8-7).

Governance of a Smart City initiative, means influencing the targeted results, the involved stakeholders and all steps on the way to the results. Those steps can be technical, organizational or concern the policy of some or all stakeholders. Governance is shaping an initiative, like the external factors in the integrative framework, but there is a higher form of interaction: a Smart City initiative is also shaping the governance it needs and deserves.

I have formulated some recommendations for further research on the topics of European funded projects, Smart City implementation, Governance processes and Smart City strategies.

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1 Introduction

This chapter introduces the phenomenon of Smart City in the context of urban area development in The Netherlands and Europe. I will show from different perspectives what current implementation barriers are found and describe the research I have set up to tackle these barriers from a governance framework. This chapter concludes with a short reader's guide for this thesis.

Smart City initiatives have been springing up everywhere. "As of 2012, there were approximately 143 ongoing or completed self-designated Smart City projects. Among these initiatives, cities in North America (35 projects) and Europe (47 projects) are leading efforts to implement smart technologies to address and resolve urban problems. All demonstrate high expectations of the use of the concept of (becoming) a Smart City" (J.-H. Lee & M. Hancock, 2012, p. 82). In 2014, in Europe the initiative by The European Innovation Partnership 'Smart Cities & Communities' let to 370 submitted commitments for Smart City projects and solutions by more than 3000 partners (European Commission, 2014a). These commitments are published on an online market. The first Smart City call in 2014 for the European Horizon 2020 project is won by Triangulum, a partnership in which cities of Eindhoven, Manchester and Stavanger are joining forces to develop, test, and apply Smart City ideas (Tijl, 2014). In the lead of these commitments are the business sector and public authorities, private individuals show to be only 2%, as shown below.

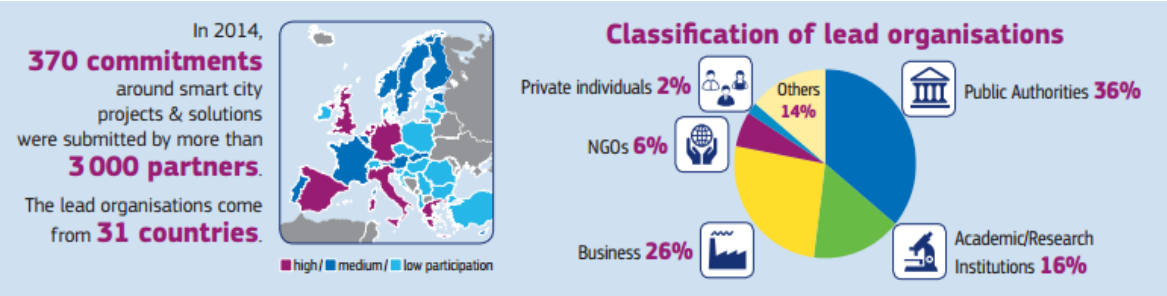


Figure 1-1 Overview Smart City Projects and Solutions in Europe (European Commission, 2014a)

The scale, size and impact of these 'smart city projects & solutions' remain unclear, as well as what amount has actually been completed.

Willem van Winden, urban economist specialized in urban innovation and policy, professor of Urban Knowledge Economy & Strategy at Amsterdam University of Applied Sciences held a presentation on the 10th of March 2016, on 'Smart City pilot projects: scaling up or fading out?'. He concluded that "Typically, these projects are supported by the municipality, funded by subsidies, and run in partnerships. In many cases however, their impact is very limited, as many projects die after the pilot stage, and never scale up." (Winden, 2016). This sounds alarming, especially since URENIO (Urban and Regional Innovation Research) published a research which revealed that in the next three years, one-third of medium-sized and large cities will define their Smart City Road Map (Brooks, Claps, Clarke, & Wang, 2015). This observation, together with the notion that implementation and up scaling of Smart City projects fail, calls for appropriate long-range policy strategies for urban areas (Urban Europe, 2011) and new and innovative ways to manage and govern the complexity of urban living problems (Chourabi et al., 2012).

This chapter introduces the topic of Smart City implementation. After a short explanation of Smart City as urban development and of the Smart City concept, I will touch upon the main drivers for this relatively new phenomenon in urban planning and development, provide an overview of different

perspectives on the mishaps in Smart City implementation, I will describe these observations from different perspectives about the challenges smart city initiatives are supposed to meet, as a background for an analysis of success factors and barriers during Smart City implementations. I will explore and motivate the choice for focusing on governance aspects during Smart City implementation. The focus lies on two cities in The Netherlands – Amsterdam and Eindhoven – where the implementation of two European Smart City initiatives – Transform, have been, and Triangulum, are being, pursued on a urban district scale.

1.1 Smart City as Urban Development

Cities will play an important part in the future of urbanized Europe. Major challenges that cities are facing are due to changes in the economy, in the related availability of capital, in their demographic profile, in mobility, in the environment, in climate change, in social participation, and in energy shortage, usage and production. In order to face these urban development challenges, many stakeholders place great faith in the concept of the Smart City.

Urban Development

The current urban environment is of a high complexity. As Healey states it, "a complex mixture of nodes and networks, places and flows, in which multiple relations, activities and values co-exist, interact, combine, conflict, oppress and generate creative synergy"(Healey, 2006, p. 1).The development of this urban environment (often designated as 'spatial strategies') is not a simple top-down process anymore, but it "centres around collective action, both in formal government arenas and in informal mobilisation efforts, which seeks to influence the socio-spatial relations of an urban area, for various purposes and in pursuit of various values" (Healey, 2006, p.1). The involvement of many stakeholders does not necessarily lead to adequate policy. Top-down command-and-control is no longer appropriate and a form of collaborative governance by a group of stakeholders is more and more seen as the needed approach.

De Zeeuw and Franzen relates to this view by opting urban development is "the art of connecting functions, disciplines, actors, interests and financial flows, focusing on (re)development of an area" (de Zeeuw & Franzen, 2008, p.15). Or as Peek and Troxler state it:

> Urban area development may be defined as the integral development of a (large scale) area, in all its dimensions over a long period, with different stakeholders (public and private). There are no clear limits in terms of size, investment volume, or mere square meters. Complexity is the common denominator as both content and context of the development are complex as a result of a certain combination of the different elements (Peek & Troxler, 2014, p.153)

To get a grip on the complexity of urban development Peek and Franzen name five main disciplinary aspect: 1) public private partnership, 2) land assembly, 3) financial engineering, 4) urban design and 5) branding. This is similar to the viewpoint of Van Hoek and Wigmans who state urban development "combines aspects of governance, urban planning, economic development, financial management, social planning and marketing, and leads to a more integrated strategic decision-making process in which both public and private sectors participate" (Franzen, Hobma, de Jonge, & Wigmans, 2011, p. 53). According to these visions 'governance' has become relevant as a mean of handling the current complexity in urban development.

The Smart City is, like any other urban development form, “part of a broad range of activities involving government intervention at various levels, from local, regional or provincial to national or even international level, and in interaction with the activities of private organizations” (Franzen et al., 2011). The complexity of Smart City projects is typified by technical content dynamics and organisational dynamics (Weening, 2006). In this thesis the focus will lie on the organisational dynamics, like the actor composition.

In the case of Smart City development, instead of involving private organizations such as property developers, often other organizations are involved: for example ICT companies, energy or grid companies, and consultancy companies. As for government intervention, Smart City development is widely influenced by all different levels, international (EU), national, regional and local. In this context, the urban development process has changed by adding ICT as an extra layer, making the implementation process even more complex. The following statement from Tomasz Janowski’s research outline ‘Smart Cities for Sustainable Development’ from United Nations University clearly shows the potential of Smart City initiatives, as well as the challenges in urban development:

> Smart City initiatives can help overcome the limitations of traditional urban development that tends to manage urban infrastructure systems in silos. By leveraging the pervasive character of data and services offered by digital technologies. . . they help [to] connect different city stakeholders, improve citizen involvement, offer new and enhance existing services, and provide context-aware views on city operations. Smart City development is, however, highly complex, challenging and context-specific. The challenges include different discourses used by technologists and policymakers, lack of capacity to connect urban sustainability challenges to actionable approaches, and pressures on social and territorial cohesion requiring unique governance solutions. (Janowski, 2015)

Concerning the five main disciplinary aspects of urban area development of Peek and Franzen, the following can be posited: Smart City developments need to establish public private partnerships (1) to form a stable basis for collaboration. An example is the European Innovation Partnership (EIP) which “looks to establish strategic partnerships between industry and European cities”(Communities, 2014). Land assembly (2) is not always relevant for Smart City development, however, specific zoned areas are often determined, influencing development to a great extent. Instead of land assembly, the focus lies more on infrastructure assembly, (for example concerning smart (energy) grids or ICT-architecture; as for financial engineering (3) it often shows that assessing future value of an investment is very difficult, since Smart initiatives can be seen as urban innovation programmes in which outcomes are still unknown. Thus finding funding is a big deal. Urban design (4) of a Smart City, can deal with spatial outlines for example infrastructural works, here often ICT takes over the spatial aspects of urban development. Finally, branding (5) is a key component for a Smart City in communicating core-values of the future area, and changing its reputation (Amsterdam Smart City & Eindhoven Smart Society).

Implementation process urban development

In most Urban Area Developments (UAD) the implementation process is organised as a waterfall model divided in four phases. Actors take the initiative to set goals, define a strategy and make resources available to start a project or programme. Planning is a crucial phase in which the goals are operationalised and the work is organized. During the execution of the plan, strength is developed by building on available success factors, but weakend by the presence of barriers to overcome. Depending on the outcome of this realisation phase the results are, more or less, matching the objectives. Governance is a crucial factor of influence during all the phases, traditionally executed from steering committees, programme boards, public-private consortia etc., but more and more

realised by less clear structured collaboration. The work is executed within an ever changing context which may influence all aspects of the initiative. These implementation aspects are visualised in the Urban area development implementation model. The model can be used on a programme level, and in succession also on a project level. Combining the two levels would create a looped model.

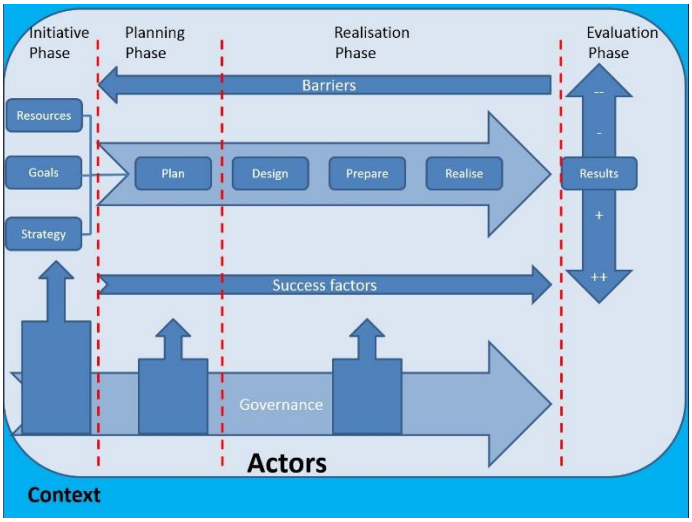


Figure 1-2 Urban area development implementation model

In this thesis I will refer to 'implementation power' as the strengths of the involved stakeholders to realise the objectives of the Smart City initiative. The 'implementation power' originates from the competencies (knowledge, skills and attitude) of the people involved, the available means and the facilitating organization. The 'implementation power' developed by the organisation is also largely dependent on the attractiveness of the objectives and the vision it is based on for the participants. Implementation power is a theoretical concept since it cannot be measured exactly. The idea is that the available power should fit the challenges to be successful and can be seen as a result from optimal preparation by assuring the availability of success factors including the measures to overcome foreseen barriers.

Urban development can be described as a linear process, starting with an initiative, followed by planning, execution and maintenance. However in reality, urban development (especially Smart City development) is often an iterative process. Iterations can take place within the phases but also by short cutting to earlier phases in the sequence. Having iterations on different levels (programme and projects) makes clear that governance of these operations is demanding.

These iterations articulate the need for governance in the complex network environment of Smart City development. For urban innovation, Smart City in particular, the external system is of high importance. This system includes: the external environment, government policy and regulation, social network and incentives, and is shaped and impacted by the innovation under consideration (Ojo, Curry, & Janowski, 2014). The choice to develop Smart City initiatives in an urban area generally depends on "the role of public local government, on the territory and on its capacity to drive and influence the creation of public infrastructure for Smart City implementation" (Dameri, 2013, p. 2548).

Urban governance

In the Netherlands, the capacity of the government to change public infrastructure, thus the role of the government in urban development has been shifting: "Nobody has the monopoly over area development any more. The government had to give up its monopoly and enter into all kinds of co-productions"(Franzen et al., 2011) . The more traditional approach of developing cities through

government-led town planning has gradually been shifting to the more entrepreneurial approach of strategic management of both public and private initiatives in the urban environment. This method of policy making is increasingly developed on the basis of consultation. Without the partial agreement of private market wishes beforehand, hardly any urban development can take place. Private parties are, or need to be, included at an increasingly earlier stage. In the case of Smart City development, the role of the government can be varying from pushing and promoting, to facilitating and stimulating.

1.2 The Smart City in Europe and The Netherlands

The phenomenon of a Smart City is relatively new and has many interpretations. Baccarne, Mechant, & Schuurman see the Smart City as "a conceptual model which embodies a fresh wave of techno-optimism and emphasizes the positive effects of ICT and other innovative technologies in a city, often in combination with multidisciplinary collaborative partnerships" (Baccarne, Mechant, & Schuurman, 2014, p.1).

Europe and the Smart City

In Europe, from 2008-2010, the economic crisis really struck urban development practices. In this period alarming sounds came from property developers due to decreasing demand. At the same time smart urbanization publications appeared, involving new private parties, like ICT and energy companies. This concept grew globally, pushed by private companies like IBM and Cisco, who try to play their part in urban development. "Policy makers, city managers and industry leaders realized that building sustainable systems needs to include industry and technology providers to a far greater extent than originally thought" (Duncan, 2015, p.2).

The European Commission (EC) and the European Investment Bank launched a Smart Cities & Sustainable Development Programme in Europe, aimed to secure the EU's 2020, specifically in the domains of sustainable urban regeneration, ICT, renewable energy, energy efficiency, transportation and mobility. This programme is to be carried out by local authorities, utilities, smart Small Medium Enterprises (SMEs), and other founding members of the EIP on Smart Cities and Communities providing services to authorities over the period 2014-2017 for a total investment amount in excess of EUR 10 bn"(Group, 2013, p.1). The EC still finds this investment relatively modest considering the smart city market projections to exceed $ 1 trillion by 2016 (European Commission & Bartholmes, 2013).

Also outside Europe this topic is booming business. In India, the nation is embarking an ambitious $90 billion two-phase industrial programme to build new industrial cities as smart, sustainable cities of the future, in collaboration with Japan (European Union, 2014). China too is pursuing a Smart Cities strategy as part of its efforts to stimulate economic development and eradicate poverty. As of March 2012, this strategy, based in transforming existing cities, involved at least 54 Smart City projects totalling EUR 113 billion (European Union, 2014). An overview of global investments in Smart City development makes clear that this is a serious market, both for enterprises and politicians.

Smart City strategy

Cities and municipalities seem to use the Smart City concept as a form of city-branding, achieving high international rankings, attracting people and businesses, and stimulating economic prosperity. According to Wolfram (2012) the main factors contributing to the emerging of the concept Smart City are grand environmental challenges (global warming and climate change), urbanization issues

(growing share of urban population), competition (cities are competing against each other, ranking and branding), technology convergence (rapid technology push of ICT companies and system components), industrial convergence (integrating ICT components with other infrastructure and technology) and the information society, which becomes more advanced and widespread in which the role of the internet as enabler of collaboration and city services has become more important for urban development.

The heightened interest by a wide range of stakeholders for the potential of Smart City initiatives as a 'new' approach to the urban area development scene throughout the world, but mainly in Europe, requires for cities to have a suitable urban development strategy: "Smart Cities emerge not just as an innovative modus operandi for future urban living, but as a key strategy to tackle poverty and inequality, unemployment and energy inefficiency" (European Union, 2014, p.17)

According to (Rodríguez-Bolívar, 2015) the Smart City concept can serve both in defining means and ends of local economic development. Also Staffans & Horelli sees the concept is still in flux "The smart city seems to be both a strategic way of action and a normative, even a utopian goal, which often comprises a description of the city as a living environment enriched by ubiquitous technology" (Staffans & Horelli, 2014, p.1).

Weening notes in her thesis that there are mainly two types of Smart City projects, both with a central role for the relation with ICT and the city. One type focused on developing electronical services (ranging from information, and interaction to transaction), while the other type of projects are more focused on developing an ICT-infrastructure (including a physical component) often with a focus on the city (geographical) level, including an economical element, and initiated by public private partnerships. (Weening, 2006) In this thesis I will focus on Smart City initiatives which include both of these types of projects.

From the Report "*Mapping Smart Cities in the EU*", five types of Smart City initiatives are recognized. These are Smart City neighbourhood units, testbed micro infrastructures, intelligent traffic systems, resource management systems, and participation platforms. Of which the first one is mainly related to urban development, and the other four types of Smart City Initiatives are smaller projects. This thesis looks into two Dutch Smart City Initiatives on the largest scale of Smart City neighbourhood units (or Living Labs) in the energy and mobility field, thus relating to the physical infrastructure of the area. (European Union, 2014).

In the Netherlands, in 2009 Amsterdam Smart City (ASC) started with 14 test projects in order to decrease energy usage. These 'demonstration projects' were in between the design and implementation phase. Project examples are creating smart meters, energy scans, dimming of public light, a 'climate street' in which energy feedback displays create awareness of energy usage (Agentschap NL, 2011, p.2). In 2015, Margerita Angelidou noted that "Currently the program comprises 32 projects that encompass innovative ideas and new business models across Amsterdam's neighbourhoods. . . they are initially tested on a small scale and the ones that prove to be effective will be extended to include other areas"(Angelidou, 2015). So ASC might have tested these projects, but actual implementation and up scaling is definitely not the case for the majority of these projects. The scale and size of the ASC projects vary widely. They are mainly, small scale, low investment projects, ranging from for example smart phone applications to virtual management systems, a climate street, online dashboards, games for cities, etc. As research in *'Mapping Smart Cities in*

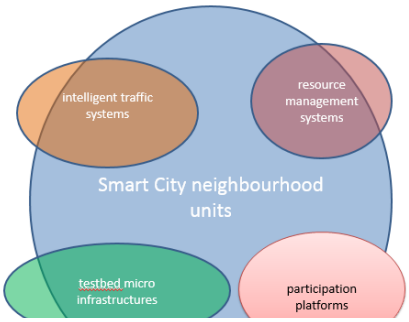


Figure 1-3 Five scales of Smart City Initiatives. (European Union, 2014)

the EU' found "Most Smart City projects developed in the ASC dealt with energy management systems for businesses"(European Union, 2014, p. 144).

In this research I see the Smart City as a tool in which the focus can be kept on 'how to' achieve goals like sustainability, innovation, employment and a better 'quality of life'. Like Meijer and Bolívar show in their research about the governance aims of Smart Cities, it is not about better outcome of urban governance (wealth/health/sustainability), but about the better process of urban governance, i.e. citizen participation and forms of collaboration (A. Meijer & Bolívar, 2015). In regards to the scale of the Smart City initiative, I will dive into the urban development scale, referred to in Figure 1-3, as the 'Smart City neighbourhood scale', or 'the living lab'.

Smart City policies in the Netherlands

The first Dutch election for 'Smartest inner city' was in 2015. This same year Jorritsma, chair of the Association of Dutch Municipalities, preached that every city or municipality should try to be 'Smart' by implementing technology in cities and city governments to benefit the citizens. What is the current Dutch Smart City policy?

In 2014 the Dutch Ministry of Infrastructure and Environment (I&M), published a magazine 'Smart Cities – to a 'Smart Urban Delta' – a look at the Smart City by Hans Tijl'. In this publication, Hans Tijl, director Spatial Developments for I&M), states "I dare cities, companies and knowledge institutes to realise this smart urban Delta together". He opts that high ambitions can be realised by sharing knowledge and experience on the platform 'learning network NL Smart Cities'. Smart City initiatives should focus on 'area development' offering opportunities for integral Smart City developments, therefore the ministry of IanE is promoting Dutch cities to develop spatial strategies in collaboration with stakeholders. Besides collaboration, Smart Cities cannot be developed without open governmental data, therefore the government is actively striving towards an open data policy (Tijl, 2014, p.1). Tijl argues that collaboration on all government levels is necessary on the area of Smart Cities. "Simply because all departments are working on the same sector crossing issues, like privacy, up scaling, technology, and business cases . . . It [Smart City development] nearly forces to collaborate"(Sprick, 2015) . According to him, professional collaboration is already happening.

In the Netherlands, 'Agenda Stad' (City Agenda) is the main policy umbrella for Smart Cities. According to Evert-Jan Mulder, consultant at PBLQ regarding Policy and ICT, e-Government and Smart Cities, and expert at the EU Digital Agenda, the importance of Smart City development in the Netherlands is underlined, while only little attention is paid to the role of technology. He notices that a clear Smart City vision and concrete policy initiatives are lacking, while each city individually is experimenting and investing in new infrastructure solutions and applications (Mulder, 2015).

He further finds that the theme of Smart City is still lacking on the agenda of policy makers of the digital government, raising the question whether new forms of collaboration are necessary in the future. Mulder has five recommendations regarding the Dutch Smart City policy: to underline the importance of digitalisation on a national scale; forming a powerful platform of ministries, cities and other important stakeholders to develop a 'Digital City Agenda'; having a concrete vision and programme to give substance to this agenda; have a emphatically relation with European and international developments and EU policy regarding the Smart City; *and finally focusing on Smart City as a mean rather than a goal.*

Unlike many other countries in the world, The Netherlands has no real big cities, the cities are more in the form of urban networks. Also the urban issues in the Netherlands are different from for example cities in India and China, where quality of life is a real issue. In the Netherlands, an important incentive for Dutch Smart City policy is the necessity to innovate, stay competitive and

internationally attractive. Therefore the five largest Dutch cities (Amsterdam, Rotterdam, The Hague, Utrecht and Eindhoven) are trying to become a Smart City (Mulder, 2015).

1.3 Three perspectives on implementation issues

Cities in Europe are appointing 'living labs', creating playgrounds in the form of urban districts, for innovative and experimental Smart City projects. New ways of working, collaborating and networking are put into place, to improve the process of implementation. Even though the Smart City strategy may be an appropriate long-range policy strategy for urban areas, many say "not enough progress has been made in implementation" (Smart Cities and Communities, 2013, p.5). Since Smart City implementation is still hampering, this chapter will elaborate on the issues in the process of Smart City implementation. This will be discussed from international academic, industry and governmental perspectives.

Academic perspectives on Smart City implementation

In the academic literature on Smart Cities multiple implementation issues are mentioned. According to Veeckman and van der Graaf. The fundamental issues of realizing the Smart City implementation are very hard to define, and vary widely. "Detailed analyses on how to manage smart city initiatives as well as descriptions of underlying challenges and barriers, seem still scarce" (Veeckman & van der Graaf, 2014, p.1).

The challenges range from complexity, economic, social to governance and technological challenges. "Smart Cities faces a set of challenges that vary from one region to another and between countries within the same region" (Ibrahim, El-Zaart, & Adams, 2015, p.570).

These challenges also differ between Smart City initiatives. Cosgrave found the following main issues: smart concepts are still in their infancy, the complex nature of the city, and restricted investment capabilities (Cosgrave, Arbuthnot, & Tryfonas, 2013). Nam and Pardo (2011a) refer to four categories of challenging issues for Smart City implementations: technological, policy, management, and context issues, while Chourabi, Nam, Walker, Gil-Garcia, Mellouli, Nahon and Scholl, mention eight influencing factors, among which the previously mentioned factors by Nam and Pardo, together with: Peoples and Communities, Built Infrastructure, Economy, Natural Environment and Governance (Chourabi et al., 2014).

Smart City projects are depending on many technological components. Examples of technological innovation risks are: incompatibility between old and new systems, lack of technological knowledge, and too much hope over technological feasibility. The use of advanced technologies increases complexity and uncertainty. The greater the risk, the more necessary to look beyond technology for effective managerial and policy tools necessary to deal with the risk (Nam & Pardo, 2011b).

A study on the issues in realization of UK Smart City initiatives found that the transformative power of technology was often overestimated and the importance of the 'soft' human infrastructures that underpin urban decision-making and governance were underestimated in Smart City implementation. This study found the following constraints: "The conjectural nature of the smart city debate. . .the weakened capacity of urban governments to control their infrastructural destiny and also constraints on the ability of the public and private sectors to innovate"(Buck & While, 2015, p. 1). Other evidence points to important challenges including: having to work through technology providers with different priorities; potential knowledge deficits about what is possible and how it might be steered; and limited resources to fund the required infrastructure.

In this light of 'soft' human infrastructure, a recent study analysing 13 Smart City cases based on the model of Chourabi et al. (2012) found that the key variables and main factors of successful Smart City Projects are 'citizen engagement' along with 'the critical role of governance' (Kogan & Lee, 2014).

Similarly Schaffers states in Rodriguez-Bolivar's 'Transforming Cities Governments for Successful Smart Cities, that there is little evidence of Smart Cities in realizing their visions, and there is a lack of of attention to engagement and empowerment of citizens, SMEs and other entities (Rodríguez-Bolívar, 2015, p.126).

Paskaleva in her call for papers 2016 - focus on the implementation and assessment as critical to the management of open innovation in the field of smart city services - mainly mentions the critical role of governance:

> Governance-related challenges have been identified as key to service co-production [of Smart City initiatives]. Critical factors include citizen participation and effective collaborative processes between stakeholders (Odendaal, 2003; Paskaleva, 2011), leadership (Mooij, 2003; Lam, 2005), private/public partnerships (Giffinger et al., 2007) and governance infrastructures (Johnston and Hanssen 2011), the latter allowing for collaboration, data exchange, service integration and communication. (Paskaleva, 2015)

Chourabi et al. (2012) underline the important role of "internal and external governance influencing participatory and collaborative decision making." Nam and Pardo describe similar governance related implementation issues, among which "poor planning, weak business case, lack of top management support, lack of leadership, lack of professional skills, misalignment between organizational goals and project objectives, vulnerability to policy swings, too much technology-driven enthusiasm, and political hyper-activism" (Nam & Pardo, 2011b). They see a recurring problem in the risk avoiding public culture:

> On governance level, it shows the innovative nature of Smart City projects, does not align with the culture in the public sector. . . Public sector innovation could be an oxymoron. . . Risk taking through experimentation is likely to be institutionally blocked in government. Public sector e-services has a legacy of a risk-averse environment where the focus is on the politically charged short-term delivery of goals and results, lacking a long-term strategy of service innovation. (Nam & Pardo, 2011b, p.186)

Ojo, Curry, & Janowski (2014) find issues regarding stakeholders and partnerships, buy-in and funding, and participation, and funding issues. Finally (Ibrahim et al., 2015) names five challenges facing Smart Cities transformation, which are complexity challenges, economic challenges, social challenges, technical challenges and governance challenges. Of which a governance challenge is "The need of coordination and integration between public, private and civil bodies for the purpose of making a city function as an organism in an efficient and effective manner" (Ibrahim et al., 2015, p.570).

I conclude that almost every source in literature uses a different framework for analysis, in which governance aspects show to be a central aspect of most frameworks.

Industry perspectives on Smart City implementation

Several companies from the urban development industry have also published their perspective on Smart City implementation. According to the industry, challenges in implementing the smart city concept are complex and multiple.

In Research from Forrester, Industry companies like Cisco and IBM, point out in 'Helping CIOs Understand "Smart City" Initiatives', that **"**A critical component of delivering on the smart city vision is management — particularly governance. Many of the obstacles result from a lack of governance that ensures city officials, CIOs, and technology integrators collaborate through a project's entirety — not just at design and implementation, but post-implementation as well"(Washburn et al., 2010). Other issues they found are lack of funding, lack of IT skills, dealing with compliance standards and security and risk management.

Managing and governance issues are related with human capital: having the right people with the right knowledge and skills at the right place and the lack of citizen engagement. Issues regarding open data concern pooling and processing. On top of that, providing assurance in the protection of privacy is another big deal. Some projects carry too many unknowns to roll out immediately at scale and often resources are not available. This relates to cities having shortage of financial capital. Additionally, it is difficult to create transparent investment metrics, due to difficulties in measuring results and ensuring actual sustainability. Furthermore issues regarding complex procurement legislation of product and services make it unable to cope with the use of new ICT services. All of the above obstruct Smart City implementation leading to disappointing results, and prevent pilot projects from being scaled up to city wide projects.

Government perspectives on Smart City implementation

The European Union formulated a broad list of challenges in relation to their 'Smart Cities and communities' platform, mainly focusing on sustainable socio-economic issues. According to the EU "When it comes to devising and implementing a Smart City strategy, it is the complexity of the city itself and of the institutional (decision-making) processes that need to be put in motion to change the status quo" (European Commission, 2013b). Other factors hindering the adoption of Smart City solutions are: "Lack of scaling up/replicability of new and smart technologies; technology is not well-understood across city sectors, and existing governance, financing and procurement models are ill-suited for technology integration" (Smart Cities and Communities, 2013, p.5).

In publications by public authorities, like Simon Haston, Planning & Strategy of The City of Edinburgh Council, the following issues in Smart City implementation can be found: Political priorities change in time, during the life of a Smart City initiative, resulting in complex decision making and changing commitment. The Business strategy of an initiative is not clearly articulated, relating to a mismatch in governmental culture and business model. On top of this technology is overpromising, and the actual value of Smart City projects is difficult to measure, making plans unrealistic or unaffordable. Finally project teams are missing required capabilities, resulting in strategies gathering dust on the shelf (Haston, 2009)

In a survey by Cisco based on 668 respondents of North American municipal executives, financial issues, like attracting funding, and lack of insights in costs and benefits are the most fundamental issues in Smart City implementation. Other issues are regarding internal organizational challenges, such as the lack of cross-departmental coordination and alignment on priorities, and lack of visionary leadership, and missing citizen engagement (Cisco, 2014).

In the Smart Impact Baseline Report *"Local Impacts from Smart City Planning"*, coordinated by Marc Duncan from the Manchester City Council, published in the URBACT III programme (running from 2014 – 2020) funded by the European Union, is stated that "the key challenge in creating smart districts is to align four core levels of district development in innovative project consortia" (Duncan, 2015, p.9). These are 1) the technology and infrastructure level 2) the socio-economic strategy level 3) the governance and management level and 4) the availability of finance. Furthermore is stated that "Developing smart cities in fact means that local governments and city administrations need

to become innovators, just like companies need to discover their corporate share in urban governance"(Duncan, 2015, p.10). This publication gives an overview of the main challenges for developing, implementing and operating smart districts and smart cities, structured in three larger categories: 1) challenges through market barriers; untested innovative technologies, unclear cash-flow models, failing business models, lack of standards and interoperability of systems 2) organizational challenges; companies think in product instead of holistic solutions, and there is a vacuum when it comes to designing, coordinating and leading integrated smart city projects, cities think and act in silos, and 3) leadership challenges; missing political leadership, having no real partnerships, needing support in creating sustainable value.

Finally a recent report by the United Nations Commission on Science and Technology for Development, published in January 2016, 'Issues paper on Smart Cities and Infrastructure', in which main challenges encountered in the implementation of smart infrastructure projects are related to localization of smart infrastructure, skill gaps, lack of finance, and the application of a suitable governance model (UNCTAD secretariat, 2016).

Summary on Smart City implementation issues

I have summarised the implementation issues registered in Table 1-1 Overview of Smart City implementation issues, from three perspectives, to determine whether there are significant differences in views on the most relevant issues. Comparing the results of academic, industry and government analyses of Smart City implementation issues, shows that there is a lot of overlap on the different issues hampering Smart City implementation.

The main difference comes from the industry perspective (who seem keen on implementing the Smart technology), stating that the technology itself is not the issue. In contrast, academics and government actors do include new technologies as a barrier to implementation. The research done by Cisco in which municipal executives spread their light on government issues rather than on technology issues, might be due to Cisco's advantage in pushing IT solutions, thus presenting research results in favour of technology applications.

The different perspectives are related to what the different parties have to win from the Smart City. The industry is mainly interested because of the possible revenue and profit on their products and services, the government has a reputation to win or consolidate for future elections and the academic researchers have possibilities for funded research with broad interest. It is clear that the different visions on the smart cities are influenced by the interests of each group.

Table 1-1 Overview of Smart City implementation issues, from three perspectives

	Government	Industry	Academic
Policy	• Political priorities change • Complex decision making • Changing commitment • Mismatch governmental culture and business model	• Complex procurement	• Innovative nature does not align with culture public sector; risk averse

Uncertainties / complexity (mainly financial)	• Business strategy not clearly articulated • Financial issues; lack of funding • Lack of insights in costs and benefits (most fundamental) • Actual value is difficult to measure • Plans unrealistic and unaffordable	• Too many project unknowns (difficult to create investment metrics, measuring results, and ensuring sustainability) • No (financial) resources available	• Projects still in its infancy • Complex nature of the city • Multiple unknowns dealing with future; unknown long term implications; actual value unclear • Restricted investment capabilities/difficult to support investment decisions, funding and buy-in • Limited resources to fund the required infrastructure.
Technology	• Technology is over promising		• Incompatibility old and new ICT systems • High hope technological feasibility • Advanced tech increases complexity/uncertainty/High risk • No clear connection to social agenda • having to work through technology • providers with different priorities
Governance/ Management	• Internal organizational challenges (cross-departmental and alignment, lack of leadership, citizen engagement) • Project teams missing required capabilities	• Citizen engagement • Open data (pooling, processing, privacy) • Missing right people, knowledge, skills, place	• Citizen participation • Effective collaborative processes between stakeholders/PPP • Leadership • Governance infrastructure (collaboration, data exchange, service integration and communication) • knowledge deficits about what is possible and how it might be steered

All in all, implementation issues are related to financial and technological uncertainties and aspects like policy, management, and governance. An underlying issue is the complexity of cities [multiple parties, stakeholders, and processes], which remains the most significant barrier to adopting Smart City solutions (Falconer & Mitchell, 2012). This complexity is not a barrier which can be overcome easily. Although each Smart City initiative will have its own critical bottlenecks, it is clear governance aspects are of great influence and critical importance for the success of a Smart City initiative.

1.4 Problem Statement and Aim of the Research

Problem statement

By now, it is clear that although many place great faith in Smart City as a concept to face urban challenges, there seems to be a large gap between policy and implementation. As Buck states, it is a "challenge for policy-makers of moving from attractive but elusive imaginaries of smart city discourse to tangible intervention"(Buck & While, 2015, p.2). If not, as Ching points out that the "inadequate understanding of smart city implementation may lead to cities falling for possible image or technological traps, heavy investments in ICTs and infrastructure without maximizing their potential" (Ching, 2013, p.3). The poorly-managed conflicts during implementation can diminish the potential of Smart Cities and discourage future improvements (Kim, 2015).

The ambition of Dutch and foreign cities to actually implement Smart City projects, signals a need to improve Smart City implementation. Understanding 'how to' realize Smart City ambitions means being able to recognize and overcome institutional barriers, and identify governance principles for effective Smart City implementation.

Apparently there are common problems as well as specific issues when a Smart City concept is carried forward towards implementation. However, there still seems to be limited insight on how to overcome the barriers that hamper smart city project implementation. What steps are part of an effective governance strategy for smart city implementation? As Mora states *"o*nly a few examples of

procedures can be found in scientific publications. However, they come mainly from the grey literature produced by the corporate sector and are characterized by both a low level of detail and a lack of empirical evidence" (Mora, 2015). And if examples are found, than "a tendency was found to mostly focus on desirable and successful project outcomes [62]. However, confining the study of smart governance that narrowly runs the risk of neglecting important lessons learned from failure and undesirable project outcomes."(Scholl & Scholl, 2014, p.170).

As Duncan formulates this problem clearly:

> Due to a lack of experience with the development of smart districts and a corresponding scientific monitoring of processes, there is no comprehensive overview over the barriers and risks that are related to the development and implementation of smart districts and there is no toolkit or basket of risk-reduction strategies and instruments that would help stakeholders identify the right strategies and measures to provide for good organizational, financial and technology-oriented measures to overcome the barriers and counter the risks. (Duncan, 2015, p.13)

Research Objective: shaping strategies for smart city implementation
This thesis will focus on enforcing effective implementation of Smart City initiatives. I want to investigate how to improve Smart City implementation, particularly with regard to the governance factor. As described by Scholl and Scholl, in their article 'Smart Governance: A Roadmap for Research and Practice':

> a whole host of research and practice related problems need to be better understood. Academic research can effectively support the evolution of smart governance . . . in practice. Academic research can in particular accelerate the learning process and implementation by systematically sharing the results of studies across all elements of smart governance. (Scholl & Scholl, 2014, p.170)

Hence, the main research objective is to provide insight in the governance behind Smart City implementation efforts by identifying the issues and tensions as well as the challenges and solutions found in the literature about Smart City implementation and in projects in Amsterdam and Eindhoven, The Netherlands.

1.5 Research Scope

On a strategic level, Angelidou reviewed the factors that differentiate policies for the development of Smart Cities. She identified four strategic choices with a spatial reference: national versus local strategies, strategies for new versus existing cities, hard versus soft infrastructure-oriented strategies, and sector-based versus geographically-based strategies (Angelidou, 2014). In this research I will focus on initiatives for local, existing cities, and sector-based Smart City strategies.

The choice for Europe is evident, since this continent is strongly promoting Smart Cities through European funding. Therefore the highest number of Smart City projects is hitherto initiated in Europe. Since most Smart City initiatives in Europe are about redeveloping brownfield areas, this is also the empirical focus in this thesis.

The empirical part of this study is concerned with European funded Smart City projects in the Netherlands. Thus focusing on urban development and the conditional environment in the Netherlands. This implies the use of multiple-helix collaboration, involving public, private, research,

other organizations and even citizens. These urban development projects are mostly (planned to be) implemented on scale of a city-district and to be tested in Smart Urban Labs (SULs).

Practicalities aside, the choice for The Netherlands is made because this is a country in which "all major cities have formulated [Smart City] visions and missions, and basically every municipality has their entire governmental organization involved: from alderman to management and contractor. It's not just the enthusiastic project managers any more" (Jansen, 2015). According to Gielijn Blom, a Smart City specialist at Platform 31 (a Dutch knowledge and network organisation) contacted for this thesis, the most relevant cities to focus on are Den Haag, Delft, Amsterdam and Eindhoven. In fact, Amsterdam and Eindhoven seem to be European frontrunners in Smart City development. Jansen (2015) even claims that "Amsterdam and Eindhoven are two of the few heralds of Smart City development" in the world**.** This claim is underpinned by multiple case studies focusing on Amsterdam as a Smart City, and the outcome of a recent survey of worldwide Smart Cities by IESE Business School in Spain who examined 135 cities worldwide, which placed both Amsterdam (16) and Eindhoven (15) in its top 20**.** Both cities scored well on Urban Planning, and Governance**.** A year earlier, Amsterdam was ranked 2nd Smartest City in Europe by Boyd Cohen. The two Smart City initiatives focused on in this research are TRANSFORM (Amsterdam) and TRIANGULUM (Eindhoven).

Transform-Amsterdam:

Transform was a European funded Smart City programme executed between January 2012 and August 2015. Transform was a European collaboration of six European cities including Amsterdam, Copenhagen, Genoa, Hamburg, Vienna and Lyon and thirteen partners working together to improve their policy and programmes to lower carbon dioxide emissions: making a TRANSFORMation agenda for low carbon cities. The project dealt with the energy transition of cities under the umbrella of Smart Cities and Communities. The overall budget of Transform was 7.5 million Euros (Amsterdam, 2015).

The TRANSFORM consortium operates on the levels of SMART energy systems, SMART Spaces and SMART governance – combining space with energy with politics and governance (Gemeente Amsterdam, 2013b).

Triangulum-Eindhoven:

The three point project Triangulum is one of the three European Smart Cities and Communities Lighthouse Projects, set to *demonstrate, disseminate* and *replicate* solutions and frameworks for Europe's future Smart Cities. The flagship cities Manchester (UK), Eindhoven (NL) and Stavanger (NO) will serve as a test bed for innovative projects focusing on sustainable mobility, energy, ICT and business opportunities. The project consortium combines interdisciplinary experience and expertise of 22 partners from industry, research and municipalities who share the same objective and commitment to develop and implement smart solutions in order to replicate them in the three follower cities Leipzig (D), Prague (CZ) and Sabadell (ESP). The overall budget of Triangulum is 30 million Euros (2015-2020). The European Commission funding (Horizon 2020) accounts for 25 million Euros. The project duration is from February 2015 to January 2020 (Fraunhofer IAO, 2014).

In this research I intend not to come up with a comprehensive definition for Smart City development, neither will I focus on the often mentioned ranking of Smart Cities. I will see the Smart City concept as a means to an end, rather than an end in itself. I will evaluate the actual outcomes of the Smart City projects where possible, and focus on the governance processes. I will not include empirical analyses of Smart City initiatives in other parts of the world, or provide an overall list of general 'success factors' as seen in other studies (Nam & Pardo, 2011a and 2011b; Chourabi, 2012; Kogan,

2014). I strive to provide an overview of the specific governance factors and the related barriers and success factors in Smart City implementation in European funded initiatives in The Netherlands: Triangulum and Transform.

1.6 Research Questions

The problem and scope described above brings me to define the following research questions, divided into a main, action-oriented, question and several supporting knowledge questions about Smart City implementation and initiatives in The Netherlands:

1. **Main question**: How are governance factors used in the implementation of Smart City initiatives Transform in Amsterdam and Triangulum in Eindhoven and how can governance factors improve their implementation?

Sub questions

2. What is a Smart City?
3. Which factors influence effective Smart City implementation?
   3.1. Which factors are most important for successful Smart City implementation?
4. How can governance factors contribute to effective implementation of Smart City initiatives?
   4.1. What is governance?
   4.2. Which governance factors influence urban development implementation?
   4.3. Which governance factors influence Smart City implementation initiatives?
   4.4. How can these governance factors be defined?
   4.5. How are these governance factors related?
   4.6. What are the success factors and barriers related to these eight governance factors?
5. How are governance factors used in the implementation of the Smart City initiative Transform in Amsterdam?
6. How are governance factors used in the implementation of the Smart City initiative Triangulum in Eindhoven?
7. How can governance factors improve Smart City implementation in Amsterdam and Eindhoven?

1.7 Conceptual Model

In the research questions different concepts are involved. The domain of study is urban development. The focus is on the Smart City concept and the implementation of this concept in practical initiatives with typical Smart City objectives. The results of an implementation are significantly influenced by the governance of such initiatives. The governance can be seen as a collection of sub processes to create and maintain the necessary implementation power to realize the Smart City objectives. The execution of governance is depending on numerous decisions made by the collective stakeholders. In this situation ‘governance’ is the independent variable and the ‘Smart City implementation’ the depending variable.

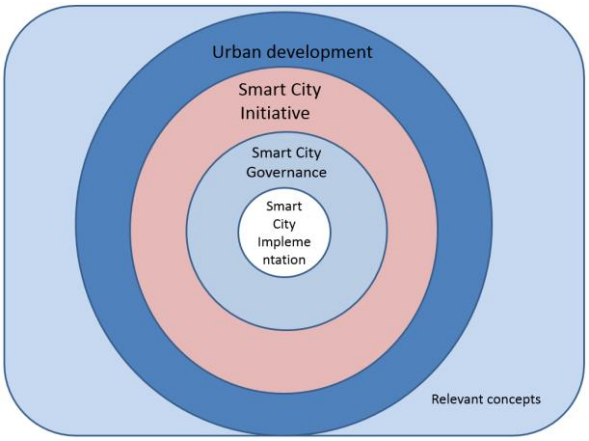


Figure 1-4 conceptual model

For these core elements of the domain of study for this thesis I present a definition based on literature or on own insight developed during this study.

Urban development: "Collective action, both in formal government arenas and in informal mobilization efforts, which seeks to influence the socio-spatial relations of an urban area, for various purposes and in pursuit of various values" (Healey, 2006, p.1).

Smart City concept: A city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based partnership' (EU working definition, European Union, 2014,p. 9).

Smart City initiative: Agreed action between different stakeholders to realize one or more specific Smart City objectives. The action can have the form of activities, one or more projects or a complete program.

Smart City Governance: The collective governing in Smart City initiatives based on complex networks of stakeholders without hierarchical structure and line of command and control, meaning to bundle activities of all relevant parties and create an optimal environment to realize agreed upon objectives

Smart City implementation: Projects, programmes and activities launched by a group of stakeholders to realize one or more aspects of a Smart City concept in an urban environment.

Implementation power: the developed strengths of the stakeholders in a programme or project to realise the objectives making effective use of success factors and ways to overcome barriers. This implementation power is strongly influenced by the governance sub-processes.

1.8 Research Design

This schematic overview of the research shows the approach, main results, models and chapters. This research started with my Internship for Transform, and through an iterative process, here described as linear, I mixed literature study with field research, interviews to describe the two Smart City cases and to develop, design and test the governance model. More on the approach and research method in chapter 5.

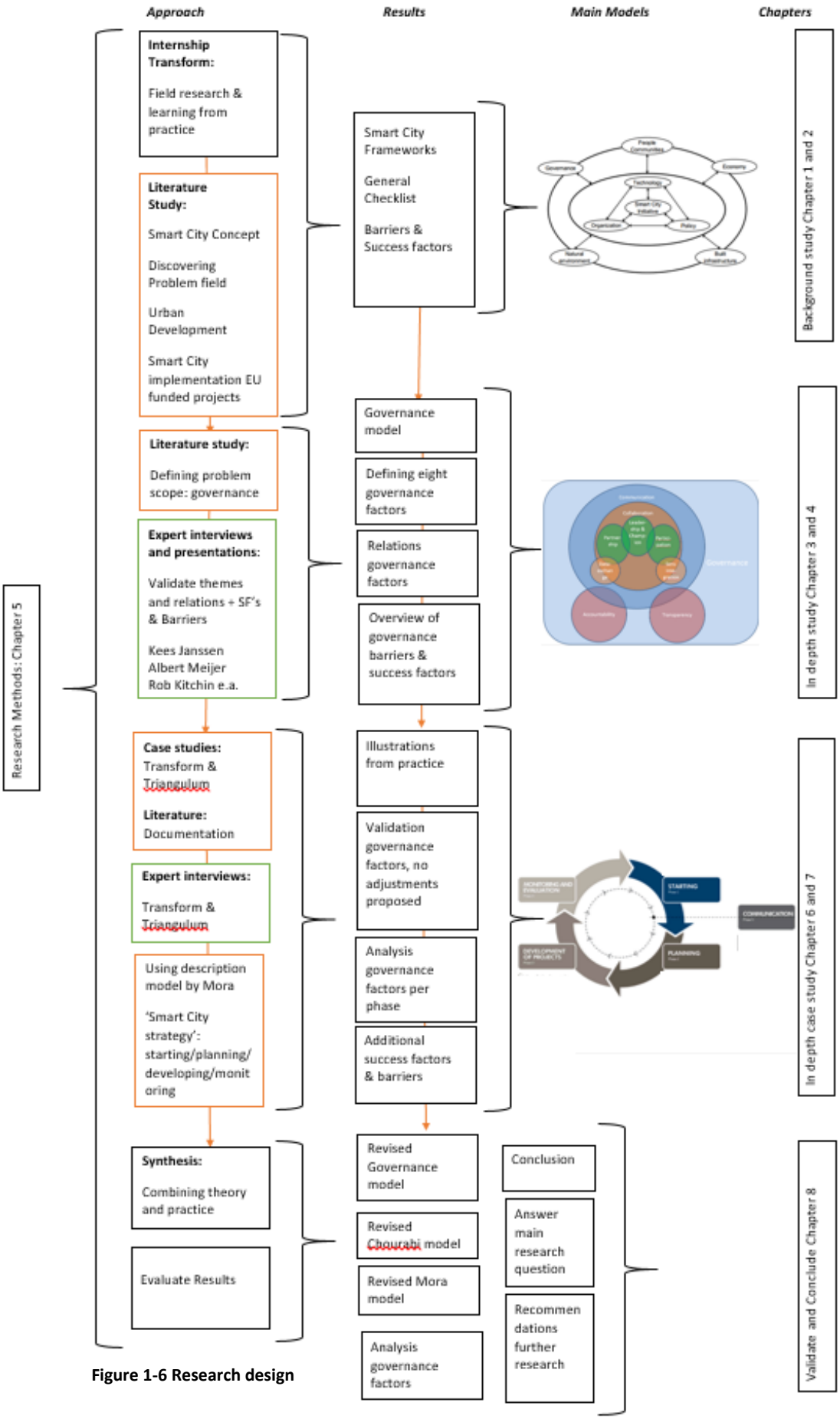


Figure 1-6 Research design

1.9 Research Relevance

Scientific relevance

Different researchers have already signalized that there is a high demand for better understanding of the role of governance aspects during the implementation of Smart City initiatives, based on the analysis and comparison of practical cases. Bolivar pleads to do research to the role of governments in relation to the success of initiatives and the used governance models: "it could be interesting to analyse some empirical experiences in smart cities regarding the role that governments are taking in each one of them as well as the success of these smart initiatives. It could help us to understand factors or drivers for governance models in smart cities" (Bolívar, 2015, p.5). Paskaleva encourages authors to consider "co-production of services in the smart city in the context of both our theoretical understanding and our practical experience of how such governance works." (Paskaleva, 2015).

In an extensive literature review on Smart Sustainable Cities, the State of Research for Smart City Governance is visualised (Estevez, Lopes, & Janowski, 2015). This figure gives an overview of the governance and service delivery attributes, governance Smart City functions and operations, and governance requirements like the '*well designed governance model*'. It reflects that many authors, like Bolivar, limit governance to a specific model for collaboration, to my opinion only one of the many governance factors to be arranged.

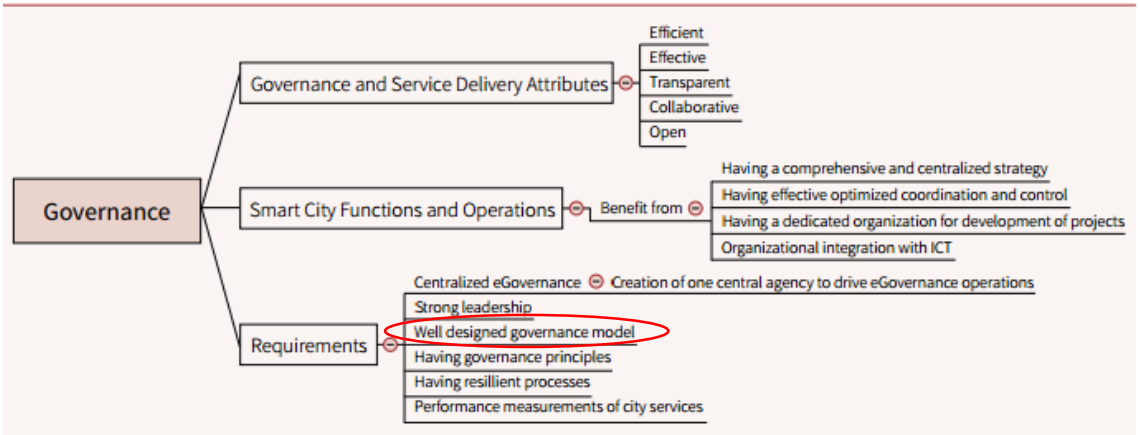


Figure 1-7 State of research Qualitative Analysis of Smart City Governance (Estevez et al., 2015) including the focus on governance in this thesis (in red).

Societal relevance

Smart Cities Stakeholder Platform's Roadmap Group (part of the Smart Cities and Communities European Partnership Initiative (EIP)) acknowledged in 2013 that "Interest in Smart Cities has triggered plenty of theoretical and technology-led discussions, but not enough progress has been made in implementation" (Smart Cities and Communities, 2013,p.5). More than two-third of Smart City projects remain in the planning or pilot testing phases. "Neither soundly tested business cases nor comprehensive hard evidence of impacts of these projects is widely available" (European Union, 2014, p.57). Even though implementation is hampering, the number of Smart City initiatives, plans, projects, publications and websites on the topic 'Smart Cities' is considerable and daily growing. The European Union, in particular, is investing in Smart City strategies for metropolitan city regions such as Barcelona, Amsterdam, Berlin and Manchester. Even before the year 2014, a staggering 240 European cities (EU-28) have launched a Smart City Strategy (Mora, 2015). Today, many Smart City events are being organized, like the EXPO in Barcelona, or the ones I have attended in Delft,

Schiedam, The Hague and Amsterdam. During these events speakers are stressing the importance of Smart City governance, often without really defining what exactly Smart City governance is, let alone 'how' this process can improve Smart City implementation.

1.10 Readers guide

In chapter 2, I present an overview of the Smart City with the focus on the origin and objectives. I position the European Smart City programmes and introduce the two Smart City initiatives Transform and Triangulum. Chapter 3 describes the strategies for implementation. It provides a framework for the development process of Smart City initiatives, which is used later to describe the empirical part of this thesis, and finally the different internal and external influencing factors of a Smart City initiative are noted. Chapter 4 gives insight on the term 'governance' and the role in urban development and Smart City implementation. Here the explicit governance factors, definitions and framework are described. This chapter is the core of the thesis and forms the framework for analysis in the case study descriptions. Chapter 5 defines the research methodology for this thesis. Chapters 6 and 7 offer practical insights in two European Smart City initiatives, respectively in Amsterdam (Transform) and Eindhoven (Triangulum) with special attention to the governance factors. The conclusions of this research is presented in chapter 8 combined with recommendations to improve governance for Triangulum and suggestions to improve the different frameworks. Chapter 9 wraps up with a reflection.

2 The Smart City Concept

In the previous chapter, I introduced the theme, objective and relevance of the research presented in this thesis. In this chapter I will discuss the Smart City origin, concept and characteristics. I will further elaborate on the two Smart City initiatives Triangulum and Transform in the light of the European Smart City programmes, and I will give insight in the main concerns for Smart City implementation.

2.1 Conditions for the Rise of the Smart City

The origin of the concept of Smart Cities can be traced back to at least the Smart Growth Movement of the late 1970s. Harrison and Donnelly note the term 'Smart City' has been used by global technology firms, particularly since 2005 (Harrison & Donnelly, 2011).

The concept 'Smart City' had a boom in 2010 after the European Union (EU) strongly committed to support and fund 'smart initiatives' in European cities, aiming to reduce CO2 emissions and to govern energy consumption, waste treatment and building efficiency. Duncan describes the use of the Smart City concept as a paradigm-shift since:

> Cities realized that building sustainable systems needs to include industry and technology providers to a far greater extent than originally thought. Using ICT made it possible to maximize efficiency of urban systems by linking clean technologies, infrastructures, city operators and citizens through smart devices and intelligent services. The extensive use of data is now improving urban mobility systems and increasingly decentralized energy flows. They help city authorities to take better decisions . . . this shift of paradigm is the smart city! (Duncan, 2015, p.2)

This new practice of urban development is reflected in a steep rise in Smart City publications from 2010 onwards:

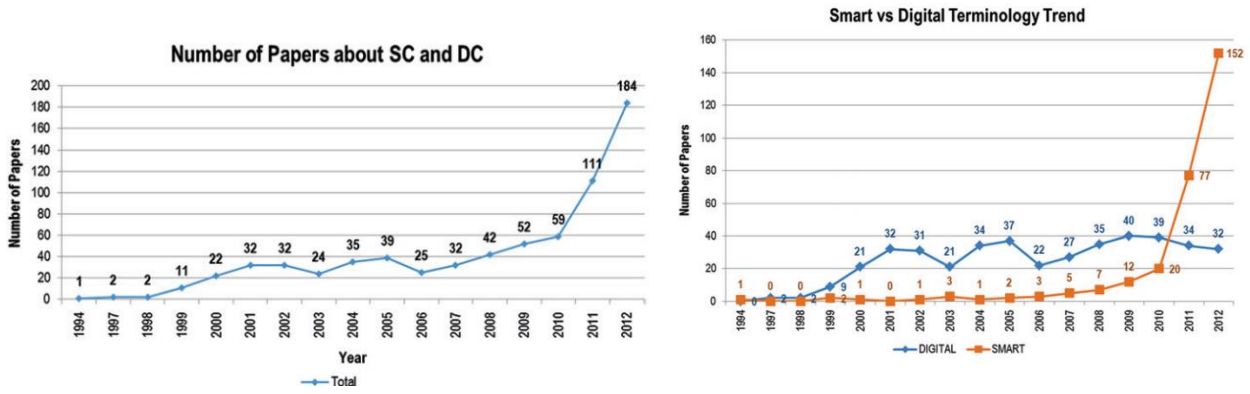


Figure 2-1 Time analysis: number of papers about smart city and digital city and Terminology analysis: Digital vs Smart (Cocchia, 2014, pp. 25-28)

According to Wolfram the main factors driving the Smart City concept forward are grand environmental challenges, urbanisation, technology convergence, industrial convergence and the information of society. Wolfram is convinced that the combination of all these factors gave the punch to this new concept (Wolfram, 2012).

Baccarne et al. add other stimulating factors: cities becoming central actors for social, economic and political change, pressure to innovate (open innovation, increased competition, innovation spiral, etc.), policy support (the importance of funding and governmental support), and city marketing - using 'Smart' as an appealing attribute for the city as a brand (Baccarne et al., 2014).

According to Veeckman & van der Graaf urban challenges, like reducing CO2 emissions, offer opportunities for ICT based solutions. "These and other challenges, force cities to seek solutions and invest in the necessary information and Communication Technologies (ICT) infrastructure and human and social capital development" (Veeckman & van der Graaf, 2014, p. 2). They identify the EU as an important promoter of the Smart City concept, especially after the expression ´Smart City´ became part of the complex mechanisms of EU research funding. The EU itself has embarked on a long-term strategy for a smart and sustainable growth, and acts as a stimulating force in adopting the Smart City concept. The EU has a clear focus on using the concept as a mean to stimulate innovation in the urban area with the focus on 'increased competitiveness', 'enforcing sustainability' and realizing 'energy and climate objectives'.

This introduction shows 'Smart City' marketing, research and development is serious business, and the EU wants to stimulate all of it through their funding programmes.

2.2 Characteristics of the Smart City concept

The concept of 'Smart City' is notoriously fluid, scarcely formalized and, to some degree, subject to different ideological interpretations (e.g. Hollands, 2008; Deakin and Al Waer, 2011; Caragliu et al., 2001). A shared definition of the Smart City is not available and it is hard to identify common global trends (Neirotti, De Marco, Cagliano, Mangano, & Scorrano, 2014). In this chapter I will give a short overview of the different definitions, it is by no means complete.

Most cited definitions for a Smart City include a 'citizen focus' with 'self-decisive, independent and aware citizens'. However, elements like data, information and communication technologies and urban governance are almost ubiquitous in discussions about Smart Cities (Caragliu, Del Bo, & Nijkamp, 2011).

In *'Mapping Smart Cities in the EU'* the working definition of a Smart City is *"a city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based partnership"* (European Union, 2014). Caragliu et al. derive a Smart City definition from the model with six axes to describe a European city :

> 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 development and a high quality of life, with a wise management of natural resources, through participatory governance. (Caragliu et al., 2011, p.70)

These phrases show the high ambition of the concept. Building on these different definitions Ojo et al. (2014) researched literature for the defining elements of Smart Cities and found the following for their *nature*, *essence* and *approach*:

Table 2-1 Defining elements of a 'Smart City' (Ojo et al., 2014)

No	Description	Reference
Nature	*Is a* (1) forward-looking City in the areas of economy, people, governance, mobility, environment and lifestyle; (2) form of urban innovation; and (3) Intellectual Capital Profile of a City	Giffinger et al. 2007), (Nam, Taewoo; Pardo, 2011), (Zygiaris, 2012)
Essence	*Means to* (1) Information access, bridging digital divide, lifelong learning, social inclusion and economic development; sustainable economic growth and urban development, higher quality of life; and wise management of natural resources; (2) innovative socio-technical and socio-economic growth of a city	(Hollands, 2008) , (Vasseur & Dunkels, 2010), (Zygiaris, 2012)
Approach	*Involves* (1) investments in human and social capital; (2) investment in traditional (transport) & modern (ICT) communication infrastructure; (3) promoting participatory governance and engagement of citizens; (4) technological, organizational and policy innovation	(Caragliu et al., 2009), (Nam, Taewoo; Pardo, 2011)

Dameri develops a comprehensive definition for the Smart City:

> A smart city is a well-defined geographical area, in which high technologies such as ICT, logistic, energy production, and so on, cooperate to create benefits for citizens in terms of wellbeing, inclusion and participation, environmental quality, intelligent development; it is governed by a well-defined pool of subjects, able to state the rules and policy for the city government and development (Dameri, 2013, p.2549)

This variant stresses the fact that a Smart City initiative is inseparably detached to geographical area development and that governance influencing rules and policy is an essential factor. In a later publication Dameri & Rosenthal-Sabrou relate the lack of a generally accepted Smart City definition to the technology driven way it has arisen:

> Smart or digital projects have been influenced from technological innovation and its application to urban areas and themes. It means that the idea of a Smart or a Digital City has been mainly technology drive, instead of policy driven. However, after several different technological applications have been implemented in cities, and each of them has been qualified as smart, to express a unique, universal Smart City definition has become very difficult. The origin of smart implementations explains therefore why a shared definition of Smart City still lacks (Dameri & Rosenthal-Sabroux, 2014a, pp. 35-36).

Outcomes, goals and objectives

According to Lee and Hancock a Smart City is defined by its objectives:

> A smart city aims to resolve various urban problems . . .through ICT-based technology connected up as an urban infrastructure. The ultimate goal is to revitalize some of the city's structural . . . imbalances through the efficient redirection of information. (J.-H. Lee & M. G. Hancock, 2012, p.82).

Meijer & Bolivar (2015) recently published an extensive review of literature research focusing on the definitions of the Smart City concept and the governance in the Smart City. They confirm that there are many different views and that in about one-third of the relevant publications there is even no attempt to give a definition of the Smart City concept. The authors conclude that there are three different types of ideal-typical definitions: Smart Cities as cities using smart technologies (technological focus), Smart Cities as cities with smart people (human resource focus) and Smart Cities as cities with smart collaboration (governance focus). Based on this insights they present an attempt to define the smartness of a city incorporating all three perspectives: "the smartness of a city refers to its ability to attract human capital and to mobilize this human capital in collaborations between the various (organized and individual) actors through the use of information and communication technologies" (Meijer & Bolívar, 2015, p.7). This type of definition puts the focus on

'smart' as an end, a measurable objective by itself, therefore Smart City initiatives where 'being smart' is seen as a mean for reaching other objectives don't fit well under this definition.

Towards a Smart City working definition

Rephrasing all the slightly different approaches makes clear that basically the concept for Smart City is the representation of integrating the 'business intelligence' possibilities of ICT within the domain of urban area development ('the approach'), to realise ambitions on a higher level than ever – quality of life; sustainability etc. -('the essence'), while at the same time – forced by developments like globalization, liberalisation and climate change - *adjusting the classic governance to a more open and participating cooperation between designers, developers and citizens ('the nature')*. This nature of the Smart City is the central research topic of this thesis. Therefore, in this thesis, I will use the compact working definition for 'Smart City' of the EU:

> **"A city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based partnership" (European Union, 2014, p.9.)**

Although the term 'governance' is not used in this definition it is implicitly referred to as it are governance processes that will make 'a multi-stakeholder municipally based partnership' work in practice. Visualizing this definition puts the focus on the core elements of Smart City implementation: ICT is always there as an enabler; Urban services and infrastructure are developed not only for their own stake but to contribute to the realisation of high level objectives. To smooth this development process 'participative governance' is a strongly needed success factor.

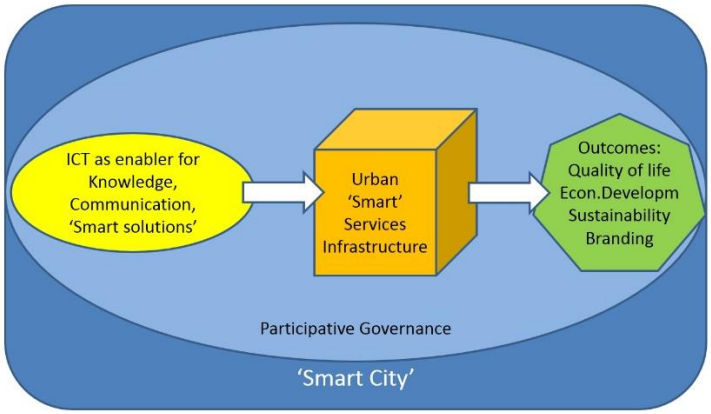


Figure 2-2 Visualisation of the EU working definition on Smart Cities

Successful Smart City

The EU uses two definitions of success, for Smart City initiatives and cities:

Successful Smart Cities: having meaningful objectives (aligned with Europe 2020 and actual outcomes) covering a mix of policy targets and characteristics; having balanced portfolio of initiatives; attaining maturity; actively joining in Smart City networks.

Successful Smart City initiatives: observable indicators through the life cycle of the initiative: attracting wide support, having clear objectives aligned to policy goals and current problems, producing concrete outcomes and impacts, being imitated or scaled:

- Be 'smart' (there should be a significant role for ICT enablers);
- Contribute effectively to achievement of EU 2020 targets;
- Be innovative;

- Offer sufficient information to assess its success (European Commission, 2013a).

2.3 Smart City initiatives

The European Union is a driving force in Smart City initiatives: “Smart City initiatives are viewed both as instrumental means of tackling specific problems and as a way to build a community of interest or overarching awareness of the potential of such joint initiatives to provide a platform for continued progress that adapts to changing circumstances” (European Union, 2014, p.59).

In the document ‘*Mapping Smart Cities in the EU*’, is stated that Smart City initiatives can be considered a useful vehicle for cities to achieve their Europe 2020 targets. Some potential uses and characteristics of Smart City initiatives are:

- Smart Environment or Smart mobility – focus on energy targets
- Smart Economy and Smart People – focus on employment and education
- Smart Governance and Smart Living – focus on poverty and social exclusion

Smart City initiatives and long-term urban planning are still somewhat separate worlds. As Angelidou states in a recent study on 4 cases of Smart City development “many cities fail to see smart city programmes as part of their long-term, comprehensive development plan and, consequently, they do not engage in methodical strategic planning” (Angelidou, 2016, p.27). She concludes with an optimistic view on a future enforced relation between long term urban development and short term Smart City initiatives: “it seems that we are finally heading towards a true integration of the digital with physical and institutional dimensions of the smart city.” (Angelidou, 2016, p.27). She wants physical planning and social policy to underpin the ‘smart’ dimension of the city and promote its integration.

Smart City initiatives may target a single domain, however in general initiatives would be expected to target two or more related domains. The table below shows cities worldwide are targeting more related domains, with an average of 3,7 domains per initiative. The table shows energy, environment and mobility are the domains most commonly targeted. Ojo et al. observed, across the ten investigated cases, that Smart City initiatives in general aim at:

> (1) Carbon reduction and neutrality; (2) achieving energy efficiency; (3) leveraging ICT to develop niche industries such as those relating to multimedia or knowledge-based industry; (4) attaining the highest quality living environment for residents; (5) developing green areas within the city; (6) developing state-of-the-art information infrastructure accessible to all; (7) achieving economic growth and quality of life simultaneously; (8) developing sustainable

communities; (9) ensuring social harmony among different groups of residents; and (10) evolving city as living laboratory to foster continued improvements (Ojo et al., 2014).

Table 2-2 Dimensions covered in ten Smart City Programmes (Ojo et al., 2014) shows, energy, environment, governance and mobility as key dimensions for these Smart City initiatives.

Table 2-2 Dimensions covered in ten Smart City Programmes (Ojo et al., 2014)

Program	Economy	Economy and Environment	Energy	Energy and Environment	Environment	Environment and People	Environment, Energy	Governance	Lifestyle	Lifestyle, Environment	Mobility	Mobility and Environment	Mobility, Governance, Environment	Technology	People
AMSTERDAM		■	■		■			■	■		■				
MALMO		■	■		■			■	■						■
MALTA	■														
MASDA CITY			■		■			■			■				
PLAN IT							■	■			■				
SINGAPORE			■		■			■	■		■				
CURITIBA		■			■	■					■		■		
SONGDO				■	■						■			■	
TIANJIN					■				■	■		■			
YOKOHAMA			■		■										

Over time more attention is being paid to the more abstract goal of enforcing the city innovation capability's, thus creating a structural force for the successful implementation of initiatives with specific objectives in other domains.

European Smart City Programmes

Transforming Europe's hubs into smart cities and communities is a priority for the EU. That's why the European Commission launched the European Innovation Partnership on Smart Cities and Communities (EIP-SCC) in July 2012, bringing together European cities, industry leaders, and representatives of civil society to smarten up Europe's urban areas, meaning: to improve quality of life, growth, jobs and decarbonisation.

The EIP-SSC targets for 2016 are to have at least 100 cities active in this partnership in different groupings to strengthen the demand for tested solutions. 100 key industry partners will cooperate developing innovative solutions, including the needed business models and financial solutions. Other key parties, like academia, governments, associations and other institutions, as well as civil society will join these initiatives to support their success. This joined effort should result in a growth of available open solutions and ease the way to roll out and up scaling. Their roll-out actions are among others to establish interoperable urban platforms, with the aim to increase pace and scale of roll-out of open solutions, approaches for citizen engagement including co-design and co-creation (European Innovation Partnership, 2016).

The Seventh Framework Programme for Smart Cities and communities (FP7), had a budget for 2013 of 209.000.000 Euros for cooperation on ICT and Energy to develop Smart Cities (European Commission, 2012). This FP7 framework, was the European Union's Smart City Research and Innovation funding programme for 2007 – 2013.

The current programme is Horizon 2020, but there are many projects funded under FP7 which are still running. The European Horizon 2020 programme is a framework for research and innovation meant for implementation and demonstration of projects, like Triangulum. In this programme, projects are innovatively applied by international triple helix partnerships on themes of ICT, Energy and Mobility. It has an investment agenda for the years 2015-2020 in which about 80 billion euros are available.

The FP7 and the EIP under Horizon 2020 provides several funding schemes related to the initiative called 'Smart cities and communities'. The goals of the initiative include a 40 per cent reduction in greenhouse gas emissions by 2020 through improvement in the energy distribution networks and transport systems (Vanolo, 2013). With these projects or programmes the EU is trying to ensure that smart solutions for cities can be explored, implemented and replicated.

The Figure 2-3 European RDI Funding in the Urban Field shows the current phase of 'Smart Cities and Communities' is focusing on Pilot Projects and Demonstration and Evaluation (in the development and validation phase).

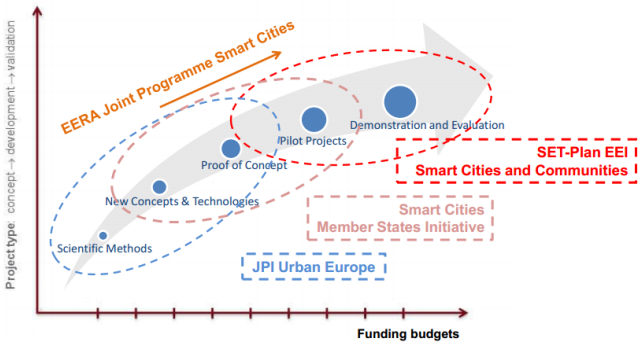


Figure 2-3 European RDI Funding in the Urban Field (Schwarz, 2013, p. 20)

The European Commission (EC) has published a Technology Readiness Level (TRL) list ranging from TRL 0-9. See the figure 2.4 below.

TRL 0: **Idea**. Unproven concept, no testing has been performed.
TRL 1: **Basic research.** Principles postulated and observed but no experimental proof available.
TRL 2: **Technology formulation**. Concept and application have been formulated.
TRL 3: **Applied research**. First laboratory tests completed; proof of concept.
TRL 4: **Small scale prototype** built in a laboratory environment ("ugly" prototype).
TRL 5: **Large scale prototype** tested in intended environment.
TRL 6: **Prototype system** tested in intended environment close to expected performance.
TRL 7: **Demonstration system** operating in operational environment at pre-commercial scale.
TRL 8: **First of a kind commercial system**. Manufacturing issues solved.
TRL 9: **Full commercial application**, technology available for consumers.

Figure 2-4 Technology Readiness Levels in the European Commission (EC) (Schwarz, 2013)

Some Smart City projects start at a low TRL level, being ideas, unproven concept, without being tested. These are often FP7 projects, other projects use technologies that were already used as full commercial applications, these are often Horizon 2020 projects.

Living labs and Smart Urban labs

As mentioned in chapter 1, this research focuses on Smart City initiatives on urban development scale of an area, in the form of a Smart Urban Lab (SUL) also referred to as a Living Lab. The Living Lab is seen as "a platform for implementing an open innovation model to pilot different initiatives towards the Europe2020 perspective of well-being and sustainability." This is done through "user-driven innovation ecosystems based on a business–citizens–government partnership which enables users to take active part in the research, development and innovation process (EC, 2010d)" (Paskaleva, 2011).

The Living Lab approach is one of the many strategies of creating a smart city: "A Living Lab is a real-life test and experimentation environment in which users and producers co-create innovations. Living Labs have been characterised by the EC as Public-Private-People Partnerships (PPPP) for user-

driven open innovation" (den Ouden, Valkenburg, & Blok, 2016, p.8). There are many varieties of the concept: 'Lighthouse Initiatives', 'living labs', 'test labs', 'smart urban labs' and 'smart city neighbourhood units', etc.. Here it is not about the distinction between the definitions, but rather to notify these are forms of (urban) development proposed by the European Commission as new vehicles to support future success in deploying smart city solutions on a larger European scale to realize the 20/20/20 goals, across the three domains mobility, built environment and infrastructures using ICT. (Azamet, 2015).

2.4 Transform and Triangulum

City innovation in Amsterdam and Eindhoven

Amsterdam and Eindhoven are aiming at innovative urban development. For the city of Amsterdam, the Smart City is a key theme in the city. Therefore, Amsterdam has set up 'Amsterdam Smart City', which acts as an innovation platform for the Amsterdam Metropolitan Area, challenging businesses, residents, the municipality and knowledge institutions to test their innovative ideas (Amsterdam Smart City, 2016). As in Amsterdam, local government of a Smart City often performs as a civic boosters, aiding urban entrepreneurialism, through providing public–private partnerships and knowledge transfer through higher education institutions (Hollands, 2008). Mora concludes, after an analysis of the Amsterdam Smart City, that:

> The success of Amsterdam in the field of smart cities results from an approach closely linked to strategic urban planning principles. To manage the complexity of smart city strategies, the city has effectively combined the importance of new ICT infrastructures and digital services with many other non-technological but yet critical factors that are widely discussed in smart city research. For example: leadership and political commitment; governance and funding capability; coordination, sponsorship and support across departments; collaboration between stakeholders and organizations across multiple sectors; innovative business and operating models; long-term vision, performance metrics and commitment from the top; the capability to connect short-term projects and initiatives to real local needs, and benefit from the enormous innovative potential of grass-roots efforts (Mora, 2015).

Whether these conclusions are relevant for the case of Transform, will show in chapter 6 and 8.

On 8 April 2016, the European Commission awarded the title of European Capital of Innovation 2016 to Amsterdam "for its holistic vision of innovation related to four areas of urban life: governance, economics, social inclusion, and quality of life" (European Commission, 2016). Amsterdam won for embracing a bottom-up approach based on smart growth, start-ups, liveability and digital social innovation. With this edition of the award, the European Commission's aim was to celebrate the European city that is building the best 'innovation ecosystem' – connecting citizens, public organisations, academia, and business – with a view to helping the city scale up its efforts in this field. Among the other eight European finalist one other Dutch city was selected: Eindhoven: "This city combines digital technology with creativity in its world-leading urban smart lighting strategy" (European Commission, 2016).

Triangulum and Transform

Triangulum and Transform are both part of European Smart City funding programmes. In contrast to most ASC Smart City initiatives, Transform and Triangulum are European Smart City projects[1] with high investments on the large urban scale of a 'living lab'. About these large scale Smart City initiatives, the authors of *'Mapping Smart Cities in the EU'* state: "The projects are holistic in scope; the different neighbourhood units demonstrate complete visions of a future Smart City by incorporating infrastructure, Smart Living and sustainability. . . Besides energy consumption objectives, the projects all have a strong emphasis on a complete energy infrastructure" (European Union, 2014, p. 134).

This shows that these Smart City initiatives are 'area-based urban development', thus much more complex than the development of - for example - Smart City Applications, as is the case for most projects at Amsterdam Smart City (ASC). Through these living Labs the Smart City is taking its form as urban development, including the infrastructure layer of urban development on a neighbourhood or district scale

Transform-Amsterdam

Transform was a European funded programme executed between January 2012 and August 2015. This initiative is a European collaboration, with six cities on the consortium: Amsterdam, Vienna, Lyon, Genoa, Hamburg and Copenhagen and thirteen partners from industry and research worked together to improve policy and programmes to lower carbon dioxide emissions. From the six working packages, in this research I will put the focus on Work package 4: 'The implementation plan', and especially the one in relation to the Smart Urban Lab Amsterdam.

In Transform the making of Implementation Plans is the main objective for Work Package 4. In Transform an Implementation Plan is defined as: "an area-based comprehensive strategy and investment programme geared to significantly reduce per capita/workplace energy consumption and CO2 emissions in the area, in line with EU 2020/2050 targets and the city wide development targets." (TRANSFORM, 2014a, p. 6). The Implementation Plans are focusing on the conception of new energy systems, the quality and transformation of building stock, economic and legal prerequisites and – very importantly for making implementation happen – governance issues." (TRANSFORM, 2014b). This will be support for ongoing redevelopment projects in specific districts.

The Amsterdam district of Zuidoost (Southeast) is 22 km2 and is home to about 83.000 residents. The plan area, or Smart Urban Lab, for TRANSFORM is 300 ha and contains about 18.000 residents (Gemeente Amsterdam, 2013b, p. 7). The SUL is located outside the Amsterdam city ring. In this zone the plain municipal investments are mostly directed towards social and economic programs and less to actual physical area development. This existing mixed use area consists of leisure, retail, dwellings, offices and industry.

[1] Transform and Triangulum are in different sources described as 'projects' or as 'programmes'. Being a part of a European programme they are often typed as 'project', but being a collection of projects by itself it can also be seen as a programme. For this thesis I will actively refer to them as 'projects'.

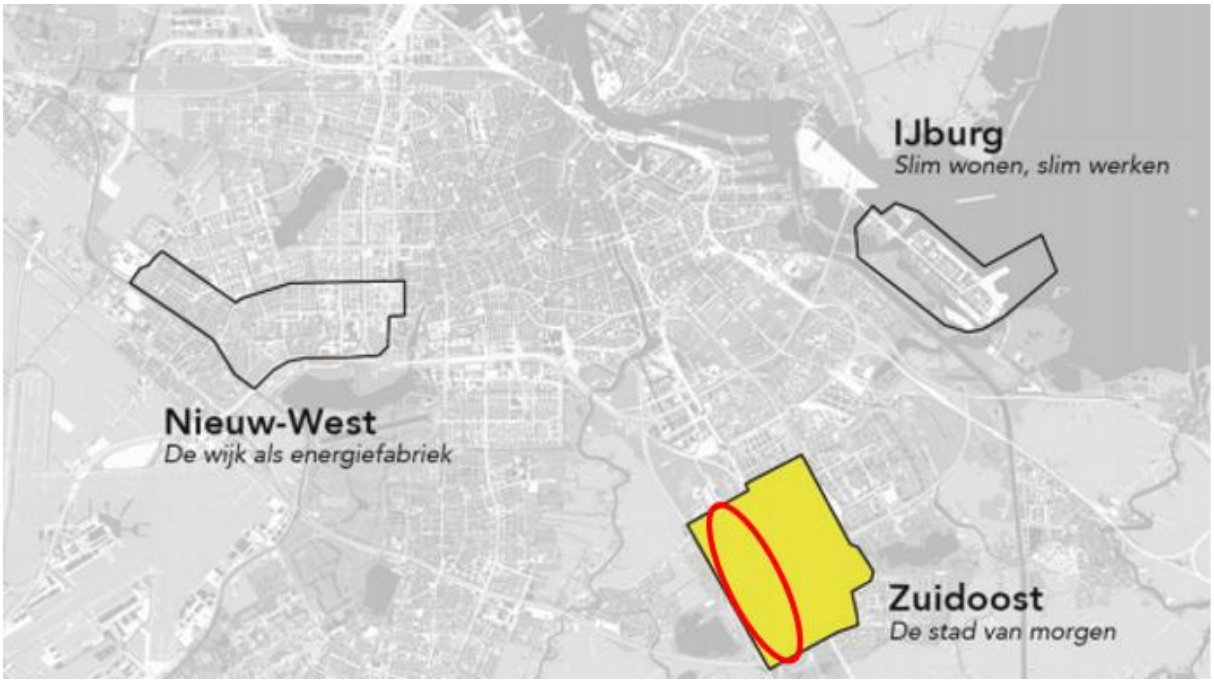


Figure 2-5 Three living labs in Amsterdam, with Southeast in *yellow*, as the Transform living lab. The main SUL focuses on the business area *red circle. (TRANSFORM, 2014a)*

For Transform, the exact Smart City projects have not all been defined prior to the writing of the call. Therefore no TRL was decided on. Transform started still in its fundamental research stage in the phase of 'new concepts & technologies - proof of concept' making plans to become a pilot project after finalising the project.

Triangulum-Eindhoven

Early 2015, the Triangulum project started in Eindhoven. This 25 Million euro project is funded by the EU as so called 'Lighthouse project' that will serve as an example for other cities in Europe.

> The Triangulum consortium combines the expertise of 22 partners from research, business, and cities from six countries in Norway, the Netherlands, United Kingdom, Germany, the Czech Republic and Spain . . . Each of the participants has extensive experience and knowledge with regard to smart urban development and has been involved in national, European or international research and demonstration projects or networking activities in the area of smart cities (Fraunhofer-Geselschaft, 2015b).

The three leading cities are Eindhoven, Manchester and Stavanger. At every city the consortium consists of the municipality of the city, local SME's, the University of the City, and citizens' platforms. In this project the word 'Smart' mainly refers to the use of data and ICT in combination with measures to improve the quality of life in the urban environment, particularly in the fields of energy and mobility.

Triangulum uses more mature innovation projects, with a higher TRL. According to the alliance manager of Triangulum, the projects in the Triangulum call had to be of a TRL between 7 (demonstration system; operating in operational environment at pre-commercial scale) and 8 (first of a kind commercial system-manufacturing issues solved).

The Triangulum mission consist of ten statements: demonstrating real smart city solutions; looking beyond subsidy and demonstrate working business models and social value models; minimize risk for future smart city investments; co-create with citizens; transfer knowledge; seek to activate and

enable entrepreneurs, SMEs and young talents by creating an attractive eco-system; develop and implement a smart city reference model; sustainable transformation of existing buildings and demonstration of solutions for shifting energy demand; build upon the replication potential of follower cities; and contribute to strengthen the European Smart Cities Movement (Fraunhofer-Geselschaft, 2015a).

Below an overview of the two Living Labs in Eindhoven located in the city of Eindhoven.

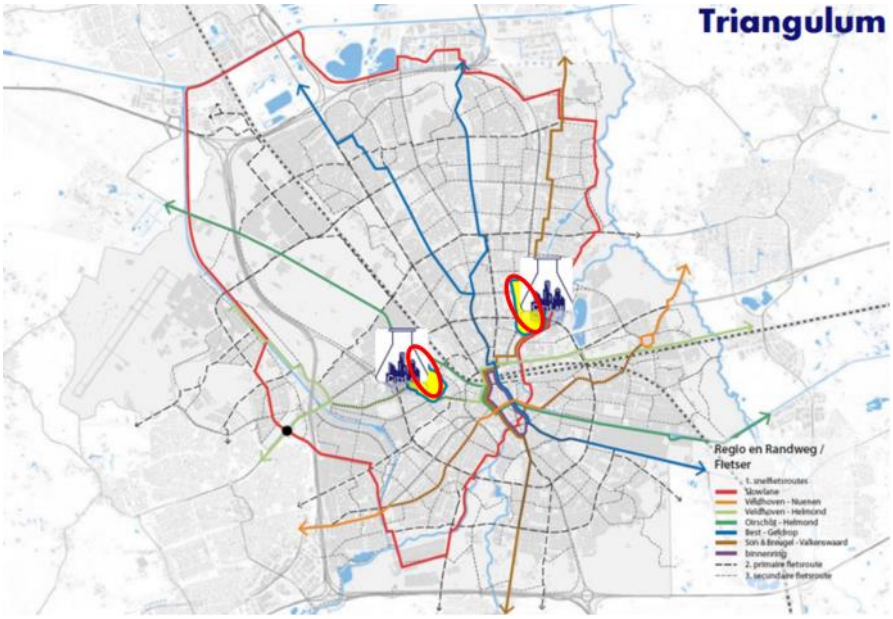


Figure 2-6 Two Triangulum living labs in Eindhoven: Strijp-S and Eckart/Vaartbroek (right)

Overview Transform and Triangulum

In the next table, I will give a summary of both programmes on their major characteristics.

Table 2-3 overview Transform and Triangulum

	Transform	**Triangulum**
Consortium European level	Amsterdam, Vienna, Lyon, Genoa, Hamburg and Copenhagen	Eindhoven, Manchester, Stavanger,
Cities	Amsterdam	Eindhoven
Smart Urban Labs/ Living Labs	Amsterdam Southeast	Strijp-S Eckart/Vaartbroek
Period	1st of January 2013 until the 30th of June 2015. Status: Completed	1st of February 2015 – 31 December 2019 Status: Ongoing
Local stakeholders /partners	ASC, AMC, ArenA, Liander, Nuon, HvA, Ikea, ING, ABN, etc.	KPN, Woonbedrijf, Technical University of Eindhoven, Municipality of Eindhoven, VolkerWessels
Themes	Energy, mobility, waste	Energy, Mobility, ICT, focus on intersections
Goals	EU 20-20-20 targets	EU 20-20-20 targets: energy-efficiency & low carbon development
Innovation level	mature (no specific TRL)	mature (TRL 7-8)
Type subsidy	FP7 Research & innovation Project	Horizon 2020 Implementation project
Funding (Euros)	Total project 7.5 M, of which 5.6 M by EU.	Total project 25 M Euro, Eindhoven; 6.4 M Euro '254 months'
Key Roles	Cities and industry	Cities, industry, academic and citizens

2.5 Critique on Smart City initiatives

Critique on the Smart City initiatives comes from different perspectives. Major criticism is concerning the concept of 'Smart Cities' itself and the major role of ICT within the concept. The lack of evidence for proven success is a second area for criticism and tempering the expectations. Besides that there is some criticism on neglected possible risks as a side effect of the realization of 'Smart Cities'.

In the Netherlands Hajer and Dassen (Netherlands Environmental Assessment Agency) published a book called 'Smart about Cities - Visualising the challenge for 21st century urbanism'. They point out at the risks of the current hype, questioning whether 'efficient' cities actually improve the quality of life (Hajer & Dassen, 2014). Hajer and Dassen plea for a 'smart urbanism' instead of uncritically adopting 'Smart Cities'. They question the reliability of ICT claims in improving the city and are critical towards the Smart City concept and its potential benefits. According to them "the concept of 'Smart Cities' currently mobilise much positive energy among the elite, and its discourse is truly of the 21st century . . . however, It lacks connection to a broader social reform agenda" (Hajer & Dassen, 2014, p.31).

Walravens finds criticism on different aspects of the Smart City concept: "The various operationalization's of the Smart City, the different interests at play, the potential misuse or even abuse of the concept at its potential pitfalls also constitute recurring critiques" (Walravens, 2015, p. 283). Some researchers warn for a too dominant role of ICT (Caragliu et al., 2011). In a more extreme case, some researchers state that cities who have a broader portfolio of investments in smart initiatives are not necessarily better or more liveable cities. Rather than reaching a good level of democracy and quality of life, these cities could turn into panoptical environments in which the citizens are persistently observed and scrutinised (Neirotti et al., 2014). In this line, Anthony Townsend is focusing on the possible negative aspects of the permanent data collection since people have been enhanced with mobile computers in their smart phones: "Increasingly, mobile networks themselves are becoming observatories where we can watch in real time how people move, how cities grow, the quality of life, and economic activity" (Townsend, 2013). A best example of this is being built in New York 'The Hudson Yards'.

The use of ICT may have an enforcing effect on democratic processes, it can also have unwanted side effects: "it [the smart city] is an increasingly authoritarian and undemocratic place, aimed at users and consumers rather than at citizens. These are invariably privately owned and privately controlled places, albeit ones often propped up by public subsidy" (Minton, 2014).

Baccarne, Mechant and Schuurman focus their critique on the lack of evidence for positive outcomes: "While both research and policy often promise disruptive solutions, improvement of life in the city and economic growth, there is a vast lack of evidence concerning the actual value that is being created in a smart city and the processes that allow the exchange of value and knowledge" (Baccarne et al., 2014).The European study '*Mapping Smart Cities in the EU*' showed that evaluation of the outcomes is complicated by:

> the absence of objectives stated in concrete and measurable terms, and by the lack of identified and agreed baselines for comparison. Even where partial indicators are identified . . . the data necessary to assess performance are not always collected, made available, or provided at the necessary levels of quality and coverage (European Union, 2014, p.57).

And for cases in which value is created by these Smart City initiatives, researchers emphasize on the minimal effect they have: "The popular perception of smart city initiatives as an overarching, citywide urban policy concern often narrows its focus onto much smaller deliverables that may have

minimal effect" (Shelton, Zook, & Wiig, 2014, p.9). According to Dameri & Rosenthal-Sabroux the 'measurement of the results' is strongly related to the 'will to invest' in Smart City initiative:

> No city till now has developed and applied a set of key performance indicators and a measurement framework to evaluate the real effectiveness of smart actions. For smart city development, in a large sense, it is difficult to evaluate the returns they produce. More difficult is to evaluate the benefits or the public value produced by an integrated smart strategy. It is an important barrier to smart initiative implementation, because they often require a large amount of public investment and therefore also the need to justify the expenses and to demonstrate the reached results (Dameri & Rosenthal-Sabroux, 2014a, p.3).

Finally Caragliu points at the risk of neglecting other potential better ways to strive for a better future by focusing on the Smart City concept (Caragliu et al., 2011).

2.6 Conclusions

What is a Smart City? The literature analysis gives us insight in the Smart City concept. For this thesis the EU working definition of Smart Cities has proven to be a useful description of the relevant factors: *'A city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based partnership'.*

Smart City initiatives are mostly 'smart' because of their chosen objectives and used technology; urban area development is not a core objective in most initiatives but the improvement of urban services is.

'Smart City' is not a well-defined label and it will probably never become so defined before being replaced by a new label. This happened already to the 'digital city' and the 'intelligent city'. The city marketers will continuously be looking around for new labels to distinguish their cities and form an attractive leading group. No city wants to be 'dumb', so being 'smart' is at best a temporary advantage on the rest. At long last all cities strive to be smart, so the adjective will lose its meaning. Just like 'e-mail' is being expelled by 'mail', all 'Smart Cities' will eventually become 'cities' again.

Since 'smart' is a human quality it's quite obvious that a Smart City initiative has focus on the participation of smart people. The use of 'smart technology' can make them even smarter. The current cultural connotation of being smart is also 'seeing the bigger picture' or 'using the holistic view'.

Measurement of the outcome of any Smart City initiative is a prerequisite like it is for any initiative based on public funding, therefore the objectives, adjustment and evaluation should be part of the democratic process.

The criticism on Smart Cities is focused around the dominating role of technology and thereby its providers, with the risk of under estimating the possible negative side effects like the possible reduction of democratic control and citizens' participation. The potential 'big brother' dimension which should always be addressed explicitly with built-in measures to secure the privacy of citizens and the flow of democratic processes. Another critical perspective is to focus on the real proof of the measurable realization of the objectives.

3 Smart City implementation strategies

In the previous chapter I presented the Smart City concept and characteristics, elaborated on the European funded cases in this research, and selected the critiques regarding this urban development concept. In this chapter I will investigate on the Smart City process and implementation strategies to realize Smart City initiatives in relation to their scope and the stakeholders involved. I will analyse different Smart City frameworks from the academic literature, to argue what factors are most influential in Smart City implementation. This inventory of influencing factors will make clear that 'governance' is a critical factor for further investigation.

3.1 Smart City Implementation Process

Figure 3-1 Extent of Smart City phenomena (Mora, 2015)

As there are many differences in local circumstances and objectives for Smart City initiatives, there are also many approaches towards the implementation. The differences in approach is often seen as a difference in strategy. The implementation strategy or 'approach' is the planned road to realize the objectives (the essence) working under the governance influence of collaborating stakeholders (the nature). The strategy is developed by the stakeholders in their collaboration and thus influenced by the collective governance. Strategic choices in return have their impact on the way governance processes can be designed and executed. For example in a top-down strategy the participation level will be low to zero.

The figure shows the rapid rise of urban areas with a smart city strategy, especially in Europe in which 240 cities launched a Smart City Strategy before 2014.

Roadmap for developing smart city strategies

Bolivar found three main directions for the followed approaches in Smart City implementations, with a main accent on a pragmatic focus:

> there is no one route to becoming smart, and different cities have adopted different approaches that reflect their particular circumstances, three general principles to guide smart city agendas have included the integration with economic development and public service delivery plans, the pragmatic focus with the bulk of investment going on projects that are practical, achievable and financially viable and, finally, the participation of community representatives, local businesses and residents to ensure projects are relevant to the city's opportunities and challenges (Bolívar, 2015, p.2).

In the cases I will discuss later, all three principles will be encountered and also there the main accent will be on the pragmatic focus.

Relating to the urban area development implementation model, Bolici & Mora describe a comparable phasing model for the development of a Smart City programme, but puts the accent on the recursion of these processes.

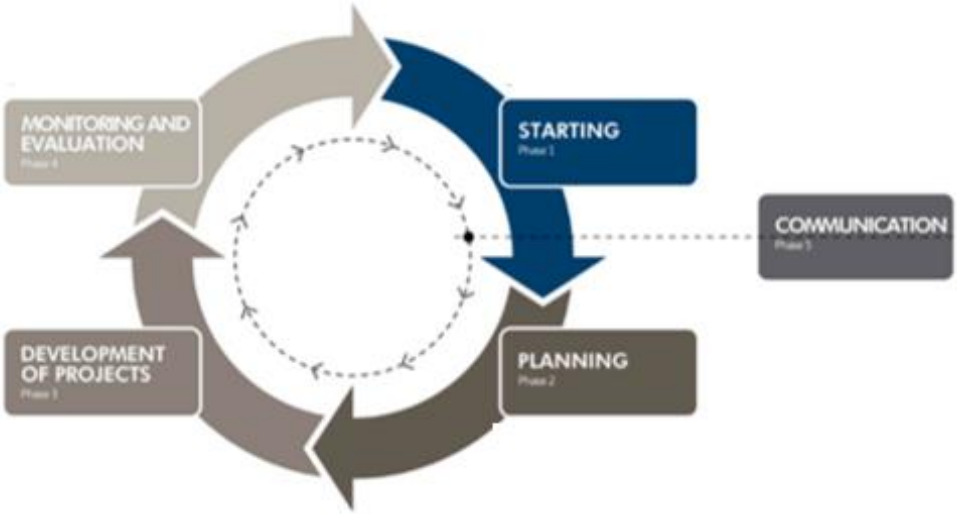


Figure 3-2 Roadmap for developing smart city strategies in large European cities (Bolici & Mora, 2015)

Bolici & Mora developed this model through analysis of Smart City initiatives proposed by the municipal administrations of Amsterdam and Barcelona, to outline this step-by-step roadmap, "in which a possible approach for developing Smart City strategies in large European Cities is described" (Bolici & Mora, 2015, p.110). They find "The knowledge accumulated with the analysis has allowed to build a roadmap split in 5 phases and 16 different activities [The description of each phase has been connected to the contents of scholarly literature that deals with the process for transforming ordinary cities in smart cities." (p.112). These phases and their different activities are used in chapter 6 and 7 to describe the Smart City initiatives Transform and Triangulum. Paraphrasing and quoting Bolici & Mora (2015), I will give a summary of the description of this model.

An overview of the five phases of the Smart City implementation process:

Phase 1: Starting:

"The need and desire to transform the city into a place with a better quality of life is common to all Smart City Initiatives. However, it is up to each city to define what that means in particular. . . What are the overall aims of the initiative and what is the grand idea to achieve specific targets? . . . The consideration of the initiation phase [should] provides a deeper understanding of the vision of a Smart "(European Union, 2014)

"Smart city strategies start when one or more organizations working in the city mature the idea to use ICTs as a tool for supporting urban development."(Bolici & Mora, 2015, p.112) These organizations will drive the strategy by defining an initial motivation identifying what problems will be resolved with the support of ICT. Motivations are developed considering the specific problems and strategic priorities of the city. The initiators should also provide strong leadership from the very beginning of the process. The three activities mentioned in this phase are:

- grow up the idea to become smart;
- define the motivation and take the leadership;

- identify the department responsible for the development of the strategy and form a planning team.

“The transition from the initial phase to the planning phase occurs when the initiators nominate a department of one of the organizations involved as responsible for the process and instruct it to form a team” (p.114).

Phase 2: Planning

First, the Smart City strategy has to be aligned with the strategic framework of the city. Subsequent actions are vision-building and goal setting, followed by the identification of the fields of action and determination of ICT-based projects and initiatives to be completed in the short and medium term. “A methodology for monitoring progress and evaluating the results achieved with each project need to be defined, together with a specific process for producing, evaluating and selecting project ideas to develop” (p.114-115). The six activities in the planning phase are:

- rebuild and analyse the strategic framework of the city;
- formulate a long-term vision, and define objectives, approach and lines of action;
- select the fields of action;
- set up a team responsible for the implementation of the strategy and establish roles and responsibilities;
- establish how to produce and select ideas;
- define a monitoring and evaluation methodology

Phase 3: Development of projects:

This phase starts when the implementation team and its working groups are formed. “The aim is to ensure the continuous and constant implementation of ICT-based projects and initiatives that contribute to both the realization of the vision and the achievement of the overall objectives”. (p.115)

The four activities in the development phase are:

- activate the implementation team and start the activities for implementing projects;
- generate, select and organize project ideas to achieve your objectives;
- ensure financial support to the projects;
- implement the projects.

Phase 4: Monitoring and evaluation:

The implementation team will undertake the activities for monitoring progress and evaluating the results achieved with projects.

Considering that the implementation of the strategy represents a long-term initiative, the various phases are never definitively closed. On the contrary, they will remain subject to a continuous process of review and modification aimed at the constant improvement of their structure and functioning, and their adaptation to a changing environment. As suggested by Webb et al. (2011): «cities will continually learn from projects, discover new opportunities for investment, develop new relationships with stakeholders and have to respond to evolving priorities». (Bolici & Mora, 2015, p. 115)

The evaluation of the programme is mentioned as one of three process success factors: “assessing the phases of a development is crucial to avoid or correct erroneous trends in a project or city” (European Union, 2014)

The two activities in this phase are: Monitor progress and evaluate results; Adjust and modify.

Phase 5: Communication:

“The implementation team should also ensure the continuous diffusion of data and information concerning the strategy and its promotion all over the world, allowing the city to acquire visibility and recognition in the smart city field.” (Bolici & Mora, 2015, p.115). Communication will make use of the constant production and distribution of information documents through a diversity of channels and the organization of events to support communication between all direct stakeholders and other potentially interested parties.

Two key process success factors as mentioned in Mapping Smart Cities in the EU, like communication, relate to all phases of the process: “successful process management, require effective project management” (p.78) and “the structure of knowledge management. In this context, access to the relevant data, which is required to develop business models, is as important as the guarantee of data privacy and data protection” (European Union, 2014)

Using this approach, analysing the five phases of a Smart City initiative, seems to fit well with the characteristics of the selected cases Transform (Chapter 6) and Triangulum (Chapter 7). The selection of steps are matched with the governance processes described in Chapter 4. Not all off the 16 activities might be as relevant for these cases, but the model shows to be a useful guideline for the description of the case studies.

About the Smart City process the ‘Smart Cities and Communities’ foresees a learning curve in their 10 year rolling agenda with continuous impact on the governance:

> The transformation towards the Smart City will not be a linear development, but based in many cases on trial and error. Cities therefore will require space to experiment, to learn from their successes and failures and, more generally, to gain experience (p.8) . . . [therefore] the development of smarter cities requires smarter planning (p.13). . . Good plans are to be followed by good governance of the city, so governance innovation is an intrinsic part of successful planning and implementation (p.13). (Smart Cities and Communities, 2013)

Since planning is so important for successful Smart City implementation, the Transform project is completely focused on making ‘implementation plans’. This notion of finding a way ‘by trial and error’, is part of this journey. The risk of financial losses is reduced by the European Smart City funding programs. At the Triangulum project lowering expectations, and being ‘realistic’ is explicitly formulated by the municipality Eindhoven to succeed on their path of trial and error.

Smart City excitement and complexity

Like many ambitious change initiatives, Smart City initiatives can bear the burden of sky high expectations, being tempered by the more than expected effort and time needed to realize only a part of it. Although high expectations are often needed to raise awareness and willingness, obtain funding and enthusiasm, management of realistic expectations is a success factor from the very beginning. Kim (2015) observed the tension between ‘marketing’ and ‘realization’ and pleads for realistic expectations as a success factor.

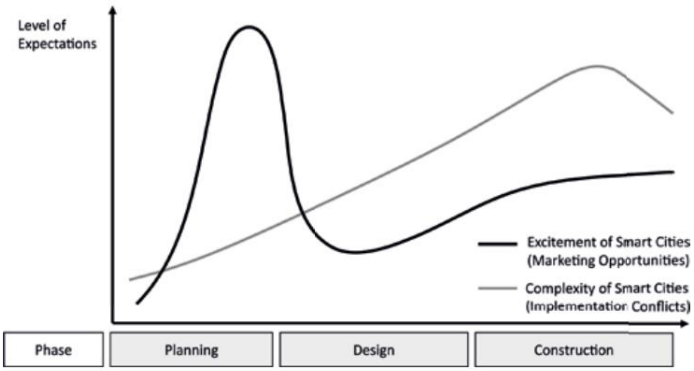


Figure 3-3 Excitement and Complexity Cycles for Smart City implementation (Kim, 2015)

The figure shows that the complexity (implementation conflicts) of a Smart City (project) is continuously on the rise, during the phases in the implementation process, with a slight decrease of complexity towards the end of the construction phase. The excitement of a Smart City project, on the other hand, sky rockets in the planning phase, with a major downfall moving towards the design phase. This excitement level stays on a low level, with a slight increase in the level of excitement if actual construction of a project shows to be realistic. However many projects don't even make it so far, and this line should

3.2 Smart City Strategies

A 'strategy' can be applicable on different levels of action. At first it refers to the action of setting goals, but the main focus of strategy is then on determining the path to go (How?), given a specific situation. The core aspects of a Smart City initiative are thus all strategic (Why? What? And how?), as shown in this table by (Peek & Troxler, 2014).

Table 3-1 Core-aspects of the Smart City approach (Peek & Troxler, 2014) focus thesis how (organisation)?

Why?	*What?*		*How? (technology)*		*How? (organisation)*	
Sustainability	Resources	Utilising	Infrastructures	Communicating	Public	Providing conditions
Resilience	Economy	Adding value	Buildings	Producing	Private	Investing
Quality of life	Politics	Connecting	Places	Meeting	Individuals	Participating

Since the governance of Smart City initiatives is mainly concerned with the 'How' aspects it is relevant to consider the different possible answers on this question, mainly regarding the organisational aspects.

From the academic literature on Smart City implementations the different approaches will be described.

Scope, scale and domain status

The scope of an initiative is determined by two main factors: the scale and the status of the domain. The implementation strategy is influenced by the scale of the Smart City initiative: is it focussing on a national level, or on a regional, urban or district level. The higher the level the more stakeholders will be involved and the more risk on discontinuity on the political levels and the more complex the legal and policy items can be.

Angelidou (2014b) gives an overview of the advantages and disadvantages of a local scale from the literature; relevant because the cases in this thesis have a local scale. It shows more advantages than disadvantages for operating on the local scale. The aspects direct related to governance are summarized in the table below.

Table 3-2 advantages and disadvantages related to governance aspects (Angelidou, 2014; Ibrahim et al., 2015)

Advantage	**Source**
The importance of collaboration among public and private actors, and most importantly the engagement of the city's people, in order to design socially sustainable and liveable smart cities	(Bria, 2012; Paskaleva, 2011; Sassen, 2011;Townsend et al., 2010).
Cities are capable of engaging various constituents in the innovation process on a much broader range of activities, fostering citizen-centric governance; the result is well established smart city ecosystems	(Bria, 2012, Hodgkinson, 2011, Paskaleva, 2011 and Streitz, 2011).
Cities are more flexible in exploring and adjusting a variety of business and governance models to their own profit. Their experience, agility and proximity provide them the necessary knowledge and ability to set up a favourable climate for the purposes of becoming smart	(Hodgkinson, 2011).
Disadvantage	**source**
Small and medium sized cities compete for resources against larger and better-equipped cities; therefore they are less likely to be able to receive or afford the necessary funds for smart city projects	Giffinger et al., 2010).

Besides the scale, the status of the domain is also an important factor in the scope of an initiative. The main differentiator here is the distinction between new development (green field) and improvement of an existing city or area (brown field).

Angelidou (Angelidou, 2014) also gives an overview from the literature of the advantages and disadvantages of adjusting an existing city which is summarized in the table below. This is particularly relevant because the cases in this thesis are also situated in existing cities. There are as many advantages as disadvantages summarized. The aspects directly related to governance are summarized in the next table.

Table 3-3 Governance related advantages and disadvantages of making an existing city Smart (Angelidou, 2014)

Advantage	**Source**
Opportunity of employing open innovation techniques and a bottom-up approach (crowdsourcing, user engagement, living labs, open data, etc.) to accelerate the innovation process	(Bakici, 2012; Bria, 2012; Paskaleva, 2011; Schaffers, Komninos, & Pallot, 2012; Schuurman, Baccarne, de Marez, &Mechant, 2012; Vicini, Bellini, & Sanna, 2012a).
An ecosystem of stakeholders is already present, allowing for innovatory ways to collaborate and secure funding	
Disadvantage	**Source**
Complex ecosystems of people, institutions and stakeholders require extreme effort to organize and discipline	(Bélissent, 2010; Ratti & Townsend, 2011).
Besides becoming 'smart', existing cities have many problems that must be addressed and which compete for a share of the city's recourses. Therefore, it is not possible to address all aspects of a smart city; the strategy has to be highly selective and based on a laborious prioritization process	(Bélissent, 2010).

The dimensions ‘scale’ and ‘domain status’ determine the scope of an initiative with a heavy impact on the possible implementation strategies. The strategies in the case studies on Transform and Triangulum are to typify as ‘local brown field’. This scope implies a number of advantages and disadvantages which will influence the Smart City initiative.

Stakeholder Collaboration

Main player among the stakeholders are the government(s) on urban, regional and/or national level. Like in traditional urban development programmes they work together with numerous companies and institutions, depending on the objectives of a specific initiative. Very often the public-private partnership (PPP-model) is the framework for the cooperation between the stakeholders as in more conventional urban development projects.

Stakeholders are a dominant factor in determining an implementation strategy as they are a dominant factor of the city itself. The main stakeholders are:

- Political leaders, managers and operators of local city-government;
- The service operators – public or private: water, electricity, gas, communication, transport, waste, education, etc.;
- End users and consumers: inhabitants and local business representatives;
- Investors: private banks, venture capitalists, pension funds, international banks;
- Solution providers: ICT companies, financial and investor providers.

The different stakeholders play different roles within the organization of a Smart City initiative. “in smart city development [it] is important to achieve the necessary consensus for the changes. Their concerns need to be carefully considered and acknowledged, and ultimately the direction and next steps have to be collectively approved” (Commission, 2014, p.4). The table ‘stakeholder coordination’ gives an overview of different actors and their roles, by the European Innovation Partnership on Smart Cities and Communities:

Table 3-4 Smart City Stakeholders and their roles (Sherpa Group, 2013, pp. 95-96)

Actor	Key Role(s)
European Institutions	- Convening action - Setting and supporting policy and regulation where adequate - Supporting standardisation - Providing funds for research, innovation and large-scale deployment through intelligently combining Horizon 2020, COSME, ESIF funds and other financing tools - Promoting awards, competitions, dissemination, learning
Member State and Regional Governments	- Providing supportive legislative, policy and regulatory environment - Establishing innovation programmes - Supporting (national/regional) city competitiveness / competitions - Providing funds, and supporting the establishment of funding vehicles - Risk management - Market development activities (e.g. international trade missions)
Investors	- Commercial models that support collaboration and common solutions - Funds that enable the OIP ambitions of early scale
City Administration	- Leadership - Societal engagement - Policy, programmes, capacity building
City Associations and Networks	- Collaboration mechanisms - Benchmarking - Experience sharing and dissemination
Industry	- Innovations - Solutions - Research resources - New business models
Academia / RTOs / EERA	- Insight development, research capability, scientific support along the entire value chain - Independent validation - Dissemination - Discussion forum
Society	- Ideas, opinion, feedback - Engagement on service operations

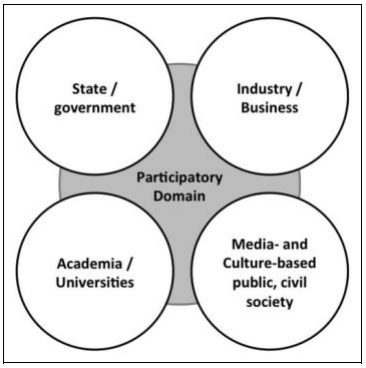
This table shows that the European Institutions are driving the agenda, Member State and Regional Governments are supporting this, possibly with the help of investors, definitely lead by city administrations, ideally in collaboration with industry, academia and society.

Quadruple Helix

The chosen strategy in specific Smart City initiatives is heavily depending on the perspective of these stakeholders. “Two of those extreme approaches and a final one that aims to meet them in the middle are: the top-down Smart City, the bottom-up Smart City, and the Smart City as a local innovation platform” (Walravens, 2015, p. 283). With Smart City programmes becoming more ambitious the collaboration between stakeholders becomes an even more dominant factor in the strategy. As a result from practice and supra-national stimulation by the EU the focus is at new models for collaboration like ‘the triple helix model’ and ‘quadruple helix’ cooperation.

According to Leydesdorff and Deakin, the triple-helix model is a combination of government policies, academic leadership and corporate strategies to transform a city into a Smart City. (Leydesdorff & Deakin, 2011). Carayannis and Campbell add ‘the public’ as an extra helix into the triple-helix model, turning it into a quadruple helix model and even a five-helix structure model (including the natural environment) (Carayannis & Campbell, 2012). In their article “*A Participatory Approach for Envisioning a Smart City*”, van Waart, Mulder and de Bont (2015) visualise the quadruple helix in a ‘participatory domain’. They argue that “designing a smart city involves large-scale, complex urban innovations that exceed the span of the co-design relationship between designer and end user. Therefore, participatory prototyping for smart cities aims to involve all quadruple-helix stakeholders in collaboratively envisioning future applications” (van Waart et al., 2015, p. 6). They refer to the

'participatory domain' as collaborative participation in the public domain. Their proposed 'participatory prototyping' approach aims to:



- Improve (mutual) understanding between stakeholders (of each other's concerns and values),
- Contribute a shared vision among stakeholders of the applications in the future smart city which addresses the concerns of all stakeholders as comprehensively as possible,
- Strengthen the social fabric of stakeholders in the city, in order to sustain future collaboration and
- Achieve the above through the collective creation of prototypes by stakeholders. (van Waart et al., 2015, p. 6).

Figure 3-4 Quadruple helix in the participatory domain (van Waart, Mulder, & de Bont, 2015, p. 5)

This design approach can be seen as "first step toward a more sustainable practice of collaboration between stakeholders within the city", for example in the form of 1-day to 3-day sessions of stakeholder events (p.6). From two case studies they found that "stakeholders indeed gained a new perspective upon issues facing the city, due to an increased awareness and understanding of, and empathy for, the interests of other stakeholders" (p.1) Furthermore they found "indications that transfer of knowledge was taking place from the prototyping sessions to the daily practice of participants working in the public sector" (van Waart et al., 2015).

Holistic Approach

Two possible approaches or strategies for a Smart City, mentioned by Walravens, are the 'top-down' or a 'bottom-up' approach. In which the bottom-up perspective is about the grass-root initiatives developed by citizens through the rise of apps and social networks, while the top-down approach is about the high investments in ICT and 'all of its critical infrastructure' made by city authorities and tech companies, to better optimize its resources. By combining the 'best of both worlds' Walravens pleads to keep the focus on a holistic view, by adding a combination of both: the middle-out approach, or the "Smart City as local innovation platform". Since, "a purely top-down view on the Smart City carries a danger of authoritarianism with it, while a bottom-up-only approach leans towards chaos and lack of long-term vision" (Walravens, 2015, p. 286). In line with the quadruple helix model, the local innovation platform is about "organized collaboration between all involved stakeholders (governments, businesses, academia, users/citizens etc.). It includes co-creation of services, products and much more, and the availability of open platforms that facilitate the necessary collaborative processes and interaction" (p.285). This approach is being practiced in the form of Living Lab projects, as evaluated by (Paskaleva, 2011) and shortly described in chapter 2.3 of this thesis.

Suzuki writes about different leadership patterns to create data infrastructure in Smart Cities, mentioning 'the middle-out approach', as a form, putting both the data and stakeholders at the centre of interest. Based on having a strong value network of collaborators, of having feedback loops to understand user's perceived value which will help decision makers to assess whether the delivered value matches the expected value of users is of high importance. She notes that the implementation of efficient governance strategies is necessary since governance can reduce behavioural complexity. (Suzuki, 2015)

Smart City Maturity of the stakeholders

In a way the chosen strategy is dependent on the maturity of the stakeholders with respect to the Smart City concept. Boyd Cohen (2015, founder of the 'Smart City Wheel', distinguishes three maturity levels in his weblog *'The 3 Generations of Smart Cities. Inside the development of the technology driven city'* (Cohen, 2015). Early adopters grow in maturity, while followers can build on former expertise and step in at a higher generation level. These different top-down and bottom-up approaches relate to policy framework conditions for system innovation, and the three different policy paradigms presented in chapter 3.3 'Smart City Frameworks'.

*Smart Cities 1.0 'Technology push'***:** The first stage in Smart City development is characterized by the technology push. City government is seduced by multinational companies with their vision of a future ideal urban society, while they are not yet capable of understanding the effects of integrated technology on urban life. Extreme examples of these cities are PlanIT in Portugal and Songdo in South Korea. In this case "Technology providers play an important role in partnering cities; in particular, major global technology providers such as IBM, Cisco, and Siemens. These companies have been heavily involved in efforts to encourage cities in the adoption of ICTs and new technology. These efforts are often framed in the context of sustainable development" (Ching, 2013, p. 14). One can say that 'Technology push' may refer to a lack of strategy at the involved government.

Smart Cities 2.0 'Demand pull': In this next stage politicians take the initiative and define the outcome of the initiative. In this case demand pull can thus be a top-down strategy. Technological possibilities are examined on their contribution to the desired improvement of the quality of life in the city. According to Wolfram, the main strategies for implementing this concept of the Smart City is either by shaping 'Smart City' alliances (triple-helix model), or by designing service incubators (Wolfram, 2012).

Smart Cities 3.0 'Co-creation involving citizens/Open innovation platforms': A relative new form of collaboration in Smart City initiatives is the situation in which co-creation with citizens is the chosen model for development. For example in Vienna, where citizens are getting involved as investors in local sustainable energy supply. According to Boyd Cohen, "Cities like Amsterdam and Seoul seem to be taking the early lead in promoting sharing activities amongst citizens and fostering sharing start-ups" (Cohen, 2015). I will describe in the Transform case that this refers to Amsterdam Smart City but not to the Transform project. The importance of participation of citizens and their organizations is currently widely underwritten, and has become a key aspect of Smart Cities: "the most used models in smart cities projects take into account the social participation as one of the crucial features to involve stakeholders and to enable their actions in supporting the urban governance process"(Bifulco, Tregua, & Amitrano, 2013, p. 17)

The different policy approaches can be found in the different maturity stages, although the more recent focus on open innovation platforms (Paskaleva, 2011) matches solely with the third maturity stage.

Table 3-5 possible combinations of strategy factors policy and maturity levels

Policy / Maturity level	**1.0 Tech.Push**	**2.0 Demand Pull**	**3.0 Co-creation**
Top-down	X	X	
Middle-out		X	X
Bottom-up	X	X	

What approach will be most suitable for Smart City development? There are many views on this, however, it seems the answer lies in the middle. In a Smart City review by Tim Smedley is warned for

big corporates: “If we leave government and IT giants to their own devices, we end up with a world of Songdos”. Smedley, states that Townsend, known by his book *‘Smart Cities: Big Data, civic hackers, and the question for a new utopia’*, warns for “wonderfully engineered, technologically advanced ghettos. The alternative – open-sourced data, planners working with civil society, hackers with poor communities, smart sensors running alongside smartphones – could improve city life” (Smedley, 2013). Somewhere ‘in the middle’ is the more bright future.

3.3 Smart City Frameworks

Michael Batty, an architect-planner at University College London, stated “There are almost as many approaches to understanding cities as there are commentators trying to make sense of this complexity” (Smedley, 2013). The broad range of Smart City frameworks to describe the concept is dazzling. Researchers have presented many types of frameworks suitable to fit their message and support their view on the Smart City concept. I have selected the framework by Chourabi et.al. (2012), because – based on an analysis of different frameworks (see a short summary in Appendix I) - I concluded that this is the most elaborated framework for understanding Smart City initiatives.

Many frameworks are rather broad in their perception. Many publications stress the fact that Smart City initiatives originate frequently from a technology push with a high risk to neglect other relevant factors. Below I present a short overview.

Nam and Pardo (2011a) think “a socio-technical view on the smart city is needed” (p.188). Not technologies, but social factors are central to failure or success of Smart City initiatives. They see the Smart City concept as an organic connection among technological, human and institutional components. According to Nam and Pardo (2011a) these three factors are influencing the six characteristics of a Smart City. These characteristics can be seen as the objectives or ‘smartness in certain areas’ for a particular Smart City initiative and match those defined by the EU (European Union, 2014).

In another publication, from this socio-technical viewpoint, Nam and Pardo (2011b) focus on the Smart City as Urban Innovation. This article provides a framework for Smart City innovation, which shows *four dimensions* (technology, organization, policy and context) in relation to *ways to change the government service delivery* (innovation), *related risks* (risk) and *ways to deal with this risk* while innovating (way to success). These *ways to success* consist of generic and vague solutions and recommendations. For example, ‘governance’ is ‘the way to success’. How this governance should be implemented is undescribed. They do stress the strategic directions of a Smart City for Technology factors is *integration*, for human factors is *learning,* for Institutional factors is *governance* (Nam & Pardo, 2011b).

Walravens (2015) describes in her Smart City model the importance of a holistic view on the Smart City concept and places the accent on three so called characteristics ‘Collective’ (aiming to tackle grand societal challenges), ‘Contextual’ (making sense out of the data flood) and ‘Collaborative’ (working with all stakeholders, including citizens, using open innovation methods).

Dameri (2013) has produced two models defining the essential elements of the Smart City concept: “The smart city governance is a crucial activity to grant the success of smart initiatives. Indeed, governance is the process able to address all the individual behaviours towards a common vision and goals of all the initiatives”(Dameri, 2013, p.2545). In both the comprehensive scheme and the development path of a Smart City, Dameri gives a central role to governance, however stays superficial in explaining the meaning of governance.

The framework by Chourabi et al. (2012) in their paper *'Understanding Smart Cities: An Integrative Framework'* has a higher level of determination and more detailed description. They identify eight critical influencing factors of Smart City initiatives: management and organization, technology, governance, policy context, people and communities, economy, built infrastructure, and natural environment. In this framework distinction is made between two levels of influence on the Smart City initiative. The first level with the most direct influence is formed by the triangle: Technology, Organization and Policy (TOP); the same factors as distinguished earlier by Nam and Pardo. The second level identifies five major contextual factors of influence on the first level factors, in my interpretation a crystallization of the factor 'context' also previously mentioned by Nam and Pardo (2011a).

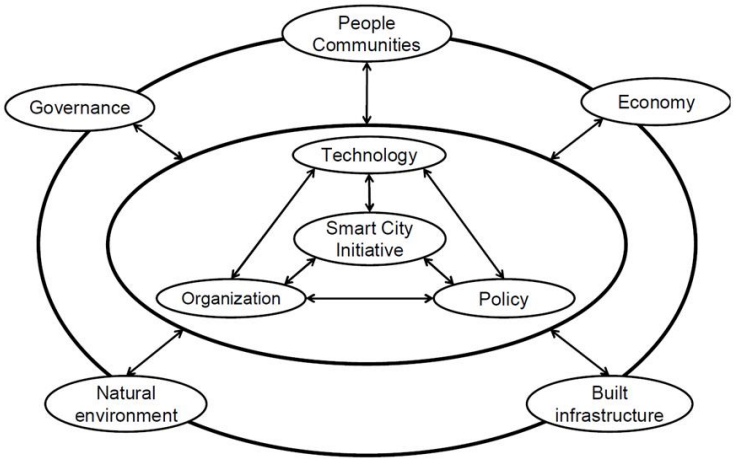


Figure 3-5 Understanding Smart Cities: An Integrative Framework (Chourabi et.al 2012).

Each factor is elaborated on by the authors. The framework could be used to address practical development issues of specific initiatives in case study research. The distinguished factors support the categorization and description of influencing factors found in the research literature, supporting a better understanding of implementing Smart City initiatives. From the eight influencing factors the core elements and Governance will be described below by summarizing the explanation from the *original paper*, together with their main findings from the case study paper *'Building Understanding from Smart City initiatives'* (Alawadhi et al., 2012). The complete description of all eight factors is included in Appendix I 'Smart City frameworks'.

Based on this framework I analysed the Smart City literature for relevant success and fail factors. In the appendix III a list is presented of the success factors and barriers for every factor in the framework.

(1) (Management and) Organization

Original paper: Based on E-government success factors and barriers for Management and Organization (M&O): Project size; Manager's attitudes and Behaviour; Users or organizational diversity; Alignment of organizational goals and project; Multiple or conflicting goals; Resistance to change; Turf and conflicts; Project team skills and expertise; Well-skilled and respected IT leader (tech-social skills); Clear and realistic goals; Identification of relevant stakeholders; End-user involvement; Planning; Clear milestones and measurable deliverables; Good communication; Previous business process improvement; Adequate training; Adequate and innovative funding; Current or best practices review.

Main findings M&O: The role of a leading organization is essential, managing involves interdepartmental collaboration, the initiatives change organizational culture and vice versa, the role of the top-management and leadership is critically important, limited funding continues as a major challenge.

(2) Technology

Original paper: The integration of ICT with development projects can change the urban landscape of a city and offer a number of potential opportunities, they can enhance the management and functioning of a city. City managers should consider certain factors when implementing ICT with regard to resource availability, capacity, and institutional willingness, also with regards to inequality, digital divide and changing culture and habits.

Main findings technology: New technologies for back office functions are used for the initiatives, social media and smart phone are increasingly used, and the lack of staff and budgetary constraints are main challenges.

(3) Policy

Original paper: Political components represent various political elements (city council, city government, and city major) and external pressures such as policy agendas and politics that may affect the outcomes of IT initiatives. Institutional readiness such as removing legal and regulatory barriers is important for smooth implementation of Smart City initiatives. E-government success factors identified are: legal, regulatory, institutional and environmental challenges. Smart city initiatives face similar challenges which influence the policy context.

Main findings policy: Interdepartmental agreements and the executives' policy directions shape policy context.

(4) Governance

Original paper: Governance, involves the implementation of processes with constituents who exchange information according to rules and standards in order to achieve goals and objectives. Stakeholders' relations is one of the critical factors to determine success or failure. 'Stakeholder relations' refers to four main issues: the ability to cooperate among stakeholders, support of leadership, structure of alliances and working under different jurisdictions. The recollected factors are: Collaboration; Leadership and champion; Participation and partnership; Communication; Data-exchange; Service and application integration; Accountability; Transparency.

Main findings governance: Various types of governance models and governance bodies exist, governance encompasses programmatic directions, budgetary and resource allocations the interactions with external actors as well as internal partnerships with other departments agencies.

Conclusion Smart City Frameworks

The described models put different accents on aspects of the Smart City concept. Almost every model has in some form the distinction between the three core elements: technology, organization and human aspects. Most models incorporate the objectives of Smart City development as a core influencing aspect. Governance is a key element in most frameworks. The model of Chourabi et.al (2012) is the most detailed and can be underpinned with descriptions of success and fail factors for each aspect of the model (see Appendix V). The model forms the integration of different models from the involved group of researchers.

3.4 The importance of Governance

Given the clear view of the wide range of factors influencing a Smart City initiative, what factor is most relevant to Smart City implementation for this research?

In 2009, a pan-European research project concluded that "governance, as a process and outcome of joint decision-making and action, has a leading role to play in building the 'smart city' and that cities should develop collaborative digital environments to boost local competitiveness and prosperity by using knowledge networks and partnerships, integrated e-services and governance"(Paskaleva, 2009).

Giffinger & Gudruns' use a model to rank European mid-sized Smart Cities, view smart governance as the core of Smart Cities. In their model smart governance (participation) represents participation in decision-making, public and social services, citizen participation, transparent processes and political strategies & perspectives (Giffinger & Gudrun, 2010). Likewise, Forrester states "Smart Governance is the core of Smart City initiatives" (Belissent, 2011b, p. 3)

In the Netherlands, the Dutch consultancy company PBLQ, has been focusing on the concept of the Smart City for a few years now, and has been supporting municipalities like Rotterdam, The Hague and Eindhoven regarding Smart City implementation. They find that concerning the Smart City, Smart Governance is the basic requirement for success. In this PBLQ research publication titled: *'Smart City a step towards Smart Governance'*, Theresa Pardo and Meghan Cock are interviewed regarding the main factors for Smart City project success. Their reply: "To our opinion, what is necessary for traditional innovation is also needed for Smart Cities: leadership, vision, and governance as well as strategic roadmaps and capability assessments. All are required if cities are to reach their goals." (PBQL, 2016, p. 22).

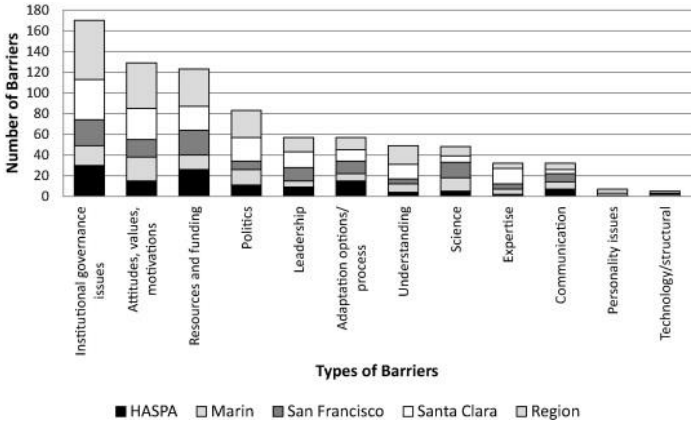
Dameri relates to the essential dimension of governance in Smart City implementation, seeing the importance of "the role of public government in driving the strategic goals of smart cities and in influencing the private investments towards the right directions for the city well-being and quality of life"(Dameri, 2013, p.2547). She sees the lack of governance as a high risk factor (both at local or central level) in establishing the general policies and rules for smart city implementation produces a dispersion of investments and a loss of important synergies, economies of scale and scope, to improve the return on investments in smart city

Chourabi et al. (2012) found that "several cities have felt an increased need for better governance to manage these projects and initiatives"(p.2292) . They argue that "Internal and external governance influence participatory and collaborative decision making"(p.2291) . Furthermore they discovered many models and governance bodies exist: "Participatory, hierarchical, and/or hybrid models are found in various initiatives." However, how these different models actually work is not described. Therefore they stress the importance of the "need for better governance to manage initiatives or projects to make a city smart" (Chourabi et al., 2012, p.2292).

The Master thesis publication *'Exploratory research on success factors and challenges of Smart City Projects',* by Kogan (2014) analysed thirteen Smart City initiatives from around the world, mainly focusing on European cases, using the eight factor Smart City model by Chourabi et al. (2012). From these cases Kogan derives that "citizen's engagement and governance of the city is highly important."(p.63) Her main findings in this study are "besides such core factors as ICT, Open Data, which were previously considered the central part of the Smart City Model this analysis discovered that Human and Social Capital, Governance and most of all, Civic Engagement factors cannot be ignored. These factors are indispensable for the success of the Smart City Project" (Kogan & Lee,

2014, p.38). Like Chourabi et. al (2012), Kogan's research is only focusing on general success factors and challenges, and not so much on solutions, explaining how governance should improve Smart City implementation: "the results of this research serve as a very general outlook for the existing and future Smart City Projects" (Kogan & Lee, 2014, p.65). A good reason to analyse 'Governance' in the next chapter.

Jonas Bylund management board member at the EU Joint Programme Initiative (JPI) stated in his weblog "I guess all [Urban] transition roads lead to governance. . . As governance is always bound up with what path to take, what next steps to take and future states to arrange" (Byland, 2016). The theme of urban governance and participation is therefore a thematic priority for the JPI Urban Europe Research and Innovation Agenda.



The importance of the barriers on governance aspects is supported by a study of Ekstrom & Moser on identifying and overcoming barriers in urban climate adaptation, which relates to a broad field of initiatives. This study confirms that governance issues are the most frequently encountered barriers, in obvious contrast to the low number of barriers related to technology issues.

Figure 3-6 Identifying and overcoming barriers in urban climate adaptation: case study findings from the San Franscisco Bay Area, Ca, USA. (Ekstrom & Moser, 2014)

According to Alawadhi et al.(2012) "Governance structures are embedded in all stages of any [Smart City] project"(p.49). Kim (2015) states that "The nature of smart cities is based on the concept of governance, while the planning practice is still in the notion of government" (Kim, 2015, p.561). It is not possible to generalise that governance is always the most critical factor for smart city implementation. However, the observations in this paragraph confirm the need of focusing especially on governance, rather than policy, technology or management. Dameri and Rosenthal-Sabroux (2014) point at 'governance' as a central factor for further research:

> All cities are at an early stage in smart city development; nowadays all the projects have mainly the role to experiment initiatives and to collect best practices, but in the future these projects should become daily work to improve the quality of life in cities. Therefore, to be able to govern the smart city will be the most important weapon to reach substantial results. There is need for a governance framework for effective realization (Dameri & Rosenthal-Sabroux, 2014b).

3.5 Conclusions

The development process of a Smart City initiative can be seen as an urban development process with five phases. In which the phases starting, planning, development of projects and monitoring and evaluation and finally communication throughout the entire process are forming the main categories. This roadmap towards a Smart City will often be iterative. Each phase has its particular activities, forming a step-by-step action plan towards becoming smart.

Smart City initiatives can bear the burden of sky high expectations, therefore realistic expectations are needed. During the life cycle of a Smart City Project conflicts are continuously on the rise, whilst towards the end of the planning phase the level of expectations and the excitement of the market opportunities drops dramatically. There is tension between 'marketing' and 'realization' of Smart City initiaves. This makes it difficult to overcome the planning phase and actually design and implement the Smart City project.

There are many strategies for implementing a Smart City initiative. Whether it is a top-down, bottom-up or middle-out approach, pushed by technology companies or demanded by ambitious politicians or even in co-creation with the citizens. Whether it is by a Living Lab or through a local innovation platform, each strategy has its advantages and disadvantages, which also relate to the context, the scope, scale and domain of the initiative.

Transform and Triangulum are both Smart City initiatives on an urban, district, scale (scope), in brownfield (domain) redevelopment. Here the main advantages are: having an ecosystem allowing for innovatory ways to collaborate and secure funding; and main disadvantages the extreme effort to organize and discipline this ecosystem. The strategy used for Transform and Triangulum is top-down, demand pull 2.0. In Transform this is tried through a triple helix approach, mainly involving local industry and businesses while excluding citizens. In Triangulum this is more going towards a quadruple helix approach in which citizens are participating.

What factors influence Smart City implementation? Since there are different views on the concept of Smart Cities there are different views on the influencing factors. From the study of different frameworks for the Smart City concept, the 'Integrative Framework' from Chourabi et.al (2012) stands out as the best suitable to sum up the key influencing factors and demonstrate the relations between them. The model includes the perspective that the Smart City is not driven by technology alone, but that policy and organizational issues are also key drivers. The model embeds the Smart City initiative in a number of more contextual influencing factors among which governance. This model is evolved on the base of some of the described models from different authors, contains the most recent insights and is based on descriptions of all factors with concrete lists of sub-factors.

Being based on a broad analysis of research on success and fail factors (Appendix V) the 'Integrative framework' (Chourabi et al, 2012), presents the influencing factors on Smart City implementations. The most critical factor influencing Smart City, is difficult to determine, since Smart City initiatives are very context specific. However, governance is, according to many academic publications, without a doubt, a crucial influencing factor for the successful implementation of Smart City initiatives. Especially for brown field, area based Smart City development in a network society as the Netherlands. The establishment of 'governance' is a key influencing factor, by adjusting the classic governance to a more open and participating cooperation between city leaders, designers, developers and citizens, forming a multi-stakeholder, municipally based partnership. This will be further analysed in chapter four. Using the list of eight governance factors potential pitfalls may be avoided, and successful Smart City implementation can be enforced.

4 The Role of Governance in Smart City Implementations

The first two chapters of this thesis have been an introduction to the topic, problem, concept and characteristics. A short introduction to the European Smart City programmes has highlighted the two Dutch Smart City initiatives central in this thesis: Transform and Triangulum. Looking into the wide variety of implementation issues, regarding Smart City initiatives, awareness is raised regarding the challenges and critiques of this specific type of urban development. In chapter three, throughout the implementation processes, governance showed to have a critical role in the case of 'brownfield' Smart City initiatives. The overview of strategies and influencing factors forms the basis for this chapter, which will provide a governance framework for analysis of the two Smart City cases. I will elaborate on the use and the meaning of the term 'governance' as it is referred to by different researchers to come to a clear definition of 'governance' in a Smart City context. The central research question 'How can governance factors contribute to the implementation of Smart City initiatives?' will be answered by distinguishing and defining the different governance factors.

4.1 Governance in Urban Development

In Urban Area Development and more specific in Smart City literature, the need for good governance is more and more stressed as a global success factor, but what is governance within this specific context? In this paragraph I will focus on gathering the body of knowledge necessary for this research. It will start regarding the governance in urban development before introducing governance in a Smart City. There is a direct link between governance factors influencing urban development and governance factors influencing Smart City initiatives. Thus understanding urban development is a necessary prerequisite for understanding what the possible success factors and barriers in Smart City governance are.

Governance

The term 'governance' is used besides the term 'government'. Both terms relate to the verb to 'govern', with 'government' relating to the institution that traditionally has to perform the task of 'governing' in relative simple hierarchical networks, reserving 'governance' for the processes of collective governing in complex networks of stakeholders. In the modern western society, policy-making used to be the preserve of traditional hierarchies but more and more this process occurs through the interaction of 'stakeholders' implying a diversity of steering actors, changing the role of the government from directly steering processes towards facilitating and coordinating this interaction.

In Stoker's view 'governance' is a new alternative for 'government' in situations where networks of actors are a necessary condition to realize desired objectives. This puts the focus on network management activities when realizing governance (Stoker, 1998). Stoker finds "within local governance there is somehow shared responsibilities for outcomes"(p.31). This shows the need for governance to improve the process of interaction within complex networks. Ferro, Caroleo, Leo, Osella and Paustasso suggest that to improve this process good governance is participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive and follows the rule of law (Ferro, Caroleo, Leo, Osella, & Pautasso, 2013). They built on definitions of the EC and OECD from 2001, a decade in which 'governance' of these institutions was in heavy debate.

Bossert, an academic authority on the governance topic, gives a demarcation and definition of governance in terms of its objective and underlying processes: “To guarantee the mutually consistency of management, control, supervision and accountability of organizations, focused on the efficient and effective realization of policy agreements, and to communicate and offer accountability on these processes to all relevant stakeholders” (Bossert, 2014, p. 20). Although this definition is developed in the context of the care practice it has the key elements and seems to fit well for the Smart City context. First governance in urban development is discussed.

Governance in the context of Urban Development

End of the 1990s, early 2000s, urban governance became the new catchphrase, varying from traditional forms of government having public sector involvement, now including actors from private and voluntary sectors, in which relationships between participants do not have to be balanced (Andersen & van Kempen, 2003).

Patsy Healy, urban planner specialised in how planning strategies work out in practice and on partnership forms of governance, states “Governance can be seen as a framework for steering networks, as it is the capacity to bring together and bind actors with divergent perspectives” (Healey, 2007, p.17-19). She expressed the vagueness of the entity ‘governance’: “Governance has come into use to refer to all 'collective action' promoted as for public purposes, wider than the purposes of individual agents” (Healey, 2006, p. 17).

To steer on urban complexity, according to Hoek and Wigmans, as mentioned in Franzen (2011), the rise of governance holds opportunities for different stakeholders in the urban area and threats for the influence of elected democratic representatives:

> Governance acknowledges the existence of hybrid networks . . . [and] the increasing role of private parties in public policy processes, both in setting the agenda and in implementing policies. Urban authorities have been forced to both cooperate and compete with various actors, networks and organisations, all of which strive for power and influence.

Thus in urban development the municipality increasingly depends on private parties, other government bodies and decision making that takes place outside the realm of the municipal territory, as for Hoek & Wigmans governance, as mentioned in Franzen (2011):

> . . . is not limited to one actor. It mainly refers to the way in which the organization and decision making regarding area development have been regulated. All the different visions, interests and opinions that come into play during the trajectory are streamlined into a collaborative whole – this is governance. (Franzen et al., 2011)

This view on governance as a set of processes is also demonstrated by Daamen & Vries who describe the governance process as the range of actions done by actors involved in the on-going spatial changes (Daamen & Vries, 2013). This implies that the activities of authorities are seen as part and parcel of all the governance work focused on these complex areas. They stress that the execution of governance processes is a result of the capacities of the different stakeholders, but that by performing the governance processes the stakeholders are affected in their norm, values, objectives and perhaps even structure.

From the cited literature I conclude that the concept ‘governance’ is alternatively seen as process, structure, order or capability; its nature remains somewhat unclear. For this reason I deduct my own definition of governance combining some of the most relevant elements:

- It concerns collective activities from all stakeholders; these activities can best be described as processes;
- Because there is a situation in which central command and control won't be adequate to mobilize all parties needed;
- It supports the optimal integration and synergy of the powers and resources from the stakeholders;
- To realize the shared vision or objective and outcome.'

Based on these elements I define 'governance' for this thesis as:

The collective governing in complex networks of stakeholders without hierarchical structure and line of command and control, meaning to bundle activities of all relevant parties and create an optimal environment to realize agreed upon objectives.

Challenges for governance

Governance is a complex concept in an even more complex and demanding environment of urban development. To make governance work will ask a great effort from all stakeholders, so in practice often problems with the execution of governance processes can be expected. In the context of urban area development most initiatives have a large and diffuse set of stakeholders without an overarching hierarchical governing body. In this multi-dimensional game many different coalitions and many conflicts may occur. Therefore urban governance advocates the inclusion of private and corporative interests as well as citizens and their associations in sharing in the power, control, responsibility and accountability of local development (Healey, 2006).

Andersen (2003) signalled that there are a number of governance related changes in Dutch urban policy: "a stronger focus on the empowerment of underprivileged groups and communities,… the reliance on area-based programmes, the move from sectorial to integrative policies, and the use of covenants or contracts between different parties involved in policy" (Andersen & van Kempen, 2003) These changes seem closely related to the upcoming of governance in Smart City projects.

According to De Bruijn & Ten Heuvelhof difficulties during the implementation phase are often that actors who want to change the urban landscape often find themselves involved in a network of dependency, thus compromise or consensus needs to be found (De Bruijn & Ten Heuvelhof, 2010).

Vranken, De Decker, & Van Nieuwenhuyze present a sort of implicit definition of governance by pointing out what fail factors can arise in the implementation of the concept: "Accountability (who is responsible for what), potential goal conflicts (whose goals should be worked on first), legitimacy and representations (who is representing whom and based on which mandate), if not properly dealt with, can easily obscure the core issue, lead to organizational chaos and impede local development." (Vranken, De Decker, & Van Nieuwenhuyze, 2003, p. 33)

According to Rocco, lecturer at Spatial Planning & Strategy at the TU Delft, in a presentation on issues of governance in regional planning: there are six main issues of governance: 1) Hollowing out of the State 2) Accountability 3) Multi-level nature (complex structure cutting across decision levels) 4) Representation and visibility 5) Decoupling of the realm of politics 6) Composition of networks of governance (Rocco, 2012).

On the one hand the governance challenges for urban area development mentioned, make clear that this concept is descending from the governance development within private companies and public institutions, on the other hand it shows that the possible fail factors are a result of the unstructured situation between the different stakeholders. These unstructured situations have led to the emergence of 'network governance', according to Kahn a specific form of governance that: "has emerged as a promising 'new mode of governance' where cities can increase both the legitimacy and implementation capacity of an ambitious climate agenda . . . the municipality is a facilitator rather than commander and implementer." Khan finds "there are also some important potential problems with network governance relating to its democratic legitimacy (politics increasingly carried out by closed elites) and its capacity to lead to radical change (networks of established interests tend to preserve status quo)"(Khan, 2013, p. 133).

Partnership as mode of governance

A crucial governance factor in urban development is the mode of governance: the partnership of the stakeholders. This is often referred to as 'governance model' or 'governance structure' and for some publications it is the only meaning of the term governance. The result of the fact that top-down control no longer is effective and that self-organizing networks and bottom-up initiatives try to fill the gap. To execute governance processes in collaborative networks different modes of cooperation have been developed to build upon and develop partnership between the stakeholders. From this perspective partnership can be seen as a mechanism or even mode of governance. Vink et al. find that the governance in Dutch state tradition "yields learning but shows apathy among politically elected decision makers compared to deliberative governance initiatives in the pluralist state tradition of the UK where clearly defined rules and responsibilities yields negotiation and action"(Vink et al., 2015). About this (in) effectiveness of Dutch governance Daamen stresses that:

> Spatial policies, plans, and projects are thus the result of a negotiation process in which governments are no longer obviously 'in the lead'. Private actors, community groups and other public bodies have all become participants in an ongoing quest for improving the way land is being used and developed. However, concerns about the effectiveness of such 'governance' efforts are still at the heart of many European practices (Healey, 2007). In the Netherlands, this seems doubly so (T. Daamen, 2010, p. 3)

Frantzeskaki, Wittmayer & Loorbach defined partnerships as: "collaborative arrangements important for implementing sustainability agendas due to two distinct and defining characteristics: (a) Partnerships create and catalyse synergies between partners . . . (b) Partnerships are flexible and versatile in the role they take up despite the problem context" (Frantzeskaki, Wittmayer, & Loorbach, 2014, p. 409). Other basic characteristics are shared risks and benefits among participants, and having "a trade-off between the participants in order to pool resources and certain abilities in a development project that the partners could not have carried out alone" (Reuschke, 2001). Reuschke's definition of a partnership is:

> cooperation between the public and private sectors, usually based on formal agreements, sometimes informal as well, to work together towards specific urban development objectives . . . with profit and risk sharing . . . and different roles and different objectives for those that are responsible for developing strategies and those responsible for implementing it. The partners may act as equal participants, however, equality is an ambitious ideal that can rarely be realized in practice. (p.9)

Reuschke, recognises in this definition two basic forms of a public private partnership in urban development which are relevant in regards of the Smart City initiatives mentioned in this thesis. These are formal and informal partnerships.

Frantzeskaki, Wittmayer & Loorbach provide strengths and weaknesses of partnerships for service delivery in realizing urban sustainability in The Netherlands. The following includes an overview for each type of the three (social, resource and governance) synergies that partnerships create, based on an extensive literature review (Frantzeskaki et al., 2014, p. 408):

As **strengths** (potential success factors) they find partnerships create synergies between partners such as:

- Social synergy: creating trust, a channel to express ideas, concerns, problems outside official route, as well as about area-specific issues;
- Governance and institutional synergy: creating and enabling integration between departments and between different policies, institutionalize cross-sector cooperation while recognizing the 'jurisdictional integrity', create policy synergy by "combining the different perspectives of each partner" resulting in innovative solutions and arrangements, challenge and innovate ways of working, bringing about more streamlined decision-making or a more entrepreneurial way of working, simultaneously mechanisms whereby the public and voluntary sectors can challenge the private sector to adopt more 'social' short-term gain;
- Resource synergy, including knowledge resources: pool resources together, like expertise, funds, skills and maintain social and economic profitability, manage and maintain infrastructures on the long-term in a resource efficient and effective manner, research partnerships in particular offer to innovation via research dialogues that connect "professional silos".

As **weaknesses** (potential barriers) they find:

- Uncertainty of delivery: present a difficulty in delivering upon specified outcomes, focus on short-term outcomes hence short-lived, tolerate nurture strategic behaviour of partners that may diminish social values and benefits;
- Accountability issues: resist or hesitate to involve external stakeholders, present a difficulty in communicating and channelling common social messages and demands;
- Contributing to fragmentation: contribute to policy fragmentation in liberal institutional contexts;
- Risk of inception of bad-practices: bringing public sector practices into partnership making it ineffective. (Frantzeskaki et al., 2014)

Leadership and Community Involvement as Governance

In their thesis, *'Urban Governance and Democracy: Leadership and Community involvement'* Haus, Heinelt and Stewart (2004) argue that urban leadership and community involvement can be complementary in terms of not only responding to government failure, but also to governance failure. They find both core elements are separate but work together (Haus, Heinelt, & Stewart, 2004).

Community involvement is referred to as participation and effective governance is actually generated by participation (Haus et al., 2004). As weakness they find "depending on its concrete forms [of participation] it is more or less selective in involving citizens and their involvement never covers all on an equal basis of those who may be effected by (co) decisions taken through community involvement."(Haus et al., 2004, p. 26). Next to community involvement, urban Leadership "can

complement participatory governance structures if the urban leader can be held accountable for a decision taken in these structures" (Haus et al., 2004, p. 24). They see urban leadership as a precondition for increasing effectiveness and efficiency, especially through greater transparency and accountability. In conclusion, the modes of governance: collaboration, partnership, leadership and participation seem to be the main factors that influence urban development.

4.2 Governance in Smart City implementation

This literature review on 'governance' in the context of the Smart City, determines that it is the most relevant factor for Smart City implementation. What is meant by the term 'governance' in Smart City literature and why is it crucial for Smart City implementation?

Ferro, Caroleo, Leo, Osella and Pautasso, provide a literature review on Smart City governance:

> According to Mooij (2003), the presence of leadership is important for good governance. In the same way, Lam (2005) emphasized on the presence of a "champion" that collaborate with all stakeholders as an essential factor for good governance characteristic of a smart city that is based on citizen participation (Giffinger et al., 2007) and private/public partnerships (Odendaal, 2003). According to Johnston & Hansen (2011), smart governance depends on the implementation of a smart governance infrastructure that should be accountable, responsive and transparent (Mooij 2003). This infrastructure helps allow collaboration, data exchange, service integration and communication (Odendaal, 2003). (Ferro et al., 2013)

Ferro et al. argue that good Smart City governance should have two operational objectives: producing effective decisions (using information to optimize decision making) and providing adequate incentives to produce the desired outcome. (Ferro et al., 2013). They state this can only be achieved with a "clear and strategic vision detailing what value needs to be generated" (p.4). This relates closely to what Waart et al. (2015) think is needed to come a future smart city.

Dameri defines governance as the crucial success factor to grant the success of smart initiatives, her view strongly relates to Ferro et al (2013): "governance is the process able to address all the individual behaviours towards a common vision and goals of all the initiatives" (Dameri, 2013, p. 2545). According to Dameri, this vision should be built by 'shared processes', involving all the stakeholders (to drive the single project towards a common goal) and pursuing the definition of policies and rules (to state the boundaries and scope of the projects and rights and duties of all the actors).

Meijer & Bolivar analysed the literature on Smart Cities with respect to the different views on the concept of Smart City governance. they identified four ideal-typical conceptualizations of Smart City governance: (1) government of a Smart City, (2) smart decision-making, (3) smart administration and (4) smart urban collaboration. They conclude that currently researchers favor a view on governance that demand the greatest transformation of city government. They point at the potential risks of this vision, since "it may result in strong interactions at the urban level whereas a focus on smart collaboration may result in more attention to issues of collaboration than actually making things work" (A. Meijer & Bolívar, 2015, p. 8). Another risk signalized by Meijer & Bolivar is the lack of attention for the political side of smart governance. They doubt the legitimacy of claims of Smart City governance, in which "most studies of smart cities highlight either post-material outcomes (sustainability) or a post-material process (enhanced citizen participation) as sources of government legitimacy (A. Meijer & Bolívar, 2015, p. 12). They claim that there is a lack of attention for the

political consequences of technical choices and there is too much belief in Smart City as 'a good thing for everybody'.

Alawadhi et al. in *'Building understanding of Smart City initiatives'*, used interviews to qualitatively understand concepts and factors that characterize smart city initiatives. This research is clearly based on the Smart City framework of Chourabi et al. (2012), including the same eight influencing factors. They find governance as a very wide field, in which it encompasses "programmatic directions, budgetary and resource allocations, the interactions with external actors as well as internal partnerships with other departments and agencies" (Alawadhi et al., 2012, p. 51). Furthermore they found "Interviewees also see governance as stakeholder engagement" (Alawadhi et al., 2012, P.48). In literature they identified stakeholder relations as one of critical governance factors to determine success and failure of e-government projects. These 'Stakeholder relations' includes the ability to cooperate among stakeholders, support of leadership, structure of alliances and working under different jurisdictions: "While these models represent internal (within government) governance, governance also means the interaction with external actors. Smart City initiatives often entail intersectoral as well as interagency collaboration" (Alawadhi et al., 2012, p. 49). In this research they also state that governance promotes collaboration, data exchange, service integration and communication. This analysis shows there is a thin line between stakeholder participation, partnership and collaboration.

Nam and Pardo propose a number of sub factors of governance: the need for system interoperability, integration of systems and infrastructures, cross organizational management and managerial interoperability, leadership, policy integration, marketing, collaboration, partnership and consideration of the contex (Nam & Pardo, 2011b). In their publication, however, finer detail on how to deal with, or implement these success factors is lacking.

Ojo (2014) distinguishes four types of governance actions that relate partially to the eight governance factors from Chourabi et al (2012), seeing governance as a mechanism for actions: 1) Coordination and integration; 2) service integration; 3) Participation and co-production; and 4) policy and regulations. In detail:

> Coordination and integration actions in smart city programmes include identification of an agreed set of projects by stakeholders across sectors, use of administrative and legal instruments for conformance, and integrated planning practices involving multiple sectors. . . Participation and co-production actions include building multi-stakeholders partnerships with industry, academia, and residents in addition to the participation of internal firms in the development of smart cities. Lastly, policy and regulatory actions include master-planning, institutional development, certification of practices (e.g. buildings), promotional activities (e.g. low carbon growth), and development of framework acts (Ojo et al., 2014, p. 12).

In paragraph 4.3 'Understanding Smart City Governance Processes' I will point out my interpretation of these governance processes on both the barriers and success factors regarding the findings from literature on Smart City implementation.

Lee and Hancock (2012) use a framework in which the governance aspect is subdivided in six factors to analyse three cases in Amsterdam, Seoul, and San Francisco. The six factors are: 1) Smart City Leadership, 2) Smart City Strategy, 3) Dedicated Organization, 4) Smart City Development/Management Processes, 5) Performance Measurement, and 6) Smart City Principles. Their analysis leads to the three, in my opinion rather general, but absolutely relevant, recommendations concerning governance:

- Defining smart city visions & road-mapping a comprehensive smart city strategy for continued leadership (clear role & responsibility);

- Integrating planning/development/management processes & principles for smart city initiatives;
- Creating smart city eco-system for innovation & entrepreneurship through different types of private-public partnership (e.g. special purpose company). (J.-H. Lee & M. Hancock, 2012, p. 22)

Summary

The above summarized research on governance aspects is combined in the table below to compare the different conceptualisations of governance, influencing Smart City implemenation.

Table 4-1 Summary Smart City governance factors

Chourabi et al. 2012:	**Ojo et al., 2014:**	**Ojo et al., 2015:**	**Nam & Pardo, 2011:**	**Lee & Hancock, 2012:**
Collaboration	Coordination and integration	Interoperation among network of cities by sharing tools and methods	Collaboration; cooperation	Strategy formulation
Leadership & champion				Leadership
Participation & partnership	Participation and co-production	Co-created services Enabling open innovation; Open engagement of citizens in policies	Partnership; Citizen engagement and participation	Dedicated organization
Communication		Better information sharing across local authorities through data standards;		
Data exchange		Improved capacities of citizens & stakeholders to leverage open data.		
Service & application integration	Service integration	Improved services across major sectors like transportation and public safety.		
Accountability		Significant improvement in internal decision-making.		Performance measurement
Transparency		Enhanced transparency		
Other:	Policy and regulations			Development management processes

The different frameworks are partly overlapping, also due to collaboration between academic authors. I conclude that collaboration and partnership are part of every approach to governance. Compared to Chourabi et al .(2012) Ojo et al. (2014) treat 'Partnerships' as another mechanism, apart from governance. At the other hand they see 'Policy and regulations' as a Governance factor, while Chourabi addresses Policy as an independent core factor of each initiative. Chourabi et al. (2012) offer the most complete set of factors for governance and I will use this set for further analysis.

Based on the Smart City framework by Chourabi et al. (2012), eight factors which make up the category 'governance' in this thesis are:

Collaboration, leadership and champion, participation and partnership, communication, data-exchange, service and application integration, accountability, and transparency.

Chourabi et al. (2012) do not offer clear descriptions of the specific governance factors as concluded in this paragraph. In paragraph 4.3 'Understanding Smart City Governance Processes' I will point out my interpretation.

4.3 Understanding Smart City Governance Processes

This paragraph describes the influencing factors of 'governance' to gain insight in the different aspects and to establish a framework for analysis of the governance in the Smart City initiatives Transform and Triangulum. Therefore, this paragraph is elaborating on the selection from academic literature regarding the eight governance factors proposed by Chourabi et al. (2012):

1. Collaboration
2. Leadership and champion
3. Participation and partnership
4. Communication
5. Data-exchange
6. Service and application integration
7. Accountability
8. Transparency

The findings from literature are presented in green if it concerns a success factor and in red if it concerns a barrier towards Smart City implementation. When the text is not highlighted, it serves as neutral facts or background information. At the end of each factor an overview of the found success factors (+) and barriers (-) is presented, relating to the objectives of the process (why?), the performers of the actions (who?) and what actions contribute (how?). These success factors and barriers determine largely the resulting 'implementation power' of a specific Smart City initiative.

For each governance factor, the core characteristics are summarised in a short table of varied length. In these tables the two cases are analysed based on the descriptions of the cases in chapters 6 and 7. It gives an impression of the presence of these characteristics in real life projects. The presence of a characteristic in a case is scored with '1' the absence with '0'. Of course this score is a simplification of reality, because for some characteristics a scale would be preferred. Making these distinctions would go too far for this research, since the objective here is to determine whether the characteristics are useful for further analysis, by matching literature and practice using a 'quick-and-dirty' method.

Solely looking at the eight terms chosen for the governance factors suggests that the first six governance factors (collaboration until integration) are seen as activities, so they fit well to the chosen definition for governance as a set of processes, while 7 and 8 are formulated as properties. These properties seem to be founded from the generally used meaning of governance as set of rules to improve management within a specific organization. The main domain for these criteria is the decision making process which is not identified by Chourabi et al. (2012) as a separate governance process. I interpreted it is a sub-process of the other governance processes, like collaboration, partnership, participation and leadership. Within the governance of a Smart City initiative all kind of actions will be necessary to acquire the needed accountability and transparency levels. So, although they might be defined as criteria, we can also view them as the governance processes necessary to meet those criteria.

1.Collaboration

Since Smart City initiatives are citywide movements, stakeholders of the initiatives include various actors such as governments in other jurisdictions, non-profits, companies, schools, universities, and individual citizens. According to (Mora, 2015) collaboration between stakeholders and organizations across multiple sectors is one of the critical factors widely discussed in Smart City literature.

Collaboration is about working together between government departments and services mutually and between them and private parties. "Smart City initiatives require interdepartmental collaboration and cooperation through sharing information, resources, and sometimes authorities. Interviewees recognize interdepartmental and inter-organizational meetings as essential to proceeding smart city initiatives" (Alawadhi et al., 2012, p. 48). "Successful cities possess a set of common features [29]. One characteristic is collaboration among different functional sectors and parties (government, business, academics, non-profit and voluntary organizations, and others), and among different jurisdictions within a given geographical region" (Nam & Pardo, 2011a, p. 288).

Ojo et al. find a success factor is to "Collaborate with a range of partners who share the vision and commitment." And requires for "regulations and standards for stakeholders" (Ojo et al., 2014, p. 11)

Collaboration is often demanding for new ways to formalize the joined efforts. Peek clearly sees collaboration as a critical factor in the implementation process, however does not further elaborate on when, and how these collaborations should come into existence, or why this is necessary. "Urban development can flourish within the Smart City when government and market parties can be breed into new supply chain collaboration. Only then, the Smart City will be a successful impulse towards urban development" (Peek, 2013). Input for a good collaboration process is clear roles agreed upon between the different stakeholders. Falconer and Mitchell state "Stakeholder roles must be established prior to developing any Smart City plan because these players have the most influence on city initiatives and operations" (Falconer & Mitchell, 2012, p. 7). 'Prior to' will be very hard, since the start of a process will know some iterations, but I interpret their message as 'roles have to be clear when the plan is final'.

Collaboration is often formalized in specific organizational forms like steering committees or Public Private Partnerships, which have many alternatives. Lee & Hancock (2012) find that there are multiple ways towards collaboration, in which each city chooses its own path.

> It has been important for some cities to establish formal committees overseeing cooperation within their organization. Other cities have founded dedicated organizations to support smart technological developments in terms of planning, management and rollout. Some new cities have opted for SPCs (Special Purpose Companies) to attract private sector funds, expertise and other involvement in developing a smart city (J.-H. Lee & M. Hancock, 2012, p. 85).

Collaboration in the Smart City domain is about working together within a specific area, but also on a meta-level of working together with other cities to exchange expertise, knowledge and best practices, often stimulated by higher level government like in the UK or EU:

> The creation of a central office that acts as go-between for Smart City ideas and initiatives, drawing in diverse stakeholders, is of vital importance and allows coordination of ideas, projects, stakeholders and beneficiaries. Local level coordination can be important for uptake, to ensure the integration of solutions across the portfolio of initiatives […] It is important for cities to participate in networks to share knowledge and experiences, therefore promoting their own initiatives as well as learning from others and laying the foundations for future collaboration (European Union, 2014, p. 87).

Angelidou states in a recent comparative case study that this collaboration across cities is typical a characteristic of Smart Cities. “Collaboration and networking, referring to partnerships with other cities for knowledge and experience exchange and examining complementarities in strengths and weaknesses, is a basic horizontal characteristic of smart cities” (Angelidou, 2016, p. 27). She adds to this that large cities, like in her analysis Amsterdam, Barcelona, London and Stockholm, have a strong competitive advantage:

> Large and established cities, such as the ones studied in this paper, are in privileged position, as they are already experienced in international networking and are members of various networks and city alliances that they can leverage. Special attention should be paid to promote the digital presence of the city (website, social media). Such promotion will underpin efforts towards becoming smart and engaging stakeholders in this process (Angelidou, 2016, p. 27).

The set of collaborating parties differ from city to city and also between initiatives. Lee finds for example in a comparative study for Seoul and San Francisco that they “have adopted different forms of (public and private) partnership. Amsterdam has set up a special purpose entity [Amsterdam Smart City] to promote it’s the smart green city.”(J.-H. Lee & M. Hancock, 2012, p. 13).

In an interview with Kees Jansen (2016), Smart City strategist, we talked about governance success factors and barriers in Smart City initiative implementation. Jansen divides the Smart City in three layers: the city, the technology and the citizens, in which the playing field is defined by decision-makers, users, and developers. In this environment actor roles are constantly shifting. He is convinced that the main characteristics for successful governance relate to strong collaboration, in which (local) public authorities, private companies and local communities (mainly entrepreneurial individuals) show leadership by initiating ideas, sharing commitment and data, creating innovative solutions together. According to Jansen the key to good governance is stimulating synergy between different actors, and creating informal partnerships in which actors from all fields can join forces. This synergy can be driven by the local governance by creating regulation-‘free’ areas as smart ‘living’ labs (Kees Jansen, 2016, p.c.).

Besides all these success factors, a major bottle neck to collaboration can be the communication between different stakeholders and involved disciplines:

> The major bottleneck for collaboration is formed by the different ‘languages’ used by different disciplines (like environmental engineers, spatial planners/designers/architects, project developers) involved in urban spatial planning and development. These professionals appear to be living in different worlds and working on different goals and ambitions. And then there are also stakeholders like politicians, inhabitants, owners, users with their own agenda. (Tauw Consultancy, 2013, p. 2)

The process ‘collaboration’ has the function to establish and maintain the collaboration between the stakeholders to optimize partnership and participation. Collaboration is an activity of all stakeholders and will depend on their ambition and the roles they individually fulfil.

Table 4-2 Characteristics for the process of collaboration, with scores for the cases

Collaboration	Transform	Triangulum
- Stimulus for and stimulated by 'partnership and participation';	1	1
- Sharing information, resources and authorities with a crucial role for open data;	1	1
- Collaboration as 'smart governance' can also be an objective of an initiative;	1	0
- Having agreed regulations and standards for the stakeholders, including their specific roles;	0	1
- Based on a shared vision and commitment to realize this vision;	0	1
- Materialized in specific forms like PPP or SPV, meeting structures, or multiple helix collaboration;	0	1
- Not limited to the SC initiative, also operating on a meta-level between other cities and organizations.	1	1
	4	6

For each characteristic the score means: 0 = absent, 0,5 = partly present, 1= present, ? = insufficient data to determine a score. The total score per case represents the dominance of a factor within the set of governance factors.

Figure 4-1 Overview success factors and barriers Collaboration

2.Leadership and champion

'Leadership and champion' is referring to one or more essential roles within the collaboration. Giving leadership is the task and process to fulfil this role. The more complex the founding stakeholders, the more essential this leadership role will be, to build and secure all necessary 'bridges' between the parties. "Leadership of key leaders and their strong support (championing) of the smart city vision are fundamental to the success of smart city […]. The role of leadership is pivotal both within government and for its relation with citizens" (Nam & Pardo, 2011a).

'Leadership and champion' is on the border of the influencing factors Governance and Management & organization. This is for example distracted from the way it is handled by Chourabi et al. (2012) in their respective publications; first as part of Governance, later as part of Management & organization/Policy. In complex situations like Smart City initiatives leadership is needed on all levels (strategic, tactical and operational). The governance part of leadership is assumed to have a more strategic focus.

"the presence of leadership is important for good governance . . . the presence of a 'champion' that collaborates with all stakeholders as an essential factor for good governance" (Chourabi et al., 2012, p. 2292). But what kind of leadership or champion are we talking about? Alawadhi summarizes the

results of interviews on this subject distinguishing top-management, the mayor and the mayor's political position as relevant leadership elements:

- Managers interviewed commonly stressed the role of the top-management in envisioning a smart city and championing smart city initiatives. The executive support facilitates citywide and organizational commitment to the initiatives. Many interviewees also emphasized political support from elected officials.
- Quite a few interviewees talked about policy directions made by the mayor or the city manager, respectively. Along with his or her strong support and championing of smart city initiatives, the mayor's policy directions shape the city's overall strategies to make it smarter.
- The mayor's political position also impacts policy directions that outline smart city Initiatives. In one city, the mayor's administrative leadership does not belong to any political affiliation (independent). In other cities, the mayor's political affiliation may be one of the reasons for strong support for government-driven smart city initiatives from the public and groups (Alawadhi et al., 2012, p. 48).

According to Ojo et al. (2014), based on research from 10 Global Smart City initiatives, Political leadership stands out as one of the two critical success factors for Smart City programs. A similar, but more explanatory statement is made by the UK government:

> Developing a vision, displaying leadership and public engagement are underlying success factors, as well as commitment from the top to drive through change and innovation to achieve quantifiable objectives. This can materialize in the form of a group of people within the organization who are able to innovate and act entrepreneurially, to play an active role in seeking out new opportunities. These organizations must have strong political support [mayor's office/executive team] and clear mandate, for credibility and focus on innovation. Success depends upon building credibility and trust with their internal clients. A vision underlined by to ensure the longevity and sustainability of the Smart City programme (Government UK, 2013, p. 35).

The need for leadership and political support is also substantiated by research for the EU: "If the initiative is launched by the mayor of the city and leading representatives, as well as by CEO's of local enterprises, this increases the credibility of the initiative" (European Union, 2014, p. 77).

In line with this political leadership, Simon Giles (partner at Accenture and global lead for Smart Technology Strategy), as stated by Anderson, pointed out that it is crucial "to identify clear inflection points or focal points, preferably at the beginning of the political cycle, to build momentum for smart city strategic engagement" (Anderson, 2011).

Without clear leadership, John Jung, says in the article '*Smart Cities – How to move differently*': "Big cities tend to sit on their hands a lot. They debate, they investigate, studies are done and nothing happens. This is where attitude comes in. You have to have a champion and you have to keep things moving." To Jung, it doesn't matter who leads the transition to a Smart City, although he agrees that without the right attitude in the local authority it would be a hard transition to make, saying: "Certainly, you need a sense of good governance or a willingness of governance to work with the community"(Jung, 2015).

This governance factor 'Leadership' is getting more and more attention. In June 2016, during the yearly Amsterdam Smart City Event, a Conference was held on 'Urban Leadership' in which digital transformation and up-scaling of Smart Cities was a key theme. The organizers stated that the role and importance of Urban Leadership can hardly be underestimated. A new form of leadership (business executives, education luminaries and public entrepreneurs) is required to boost a city's

capabilities and organizing capacities to design and execute innovative strategies for sustainable competitiveness. This shows new leadership roles are still being discussed and discovered.

In 2016, a report entitled *'Enabling sustainable city competitiveness through distributed urban leadership'*, was published by the European Institute for Comparative Urban Research (Euricur) and PwC. The report focuses on the evolving challenges of urban leadership in the 21st century and contains ten case studies from cities around the world. It concludes in the first sentence about leadership as a core success factor relating it to some of the other governance processes:

> Leadership lies at the heart of enabling and delivering sustainable urban competitiveness and is critical to place-based strategy development and implementation. It is also increasingly shifting from being in the sole hands of strong individual public sector leaders towards a more collaborative approach with leadership distributed across lead firms, knowledge institutes and engaged citizens as well (PwC, 2016, p. 1).

In contrast to this collaborative approach, Mathew Evans, argues "ultimately it will require real political leadership . . . It is only the strong support of mayors (who can play an important convening role between private and public sector, alongside cabinet or board level responsibility for digital issues) that will help remove the day-to-day barriers for smart cities, which are often borne of inertia or bureaucracy"(Evans, 2016). He adds to this "Leadership can provide a holistic vision and the drive to allow digital networks to be deployed for data gathering, analysis and use".

Table 4-3 Characteristics for the process of (political) leadership and champion, with scores for both cases

Leadership	Transform	Triangulum
- Interacting on the process of collaboration by giving guidance;	1	1
- Envisioning the objectives;	0	?
- Relating citizens to the initiative;	0	1
- Facilitating government commitment;	1	1
- Support strategic alignment;	?	?
- Giving policy directions;	1	1
- Reaching all stakeholders;	0	1
- Building credibility and trust;	1	1
- Create an attitude towards real action.	0	1
	4	7

For each characteristic the score means: 0 = absent, 0,5 = partly present, 1= present, ? = insufficient data to determine a score. The total score per case represents the dominance of a factor within the set of governance factors.

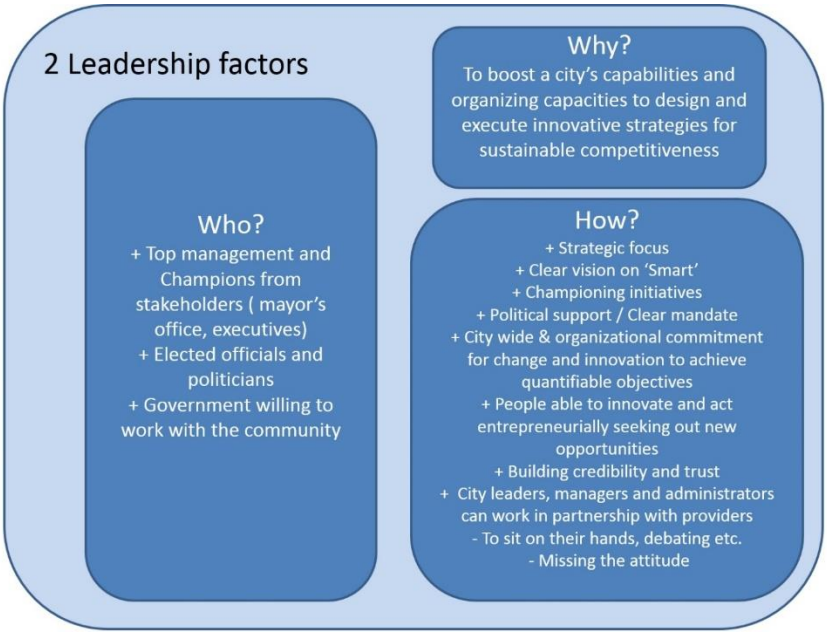


Figure 4-2 Overview success factors and barriers Leadership & Champion

3.Participation and partnership

'Participation and partnership' refers to the way and degree in which parties are involved in the collaboration. Partnership refers to any (legal) form in which legal entities like government organizations, institutions and private companies shape their cooperation. Participation refers to the hoped for influence of citizens as non-legal entities. The formalization of the commitment of partners and participants can have different formats. Although this is originally seen as one influencing factor by Chourabi et al., I will gather many differences from the academic literature to underpin the split into two separate processes.

3A.Participation

The study *'Mapping the Smart Cities in the EU*' makes clear that inclusion and participation are not only means but also important targets for Successful Smart City programs, to avoid polarization between the urban elite and low income areas. This study highlights "Citizens should be empowered through active participation to create a sense of ownership and commitment, and it is important to foster participative environments that facilitate and stimulate business, the public sector and citizens to contribute [to Smart City development]" (European Union, 2014, p. 11).

The main objective of participation is to ensure that an initiative has the focus on solving the most important problems with solutions that will be generally positively valued by the involved community (represented by some of its members). So participation has to do with prioritizing and the creation of real added value as a sound basis for acceptance of the created solutions. Participation can be materialized in very different formats like 'Living Labs', 'lighthouse areas', 'Urban Transition Labs', 'Innovation Districts' etc.

In '*Smart Cities Governance: The need for a Holistic Approach to Assessing Urban Participatory Policy making*', the central role of citizens in the decision-making process and their fundamental contribution to public value creation in the city context is reaffirmed. This central role for citizens is their most innovative element. "Citizen engagement is not just a way to stimulate participation in the public debate, but as a process of social innovation that allows citizens to coproduce public value" (Castelnovo, Misuraca, & Savoldelli, 2015, p. 10)

This value can be produced in many ways. Berntzen and Johannessen (2016) present an overview of different levels of participations. Three different categories of participation are defined: citizen competence and experience; data collection through citizens' use of technology; and participation as democratic value. These categories are linked to either 'agenda setting responsibility' or 'decision making responsibility' (Berntzen & Johannessen, 2016). This shows the power and ways of participation as influence on the process of social innovation.

Dameri states that participation is very dependent on the digital awareness of citizens, linking it to e-government initiatives:

> It [participation] requires the active role of citizens in participating to the city governance and to exercise a democratic role in the city choices. It is strictly related to the e-government initiatives and it depends . . . on the presence of public e-services and on the digital awareness and culture of the city population" (Dameri, 2013, p. 2549).

Dameri and Rosenthal-Sabroux stress the relation between the two sub-processes 'participation' and 'communication': "Citizens should even be involved, both in the plan phase and. . . Implementation steps; communication is at the centre of a shared participation in defining smart city goals and in spreading awareness about the smart city role and benefits for people" (Dameri & Rosenthal-Sabroux, 2014a, p. 11)

Alawadhi et al. find a growing awareness of the importance of participation for Smart City implementation. "Smart city initiatives welcome residents to participate in the governance and management of a city" (p. 49). Therefore "governments increasingly pay attention to citizen participation in decision making, monitoring city services, and providing feedback" (Alawadhi et al., 2012, p. 49).

The term 'citizen participation' suggests somehow it being the wish or favour of an existing power acting as the origin and force to regulate the participation. Citizens are invited 'to join the game', but according to Capra it could go a lot further:

> The typologies of citizen participation described so far share the feature of not being originated by citizens themselves. Hence, they can be considered as top-down forms of citizen participation, where either public or private decision-makers take the initiative. However, citizen participation in urban development is not limited to the aforementioned typologies, a further category of citizen participation involves the citizens as initiators (Capra, 2014, p. 25).

Capra determined different levels of citizen participation, ranging from low towards having high influence on decision making: "provision of information to citizens, consultation of citizens, existence of partnerships with citizens, control by citizens over decisions or presence of socially innovative practices" (Capra, 2014, p.28).
Capra is seeing citizen participation as a result of governance and unlike Chourabi et al. who define it as a constituting element of governance. He finds that mainly the adoption of ex-post satisfaction criteria to assess projects outcomes is a governance characteristic that contributes to a large extent to citizen participation:

> Large and complex projects are characterized by clear ex-ante set goals. Projects with governance models that include preliminary goal setting leave less room for the flexibility required by stronger citizen participation. On the other side, projects which governance permits readjustments of goals are characterized by partnership or socially innovative typologies of citizen participation (Capra, 2014, p. 72).

According to van Waart et al. citizen participation does not happen merely by putting it on the political agenda without welcoming bottom-up citizen initiatives and inviting equal co-creative partnership (van Waart et al., 2015) .

So how can citizen participation be improved? Stephen Goldsmith, writer of books as *'Governing by Network: the New Shape of the Public Sector*' and '*The Responsive City: Engaging Communities through Data-Smart Governance*' has a five-point plan to cultivate citizen support for tech or Smart initiatives. A champion in a government entity needs to cultivate allies, by obtaining buy-in from departments when launching a new initiative, but when cultivating citizen participation one should:

- Focus on the quality, quantify and usability of open data.
- Create conditions for advancing citizen collaboration and utilize residents as co-developers of knowledge and co-developers of apps.
- To build community support for digital advancements must start with trust. The issue of trust must start by addressing privacy and security, or else new initiatives will prematurely end. Residents want to know exactly what city hall is doing with personal data, how it is being handled and the lengths officials are going to in order to protect it.
- Create transparency about how a city plans to use the data. This will not only build support, but also dampen anxieties.
- A process of collaboration requires a city to find a way to curate and use the information it receives and to find ways to use social media to improve the way it involves and responds to those who often are ignored (Goldsmith, 2016).

In an interview with Kees Jansen he mentions the drive of local individuals and companies as the prime example of participation, and underlines many Smart City initiatives thrive due to innovative local leadership: "In the City of Utrecht in the area Lombok, batteries of electrical cars are being used as energy plants to collect and redistribute energy from solar panels. This project started with collaboration between local citizens, schools, and local companies and of course the municipality" (Jansen, 2016, p.c.).

Table 4-4 Characteristics for the process of participation, with scores for both cases

Participation	Transform	Triangulum
- Active role of citizens (and local) companies (SMEs)	0,5	0,5
- Different levels of influence on decision making	0	0
- Prioritizing, testing, valuing and accepting solutions	0,5	1
- To avoid polarization	0	0
- To create ownership and trust	1	1
	2	2,5

For each characteristic the score means: 0 = absent, 0,5 = partly present, 1= present, ? = insufficient data to determine a score. The total score per case represents the dominance of a factor within the set of governance factors.

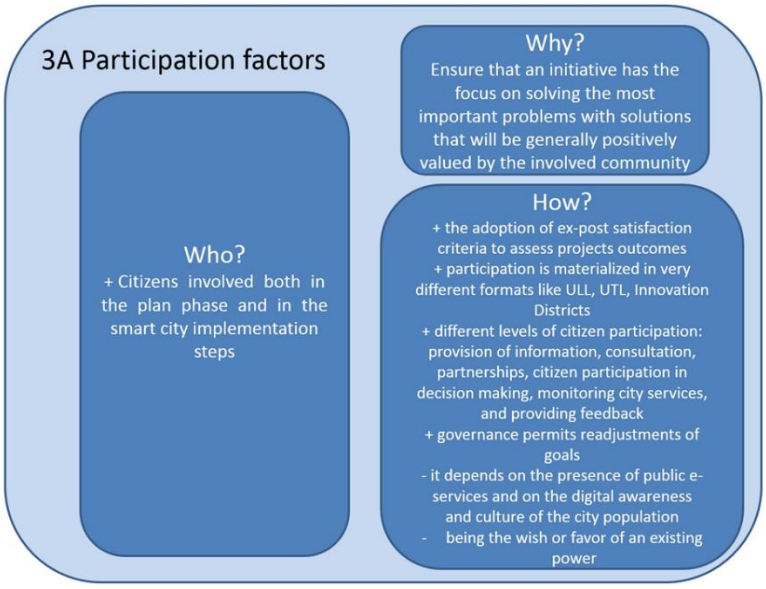


Figure 4-3 Overview success factors and barriers Participation

3B.Partnership

The effectiveness of urban partnerships, which is important for urban governance more generally, is influenced by many factors, such as the role of political leadership and their attitude towards suppliers. Anderson, global low-carbon ICT project manager at the Climate Group, wrote in an article '*Power and politics in Smart Cities*' for the Guardian, that "A smart city is one in which the actors – city leaders, managers and administrators can work in partnership with providers to leverage political power to maximise winners, minimise potential losers and remove organisational and institutional barriers to the achievement of the Smart City vision" (Anderson, 2011).

Partnership has for example been defined by Bailey, Barker, & Macdonald (1995, citation via Elander 2002) as "a coalition of interests drawn from more than one sector in order to prepare and oversee an agreed strategy for the regeneration of a defined area" (Elander, 2002).

Ojo et al. conclude that government entities are crucial to establish a partnership: "Smart City programs are complex and involve a wide range of partners and stakeholders playing different roles . . . While some smart city programs are driven by private sector, government entities always play a pivotal role" (Ojo et al., 2014). Therefore it is necessary to have "a strong local government partner as a key strategic player and [or] co-founder" (European Union, 2014, p. 10). Nam & Pardo stress the importance of partnership to create the needed synergy to find solutions for specific problems:

> Successful innovation is oftentimes made by involvement of key stakeholders […]. Successful initiatives are the result by a coalition of business, education, government and individual citizens […]. A successful smart city can be built from top-down or bottom-up approaches, but active involvement from every sector of the community is essential. United efforts create synergy, which allows individual projects to build upon each other for faster progress (Nam & Pardo, 2011a, p. 189)

A limiting factor for innovation is the fact that city management is focused on eliminating and avoiding risks, to assure continuity and quality of the services. Nam finds this as a barrier for more strategic oriented Smart City initiatives:

> Risk taking through experimentation is likely to be institutionally blocked in government. Public sector e-services has a legacy of a risk-averse environment where the focus is on the

politically charged short-term delivery of goals and results, lacking a long-term strategy of service innovation (Nam & Pardo, 2011b, p. 186).

Besides erasing barriers between governmental departments it is also necessary to create a better understanding between the public and private sector. "The private sector does not comprehend how its technologies fit into this complex environment because it tends to view cities as just physical structures upon which to add ICT. Nor does it understand which city stakeholder . . . is responsible for which solution" (Falconer & Mitchell, 2012, p. 4).

Regarding commitment of the different stakeholders, Weening (2006) mentions two forms of commitment for stakeholders regarding their participation in a project. The first is 'Ex ante commitment' in which the extent that stakeholders have to commit prior to the project is high. The second is 'ad hoc arised commitment', in which there are no duties for the involved parties prior to the project. In this case parties will get space to postpone 'actual' commitment to the project, and to let this be part of the creation process. According to Weening the first approach is relevant for a product approach, while the second approach is relevant for a process approach.

Table 4-5 Characteristics for the process of partnership, with scores for both cases

Partnership	Transform	Triangulum
Build a coalition of interest	1	1
With a strong local government partner as a key player	1	1
To prepare and execute a strategy	0	1
To realize successful innovations	1	1
By creating synergies and foster progress	1	1
	4	5

For each characteristic the score means: 0 = absent, 0,5 = partly present, 1= present, ? = insufficient data to determine a score. The total score per case represents the dominance of a factor within the set of governance factors.

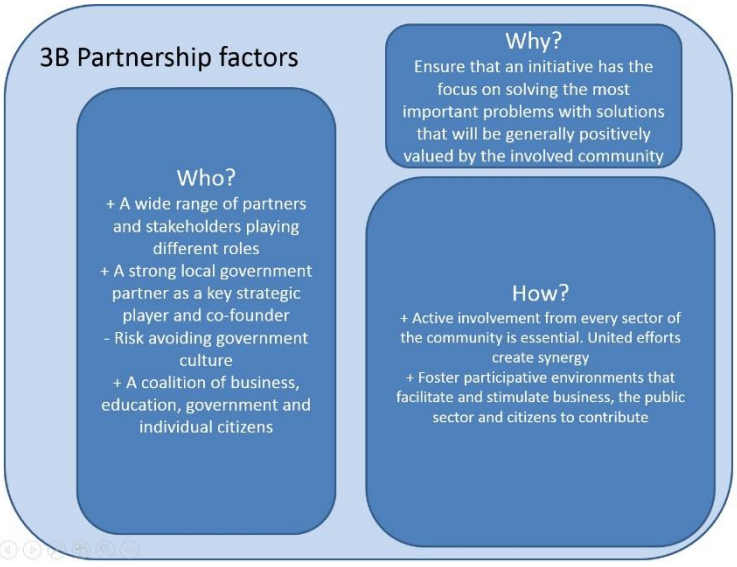


Figure 4-4 Overview success factors and barriers Partnership

4. Communication

'Communication' is the process of exchanging information about all aspects of an initiative at the right moment with the right target groups. Communication serves, of course, many objectives but the main objective is to build and maintain trust, credibility and commitment between the

stakeholders mutually and between their initiative and the context. Communication, or 'information sharing' is as ofen the basis for all further development. Scholl and Scholl describe the impact of information on the other governance processes thus confirming explicitly that the relevant factors are identified in the set of eight factors discussed:

> Information. The kingpin of smart governance and its enactment in terms of smart and open government is shared, timely, and actionable information, which is fundamental. . . Information sharing has been touted as quintessential for inter- and intra-governmental collaboration as well as for government-to-citizen and government-to-business interaction [27, 41, 63]. As pointed out. . . timely and actionable information, once open and shared, also provides for transparency, accountability, and stakeholder participation. In that capacity, shared information is also the indispensable prerequisite for smart governance. (Scholl & Scholl, 2014, p. 169).

Communication is an activity for all stakeholders but intensely related to the activities from the leadership and champion. "The role of communication and interaction is central to managing and organizing smart city initiatives" (Alawadhi, 2012, p.48).

Good communication is essential for a Smart City initiative and often a barrier found in practice, like stated by Budde: "Communications is an essential element in all smart activities. Currently all the silo-based sectors operate separate and independent infrastructure, which of course creates significant financial waste and a lack of interoperability"(Budde, 2014). Also Aoun stresses the importance of communication as a success factor "Success will come from combining public governance, people ownership and business collaboration, driving communication between these groups by giving each of them a true stake in the smart city built out of their community"(Aoun, 2013, p. 12) From a more top-down perspective Nam puts the responsibility at city government: "City government should share concepts (promotional identity and brand), visions, goals, priorities, and even strategic plans of smart city with the public and stakeholders" (Nam & Pardo, 2011a, p. 288).

Nam and Pardo discuss various levels of interaction in Smart City initiatives, and they put the focus on the interaction aspects of communication, because the main process 'collaboration' can only function based on interactive communication:

> Activities for interaction can be sharing, communication or integration. Various possible combinations create the varying extent of complexity . . . Success in smart city innovation requires the ability to understand the level and nature of the complexity. (Nam & Pardo, 2011b, p. 190)

In large scale initiatives the focus of communication is often on large campaigns to spread the message and manage expectations. But as a part of 'governance' there should be a focus on the interaction aspects of communication: "Face-to-face contacts between people remain of crucial importance. The proximity of people is still a necessary condition for intensive communication and exchange of knowledge" (Nam & Pardo, 2011a, p. 189).

Improving communication can also be one of the objectives of a Smart City initiative. "Smart city initiatives develop information and communication infrastructures, and in turn those infrastructures promote smart city initiatives" (Alawadhi et al., 2012, p. 51). In doing so, ICT-based communication infrastructures can be very helpful in supporting the communication process.

Table 4-6 Characteristics for the communication process, with scores for both cases

Communication	Transform	Triangulum
- Exchange information on all aspects between all stakeholders;	0	1
- Based on target groups;	1	1
- To build and maintain trust, credibility and commitment;	1	1
- A core task for leadership and championship to enlarge their impact;	1	1
- Essentially interactive to collect feedback;	1	1
- Improving infrastructures can be an objective leading to more effective communication.	0	1
	4	6

For each characteristic the score means: 0 = absent, 0,5 = partly present, 1= present, ? = insufficient data to determine a score. The total score per case represents the dominance of a factor within the set of governance factors.

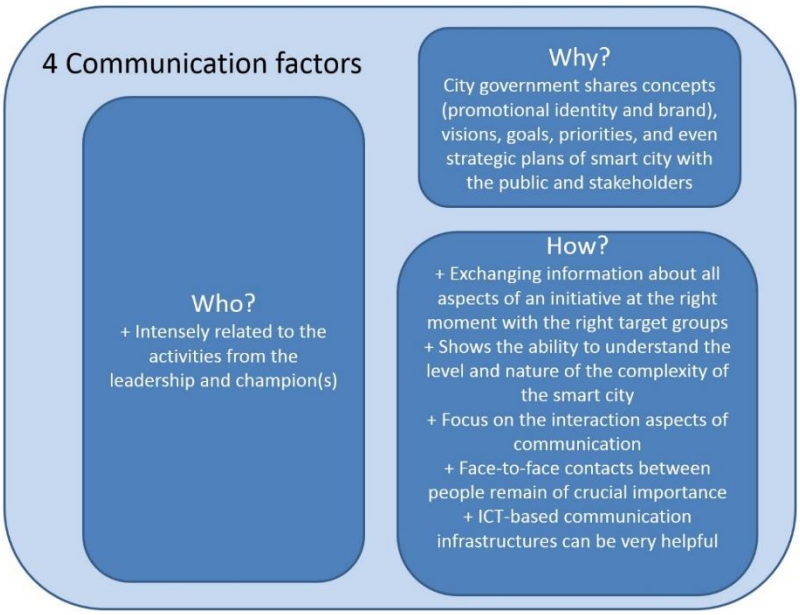


Figure 4-5 Overview success factors and barriers Communication

5.Data-exchange

'Data exchange' is a relevant sub-process in most Smart City initiatives because the effectiveness of innovative ICT-solutions is very depending on the ability to process data and deliver information. Matthew Evans, executive director of SmarterUK, stresses the importance of data for the Smart City: "smart cities are data-driven cities. Data will need to be gathered, analysed, actioned and disseminated across cities. None of this can happen without reliable and extensive connectivity, which means digital communication networks are a fundamental enabler of smart cities and initiatives"(retrieved from: http://www.publicsectorexecutive.com/Comment/the-building-blocks-for-smart-cities)

Relevant issues concerning this data exchange are the ownership of the data, the willingness to share the data, the availability of required data and the possibility to use data from different sources. The possible advantages of data exchange are often reduced by differences in attitude between the stakeholders and conceptual and technical limitations making it almost impossible to combine data from different sources without additional investments in the underlying data-infrastructure. From this situation the term 'Open data' originates, seen as a solution to overcome many of these barriers by defining a set of data 'open' to be used by anyone without restrictions or claims, and in the general interest. The analogy is found by 'open software' a successful initiative to overcome the barriers of expensive licenses.

In the article '*real-time city? Big data and smart urbanism*.', Kitchin states the risks of data regarding the lack of accountability: "Employing an evidence-based, algorithmic processed approach to city governance thus seemingly ensures rational, logical, and impartial decisions. Moreover, it provides city managers with a defence against decisions that raise ethical and accountability concerns by enabling them to say, 'It's not me, it's the data!'" (Kitchin, 2014, p. 11).

On the other hand, like Ojo et al. found, sharing data is an important base for establishing and maintaining collaboration: "In the area of collaboration, the open data initiatives were designed to enable collaboration between city and stakeholders . . . The open data initiatives were also designed to enable collaboration among different smart cities initiatives"(Ojo, Curry, & Zeleti, 2015). He finds different levels of data sharing "Data exchange objectives of the initiatives include enabling data sharing among city authorities and network of cities. It also includes the exchange of data between sensor data infrastructure providers and city management" (Ojo et al., 2015, p. 2332). The use of open data, a form of data-exchange, in a number of Smart City initiatives has shown positive influence on governance aspects, like:

1) Better information sharing across local authorities through data standards;
2) Improved services across major sectors like transportation and public safety;
3) Enhanced transparency;
4) Co-created services that better addresses citizen and business needs;
5) Enabling open innovation in City Administration involving third-party developers;
6) Enhanced interoperation among network of cities by sharing tools and methods (standardization);
7) Improved capacities of citizens and stakeholders to leverage open data;
8) Open engagement of citizens in policies;
9) Significant improvement in internal decision-making (Ojo et al., 2015, p. 2332).

Publication of data in the form of 'open data' can not only enlarge the public influence on delivering smart services and solutions, it can also, according to Alawadhi et al., contribute to a more open culture and enlarge the public involvement in city management, resulting in an improved knowledge infrastructure: "Data and information is key to the cultural change. Public management is increasingly being driven by data and information. Public managers' decision making is informed by more accurate data that smart city initiatives provide. In addition, more data and information can open governmental internal processes to the public" (Alawadhi et al., 2012, p. 48).

Open data is seen by many, among which Meijer & Bolivar and the European Union, as a chance to overcome the growing barriers between public and politics and to re-assure public involvement with city politics and improvement of the quality of services and solutions. "Open data are widely propagated as a means to strengthen the collective intelligence of cities by enabling companies, innovators, NGOs and citizens to extract value from these data" (A. Meijer & Bolívar, 2015, p. 11). Or "in order to create useful resources for the public" (European Union, 2014, p. 11).

The ideal seems not to be 'open access for everybody'; Meijer & Bolívar (2015) cite different researchers pointing at the importance of clear government regulations of the possible use of data:

> Walravens (2012) indicates that governments should promote open data systems but the responsible government body should carefully consider the terms under which this data is opened up and to which actors. Similarly, Batty et al. (2012) indicate that government regulations must protect data and model development, appropriate interfaces, security of who is able or not to access the material online, questions of confidentiality, IPR (Intellectual Property Rights), privacy and so on under a smart city framework. The politics of access are clearly identifiable in these statements but they are presented as issues of managing urban intelligence (Meijer & Bolívar, 2015, p. 11).

The production and exchange of data is more and more related to the use of sensors that generate relevant data. This ever growing data eruption makes clear that good policies are needed to determine what data can be made available to who at which point in time and on what level of detail or aggregation. The availability of data on an unpreceded level offers numerous possibilities to improve city management and services, it remains a question whether the potential will be generated "The hype and hope of big data is a transformation in the knowledge and governance of cities through the creation of a data deluge that seeks to provide much more sophisticated, wider-scale, finer-grained, real-time understanding and control of urbanity" (Kitchin, 2014).

In an interview with Kees Jansen, Smart City Strategist, he mentions data-exchange as the cornerstone in Smart City development, "since most initiatives are services or products strongly related to data input, or data integration created by users and sensors." According to him "by improving integration among departments through an open and online database where employees or stakeholders can share information and clear communication boundaries. This increases transparency and acts against silos and slabs in the organization or collaboration" (Jansen, 2016 p.c.).

Table 4-7 Characteristics for the data-exchange process, with scores for both cases

Data Exchange	Transform	Triangulum
- To improve effective services and solutions;	0	1
- To enlarge public influence;	0	1
- To create a more open and transparent culture;	1	1
- To create an improved knowledge infrastructure;	1	1
- To improve decision making based on a better understanding and control of urbanity;	0	1
- To learn from other objectives;	1	1
- Resulting in a rising level of surveillance and control.	0	1
- Risk to accountability	?	?
The process can be facilitated or hindered by input and circumstances:		
- Availability of data;	0	1
- Ownership of data can hinder publication;	0	1
- Willingness to share related to conceptual or technical limitations;	0	1
- Possibility to integrate data;	0	1
- The existence of silos and slabs;	0	1
- Regulations needed for data access and usage.	0	0
	3	12

For each characteristic the score means: 0 = absent, 0,5 = partly present, 1= present, ? = insufficient data to determine a score. The total score per case represents the dominance of a factor within the set of governance factors.

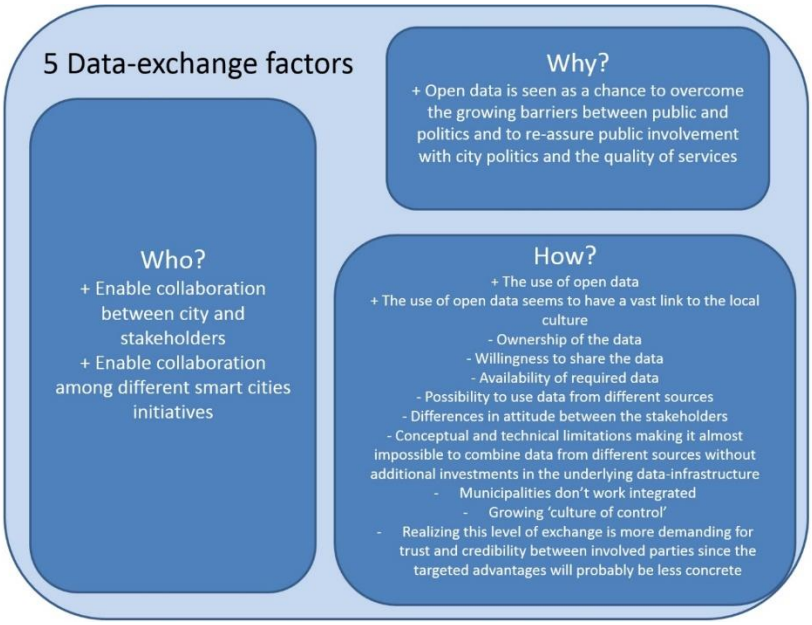


Figure 4-6 Overview success factors and barriers Data exchange

6. Service and application integration

This aspect of governance is not explained in the original publication of Chourabi et al. (2012).

Service and application integration is highly linked to the technology aspect of Smart City projects. According to Ferro "ICT in governance processes needs to be framed within a longer process of technology-driven public sector reform. . . where information sharing, transparency, openness and collaboration are key concepts with tremendous organizational and policy implications" (Ferro et al., 2013, p. 5).

Based different publications my impression is that service and/or application integration can be an objective – 'an end' - of a certain Smart City initiative, for example to enlarge the quality of a specific service. On the other hand, it can also be an intermediary - 'a mean'- to create a basis for exchange of information that enforces the collaboration between stakeholders and creates possibilities for the development of new services and added value. This integration is a core aspect of the Smart City, defined by Washburn et al. as "the use of smart computing technologies to make the critical infrastructure components and services of a city . . . more intelligent, interconnected, and efficient" (Doug Washburn et al., 2010). It is clear that the range of application areas is very wide. Areas for Smart City Service integrations can range from domains like city administration to education, healthcare, public safety, real estate, transportation, and utilities. A brief overview of various areas of Smart City applications (and their objectives) is shown in the figure 4-7.

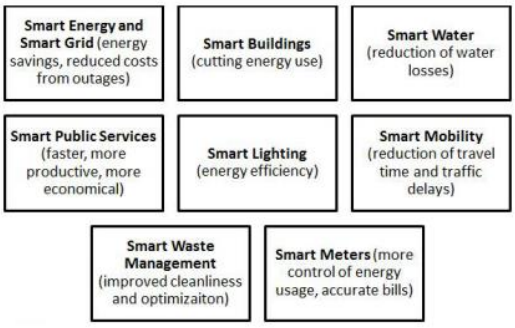


Figure 4-7 Areas of Smart City Applications (Novotný, Kuchta, & Kadlec, 2014)

Researchers like Nam & Pardo confirm the importance of the integration processes and service as a condition for further improvement of the overall quality of city services. They see an integrated system as a mechanism through which service is delivered and information is shared (Nam & Pardo, 2011b).

The need for integration is not only a result of the classic siloed organization of the government, this is, according to Anderson, increased by the way industry partners have been operating on the level of insulated solutions (Anderson, 2011).To support the integration process often specific organizational measures are taken to assure that traditional barriers can be overcome:

> In order to support cross departmental working for smart cities, many cities are choosing to place the smart city vision in a department that already works horizontally across city siloes (such as the Mayor's Office). Alternatively they are adding in new groups to their organizational structure that are able to act as umbrellas for a host of existing activities. The aim of this is to ensure that all departments are working together towards an aligned vision (BIS Research Paper, 2013)

The EU is an important advocate of integration activities, based on the belief that only integrated solutions will fit the complex needs of urban cities: "The various dimensions of urban life . . . are interwoven and success in urban development can only be achieved through an integrated approach" (European Commission, 2014b)

According to Jennifer Belissent, the report '*Smart City Leaders Need Better Governance Tools'*, by Forrester highlights the possibilities for integration tools and services facilitating smart governance: "The opportunity for tech vendors and service providers lies in facilitating smart governance — offering cloud and shared services models for business applications, providing integration and cloud management services, and generally facilitating the coordination and collaboration among city departments and city leadership" (Belissent, 2011a). Although this forecast underpins the integration process as a relevant process of governance, the focus on the ICT has the risk of 'a solution in search of a problem'.

Table 4-8 Characteristics for the process of integration of services and applications, with scores for both cases

Service and application integration	Transform	Triangulum
Necessary because of:		
- Disaggregated ownership structures;	1	1
- Siloes in governmental organization;	1	0
- Insulated solutions from IT-suppliers;	1	1
- Complex needs;	1	1
Targeted effects:		
- Integrated systems;	1	1
- Improved information exchange leading to enforced collaboration between stakeholders;	1	1
- New services and improved added value of existing services;	1	1
- More effective service management.	1	1
Demands for:		
- A specific organization working horizontally;	1	1
- New groups in an organization to change the culture;	1	1
- Erase the barriers between government departments;	0	0
- Better understanding between public and private parties;	1	1
- Technical tools and solutions to support.	1	1
	12	11

For each characteristic the score means: 0 = absent, 0,5 = partly present, 1= present, ? = insufficient data to determine a score. The total score per case represents the dominance of a factor within the set of governance factors.

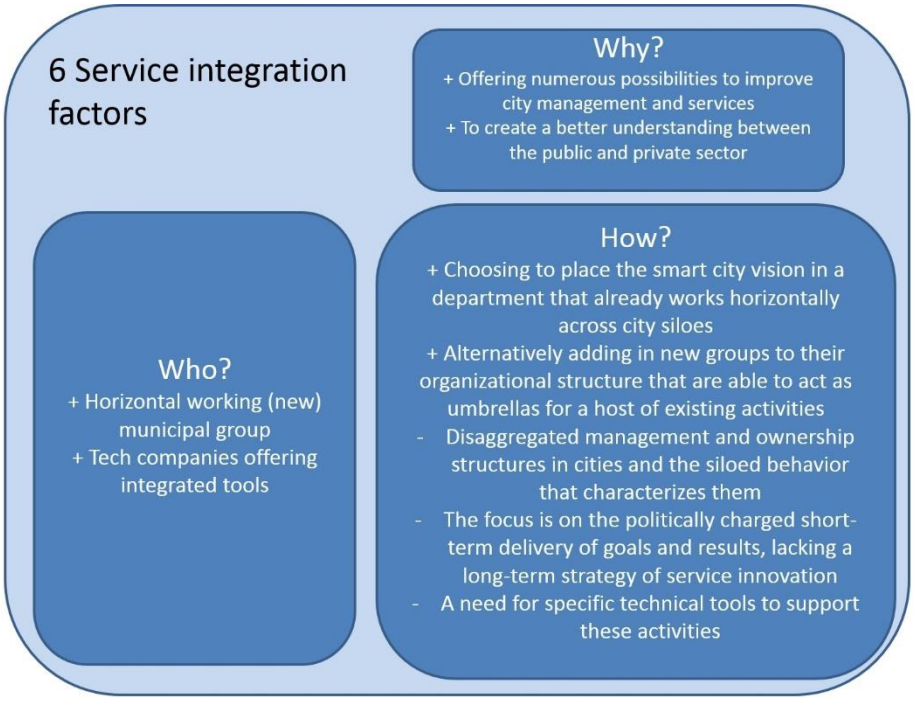


Figure 4-8 Overview success factors and barriers Service and application integration

7.Accountability

Who is accountable for what decisions on what moment? This governance process is concerned with criteria for good governance. Accountability makes clear which roles are involved in the collaboration, which stakeholder owns a specific role at a certain moment in time and what the consequences are for decision making and the use of mandates. It is a central issue in Smart City governance, as it is in any governance situation.
Accountability makes clear how responsibilities are shared by the stakeholders and more specific how they are divided between public and private sectors. It supports the process of democratic control to make clear whether objectives are met, investments are responsible and the right decisions have been made in public interest. Accountability offers the possibilities for the non-responsible parties/persons to gain insight in the process afterwards and judge the formal legitimacy and the extent to which relevant norms and procedures were respected. Accountability includes also the possibility to judge and proclaim sanctions in case rules were violated. These rules can be of different origin like for example legal, administrative, fiscal rules. Accountability can support the collaboration between the stakeholders because it helps in creating a clear division of power and influence.

Rocco refers to accountability as "the attribution of responsibility and mandate, and the possibility of check by other parties involved." According to Rocco, in his presentation *issues of governance in spatial planning,* he finds "Other forms of (necessary) accountability in policy making and implementation are fiscal, legal and administrative"(Rocco, 2012, p. 51).

He finds that "in network governance, it is difficult to attribute responsibility and mandates and ultimately difficult to hold anyone accountable (the problem of many hands)".(Rocco, 2012, p. 51) In order for 'agents' to be held accountable "they must be identifiable as accountability holders and they must belong to arenas where there is a possibility of sanction". If not, as described by Keohane (2002) "accountability gaps" occur (p.4). "We can speak of an authorized or institutionalized accountability relationship when the requirement to report, and the right to sanction, are mutually understood and accepted" (Keohane, 2003, p. 12).

Anderson states, that people relate politics to corrupt governments, dirty, closed-door deals and a lack of accountability (Anderson, 2011). This stresses accountability or to be held accountable is a necessary condition/process for politics in a democratic environment to create trust in the system.

According to Nam accountability has a negative effect on the drive to take risk and innovate in the public sector:

> Government agencies are monopolies without competitive pressure to innovate as well as bureaucracies structured to perform core tasks with stability and consistency, and resist change or disruption of those tasks. The public sector cannot easily burden varying costs of learning, experimentation and improvisation. The avoidance of failure is an organizational priority in the public sector and is highly valued because of accountability (Nam & Pardo, 2011b).

Table 4-9 Characteristics for Accountability, with scores for both cases

Accountability	Transform	Triangulum
- Clear division of power, roles and responsibilities;	0	1
- Good logging of decisions and mandates;	0	1
- Facilitating democratic control on public interest;	0	1
- Setting sanctions on violating the rules;	0	?
- Stimulates risk reduction behaviour;	?	?
- Makes use of (legal) norms, rules and procedures;	0	1
- Enforces collaboration between stakeholders.	0	1
	0	5

For each characteristic the score means: 0 = absent, 0,5 = partly present, 1= present, ? = insufficient data to determine a score. The total score per case represents the dominance of a factor within the set of governance factors.

Figure 4-9 Overview success factors and barriers Accountability

8.Transparency

Transparency has many interpretations in different study domain. For example in organizational governance it has a close link to information, communication and data exchange, as it can be defined as “the extent to which a communication medium facilitates a clear or unobstructed communication exchange” (Potosky, 2008) or “the availability to adequate information to verify or asses the data

exchange taking place" and "Transparency is the perceived quality of intentionally shared information from a sender"(Schnackenberg & Tomlinson, 2014, p. 1788).
While in the study domain of leadership, it can be defined as "Leader behaviours that are aimed at promoting trust through disclosures that include openly sharing information and expressions of the leader's true thoughts and feelings". In Strategic alliances, the simple definition of "openness toward partners"(Larsson, Bengtsson, Henriksson, & Sparks, 1998, p. 286) is used.

Like 'accountability' this governance process is concerned with a criterion for good governance. 'Transparency' is focusing on the openness of an organization, to make sure legal rules and ethical norms are valued and lived by, to avoid backroom decision making. Transparency has to assure all stakeholders that processes and especially crucial decision making is being done by agreed standards and procedures. A main objective of transparency measures is to make accountability visible to stakeholders or even to the general public.

In the context of Smart Cities, Grimmelikhuijsen and Meijer, working on a project for *Smart Governance of Sustainable Cities*, define transparency from an organizational governance point of view: "The availability of information about an organization or actor allowing external actors to monitor the internal workings or performance of that organization" (Grimmelikhuijsen & Meijer, 2012, p. 3). In another article Meijer notes the link with accountability: "the decrease in the transparency of government organizations is a serious problem for accountability"(A. J. Meijer, 2003, p. 68) . In the paper *'Understanding the Complex Dynamics of Transparency'* Meijer (2012), finds that transparency, like accountability and participation, are values that result from, but also facilitate the governance process (here also referred to as the nature of the playing field) : "transparency is constructed in interactions between actors with different perspectives within a certain (institutional) playing field, and, at the same time, these interactions change the nature of the playing field" (Meijer, 2013, p. 429)

Nam and Pardo relate this interwovenness of accountability and transparency to being citizen-centric: "Smarter government means collaborating across departments and with communities—to become more transparent and accountable, to manage resources more effectively, and to give citizens access to information about decisions that affect their lives" (Nam & Pardo, 2011a, p. 287).

Transparency is often formalized in rules and procedures among which evaluation is a crucial one. Evaluation is set up to judge the results and to learn from experience by describing lessons learned, but it generates often the time frame in which accountability is formally realized if relevant criteria are met:

> Evaluation of programs is another important aspect of a successful Smart City. In general terms, the evaluation should assess whether objectives of the projects have been accomplished and, if not, what difficulties were encountered and why. The precondition for any evaluation is that there are clear, measurable objectives and the evaluation is independent (European Union, 2014, p. 79).

Transparency is realized mainly by communication and by the publication of data. The related openness is also expected to have a positive influence on citizen participation. Zanella et al. (2014) highly value the effect of available data:

> The availability of different types of data . . . may also be exploited to increase the transparency and promote the actions of the local government toward the citizens, enhance the awareness of people about the status of their city, stimulate the active participation of the citizens in the management of public administration, and also stimulate the creation of new services upon those provided by the IoT [Internet of Things] (Zanella, Bui, Castellani, Vangelista, & Zorzi, 2014, p. 22).

In spatial planning, "Transparency induces the accountability holders to provide justifications for their actions, but there are no guarantees that accountability holders can apply sanctions"(Rocco, 2012). In contrary to transparency is 'weak visibility', in which "decisional procedures in policy networks are often informal and opaque (as this facilitates the achievement of compromise"(Rocco, 2012, p. 57). This shows sometimes a lack of transparency can lead to consensus.

Table 4-10 Characteristics for Transparency, with scores for both cases

Transparency	Transform	Triangulum
- To make accountability visible to stakeholders and sometimes even the general public;	1	?
- To create openness: decision making is done by agreed standards and procedures and verifiable;	0	1
- This openness can lead to enforced citizen participation;	0	1
- Rules and norms are lived by and backroom decisions are avoided;	0	1
- Makes operations more citizen centric.	0	1
- Creates trust	0	1
	1	5

For each characteristic the score means: 0 = absent, 0,5 = partly present, 1= present, ? = insufficient data to determine a score. The total score per case represents the dominance of a factor within the set of governance factors.

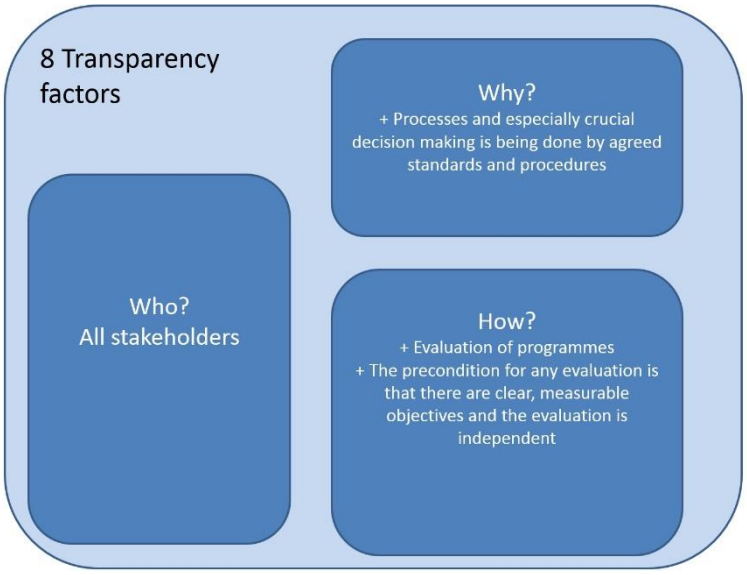


Figure 4-10 Overview success factors and barriers Transparency

4.4 Conclusions Governance process definitions

Based on the above described characteristics per governance process the following definitions for are formulated as an answer to the research question:

Collaboration, the core process of governance, contains all kind of activities developed by the stakeholders to realize a shared vision and objectives (product oriented) and to improve the ways of working together (process oriented).

Leadership and champion, the process and roles to give guidance to the collaboration, create credibility and trust, bind the stakeholders to targeted results and overcome barriers to maintain an action oriented mode.

Participation and partnership, processes to create and maintain participation of citizens and partnership between public and private institutions to guarantee optimal involvement of the stakeholders.

Communication, a process with many different activities to support and optimize the collaboration between the stakeholders and to exchange information with individuals and organization in the given context to support mutual alignment by sharing data, knowledge, ideas etc. and to collect feedback by interaction.

Data-exchange, a process supported by communication to make data available to different stakeholders (and sometimes even unidentified parties) to improve products and services and/or the collaboration process itself.

Service and application integration, the process of improvement of solutions for specific problems by combining services and/or applications and data from different developers and/or different clients.

Accountability, the process of defining and applying specific roles, responsibilities and measures within an organization to make clear who is responsible for which results and activities.

Transparency, the process of defining and monitoring clearness about decision making processes based on the defined accountability.

During an interview Kees Jansen (Smart City strategist) approved of all these definitions of the different governance factors, in which "Collaboration and leadership are key drivers in achieving smartness, and communication, accountability, transparency, integration and especially data-exchange are criteria for successful implementation of Smart City initiatives." He emphasizes the role of the government in providing playgrounds for experimentation, but is biased on subsidized Smart City projects. A nuance he adds to the governance definition is that "it is not only important to strive for shared goals, but also to achieve individual goals" (Kees Jansen, may 2016, p.c.).

The definitions include statements about the relations between the different processes of Governance. The core process seems to be 'collaboration' heavily supported by 'communication'. 'Partnership and participation' and 'leadership and champion' can be seen as sub-processes of the collaboration process. Although Chourabi (2012) presents 'Partnership and participation' as one combined factor, the analysis points out that there are so many differences in the processes concerning the different stakeholder groups, that a separate representation is justified. 'Data Exchange' and 'Service and application integration' are also sub-processes of collaboration and are part/results of the communication efforts with specific objectives. 'Accountability' and 'transparency' are processes to make sure that the collaboration meets these specific criteria.

The described relations are presented in a conceptual model of these processes of Governance.

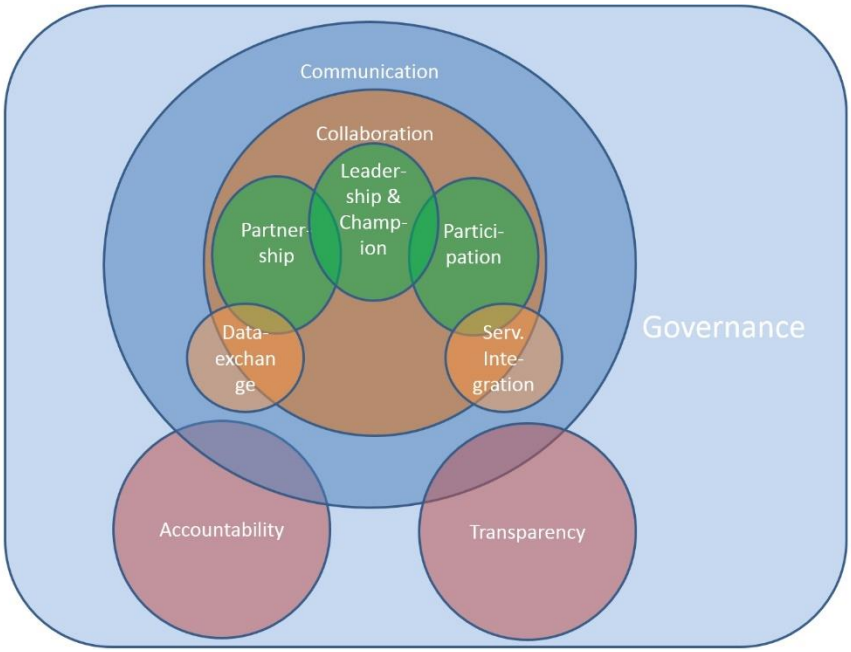


Figure 4-11 Conceptual model Governance processes

Governance processes in relation to implementation power

Based on these definitions of the governance processes I made an estimation of the impact of governance factors on the core implementation factors (technology, organization, policy (TOP) influencing the implementation power of a Smart City initiative in the model of Chourabi et al. (2012). My overall conclusion is that almost all processes have influence on organization and policy aspects, while only some processes have influence on technology aspects.

Table 4-11 The impact of Governance processes on the core TOP-factors

Influencing governance process	Technology	Organization		Policy
Collaboration	++	++		++
Leadership & champion	+	++		++
Participation & partnership	++	++		+
Communication	--	+		+
Data exchange	+	0		+
Service & application integration	++	+		++
Accountability	--	++		++
Transparency	--	++		++

Based on the description of the governance processes an estimation can be made of the impact of these factors during the different phases of a Smart City initiative. The table 4-12 shows that there are only small differences between the estimated impacts of the separate factors during different phases. My overall conclusion is that these factors of governance in general have influence during the complete lifecycle of an initiative.

Table 4-12 The impact of Governance factors during the lifecycle of an initiative

Influencing governance factor	Initiation Phase	Planning Phase	Implementation Phase	Evaluation Phase
Collaboration	++	++	++	++
Leadership & champion	++	++	++	+
Participation & partnership	+	++	++	++
Communication	+	++	++	++
Data exchange	0	+	++	+
Service & application integration	++	++	++	+
Accountability	++	++	++	++
Transparency	++	++	++	++

5 Research Methodology

This chapter will describe the research methodology used for this thesis, starting with a short introduction, followed by the method, phases, techniques and validation of results.

5.1 Introduction

Based on literature research a framework for influencing factors of Smart City implementation is selected. For the factor Governance a set of processes is defined based on the research literature. For each process a number of characteristics is gathered among which the relations to the other processes of governance. With this governance framework two cases are analysed to test the framework in practice. The framework helps to get insight in the success factors and barriers of the governance domain. This makes clear in what way governance processes are used (or neglected) to optimise the implementation of specific Smart City initiatives. Based on the use of the framework, as an analytical instrument in the two cases, adjustment in process definitions and in the framework representation is concluded. The revised framework with connotations and definitions form a set of knowledge to improve planning and evaluation of the governance in future Smart City initiatives.

Smart City development is a new domain inside urban area development. Since the concept of Smart City is building on many different knowledge areas (for example, ICT, Service development and Service management, Business development and Sustainability) it has the interest of researchers and practitioners from all these disciplines. Smart City development is really an interdisciplinary form of collaboration. Researchers that are contributing to the development of knowledge for this domain have various backgrounds from urban planning, via technological development and business administration to social sciences concerning citizen participation.

This situation underlines that there is not yet a steady body of knowledge for the domain of Smart City implementation. The domain is under the attention of many researchers from different disciplines, also because it has the attention of politicians and institutions like the EU trying to use the Smart City concept for the solution of actual urban problems and challenges. This interdisciplinary approach can be seen as a joined exploratory search from the different disciplines to find out which knowledge is applicable. It is all about the development of theories and ideas, integrating knowledge from different academic disciplines, applied to this new area of application. This quest has a focus on qualitative aspects searching for the relevant knowledge for this domain, makes alternating use of inductive approaches and is exploratory by nature. Altogether these approaches are used to build theory to better understand the suggested governance processes and to improve the Smart City implementation.

The empirical research of this thesis is based on two Smart City initiatives: Transform-Amsterdam and Triangulum-Eindhoven, thus two case are used to answer the main research question. The aim of this thesis is to produce a governance framework, using the governance components or conceptualisation of a group of key researchers in the Smart City field: Chourabi et al. (2012).

5.2 Research Method

Since the new domain of Smart City implementation is demanding for a theoretical basis to improve practice, the research is mainly based on a qualitative approach in which the focus lies on in-depth information rather than quantification in collection of data. With some exceptions, because the

interview outcomes or 'statements' have been quantified to present an overview of the most discussed governance factors in practice, to determine whether theory and practice have the same core factors in focus. This research has mainly a qualitative approach, because to understand the perspectives of participants in Smart City projects, in-depth research is necessary to explore the meaning of Smart City governance, observe the process of governance in Smart City implementation, and identify yet unknown patterns in this phenomenon.

The nature of this research is a mix of exploratory and descriptive research. This research is building on previous Smart City literature, in which influencing factors, like governance have been defined in many ways, thus using an exploratory approach, to form a theoretical idea. Following some of the leading academic Smart City researchers Chourabi et al.'s (2012) framework was chosen to find out if their interpretation of Smart City governance is inclusive and relevant in the Dutch context. Thus the following concepts or categories are used for observation: collaboration, leadership, participation and partnership, data-exchange, service and application integration, transparency and accountability. Concepts that are drawn by Chourabi et al. from the related – and since the millennium existing - discipline of developing e-services. Since they did not offer descriptions or definitions of these enumerated governance factors, research had to be done to the meaning, connotations and definitions of these factors in the context of Smart City implementation.

An inductive approach was used to develop a governance framework based on academic literature. Next a deductive approach was used, counting the different interview statements on the specific governance factors, to test the usability of the framework in the case analysis 'to help to establish the importance of this developed governance framework.

In relation to the features of qualitative research mentioned by Yin (2015) this research will study governance aspects of Smart City initiatives, under real-world conditions in two cities in The Netherlands: Amsterdam and Eindhoven. Specifically the urban area Amsterdam Southeast, Strijp-S and Eckart/Vaartbroek. It will represent different perspectives of the key stakeholders involved in the process. It will take into account the contextual conditions within urban areas of Amsterdam and Eindhoven. With the goal to contribute to gaining insights into this existing and emerging concept of governance behaviour in Smart City initiatives.

5.3 Research Phases and Techniques

For this research, five phases are described in order to answer the main research question. In each phase, different techniques have been used to generate, test, analyse, check, and interpret the data. As shown in the table 5-1 below

Table 5-1 Research phases

	Phases	Techniques
Phase one	Internship at the municipality of Amsterdam, preliminary theory and interviews	Observations, Literature research, interviews
Phase two	Test the theory and the viability of the concepts	In-depth interviews
Phase three	Analysing data, revise theory or dimensions of the concept	Coding, matching literature and interviews
Phase four	Participant feedback	Check results
Phase five	Interpreting and concluding	

These phases are also shown in the Research Design (fig 5-1). In this paragraph each phase will be shortly described.

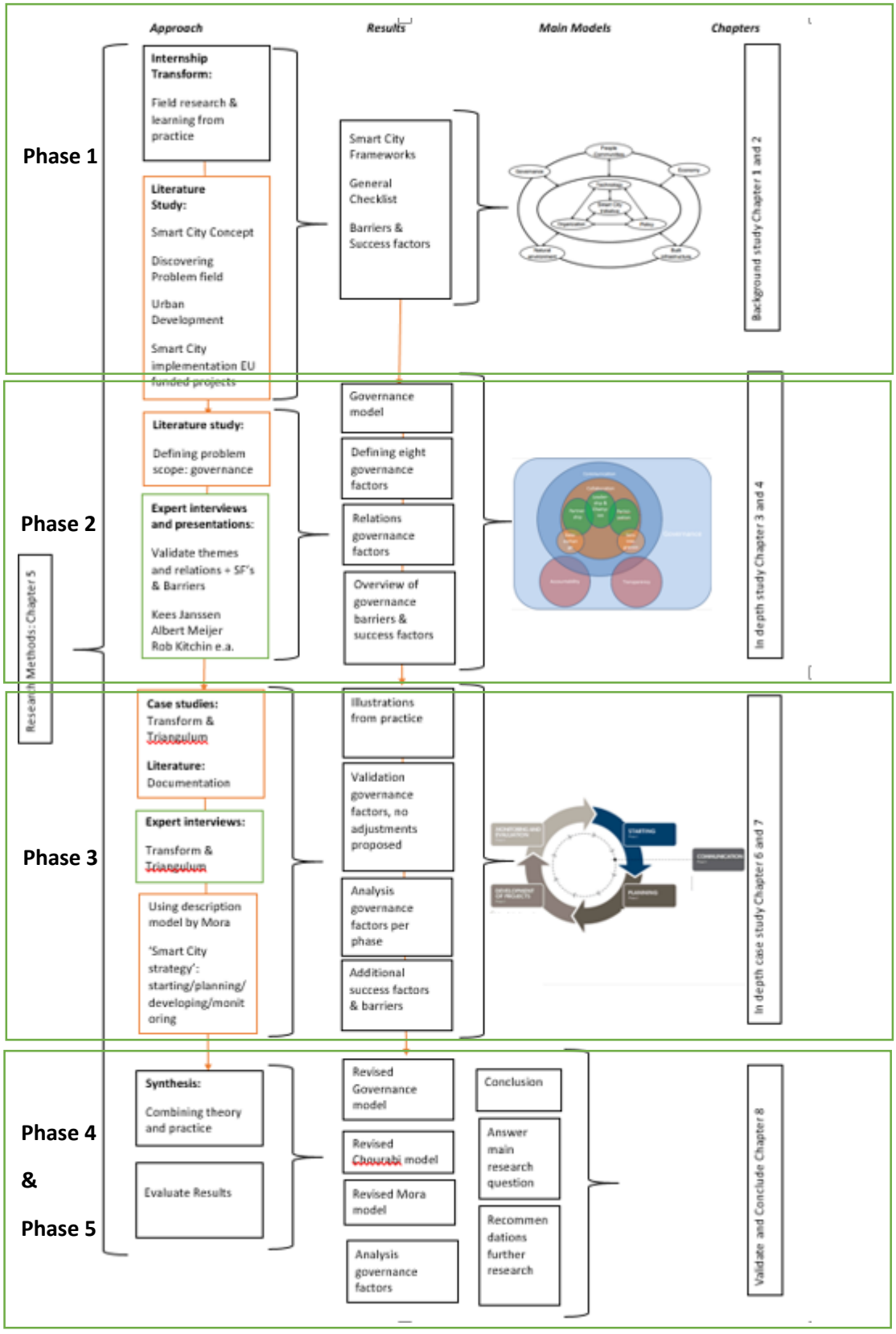


Figure 5-1 Research Design

First phase: Literature study and participative observation
The half year internship at the municipality of Amsterdam gave me the possibility to acquire insight in Smart City development from practice. I was part of the Transform team supporting the international project manager and the SUL-team in work package 4. In this phase, preliminary research is done. I analysed the core concepts, perceptions and definitions of Smart Cities. I discovered the relation between urban development and Smart City projects, and I chose the integrative Smart City initiative framework by Chourabi et al. (2012) to describe the two cases of Transform and Amsterdam. Through literature research I developed an overview of success factors and barriers towards Smart City implementation (Appendix V), which I would use as to test theory in the case study. After presenting my findings to my mentors, we discussed this approach, and changed perspective by having a closer look at one specific factor in this framework: governance. For each governance process a literature analysis was made to retrieve success factors, barriers and definitions. This resulted in a list of 85 success factors and barriers, all related to one of the eight governance processes (Appendix III).

These range from corporate literature to public literature, but is mainly based on academic literature. Since the Smart City topic is widely discussed in Industry and Government sectors, these sources are included to describe the field. The more popular sources have a higher risk of being biased, since the industry and/or municipality can have their own agenda and objectives in Smart City developments. However for this popular topic even academic sources might be biased. This might be the case an article "A Smart City Initiative: The Case of Barcelona" by (Bakıcı, Almirall, & Wareham, 2013), which looks more like a marketing folder than critical research. This bold statement was shared by the first academic reviewers of this article, nevertheless it hasn't stopped this article from being published.

Taking a critical view towards publications into account, main literature sources consulted are Google Scholar, Science Direct, Scopus, and repositories of universities worldwide. The topics searched for relate to: Smart City (or Smart Cities) implementation, Smart City governance, Smart City development, in combination with the following terms: barriers, success factors, drivers, challenges, issues, and opportunities have been used.

I continued the literature research throughout the project, to keep including the latest documents and results. From this initial research, I used the bibliography of the main researchers in this field, to discover parallel publications, to yield more insights. Final literature research took place in October 2016.

Second phase: Test theory with experts and in case study

In an interview round with a Dutch Smart City experts, first findings regarding the governance framework have been tested on their relevance. Through the expert interview feedback was received on the proposed definitions of governance and the related processes.
After this first 'pilot', the In-depth case study research started in which a wide range of stakeholders of the two Smart City initiatives in Amsterdam and Eindhoven are interviewed.

Yin (2015) stated that evidence from multiple cases is in most conditions more compelling than a single case study, however researchers seem to differ on this thought. For this research two 'leading' Smart Cities in the Netherlands have been chosen. Both cities have joined a European funded Smart City program, in which they appointed specific areas in the city for implementing Smart projects.

Based on the research question 'How both Smart City initiatives are governed', emphasis lies not on the results or on the 'why' question, rather looking at the process of becoming smart. This method of case study is to study a phenomenon (the "case") in its real-world context (Yin, 2015). For both projects a list of relevant stakeholders was developed. The interviewees were selected to get a good

spread of representatives of the different stakeholders. Each interview was estimated to have a duration of one hour, because of the limited availability of the interviewees. From the sixteen selected interviewees of both cases, fourteen agreed to cooperate.

Table 5-2 Interview scheme stakeholders Transform and Triangulum

	Transform	**Interviewed**	**Triangulum**	**Interviewed**
City level	R. van Warmerdam (International coordinator)	Y	Roy Beijnsbergen (	Y
Project coordinators **(municipality)**	B. Mantel - SULCO G. den Boogert	N Y	Henk Kok	Y
Private Actors	F. de Leeuw M. Maris	Y Y	T. van Dieren (Park Strijp Beheer) J. v. Eijkeren (SDK) R. Willemse (KPN)	Y Y Y
Knowledge institutes	-	-	Bauke de Vries (TU Eindhoven) Dujuan Yang (Postdoc, TU/e)	Y Y
Consultancy ICT	I. Wenzler (Accenture)	Y	Peter Dijkstra (Cisco)	N
Other	G. Baron (ASC)	N	J. Hijdra (Housing Association Woonbedrijf)	Y
Total		5/7		8/9

The conceptual model of governance processes and corresponding definitions formed the basis for the semi-structured interviews (Appendix II). Prior to an interview, I would send the interviewees my questions, the model and the definitions, so they could prepare for the interview. A risk in this method is that I could exclude additional findings regarding relevant governance factors. It was my aim to test my literature findings in practice, and I did not notice that the interviewees held different viewpoints to the used governance factors, at times the interviewees even acknowledged the relevance and completeness of the model.

The semi-structured interviews are either conducted face to face, via telephone or via Skype. Face to face had the preference, but due to practicalities, all of the interviews for Triangulum (Eindhoven) are done via the telephone/skype, and some of the interviews for Transform are done via telephone. Finally, the only face to face interviews have been conducted with Kees Jansen, Ronald van Warmerdam and Geert den Boogert. Especially in the telephone interview with Ivo Wenzler, I had bad reception, but other than that, I did not experience major communication issues in this method. Of course there is always a risk of interpretation of answers, therefore I transcribed the interviews, send the results back to the interviewees, to double check their results. In this process only minor changes, but necessary changes have been made.

Third phase: Analysing data

As mentioned, the interviews have been transcribed and reduced to a set of statements per interviewee, making up to a total of 241 statements. Each 'relevant' statement was categorized as a

success factor, a barrier, or a neutral factor, and related to one of the eight processes of governance. For each statements was determined whether it was related to a known element from the literature study or whether it was a new found element, in relation to the previously describe literature. This resulted in a list of relevant factors from the case studies that are categorized to the eight processes of governance.
It also resulted in an overview of the 'weight' or 'importance' of the different governance factors, by counting the different statements per factor. In this process of analysing the top governance factors (collaboration, leadership, partnership) or mentioned most often. But this analysis is only indicative, since this normative counting method, excludes the actual importance of the content of a specific statement. Best example is the statement made by Hijdra from Woonbedrijf, who mentioned 'Transparency' as most important governance process. Looking at the actual content, this would only be counted as one success factor, while it is clearly more important.

To describe the case a timeline approach is chosen, instead of the above described analytical approach. A model by Bolici and Mora (2015) is selected to be used as a phasing model to describe the two Smart City cases. For this approach all information from the interviews are coded to relate each statement to a specific phase in the life cycle of the case. By regrouping all the statements on this timeline they could be used to describe 'the story' braiding the expressions of the interviewees. Conclusions are formulated concerning the governance impact in both cases. It often showed necessary to add background information from the actual interviews to the case descripton.

Fourth phase: Participant feedback
After I analysed the case description and the interviews, I drew up preliminary conclusions. I still found knowledge gaps in my analysis and description that needed further specification. Therefore I planned two additional interviews per case, in which I discussed preliminary findings and in which I could elaborate on blank spots in the case description. From these four interviews, which had a different set up, to the previous interviews, I could better interpret my findings. This phase was therefore closely related to the final phase of interpreting and concluding.

Fifth phase: Interpreting and concluding
The findings from the case studies are confronted with the analytical governance framework. This resulted in adjustments of the original framework into a revised governance framework. Conclusions have been drawn concerning the usability of the framework for analysis of Smart City initiatives and for the improvement of new initiatives. I also interpreted and concluded on the other models used in this research, the Smart City roadmap by Bolici and Mora (2015), and the Integrative framework by Chourabi et al. (2012).

5.4 Building trustworthiness and credibility

By using multiple sources of data, like project documentation, administrative documents, newsletters etc. the research validity is strengthened. Due to being involved as an intern at Transform, I could gain inside information in this Smart City initiative in Amsterdam. This showed to be beneficial for the research. However, I have to make sure to keep my bias aside, so I will not critically reflect my own subjectivity, beliefs, and interests on this analysis.

In order to prevent threats to the validity of the outcomes, the following strategies have been taking into account.

1. Intensive long-term involvement, for the case of Transform, to produce a complete and in-depth understanding of field situations, including the opportunity to make repeated observations and interviews;
2. “Rich” data – to cover fully the field observations and interviews with detailed varied data;
3. Respondent validation – to obtain feedback from the people studied. In this case all interview transcriptions resulting in a selection of statements have been validated by the interviewees, used in phase 2.
4. Search for discrepant evidence and negative cases – to test rival or competing explanations. Which are not merely alternative interpretations, but directly compete with each other. Especially used in phase 4, but also in phase 2.
5. Triangulation- to collect converging evidence from different sources
6. Ethics – I dealt with issues of confidentiality by asking the interviewees to use their quotes, and to make sure they have checked their citations.
7. Reliability – The reliability of this research is based on the triangulation of results. However not all findings could be matched from different sources.
8. Validity – The study set out to test the different governance processes in both Smart City cases, as found in the literature. The measures used in this research, governance processes, are difficult to accurately assess, but based on the findings I found the results valid.
9. Generalizability – The results of this study will not be useful for all Smart City initiatives. The governance framework is only build on two case studies in the Netherlands, and Smart City initiatives are very context dependent. However, the governance framework can be used to analyse Smart City initiatives in a similar context, as the Netherlands, regarding brownfield urban transformation areas.
10. Limitations – As mentioned at point 9, the context is a limit to this study, and the fact that it is a particular form of Smart City initiative, is another limitation: The European funded initiatives have a different approach than non-funded projects. Another limitation to this study is that does not include an in-depth cross case analysis, and that the governance model is not tested in the different context, like the European partners cities of both cases.

6 Case Transform

The case of Transform is described in mainly chronological order using the model of Bolici & Mora (2015) as a reference framework: the paragraphs 6.1 to 6.5 and their subdivision. I particularly pursue to answer one of the main research questions: How are governance factors used in the implementation of the Smart City initiative Transform in Amsterdam?

To answer this question I will build on my experience during my internship at the Transform project in the period of September 2014 until June 2015, when Transform was finalised at the Smart City Event in Amsterdam. In this case study I focus on 'work package 4': the making of an implementation plan for (part of) the district of Amsterdam Southeast. Therefore the documents from this work package are used as main source of information, together with outcomes of interviews with the key stakeholders. Each phase will start descriptively and finalises with an analysis concerning the governance aspects. Citations from interviews are marked with the name of the interviewee, 2016 and p.c., for 'personal communication'.
What will show is the municipal effort to turn the Transform project from being initially a top-down (2.0 demand-driven) Smart City initiative with ad hoc commitment of local stakeholders, into a middle-out approach with tangible commitment on the implementation of Smart City projects. Due to lack of leadership the Implementation Plan will not produce a clear list of projects as stated in the Description of Work, but thanks to process interventions like the Captains Dinner, this collaboration will be turned into a partnership committed to the 'spirit' of the TRANSFORM project, sharing management costs to continue the collaboration in the area of South East.

6.1 Starting

1.1 Grow up the idea to become smart

Amsterdam started to grow the idea of becoming a Smart City, with the 'Amsterdam Smart City' (ASC) initiative in 2009. This initially started in 1995 as a Digital City initiatives. In 2009, "the municipality, with some key [Alliander, Amsterdam Arena, Arcadis, Hogeschool van Amsterdam, KPN and PostNL] partners, moved towards a clear smart city project" (Dameri, 2014). It is seen as a platform to encourage all kinds of stakeholders to take Smart City related initiatives. On the evolving platform all kinds of activities are organized to stimulate stakeholder activities. The initiative aims at the diversity of municipal services and all kind of companies and organizations, including citizens. The main objectives for the municipality is to reduce the use of energy, to reduce the traffic and the corresponding nuisance and to improve public safety (Unknown, 2016d).

1.2 Define the motivation and take the leadership

With the European Smart City *strategy* for Amsterdam, the Amsterdam City Council wants to put the Amsterdam Metropolitan Area prominently on the European map. The City of Amsterdam states to believe strongly in the added value of knowledge and best practice sharing between countries, regions and cities. On a city scale, the European strategy for Amsterdam is "to reduce CO2 emissions by 40% in 2025 [compared with 1990 levels] and to position the city as a front-runner in the field of integrated sustainable urban development" (Gemeente Amsterdam, 2012, p. 1).

Amsterdam advertises itself as a compact 'Smart International City' or 'Smart Global Hub'. This European strategy of Amsterdam, approved by the city council in 2012 (Amsterdam, 2012), is

focusing on strengthening four pillars. Especially the pillars 2-4 show to be essential for their motivation towards a Smart City:

1. The position as business hub, in which connectivity and trade are key;
2. Knowledge and innovation;
3. Sustainable city development towards a 'Smart City' and ambitious climate goals;
4. Active citizenship and participation.

Amsterdam's programme and cluster manager ICT, and head of the ICT project 'Amsterdam Innovation Motor', Ger Baron, took the stage in August 2012 during an international seminar, focused on 'energy-control strategies: citizens as actors', sharing details in pioneering Amsterdam Smart City initiatives. According to Baron the first starting point for Amsterdam as a Smart City was to focus on 'energy', and secondly on 'connectivity'. During the seminar he said "Everybody agreed on having ambitious climate goals, and there were loads of ambitious intentions by the city, but nothing too much happened actually" (Baron, 2012, p.2). The city of Amsterdam started an energy transition programme to implement 'no brainers' like building insulation, but also to start innovation together with grid operators, and other companies. "We want to bring parties together . . . create impact . . . We want to have companies, knowledge institutions, governments and individuals come up with ideas . . . Collaboration is key" (Baron, 2012, p.2). At this stage a living lab approach has been chosen to further develop the Smart City ideas in three urban areas of Amsterdam: Amsterdam Southeast, Smart Neighbourhood New-West, and IJburg. With these urban living labs Amsterdam is positioning itself as an international Smart City. Choice for South East as a living lab, and the intentions of the different parties in the area to become sustainable, was in line with a call for organising Floriade 2022, in the area. A month after Baron's presentation, it became clear that Amsterdam would not win the bid to organise 'Floriade 2022' in Amsterdam South East. Nevertheless the local parties, (Liander, Cisco, Nuon, the city borough of South East, housing associations, Arean, AMC and IKEA, kept excited to become highly sustainable. They started a collaboration called 'Energiek Zuidoost' (Energetic SouthEast) (Gemeente Amsterdam, 2013a, p. 29).

In 2012 the city of Amsterdam decided to respond to an EU-call for ENERGY-SMARTCITIES-2012 and take the lead in the Transform project, supported by funding from the European Union's 7th Framework Programme (FP7) for Research and Technological Development (2007 – 2013). The FP7 is part of an ongoing series of investments in technology research and development across Europe. 'TRANSFORMation Agenda for Low Carbon Cities', as Transform is called officially, was an initiative of the EU to support the realization of the EU 20-20-20 targets on climate change "by the integration of energy in urban management. In interactive Smart Urban Labs, stakeholders will be able to turn ambitions into tangible Implementation Plans" (EU Commission, 2012). As such, Amsterdam's motivation to join the Transform project was the "Guided process with major stakeholders, leading to commitment of 202020 goals, by renewable energy production and use of latest technologies in existing building stock" (TRANSFORM, 2014b, p. 9). The Transform project was about becoming a Smart 'Energy' City.

A small group of stakeholders wrote the proposal with intensive involvement of different services in the municipality of Amsterdam. The municipality, became coordinator for the project, since they took the initiative and leading role in writing the proposal for the Transform consortium. The consortium that supported the project was brought together from leading cities and companies, mainly from the Western-European countries. The cities Amsterdam, Genoa, Hamburg, Copenhagen, Lyon, and Vienna all defined areas for the Smart Urban Labs. Amsterdam chose one of its earlier appointed living labs: Amsterdam Southeast. The municipality of Amsterdam and the consultancy company Accenture were the only Dutch participant in the consortium on a European level. Furthermore, private companies like Siemens and ARUP, energy suppliers and research institutions

were involved. The consortium thus was built along the lines of a triple helix cooperation as promoted by the EU for Smart City development.

The financial motivation, for Amsterdam to join this project, is stimulated by receiving EU funding, possibly learning from other cities, and to add to their list of 'achievements'. The financial contribution by the EU on the Transform project is about 75% of the budget. The budget for the project was established at about EUR 7.5 million with an EU contribution of about EUR 5.6 million. Therefore the EU itself has the leadership role of becoming Smart. On the European scale, the necessary collaboration is stimulated by organizing international triple helix consortia.

The motivation for collaboration between the municipality and stakeholders in Amsterdam is based on the fact that the city, in contrast to other Transform cities like Copenhagen or Hamburg, doesn't have enough power for an energy transition: "Energy transition is not for cities or politicians to decide on, so they cannot govern it either. They can try to facilitate, seduce, or subsidize" (van Warmerdam, 2016, p.c.). "The city really needs the other stakeholders and therefore fulfils the role of unifying and facilitating management" (Wenzler, 2016, p.c.). Therefore in Amsterdam Southeast, the municipality was in dialogue with these participating parties to develop an area vision in which efficient and sustainable energy facilities are central. In response to this area vision, 8 concrete projects have been conceived (from the Design Thinking sessions; explained in phase 6.3).

Enegiek Zuidoost (Energetic Southeast) became the collective name for CO2 reducing projects in the Transform area of South East. 'Energiek Zuidoost' became part of The European Transform project, to save energy and produce sustainable energy in the area. Certain stakeholders have formed a 'leading group', for example the Amsterdam Arena (Amsterdam Smart City, 2014).

The Amsterdam Arena signed a 'Green Deal' with the municipality, in April 2012, on area focused development, wind energy, mobility, and waste collection. In which their goals is to decrease their CO2 emissions with 100% in 2015 (Sleijffers, 2012). Also the mobility energy portal by Arena went online. As partner of 'Energiek Zuidoost', ArenA is searching for sustainable solutions, like producing, exchanging and saving of energy with other stakeholders, and to test these in the 'living lab'. In November 2012, the European project Transform started, of which Energiek Zuidoost is part (Amsterdam Smart City, 2014). For the year 2013 concrete business cases will be developed (during Transform). (Gemeente Amsterdam, 2013a, p. 18).

1.3 Department responsible for strategy and planning team

"Preliminary to the start of TRANSFORM project, a proposal was made in the application for the European subsidy" (TRANSFORM, 2014b, p. 52). Therefore Amsterdam select an area as Smart Urban Lab, set up a local team to work on the Implementation plan, and arrange local resources to (co) finance the making of the IP.

On a local level, the department responsible for the development of the strategy for Transform was the 'Amsterdam Energy and Climate Office'. People from the office took the initiative and started as the accelerator of the process in the SUL of Amsterdam Southeast: "The office is part of the urban planning department (in Dutch: Dienst Ruimtelijke Ordening), to make sure energy and planning are combined" (TRANSFORM, 2014a, p. 81).

For the Transform project, Amsterdam has allocated a start budget of 50.000 euro to start-up the Smart Urban Lab Energiek Zuidoost. Within the city's budget, 300.000 euro is allocated for the necessary co-financing over the period 2013- 2014 – 2015. The amount of financial capacity is tried to be levered through private initiatives.

During the writing of the call, the climate office assumed that the companies already involved in 'Energiek Zuidoost', would cooperate in the Smart Urban Lab of Transform, since these parties have been involved in this collaboration : Amsterdam ArenA (Ajax stadium), Campus Arena (cooperation of office building owners), Cisco (ICT company), Heineken Music Hall, Endemol (large media company), Alliander (local grid company), NUON (energy company), Waternet (waterworks company), AMC (City Hospital), IKEA (furniture store). The Transform Description of Work (which can be seen as the contract with the EU) stated that these 'partners' "will not be beneficiary to the European FP 7 project, but contribute with their own resources to the Smart Urban Lab." (DOW p. 78).

Analysis Governance Starting Phase

The municipality of Amsterdam shows **active leadership** and marketing-skills by promoting the Smart City idea, trying to achieve ambitious climate goals, by focusing on energy and connectivity, and advertising itself as a Smart Global Hub, creating an environment for a network of partners (ASC platform) to contribute to this idea. By selecting an energy programme and having a living lab approach in which the city becomes a platform for 'innovative' Smart City projects. Having high ambitions has not always proven to be fruitful for success, as mentioned in 2012 by Baron. His statement "nothing really happens", shows that there is a high level of **transparency** regarding the actual Smart City progress. In his speech, Baron tried to make 'everyone' **accountable** in failing to reach these high ambitions. Besides that, he also refers the lack of leadership on the city level, saying the city plans stayed on the level of 'intentions'. In this phase, no Smart City projects with **service or application integration** took place, neither did **data-exchange** happen**,** rather 'no brainers' got implemented. Despite the lack of successful projects, Baron mentioned that **collaboration is key**, and underlined the **facilitating leadership role** of the municipality, as mentioned by Wenzler: "the city really needs the other stakeholders and therefore fulfils the role of unifying and facilitating management"(Wenzler, 2016, p.c.). The municipality was offering the support and conditions for stakeholders to excel – verbally (in dialogue with participating parties, **communicating a shared vision** for the area, and generating 8 concrete project ideas in the design thinkers session), and *physically* (set up living labs, ASC platform, signing a 'green deal'), both to promote co-creation in PPPs, triple-helix or **quadruple-helix collaboration,** as also shows from the 4 pillars of the European Smart City strategy of Amsterdam. The vision for South East and the eight projects already existed thanks to pre-Triangulum collaboration of the public-private partnership with the Amsterdam Arean and the set up of the **stakeholder group 'Energiek Zuidoost'**.

Apart from facilitating leadership the municipality showed **active leadership** by responding to European sponsorships by writing the call, to engage in Transform in a coordinating role, and in having ambitious goals for the city, the Amsterdam Smart City network, and the possibility to receive EU funding. In this starting phase, the motivation is also based on the powerlessness of the City of Amsterdam to enforce energy transition. "[the city of Amsterdam] can try to facilitate, seduce, or subsidize.". The active leadership shows from the allocated budget to start collaboration (design thinkers session) in the South East area.

The process of **writing and selection of the call to win European subsidies, is not really transparent**. The proposed 'partners' for the planning team, as mentioned in the DoW, could have better be named 'stakeholders, since these organizations are not sharing any risk in the transform project and do not have any direct responsibilities regarding the Transform activities, let alone possibilities to apply sanctions, neither will they receive any direct financial support.

6.2 Planning

As mentioned in chapter two, the Transform project consists of six work packages. This case analysis mainly focuses on WP4: the implementation plan (IP) because this should be the basis for prolonged development, in the form of 'commitment' for actual implementation of Smart City projects.

> Starting from different stages of development (planning and implementation phases) in the Transform cities, the presented implementation plans were made in two years' time from the start of the Transform project in January 2013, until the end in December 2014. The implementation period that will follow, has a scope of about 5(-10) years. Depending on the task and the specific situation of an urban area, the length of these periods might differ. (TRANSFORM, 2014b, p. 46)

2.1 Rebuild and analyse the strategic framework of the city

2.1.1 Strategic framework

Apart from the mentioned 2025 CO2 targets, Amsterdam has a strategic plan for the medium-long term: 2040. This plan makes a distinction between the inner city, the urban and infrastructural zone around it and the area outside the circular zone. The SUL [South East] is located in the outside zone. In this zone the investments in the medium are mostly directed towards social and economic programs and less to physical transformation (TRANSFORM, 2014b, p 10). The municipality has set up an 'energy strategy', in the form of three approaches: saving energy, sustainable energy production, and the use of waste heat. On top of that, the transformation of urban mobility will add to this energy transition (Gemeente Amsterdam, 2013a).

Amsterdam is mentioned (by the municipality itself) as a 'best practice' on linking city-wide strategies with district-specific energy system development approaches, through the 'Amsterdam with Smart City Umbrella strategy "There is the strategy in Amsterdam Energiek Zuid Oost, which works as an innovation motor [project machine]. The city supports projects coming through the stakeholder process, accompanying reflections to the city strategy are made" (TRANSFORM, 2014b, p. 74). The innovation motor refers to old organization of the Amsterdam Smart City platform, established in 2006, which promotes innovation, cooperation and activity by:

- Stimulating: actively connecting initiating, encouraging
- Development: identifying opportunities, finding partnerships and applying for national and EU funding projects
- Implementing: preparing projects for independence
- Matchmaking: using existing networks and creating virtual meeting points to help partners find each other
- Cluster forming: For and with companies and government institutions.

Based on this strategy and activities, Amsterdam started to define its facilitating new role in energy planning and urban transformation.

2.1.2 Rebuilt role of municipality: bottom-up

In the Climate and Energy year programme is stated that the role of the municipality for energy projects from 2013 onwards will be a bottom-up approach. The role of the city has changed last years from a subsidy provider and initiator towards a partner and facilitator, which means a less hierarchical relation between the municipality, businesses, and residents and the rise of new forms

of collaboration, in which everyone “to their own ability and responsibility’ contributes to the end result.” (Gemeente Amsterdam, 2013a, p. 31).

2.2 Formulate a long-term vision, and define objectives, approach and lines of action

2.2.1 Vision

In 2009, the vision for the area Amstel 3 (Amsterdam Southeast) has been published, this is the same area chosen to be the Transform SUL in Amsterdam. This office area should be transformed into a mixed-use working-living area. This area had high vacancy in 2011-2013, the Project office Southeast estimated about 30% (200.000 m2) vacant office area, of which half is vacant for over three years. This 10-year vision is mainly based on increasing value for the area, by switching from mono-function to multi-function, in which the municipality offers ‘space for initiatives’ by the market. The municipality is already facilitating and stimulating developments, for example by adjusting regulations. In this area, sustainability and the reduction of energy from fossil fuels have been on the agenda since 2009.

The Amsterdam Arena, a soccer stadium located in Southeast as an independent organization, with the municipality as one of the shareholders, developed a 5-year development plan 2010-2015 ‘Amsterdam ArenA - Naturally sustainable’, as a policy to compensate the nuisance that comes with the function of a large soccer stadium (ArenA, 2016). This background explains why in Transform “Stakeholders [Like the Arena and the municipality] could easily find each other under the label ‘sustainability” according to de Leeuw, (ArenA). Also the AMC hospital has set up an energy-efficiency plan for 2013-2016, signed for end of 2012. The main contact person for this document is interviewed for this thesis: M.Maris.

2.2.2 Objectives

In the Description of Work (DoW), which can be seen as the contract between the Transform partners and the EU regarding the description of work and the funding, the objectives for Work package 4 (the implementation plans for the Smart Urban Labs) are formulated:

> Implementation plans (IP) [will] contain the outline of the process as well as feasible projects and a description of planned investments. Investments and measures related to the energy systems in the area, including building stock, technical infrastructure and mobility systems are at the core of the IP. They include a wide range of measures and projects, from retrofitting of building stock, heating and cooling systems, the use of intelligence on both electric and thermal networks, the development potentials of existing water systems etc. to innovative (electrical) transportation modes and the development of urban green (TRANSFORM, 2013b, p. 6) .

In fine detail, the DoW literally includes the following for Work Package 4 in Amsterdam South East:

This overview show that the Transform project is seen as a ‘catalyst’, since it will ‘impact’ ongoing planning, design, and implementation processes in the existing SULs, by activating local stakeholders (not partners), to lever extra resources by innovative working methods (ILS). A clear objective was that the IPs will “ensure implementation of the measures after the project ends”. Whatever measures that may be. Another objective was to define paths to meeting the energy and CO2 targets and a roadmap of how to scale up afterwards. The IP should at district level address practical and local aspects, and “be tangible, including who is involved in which projects and what the business and finance models of the projects will look like”. These plans should also be linked to the city wide strategies.

This Work Package (4) coordinates the making of Implementation plans for 'Smart Urban Labs'. These Smart Urban Labs take place in selected districts in each city, currently in the process of redevelopment, transformation or development. In this respect, ***the Smart Urban Labs take place in an existing context, with ongoing planning, design and implementation processes with the possibility to impact these processes through TRANSFORM.***

The Smart Urban Labs activate local stakeholders, not beneficiary to the European TRANSFORM project and through this activation TRANSFORM is capable to lever extra resources.

Through coordination, this WP ensures coherent working approaches in each Smart Urban Lab, and an exchange of expertise between them. By designing and organizing city specific Intensive Labs [ILS] as an innovative working method and by defining joint actions, this WP facilitates the making of Implementation Plans. ***These Implementation Plans and cities´ and stakeholders' commitments will ensure implementation of the measures after the project ends.***

Combined with the city specific Intensive Labs, this WP ensures the exchange of intellect and experience between the Smart Urban Labs through a series of workshops, providing expert exchange on selected cross-cutting themes, such as city-investor-utility contributions to implementation, implementation strategies involving citizens, transformation strategies and instruments related to existing building stock.

Through this exchange, ***the quality and innovative character of each implementation plan will be increased. Testing results and experiences in real (ongoing) projects from all Smart Urban Labs and a comparative analysis of approaches and their impacts will provide valuable learning conclusions for various types of urban areas,*** *supporting replication in other European cities.*

Fig. Objectives in the Description of Work, for Workpackage 4 Transform(TRANSFORM, 2013a, p. 15)

According to the Transform team:

> Main expected impacts of the Implementation Plan are carbon emission and energy consumption reduction, production of renewable energy and increased efficiency, but major impacts are also to be expected – but more difficult to be evaluated – in terms of jobs created, investments induced, energy imports saved, etc.). Highly relevant are also realistic data on the cost-effectiveness of measures, e.g. investment needed in relation to energy costs saved. Measures in the Implementation Plan are scalable.(TRANSFORM, 2013b, pp. 6-7)

This clearly shows how high the expectations are (portrayed) for this project in the eyes of the Climate Office.

2.2.3 Approach

Transform project follows an approach which is closely related to the previous described objectives. The European Commission described the Transform approach as follows:

> Transform's integrative approach brings operational plans to the strategic level, including strong stakeholder processes, data analytics and takes into account all relevant energy flows, environmental aspects, urban mobility, and the interrelation of possible measures and their costs. This integration of elements creates win-win business models for stakeholders with initially different interests.
>
> . . . Transform supports cities with implementation plans embedded in integrated planning, improves insight in stakeholder processes, financial strategies, the use of data, and the possibility to find better economics by using analytics.
>
> The power of Transform is the combination of practice and scientific insights. The delivered Key Performance Indicators and models for integrated planning and data analysis set standards for the European Smart City project. All European cities will benefit from this approach in their change from business-as-usual to low carbon strategies.
>
> City-to-city replication and implementation of the results are a crucial element of Transform. The project mobilizes stakeholders and politicians of European cities through the extensive networks of all Transform partners, for example by providing master classes and through a strong political Memorandum of Understanding. (EU Commission, 2012)

Like the expected results, this text reads as a marketing brochure. It shows the Transform project is a highly complex project with incredible high ambitions. On a more realistic note. To anchor innovation, the approach was to use “data” and “engagement of stakeholders for deep diving in business cases and validation of assumptions”, and by using a “governance model in which local stakeholders would ‘take over’” (bron).

On the local scale the SUL in Amsterdam was a transformation of an existing area (brown field development), in which many stakeholders are settled. Therefore a ‘process approach’ has been chosen. For Amsterdam the approach fitted to the leadership form of ‘facilitating stakeholders’: “The development strategy is based on facilitating and positive stimulation – institutionalizing a learning process: creating a knowledge base, informing, bringing possible partners together, connecting, organizing, helping to formulate projects and testing them, possibly supported by funding” (TRANSFORM, 2014, p. 75).

In South East, the following themes are agreed upon for the projects in the IP: energy, mobility, and waste. More specific the project objectives are:

- Energy: decrease energy use, a smarter use of energy sources and renewables
- Mobility: public transport, car sharing, electrical transport, SMART use of ICT and smart use of space (also in relation to car parking)
- Waste: decrease waste production, use of sustainable and reusable materials and local processing of waste (TRANSFORM, 2014a, p.39).

2.3 Select the fields of action

2.3.1 Amsterdam ‘Energetic’ Southeast

In the starting phase (in answer to the European Smart City FP7 call for Transform), Amsterdam selected an area as a Smart Urban Lab (SUL) for Transform: Amsterdam Southeast. However, for the SUL the focus lies on the business area, between the AMC hospital and the Arena, instead of the residential area. The focus within Amsterdam South-East thus was on involving larger local companies, because they were identified as the energy-consuming stakeholders who could have an impact on the long-term objectives. In the plan area a total amount of 475,229 MWh and about 38.211 thousand m3 of gas was used in 2012. The energy usage in this area is about 10% of the usage of electricity in Amsterdam and 4,8% of the usage of gas. Based on the decision-making tool developed in this program, the Energy Atlas, Transform tried to develop new projects and energy solutions, mainly focusing on companies in the area with a large energy consumption. (TRANSFORM, 2014a, p. 16).

Figure 6-1 Smart Urban Lab (SUL) South East (Schremmer, 2016, p. 6)

2.4 Set up a team responsible for the implementation of the strategy and establish roles and responsibilities

2.4.1 Team responsible for the implementation strategy

As the climate office wrote in their publication 'road towards making the IP': "The stakeholders will be together responsible for the final outcome" (TRANSFORM, 2014a, p.26). Therefore a core team was formed from the most active stakeholders. This team consisted mainly of policy makers, no members from city management were directly involved. According to one interviewee this was not an ideal situation: "The assurance at the board level was insufficient, it was mainly an execution of the civil policy makers, not at the highest level" (den Boogert, 2016, p.c.). The local Transform team, in the role of the Climate Office from the Municipal Urban Planning office, will set up the IP for its SUL of South East. This strategy for the SUL is linked to the city wide strategies.

The climate office makes use of the existing relations with stakeholders in the ASC-platform to set up an implementation team: "Some members of the Amsterdam Transform team were part of ASC, a strategic partnership" (TRANSFORM, 2014a, p.33). For example Amsterdam Arena, Liander, and Accenture.

The most important stakeholders of the Transform-programme in Amsterdam are:

- The Municipality; in particular the Amsterdam Energy and Climate Office, defining the process interventions that build up the network and the knowledge base. Organising workshops, working groups, and setting up the energy atlas
- The Amsterdam Arena; owner of the Ajax soccer stadium. This organization has previously (2009) signed an agreement with the municipality to improve the sustainability for the area;
- The AMC hospital, owner of the hospital building;
- Local grid companies Liander and Nuon; who are producer and distributor of energy, and delivering data concerning energy usage. Nuon has moved their headquarters to Southeast in 2014; (Vlaar, 2016);

Other organisations who got, in some way, involved in the process:

- Other local (private) companies, including banks like ING, ABN Amro, and schools like the Hogeschool van Amsterdam and the ROC, or the data centre Equinix and IKEA;
- Housing associations like Stadgenoot, Eigen Haard and Ymere.

Desk research and interviews did not reveal any link between the important property developers or Housing Associations and any specific Transform project.

2.4.2 Establish roles and responsibilities

The collaboration between the stakeholders is built upon the absence of a hierarchy, as it is part of the governance definition I use. According to the IP, the City of Amsterdam was leading the Transform project on an informal basis: "The Office of Climate and Energy, was most likely seen by other parties to have the role of leadership of the process and the setting up of the programme, but this role was never institutionalized" (TRANSFORM, 2014a, p. 26). The Climate Office had a limited set of influencing instruments to stimulate collaboration: "The instruments were all about facilitating in a positive way without legal enforcement. The energy has been mostly directed on informing and connecting to foster cooperation and start up new markets (precompetitive procurement)" (TRANSFORM, 2014a, p.28).

The Climate Office, works on two levels: the international consortium sharing information between the different cities and the local organisation trying to realise concrete improvements. On the local level, the climate office has three main roles regarding energy projects: 'preparing', 'innovating' and 'implementing' (Gemeente Amsterdam, 2013a). In Southeast the main stakeholders will prepare their own business cases. Besides that, the major energy consumers will be visited by the alderman and/or program director of the Climate Office. The climate office is mainly focusing on the preparation of projects and is it facilitating projects in the innovation category through knowledge and lobbying (Gemeente Amsterdam, 2013a).

The ArenA Amsterdam, as a private stakeholder, has an intrinsic motivation on sustainability, 'becoming climate neutral' in 2015, after signing the Green Deal. They are mentioned by others (AMC, the climate office) as the champion in the urban area by showing other actors that 'it can be done' and 'how it is done' in the case of the solar roof panels.

'Stakeholder Mapping' or 'Power Modelling' can be used as a quick scan of the legal situation and of the major stakeholders) is advised as a first step in starting a SUL: "This will deliver the insight of a necessary mandate and on the willingness to collaborate on the set vision. Such a process involves to overcome conflicting interests and finding a joint way for developing quarter" (TRANSFORM, 2014b, p.35).

When transforming an existing area, the legal framework to change the context is often very limited. Therefore "In order to transform, the commitment of all the asset owners is needed" (TRANSFORM, 2014b, p.14). Thus the focus should lie on a circular process in which stakeholder management creates a joint vision and approach, in which business cases are tested and developed in relation to this development approach, and adjusted where necessary.

Stakeholder Mapping should involve four steps: general screening of actors pinpointing roles and decision making/implementation capacities; identification of present 'driving stakeholders'; identification of the gaps of involvement and definition of 'required' stakeholders in specific roles, identification of the main stakeholders containing the strongest potential to set up, negotiate, modify and implement transformation measures:

> Each city consist of multiple layers of living and technical systems, exposing great levels of complexity within them but also interconnected with each other. The process of transforming towards sustainable cities should engage all of these layers in order to be effective. When considering urban transition towards Smart Energy City, vital roles are played by a great number of stakeholders, whether driving this process or involved in it to a variety of degrees and in different positions. (TRANSFORM, 2014c).

This happened in **all cities, except Amsterdam**, because "the city of Amsterdam attained the stakeholder related information in other local activities and therefore decided to skip this task".

Some interviewees give hints that the roles and responsibilities within the stakeholder collaboration could have been better defined: “The position of AMC remained unclear for a very long time. Indistinctness about their interests and possibilities” (De Leeuw, 2016, p.c.) and “Every manager has an instruction and if this instruction does not incorporate this external cooperation, he or she will be willing to act within limits, but will never be made accountable” (Maris, 2016, p.c.).

2.5 Establish how to produce and select ideas: project machine

In Amsterdam, as in all Transform-cities: “Some of the local projects have been started earlier and most of the cities have previously made an energy strategy. TRANSFORM will benefit from this and will accelerate and optimize existing processes.”(Gemeente Amsterdam, 2013b, p. 3). In Amsterdam this refers to the 8 projects selected after de Design Thinkers session, and the 2025 CO2 city targets. Since the SUL Energiek Zuid Oost is a brownfield area within the city, and since there are no large urban developments planned, the strategy is to define separate projects and test what results they deliver: “This Implementation Plan is about the setting up of this ‘project machine’ for the area in a more structured way. Therefore, the projects defined in this IP are to be understood as a snapshot in time.” (TRANSFORM, 2014a, p.7). The main activities design thinkers session (as mentioned in the starting phase), the energy atlas and intensive lab sessions, are focused on stimulating the stakeholders to work together in defining achievable projects: “By evaluating projects, the decision is, and will be, to continue projects, upscale them, or to stop them” (TRANSFORM, 2014a, p.7). How project ideas have been selected, stays unclear.

2.6 Define a monitoring and evaluation methodology: Advisory Board

2.6.1 Monitoring

On an international project scale, Quality Assurance is designed by installing an Advisory Board (AB) on the development of the content of the project. The Advisory Board, a team of renowned international experts in the field of smart, sustainable urban planning, technology, stakeholder participation, finance and energy are closely linked to research institutes. They validate results of the project. Their feedback will be incorporated into the work packages, ensuring the quality of these deliverables.(Van Warmerdam et al., 2015, p. 23). As stated in the Description of Work: “The AB will be set up before the start of the project. The AB will validate the main outcomes and meet twice during the project.” (TRANSFORM, 2013a, p. 22).

An ‘energy balance’ was created for the area (rough calculations on demand and potential sources for renewable energy) and also a monitor system to benchmark projects against city wide targets on CO2 reductions. Using data this way, it structures the approach from the area (what are key elements for change) and validates bottom-up projects on their relevance for the approach (TRANSFORM, 2014a, p.25).

	Smart Urban Lab		South East		Amsterdam	
	Total (x 1.000)	Average per user	Total (x 1.000)	Average per user	Total (x 1.000)	average per user
Gas (m3)						
- Households	5.483	812	24.029	931	298.040	1.082
- Business	32.729	20.649	44.713	7.232	495.969	4.794
- Total	38.211		68.742		794.009	
Electricity (kWh)						
- Households	19.758	2.708	79.785	2.705	747.771	2.454
- Business	455.470	217.097	531.033	65.478	4.025.936	29.106
- Total	475.229		610.818		4.773.707	

Figure 6-2 Electricity use in the area of the Smart Urban Lab, the district of South East and the city of Amsterdam (Gemeente Amsterdam, 2013b, p. 7)

2.6.2 Evaluation

For the evaluation of the implementation plan, an ex-ante overview is made. More on this in step 6.4 monitoring and evaluation. Finally the TU Delft will provide a cross analysis of the Transformation

Agendas [TU Delft, 2015], however this was not originally the plan. The Project Coordinator will evaluate the project in a recommendation report.

Analysis Governance planning phase

From the official Transform documents I find that **the Climate Office sees the collaboration** is as very positive. Building on existing relations and networks, attracting new parties which resulted new continuing relations. Even **Stakeholder management** was **seen a success factor** in the project. Using ASC as recruitment platform for the needed stakeholders accelerated the process in the planning phase.

Looking beyond the official documents, in the interviews I found that many 'partners' in the project were either not involved, or left the collaboration process in an early phase. For example the housing associations did not get involved and citizens were mainly excluded in the project. On a local scale, in Amsterdam Southeast, the Transform collaboration did not start off as an actual '**partnership'**. A barrier is that this collaboration was **not formalized into an ex ante partnership** before or at the start of Transform, with commitment on specific projects. On the other hand Transform is a **research project** in which to discover innovative Smart City possibilities. This means that the projects have **a high risk of failure**, which is taken for granted by the EU. Based on this high risk level of the projects to succeed, rather than having a 'licence to fail', the DoW stated that the Implementations plans, would have 'tangible commitment' on the actual projects. So these could be implementation after the Transform period. I think commitment cannot be assured, especially since not even knowing who your actual partners will be, let alone knowing what projects you will be planning for. T**his accountability could not be guaranteed prior to the start of the Transform project**.

The approach of **activating a network of stakeholders** in an urban area without developing a formal **structure for the collaboration** resulted in an **unclear situation**. I found that the number of 'partners', or rather stakeholders, is varying in different documents and Transform related webpages. Sometimes 'partners' are mentioned even though they did not participate in a specific sub-project, while other 'partners' were only involved in the early beginning of Transform. This also relates to the fact that projects are 'coming and going' and that the implementation plans and websites are 'snapshots' in time. Showing a **lack in communication**, since these docs/websites are not being updated, but just used to 'paint a pretty picture' of what 'could be' happening.

The collaboration between the stakeholders is built upon the **absence of a hierarchy**. The Climate Office had a **limited set of influencing instruments to stimulate collaboration**, without legal enforcement. The energy has been mostly directed on informing and connecting to foster cooperation. The core team consisted mainly of policy makers no members from city management were directly involved. This was not an ideal situation. To plan the Smart City projects, the right **selection of stakeholders**, with clear roles and positions is of utmost importance to avoid creating false expectations. However, specific roles for the different stakeholders remained somewhat unclear. I **think these unclear relations relate to the fact that stakeholder mapping did not occur in Amsterdam**. The selection of stakeholders (or their employees) meant that sometimes **unwilling organisations got involved** (Ikea, Housing Associations), or that '**unqualified' people got involved**, lacking the necessary skills, knowledge or power, or even the time needed for effective collaboration and implementation. **Also the activities were not for all stakeholders of strategic importance**, shared values are mainly economical or image based, rather than energy efficiency.

The municipality of Amsterdam defined the quantitative targets for Energiek Zuid Oost for the mid-term, thus leaving unclear what the contribution of the short term Transform project would be in a period of only 2.5 years. This shows that the lack of vision and **leadership, relating to their lack of power. Their facilitating leadership style,** facilitating and institutionalizing a learning process,

connecting, organizing, helping to formulate projects and testing them, possibly supported by funding, let the stakeholders to focus on their own targets (image, economical gains) more than on shared value.

While citizen participation is encouraged in the initiation phase by the European Commission, in SouthEast in the planning phase, citizen involvement was not high on the agenda. It is only elaborated on, by a few projects which aimed to increasing awareness of the citizens, but certainly not directly involving them in project decision-making or in project consultancy. The Climate Office states Amsterdam was "the only [Transform] city who used a bottom-up approach". Clearly this strategy for the municipality was to initiate Transform (top-down) as 'Smart City solution' for the area, involving local stakeholders (Bottom-up), making it a 'middle-out approach' rather than a bottom-up approach. The bottom-up part of this approach refers to including SMEs or local companies, rather than citizens. Since this is where the climate office thought the most CO2 reduction was possible, and which would be most easily to mobilise, because of the existing relations.

The mechanism of creating, selecting and developing projects, the so-called '**project machine'** is presented as a 'best practice'. However, how this project machine is working and how/why the projects are selected is not described in detail. In other words**,** it is **not transparent** and/**or clearly communicated** how projects are selected, tested, and on what criteria these would be up-scaled or stopped. In this way it is not a well-documented 'best practice' that can be easily adopted by other cities. I have found a description of the process of the Amsterdam Innovation Motor, but how and if this is used the case of Transform remains a guess.

Within a city-wide framework of objectives and energy strategies, it is important to set specific targets and strategies for specific areas. However, what these specific targets and strategies are for Amsterdam Southeast has remained unclear, lacking in their local leadership role. Instead of a set of clear objectives, which could be used to defining a methodology to monitor and control the progress within the project, an **intentional collaboration** was set up. Thus **nobody could be made accountable** when the process or projects needs to be monitored. This demonstrates the risk of these 'open networks' or **ad hoc partnerships**: names and profiles can be used for marketing the idea. Although an 'energy balance' was created for the area (rough calculations on demand and potential sources for renewable energy) and also a monitor system to benchmark projects against city wide targets. This not sufficient to evaluate individual projects. At this stage of the process, the Climate Office doesn't feel fully responsible for the project, mentioning: "The stakeholders will be together responsible for the final outcome". I conclude that the governance factors **'accountability', 'transparency', and 'leadership', 'partnership' and 'collaboration'** are not given the attention needed at this stage.

6.3 Development of projects

In this phase I will elaborate on what project developments have taken place.

Transform was a FP7 project, thus a research oriented project focused on creating knowledge about realistic plans, strategies and approaches that could be brought to future implementation. In such a long-lasting and complex process as realizing CO2 reduction by energy savings each city has a different starting positions and different possibilities to realize concrete steps in the Transform project period. During Transform, Amsterdam South East (Energiek Zuidoost) was in the (energy) planning phase and partly in the (re)construction phase: "The development of South East is a bundle

of several projects running at different timelines"(TRANSFORM, 2013b, p. 14)

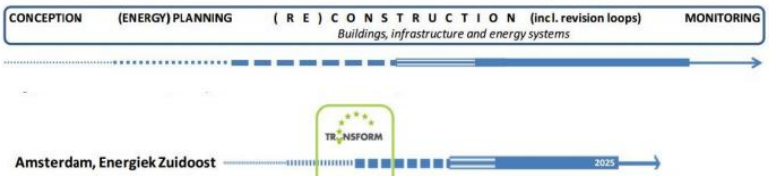


Figure 6-3 Transform running time 01/2013-06/2015 (TRANSFORM, 2014b, p.11).

3.1 Activate the implementation team and start the activities for implementing projects

3.1.1 Activate the implementation team: local stakeholders

The different stakeholders were all connected to the municipality but they were not working together on different projects in the urban area before the start of Transform. (TRANSFORM, 2014a, p. 7). The stakeholder management in Amsterdam was admired by the other Transform-cities "because there was collaboration between stakeholders from the beginning" (den Boogert, 2016, p.c.). The Climate Office is capable of building bridges between the different stakeholders: "it is a not for profit party, not coming to sell anything, so they have easy access to all stakeholders" (de Leeuw, 2016, p.c.). The municipality build these bridges by "setting up a project organization within the city, organizing events [like the design thinking sessions and the intensive lab sessions] in the process that built the network and the knowledge base, and the general project management" (TRANSFORM, 2014a, p.30). This shows the facilitating role of the climate office in stimulating collaboration.

One interviewee argues that "even if the intended collaboration is formalized in some way, it can remain very hard to come to real action. I have a letter of intent signed off by the management of ArenA and AMC but still we switch to daily operations. It is very hard to actually realize an intention" (Maris, 2016, p.c.). From the AMC year report 2013, it shows that The AMC has started in 2013 with feasibility studies for the possibilities of 'clearing waste water' and 'the large scale generation of solar energy'. In which the institution is working closely together with Arena, the municipality and Waternet. In this report at the 'governance' section is stated that the decision making for the realisation of these projects will follow in 2014. While in other year reports, (2014 and 2015) no remarks have been made regarding these project.

That the Transform project was not of strategic importance to all involved stakeholders, became clear: "Slowly but surely, also the housing corporations disappeared from the table, maybe because the right representatives were not involved. They were too operational in focus and did not see collaboration as a target" (Maris, 2016, p.c.). However, den Boogert (climate office) argues that "the housing associations didn't have their part to play in the area which is mainly consisting of offices, businesses and amenities" (den Boogert, 2016, p.c.). Another reason is found in the IP: "A hick/up in the transformation of social building complexes is that social housing corporations are restricted to raise the rent. The allowed amount to raise the rent is not enough to pay for the investments, even though the financial benefits for the users are big enough to compensate for a higher rent" (TRANSFORM, 2014a, p. 30).

3.1.2 Start the activities for implementing projects: Design Thinking & Energy Atlas

In this phase a number of activities helped creating ideas about possible improvements in the area that would fit the overall objectives and at the same time stimulate local stakeholders to get involved. Two paths have been taken to generate ideas before the Intensive lab Session (ILS): Service design thinking (as described in the starting phase) and data analysis based on the Energy Atlas.

Already in the fall of 2012, the Design Thinking sessions were set up. During Transform 4 half day brainstorm sessions (on a 10.000 euro budget) with about 20 stakeholders in SouthEast have been organised to explore project ideas by using design thinking (and project canvasses). These sessions involve matching user-friendly services to customer needs and **creating shared value between the stakeholders**. "The sessions, with stakeholders having positions in the area as renters, owners, or as shop owners, service provider, housing corporation and other, resulted in 7/8 projects and resulted in connections forged between stakeholders in the area"(TRANSFORM, 2014a, p. 25). Examples of projects was to create an energy cooperation, the application of solar energy, the exchange of waste heat of the datacentre with surrounding buildings and the switch to energy efficient LED lighting. In 2013 the technical, financial and juridical feasibility is examined, and if possible projects will be implemented. Also new projects are formulated focused on mobility, waste and energy (the topics chosen in the IP). The positive effects of these Design Thinking sessions are mentioned by many interviewees. Stakeholders have experienced this as the first opportunity to exchange ideas and get an overview of the situation in South East. The first 'results' of the energy atlas have been used in this exploration.(d4.3 p.102).

Energy Atlas: The second path involved the gathering of data and the analysis, bundling and presenting the data in the online Energy Atlas, a decision model is made in the Transform Work Package 3, under the lead of Accenture, including stakeholders like NUON, TNO, Liander, and ASC (on a 180.000 euro budget)(TRANSFORM, 2014b, p. 104). During Transform, the city of Amsterdam has mapped 173.000 buildings to the energy atlas. This could have only been possible with the help of energy provider Alliander. The figure below shows an overview of the data gathered on different energy themes.

	Number of data points	Building property data	Energy consumption				Energy generation potential				
			Electr.	Gas	Heat	Cold	Solar	Wind	Aquifer	Geo-thermal	Waste heat
Amsterdam	173,000 buildings	✓	✓	✓	✗	✗	✓	✓	✓	✓	✓

Figure 6-4 173.000 buildings mapped for in the Amsterdam Energy Atlas, on consumption and potential(Van Warmerdam et al., 2015)

The Energy Atlas got online on the 17th of April 2014, making the data available in a late stage of the project, for other stakeholders to develop ideas. Nevertheless, as a basis for understanding the problem and the possible solutions, data on energy production and consumption, presented in the Energy atlas, played a decisive role, according the transform documents: "Intensive stakeholder collaboration using data as an instrument to understand the problems and to set priorities" (TRANSFORM, 2014a, p.60). Sharing the data made it possible to get new parties involved: "Data provided new insights and defined the specific challenges for Amsterdam South East. Also data enables all kinds of parties like consultancy, foreign experts, business partners and students to get active in the area" (TRANSFORM, 2014a, p.60). For example, consultancy companies are contacted to analyse the potential of the waste heat of data centres.

The energy atlas shows the main gas consumers are the businesses (dark brown), while the housing areas are having low gas consumption (yellow). This justified the meaning to focus on the local companies rather than citizens.

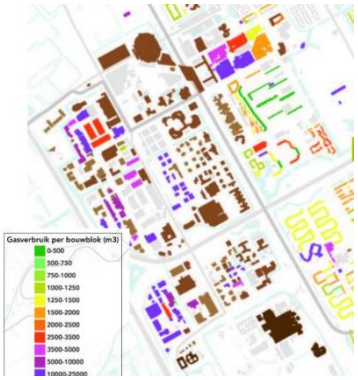


Figure 6-6 Energy atlas: local waste heat (potential in blue circkels) Amsterdam South East and existing heat grid (in red) (right image). (Schremmer, 2016)

Furthermore the Energy atlas showed that there are many opportunities (circles in colour) for the use of local waste heat, from offices (purple), data centres (blue) and the Medical Hospital AMC (green). Currently the municipality and Amsterdam Smart City are discussing the opportunities with AMC, Amsterdam Arena, Nuon and Liander. In this Nuon and Liander are the main stakeholders in charge of the energy supply and existing heating grid.

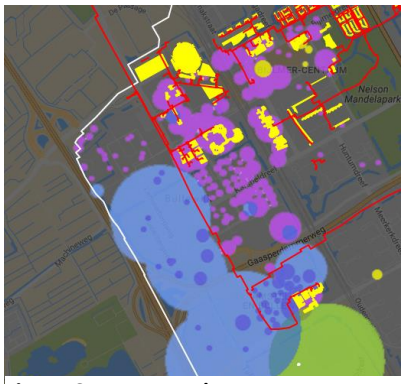


Figure 6-5 Energy atlas: gas consumption Amsterdam South East (left image). (Schremmer, 2016)

The recommendation report states that Alliander has been the key partner for data-exchange:

> *A good example of collaboration regarding the data could be [is] the relationship between city of Amsterdam and the energy provider Alliander. Alliander takes a non-conformist position related to data. Instead of keeping all data for themselves and considering competition as problem, they share data with cities and the public to stimulate new ideas and urban innovation. Alliander states that they do not have the time resources to design complex comprehensive future energy solutions. By sharing the data Alliander wants to challenge the public, SME's, start-ups etc. to come up with ideas and possible solutions to the problems readable from the data. Promising ideas are even supported and financed by Alliander. In this way they use the market and competition in the market to unleash good ideas and maybe to lower their own future investments on the grid. In short: A smart city strategic way of working.*

Figure 6-7 Alliander 'best example' in data-exchange (Van Warmerdam, Dvořáková, & Lichtman, 2015, p. 15)

The privacy issues, regarding data-exchange have been solved through an agreement between Alliander and Amsterdam. The data used for the Energy Atlas of the city of Amsterdam is aggregated to a certain level in such a way that at least 5 or more connections are combined (thus not on the level of an individual household). "The level of aggregation is useful to design new energy systems with the DSE [Decision Support Environment] tool and solves privacy issues. Other cities may therefore use this Amsterdam - Alliander collaboration as a good example."(Van Warmerdam et al., 2015, p. 13).

3.2 Generate, select and organize project ideas to achieve your objectives

3.2.1 Generate: Intensive Lab Sessions

To generate and select viable ideas from the brainstormed results in the 'Design Thinking sessions', the Transform consortium organised Intensive Lab Sessions (ILS), part of the Description of Work. The Intensive Lab Session are held during three days in Amsterdam South-East on June 18, 19 and 20, 2013. As in all Transform-cities, "city officials were present and at least one politician joined. They gave a problem statement in the beginning and received the final results."(TRANSFORM, 2014b, p. 65). The question stated was: "how to make Amsterdam South-East meet the European 202020 targets?". The positive effect of the ILS sessions, to generate ideas, is confirmed by all interviewees.

The ILS has 'in potential' the following merits:

Working together instead of back to back; Content driven; Open dialogue; Result oriented; Creates partnership; Clear base for further process; Specific, actual and main problems; International setting brings surprising discussions, insights and results; Include social programme & visit the area; Agenda setting: integral energy planning & urban development; creating urgency; Visibility; Invites others" (TRANSFORM, 2014b, p. 66).

Figure 6-8 Participants Intensive Lab Sessions Amsterdam (Gemeente Amsterdam, 2013b)

The sessions were scheduled around three themes: sustainable heating and cooling, the role of the private sector in retrofitting and public action. These themes developed over time, as well as the different projects: "During the second half of 2013 and 2014 the programme grew with new programmatic lines and new concept projects coming up and also ending" (TRANSFORM, 2014a, p.26). In the choice for the themes deviates from the original IP (energy, mobility and waste).

The objective was "to bring in extra knowledge, accelerate, and ask prying questions" (TRANSFORM, 2014a, p.26). Another objective was to come from 'individual values' to 'shared values', both with the goal to define an implementation plan.

Transform analysed the three themes using the PESTLE-method (Political, economic, social, technological, environmental) to refer to the context aspects of the projects and make sure no aspects are forgotten that could be relevant to make the step from policy making to implementation. All these factors are seen as context aspects. This methodology is used, and two topics relevant for (energy) planning are added: Governance and Space. In which governance relate to aspects like "stakeholders, citizen involvement, roles of governmental and private organisations, way of cooperation, use and sharing of data, planning" (Gemeente Amsterdam, 2013b, p. 5). Below, per theme, the conclusions concerning the governance findings are given.

Theme 1: sustainable heating and cooling. "Is not a matter of availability, it's a matter of organization'." (Gemeente Amsterdam, 2013b, p. 13) For this theme rough calculations show that the area produces enough waste heat to cover its demand. Can the area sustain itself?

> *Governance findings:* "To tackle this complex transformation process, leadership is needed. Since there is not a particular party responsible for the whole energy chain yet, this should be organized. A governance model which includes the whole chain is needed to draw the path towards implementation. The solution could be the creation of a consortium that incorporates the different interests and external finance possibilities. For example: datacentres, an esco, building owners, municipality, grid operator. (Gemeente Amsterdam, 2013b, p. 12)

Theme 2: Energy Service Companies (ESCOs). Transform defined an ESCO as "a commercial service aimed at reducing the energy use". The concept is researched, as well as the part of the district that would be suitable for ESCO services.

Governance findings: Although the ESCO sector is mostly private sector driven, there is a need indicated for governmental support:
• To bring experience and knowledge together [communication]
• To support the start-up of a local ESCO market (system transition) [leadership]
• To help to benefit from opportunities on the area level and building level. This involves stakeholder management [collaboration] and legal & regulatory issues [accountability]
• To overcome the chance of risk/trust. [transparency] (Gemeente Amsterdam, 2013b, pp. 14-15).

I analysed the four topics, regarding the [governance factors] used in this thesis, emphasizing the role of communication, leadership, collaboration, accountability and transparency.

Theme 3: Public Action, to create a strategy for one or more public events in the area, that can be carried out the coming year – with a focus on involve people in the European 202020 goals and a focus on realizing movement in the area. Four projects are selected: Smart Living Gaasperdam, Lighthouse Ikea, reaching out through an employee program and Solar Gambling

Governance findings: Governance is important in the projects. Especially in the community lighthouse project cooperation between different parties is essential. Schools, community centres, welfare organisations and housing corporations should be involved in organising activities. The target groups are children, parents and inhabitants. The project will win strength if it succeeds to reach out to other organisations like energy companies, sports associations or a nutrition centre. The case of IKEA the governance is simple. IKEA and the grid company Liander will take the lead. A strategy for the solar gambling to start small on the local market and if possible grow to a larger scale and include major organisations like AJAX, Ziggodome and the hospital (Gemeente Amsterdam, 2013b)

3.2.2 Select

Eight projects have been selected:

- Datacenter & Greenhous (using waste heat of datacenters to heat a new green house),
- **Hospital Waste Heat** (Use the AMC hospital powerplant to bring energy capacity to the market);
- Playground ESCO (Inviting industry to start a project regarding the main hurdle to implement ESCO's: trust);
- **Lighthouse IKEA** (Showcase store of a sustainable house equiped with solar panels, visualising energy reduction, creating public awareness);
- AJAX Public Action (Encouraging AJAX supporters to use sustainable energy: for example by crowdfunding for solar panels);
- **Solar Gambling** (raising public awareness by playfully 'gambling' on sustainable energy),
- Community Lighthouse (Run energy programs in schools, libraries, and community centers to raise awareness);
- Smart Living Gaasperdam (combine new, innovative products and servcies on energy reduction and smart living for residents in Smart Gaasperdam).

The only project focusing on 'hard' infrastructure adjustments is Datacentre & Greenhouse. These projects mainly focus on 'soft' aspects of energy reduction, like raising awareness, or creating trust.

Next to these eight ideas, other 'projects' are selected. The 'kitchen grinder' and 'LED public space' are mentioned in the IP to target CO2 reduction. The kitchen grinder is referred to in an interview as an idea to grind food waste, in order to compress individual garbage production in social housing, it

was not related to being 'Smart. None of these two ideas are retraceable on the Internet, they have been stopped in the concept phase.

The following statement shows that the climate office has not been in the lead towards 'smart' projects:

> From the beginning, companies like the ArenA soccer stadium, the AMC hospital and IKEA took initiatives from their own perspectives. They might not see the municipality as initiator, but they follow their own agendas and timelines. These organisations are responsible for a lot of separate projects in the area (TRANSFORM, 2014a, p.27).

However, according to Maris, "The municipality took the initiative and played a linking role" (Maris, 2016, personal communication).

3.2.3 Organize: project roadmap & captains dinner

Transform provides the needed extra financial means to be able to test solutions in practice. Transform brings in external expertise, created a sense of urgency, brought in knowledge and widened up the scope of possibilities: "Being part of a European programme legitimates the actions in the SUL" (TRANSFORM, 2014a, p.62). The Climate and Energy office did not bring in any financial support, other than the input of their human resources. '

Roadmap: Ideally, plans for project should be framed in the strategy of the stakeholders and should be ready to be implemented from 2015 onwards. During the project, a roadmap was used to develop projects in determined steps. Each of the project idea is 'validated' to define its feasibility. If the outcome was positive, the next step was to develop a business case. In October 2013, "Setting up of business cases for 4 projects is underway" (TRANSFORM, 2013b, p. 14). Which projects are 'underway' is unclear. Developing business cases "gives the sense of realism of projects and also contours of the needed investments. Also it creates a feedback loop to parties to set priorities, based on impact and finance." (TRANSFORM 2014a, p.60)

Figure 6-9 Roadmap projects from 'concept' to 'scale up'.

During the initiative the leadership developed and also other stakeholders took up the responsibility to give guidance to the collaboration: "The status at the end of 2014 was that the Amsterdam ArenA, NUON (distributor and producer of heat and cold) and AMC hospital have actively been taking the role of leadership together with the city of Amsterdam and the city district of South East" (TRANSFORM, 2014a, p.26).

Captains Dinner: Transform 'Spirit' Commitment

Figure 6-10 Captains Dinner with CEO's of main stakeholders Amsterdam South East

The leadership within Transform did not result in involvement of stakeholders at the executive level until a late stage of the project. In the fall of 2014 at the 'the Captains Dinner', CEO's of the sixteen Transform stakeholders and a representative on political level underlined their commitment to the 'spirit' of the TRANSFORM programme (i.e. long term sustainability goals) for the period after Transform, on a process

level(TRANSFORM, 2014b, p. 81). A mission statement was used to sign for this intention.

No specific commitment was given regarding the transformation of the physical (urban and energy context), or institutional reality (laws and regulation, national programs).

3.3 Ensure (financial) support to the projects

If a suitable business case for a project can be developed, the next step would be committing to the project development and needed investments. As a profitable business case showed to be unrealistic regarding project ideas, ensuring financial support was a problem. In order to overcome the financial gap in sustainable project business cases, the Amsterdam municipality sets up a revolving investment funds of 60 million euro's for energy and a fund of another 60 million euro's for innovation. TRANSFORM can contribute to deliver projects for this fund (TRANSFORM, 2013a, p. 78).

The Climate and Energy office has no resources to invest other than the Amsterdam Investment funds of 60 million for which projects can apply and compete. The climate and energy office and all other partners contribute in kind to support the project management. Each of the projects is funded individually by the partners concerned. However through the Amsterdam Funds the city is able to support projects throughout the city in the first phase of the development with loans, guarantees and shares (TRANSFORM 2014a, p.28). "Good communication" is mentioned as an important success factor for this fund. Therefore the municipality made a website which could be used as a 'ticket window', for innovative projects, making it available for citizens and SMEs. Citizens with good ideas, without project experience, can get support from the Climate and Energy office (Gemeente Amsterdam, 2013a).

3.4 Implement the projects

This sub-phase of Bolici & Mora does not fit well with the objectives of the Transform project, since executing the implementation plans should start after Transform. However, the Climate Office chose to, in contrast to the Transform call, execute projects parallel to the development of the IP. The Climate Office was aiming for a "step-by-step realization through short-termed projects"(TRANSFORM, 2013b, p. 14) . Some project ideas were tested and feasibility research was done to prepare the implementation plan. However, "In practice project ideas were researched but not actually implemented" (den Boogert, 2016, p.c.).

During Transform is communicated about the projects: "several project ideas are in different stages of development: among them a proposal to re-use the warmth generated by datacentres, to switch to LED light technology, and the AMC Medical Centre may place solar panels on its roofs."(Amsterdam Smart City, 2014). Below an overview of the status of some of the eight project ideas, and some additional project ideas, generated prior or during the Transform programme in the SUL of Amsterdam South east.

The Lighthouse IKEA: The project idea was to make a showcase within the IKEA store in South East of a sustainable house equipped with solar panels, insulation and IKEAS's sustainable products, and a normal house without energy saving measures and basic products visualizing the reduction of energy usage and financial benefits to create public awareness. The grid company Liander was involved to promote their SMART meter and SMART behaviour. "The reason the project stopped was that the management team of IKEA is very reticent in cooperating with other organisations. In their view there is a risk of confusion of brands, and the brand of IKEA should not be 'contaminated" (p.34). Mainly due to this project a lesson learnt is that it is "very important to do a check with the higher management on feasibility of the project. In cooperating with different organisations: all parties should invest in the cooperation from the beginning on" (TRANSFORM, 2014a, p.34). For this research, no employees at IKEA were willing to give feedback regarding this project.

Project: Local Waste Heat. The following is stated about this project on the Amsterdam Smart City

As part of the Amsterdam Energy Atlas, initial research has been conducted into the extent to which this waste heat can be used to satisfy local heating demands. The aim of this study is to provide an indication of the parties in the Southeast who would benefit from switching to a system using waste heat.

All aspects of waste heat usage will be investigated. The initial focus is on the AMC, whereby a wide range of issues will be examined. These include the financial feasibility, whether parties are interested in switching to a waste heat system, the required contractual arrangements and whether buildings will need to be adjusted. As such, a complete overview of the situation will be compiled in order to reach the implementation phase.

A quick scan is conducted in the third quarter of 2014 in order to establish which parties could feasibly switch to a waste heat system. These parties will subsequently be invited to be closely involved in the next phase and add additional detail to the feasibility study. During workshops, they will be introduced to potential consumers, carriers and producers. There will be a clear focus on helping to form alliances between all involved parties.

The initial phase will be followed by a period of market consultation and the drafting of contracts. Issues relating to implementation will then be addressed. This project will also provide insight into other business models linked to heating in the city, making it of potential interest to companies looking to use sustainable heating.

Figure 6-11 Use of local waste heat (Source)

The ideas have been to bring the overcapacity of the power plants to the electricity market. If this is done, than a big amount of heat will be produced. Negotiations took place between NUON and AMC, but AMC choose not to sell their high temperature waste heat to NUON. For this project 'waste heat between AMC and Arena', the Climate Office hired a consultancy company (Fosbury Energy) and a knowledge institution (University of Twente) to analyse their business case. This business case did not prove to be feasible. So after this quick scan, no consultation with possible waste heat users took place.

ZO Fexible: AMC-Arena energy supply:

Amsterdam Southeast has a diverse pattern of energy usage in the area. Some functions are mainly used during the day, others are mainly used during night time. Since there are multiple sources of energy (AMC power plant, Datacentre, NUON), this project is researching what the different possibilities are to match supply and demand of energy usage, mainly focusing on electricity, but also integrating waste heat. Specifically this project focuses on the exchange of energy between the Amsterdam Arena and the AMC. In which the new power plant of the AMC hospital can be used to switch on/off when dips/peaks in the electricity network occur. On top of this, the use of sustainable energy sources is integrated in the form of solar panels at the Arena, and possibly at the AMC. The assumption was that the fine tuning of supply and demand, will lead to cost reduction, efficient use of the electricity network and the possibility to use locally produced sustainable energy. Another goal was to make the parties aware of their possibilities in the energy market. The stakeholders Amsterdam Arena, Liander, AMC and Ecofys (consultancy) researched the (financial) feasibility. If this would be feasible, the test phase of the necessary software, administration system and contracts for energy exchange would start.

However, AMC stopped participating in the project, since they found it too risky to use one of their power plants, which should function as a back-up system of the hospital, for private party goals, like

cheaper energy, without actually reducing CO2 emissions. Apart from that, AMC dealt with different timelines as the ArenA and had unclear commitment from the top. The ArenA, as a private organization with clear targets for the year 2015, did not match with the 'public organization' style of decision making. This difference in timelines and lack of clear communication and leadership, have led to the ArenA taking matters into their own hands, withdrawing from this collaboration. *Governance issues: lack of communication, collaboration, leadership and accountability.*

Datacentre: Like, the AMC-energy supply' project, the project 'using waste heat from the Datacentre, has been cancelled. After an expert research, including a second opinion, it turned out that the using of waste heat of the datacentre does not make for a solid business case. It is technical only possible to use this waste heat in close proximity. For current businesses surrounding the datacentre heat pumps would be a better alternative. *Governance issues: no feasible business case*

Solar gambling: Amsterdam Southeast has flat roofs, that could be used for solar panels. Solar Gambling is an application developed by the Hogeschool van Amsterdam (HvA) to inform and convince the public about the advantages of solar energy, showing them explicitly how much solar energy can be generated with the use of a mobile installation. The project planned to involve students from the HvA to start a programme for citizen participation, especially to focus on SMEs, but the right contacts at HvA left, and the right course was not available at the time (den Boogert, 2016, p.c.). Another course group at HvA was interested in collaboration, but not in the 'energy' domain, therefore this project took a different turn, and became more a social research project focusing on the use of waste in households. *Governance issues: communication, collaboration, lack of participation*

Orange gas station: "Providing sustainable fuels by an Orange gas station" (TRANSFORM, 2014b, p.79-80) this project didn't find a suitable location during the Transform period. This was not an innovation project, but an existing example of a 'sustainable' gas station. *Governance issues: unknown.*

Solar Arena: A known example of a successful project, during the Transform project (however not directly produced by Transform, but by Amsterdam ArenA and their green deal partners) is the development in 2014 of a large solar panel roof of more than 4000 panels to reduce the dependency of fossil fuel for electricity. The business case was made possible by participation of the Amsterdam climate and energy fund (AKEF), the Amsterdam investment fund (Letaifa) and the fund for the stimulation of sustainable Energy production (SDE) from the national government. The aligning of the different funding policies of different government bodies made the business case enforceable. The installation of the rooftop solar system will cost approximately 1.6 million euros and will be executed by a number of Green Deal partners of the ArenA: Nuon, BAM and Arcadis. Oskomera is in charge of supplying and mounting the photovoltaic panels. The Green Deal partners support the ArenA in their efforts to achieve net climate neutrality by 2015. (Amsterdam Arena, 2015). *Governance success: Private and Public leadership*

Other projects of which no clear details are available, but which are mentioned in the IP of Southeast are: "Waste to energy: business case', 'SMART living Gaasperdam, business concept in development – exploring the possibilities of energy saving', 'BREEAM for offices Monitor', 'Retrofit market research', 'Energy plan medical business park', 'Mobility Portal Southeast', 'Smart Charging hubs, testbed', and 'Pharma Filter'.

Law and Regulatory arrangements: To make sure the above projects would not be stopped from being implemented due to legal or regulatory rules, a research project is set up between the Amsterdam Smart City, the municipality of Amsterdam and the Hogeschool (centre for energy issues) van Amsterdam (triple helix collaboration). This research project is set so the Smart City

project innovations can be tested, with the limited amount of necessary laws and regulations in Amsterdam South East (Gemeente Amsterdam, 2014). As far as I could find out, the rules and regulations couldn't be adjusted to make stimulate the Smart City projects in being implemented. Legal aspects showed to be a barrier in the waste treatment project of AMC.

Analysis Governance development phase

Activate the implementation team

Pre Transform the actors have already been collaborating in the area. The municipality, as 'neutral' party, showed **facilitating leadership** by intensifying the process of collaboration by bringing stakeholders together on selected themes. Their role was apart from the general project management, also to organize events, and set up a project organization within the city. This is all done through intense communication, informing and connecting with stakeholders to foster cooperation, without legal enforcement. So stakeholders are not made accountable in the process of collaboration, it is on a voluntary basis. On the other hand even if the collaboration is formalized in some way, it can remain very hard to come to real action, as shows from the '**letter of intent'** between Arena and AMC: "it is very hard to actually realize an intention" (Maris, 2016, p.c.).

Start the activities for implementing projects

To start activities for implementing the design thinking sessions (in the starting phase of the project, November 2012) and the energy atlas have boosted the collaboration. The design thinking session is Stakeholders experienced as the first opportunity to exchange ideas and get an overview of the situation in South East. The Energy Atlas, produced by private partners of the international Transform consortium (Accenture and AIT) has proven to help "Intensive stakeholder collaboration using data as an instrument to understand the problems and to set priorities", even enabling external participation. The content for the energy atlas (building information on energy usage etc) , could not have been produced without the private leadership of energy company Alliander in collaboration with the city of Amsterdam on sharing data. They signed an agreement to apply to privacy issue regarding the data. Alliander even tries to stimulate public participation and innovation by opening up the data and even support and finance public ideas. Data exchange in the Energy Atlas is used to select focus areas for 'Smart' projects. The only issue was that the Energy Atlas got online on the 17th of April 2014, making the data available in a late stage of the project, for other stakeholders to develop ideas.

Generate, select and organize project ideas to achieve your objectives

To select viable ideas from the brainstormed results in the Design Thinking sessions (with preliminary input of the energy atlas), the Transform consortium, under the lead of the Climate Office organised Intensive Lab Sessions (ILS) in Amsterdam South East based on three themes. The focus on these three themes proved to be the first deviation from the original objectives of the Implementation Plan, which (originally focusing on energy, mobility, and ICT. This is where a deviation to the DoW (IP) started, by focusing on three themes which were not directly linked to the themes in the SUL,

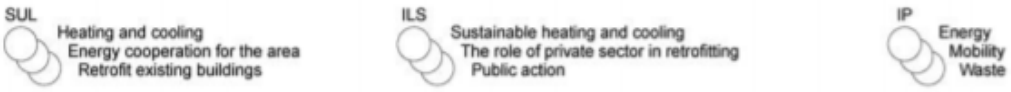


Figure 6-12 deviation between topics in SUL, ILS and IP. (TRANSFORM, 2014b)

This was done in order to come from 'individual values' to 'shared values'. In retrospect, this shows how steer less the Climate Office actually was, and that they didn't clearly communicate original

objectives. They could not lead the stakeholders in the original direction of energy, mobility and ICT: “From the beginning, companies . . . took initiatives from their own perspectives. They might not see the municipality as initiator, but they follow their own agendas and timelines”. In selecting the project ideas, the lack of power shows in the fact that many ideas generated are low investment ideas, to create awareness on the theme of energy reduction, while others mainly were about economical or image gains, while only few projects focused actually on energy saving or sustainable energy production projects like the research for the data centre waste heat or the Arena Solar project.

Organize

Each project followed a roadmap from concept, to validation, to business case, and (if possible) to commitment, strategy and scaling up. The Business cases give a sense of realism and provide feedback loops to the parties to set priorities, based on impact and finance. The development of business cases was thus a good communication tool to further define the organization of a project.

During the initiative, the leadership developed from a facilitating public perspective towards a more active private leadership (AMC, NUON and ArenA) as guidance for the collaboration. In the fall of 2014, CEO’s committed to the ‘spirit’ of the TRANSFORM programme during the Captains Dinner, for the period after Transform, on a process level.

Ensure financial support to the projects

The municipality has a facilitating leadership role in the support of projects via the energy and innovation fund, in order to overcome the financial gap in sustainable project business cases. Good communication towards the stakeholders regarding the possibilities of this fund is essential to stimulate participation. On a project level, each of the projects should be funded individually by the private stakeholders concerned.

The climate and energy office and other partners contribute in kind to support the project management after Transform is finished, thus agreeing on a partnership for ‘ Smart’ and sustainable development in the area.

Implement the projects

There are many governance issues regarding the actual implementation of Smart City projects. The main findings in this case are lack of leadership, collaboration, communication, transparency and accountability.

Most project ideas don’t make a successful business case. The ArenA solar project is an exception, only because of public and private leadership, in which three governmental funds have contributed to this business case. Constructing a sound financial basis for projects is still one of the major bottlenecks.

During the initiative the leadership roles developed and also other stakeholders took up the responsibility to give guidance to the collaboration: “The status at the end of 2014 was that the Amsterdam ArenA, NUON (distributor and producer of heat and cold) and AMC hospital have actively been taking the role of leadership together with the city of Amsterdam and the city district of South East” (TRANSFORM, 2014a, p.26). Only the Amsterdam Arena actually implemented a project. The other ‘active private leaders’ did not commitment on any projects to be implemented, making this statement seem rather superficial. The international coordinator frames the leadership situation very accurately as follows: “If tactical and strategic management in the partner organizations is not continuously linked to the operations, at making progress, doubt, decisions and solutions, you are

getting isolated from the reality, the daily operations. That was the deficiency of Transform, the link with politicians and managers within the municipality was too thin. In such a situation, reports end up in a drawer" (van Warmerdam,2016, p.c.).

6.4 Monitoring and evaluation

I interpret Bolici & Mora's definition of 'monitoring' as focusing on evaluation during the process to adjust and 'evaluation' as concluding and reflecting on the results.

4.1 Monitor progress and evaluate results

There have been different phases of monitoring during the Transform project. Official Transform-documents that have been published and that have been used for this phase are: The D4.1 'Roadmap to make an Implementation Plan' (October 2013), D4.2 'Implementation Plan Energiek Zuidoost-Amsterdam' (December 2014), D4.3 'Synthesis report' (March 2015). Finally the international coordinator published a ''Recommendation report –Transform' (July 2015). After the first year of Transform, in December 2013, another document got published on the progress of the Smart Urban Labs by Mantel & den Boogert (from the Climate Office). Most information is deducted from these reports and documents.

Regarding the delivery of smart solutions and the realisation of smart districts I analysed the findings regarding the current issues (red) and successes (green):

4.1.1 Monitor progress

According to Mantel & den Boogert, six key challenges to Smart City implementation, which are experienced in all Transform cities. The focus lies on the complexity of the energy domain and therefor the struggle to find solutions that could be realised in collaboration (The relating governance factors are in brackets):

- Accessibility of detailed energy and other data to all stakeholders, in order to facilitate dialogue and building business cases (Data-Exchange);
- Expertise to facilitate collaboration to improve existing collaborations and to align the agendas of residents, companies and the public sector (Collaboration);
- Finding solutions for sustainable district heating systems, with a focus on additional renewable sources, the use of waste heat, the need for infrastructural investments and the tension between public and private interests (Collaboration);
- Devise feasible models (of governance) for investment, applicable under existing regulation, which are interesting for banks and other financial institutions or companies (Accountability & Transparency);
- Legal framework for energy co-operatives (Partnership and Leadership);
- Organizing commitment to implement (Leadership and Partnership). (Mantel & den Boogert, 2013)

On top of these challenges, three reasons why the future Transform project outcome might still be different from the objectives are noticed:

1) The abatement curve [cost curve for greenhouse reduction], meaning solutions are often developed without a demand from the public, or with no clear connection to any issues which the public feels are important; [collaboration; no SME or citizen bottom-up approach]
2) The energy chain is undergoing changes: new players, including end users, are entering the market; and new markets are emerging; (Transparency and Collaboration)

3) Often the goal of reducing CO2 or saving energy does not appeal to stakeholders such as local businesses and households. Other values and storylines are needed to motivate people to change (Accountability) (Mantel & den Boogert, 2013, p. 18).

For successful Smart City implementation, they think "the key to success in the smart urban labs appears to be the ability to work together; to find intrinsic drivers for change or the willingness to reach out across organizational boundaries. This requires a form of story sharing which incorporates value and service design thinking, as well as good leadership" (Mantel & den Boogert, 2013, p. 21).

Mantel and den Boogert, portray the Amsterdam South East value sharing mechanism as a success in the form of a programme for the area:

> In the Amsterdam urban lab, value sharing is the main mechanism for transformation. Intensive stakeholder meetings with all parties in the energy chain (Amsterdam Arena, AMC hospital, grid operator Alliander, Nuon/Vattenval, Cisco, Housing corporations etcetera), combined with insights gleaned from the Energy Atlas, have resulted in a programme for the area. It's essential to this process that as well as the general goal of lowering CO2emissions, the values and motivational drivers of local stakeholders are also addressed. These drivers can be savings on the energy bill, the public image of companies, comfort, corporate social responsibility (Mantel & den Boogert, 2013, p. 20).

More on the critical role of collaboration "interaction between authorities, businesses and residents is of crucial importance for products and services to become accepted. What's more, interaction between these groups is vital if each party is to have a clearly defined role in an ever changing system which affects everyone. Knowing each other is the second key. Setting up co-operative bodies such as stakeholder platforms (in various shapes and forms) is one way to bring this about. The bottom line is that for a great part energy transition is a social transition…"(p.21) Therefore, they concluded that "in the Amsterdam Smart Urban Lab the focus on data and participatory models will continue, aiming to enhance implementation speeds and to get more local parties involved in the Amsterdam South East project."(Mantel & den Boogert, 2013, p. 21)

The international coordinator, Ronald van Warmerdam, was responsible for the outcome of the entire Transform project, thus also for the outcome of Work package 4. He felt things were not going so well, on both local as well as international level: "A managing client to steer on the realization of targets was missing" (Van Warmerdam, 2016, p.c.). Also the municipal leadership was at times missing due to an instable political mandate for Transform by municipal representatives. Therefore, an intervention (11th November D-Day meeting) organised by van Warmerdam, was needed to improve the involvement (and political commitment) of the different cities including Amsterdam. The director of spatial planning (DRO), Esther Agricola, has been invited to commitment to the entire project and both van Warmerdam and Agricola went on a city trip throughout Europe, to generate commitment amongst the political leaders in the participating cities. This process intervention was necessary to get the city representatives sign the MoU.

Van Warmerdam reviewed the WP4 implementation plans in February 2015. For Amsterdam South East, he noted the following fifteen gaps between the Description of Work and the IP:

1) The EU 2020 goals are used, but they seem not useful on the district level;
2) Planning guidelines are not mentioned;
3) Investment agendas are not mentioned or explained. No financial numbers;
4) The organization of the energy systems are not mentioned or explained;
5) Citizens' involvement is not mentioned;

6) Ownership is partly described; business cases and PPS are mentioned, but unclear is what they are about, what kind of projects they serve or which commitment is behind it, how they will be implemented and who is in charge?;
7) There is no competition between utilities mentioned in relation to difficulties to implement;
8) The role of the urban developer as facilitator is mentioned, but HOW it works is not clear;
9) Stakeholders are mentioned: Arena, ING, ABN, ROC, AMC, IKEA, Equinix, their interest is not EU202020 goals, but visibility, branding and financials. No further explanation in terms of divergence of interest;
10) A project portfolio is mentioned, but actions are not SMART and clear. Who is in charge, what is the plan, what is the budget?;
11) The projects are not clearly defined in terms of goals, constraints, actions, leadership, commitment, finance, planning, etc. (S.M.A.R.T.);
12) The expected energy reduction is not mentioned;
13) The requested period of time from the DoW (15 years) is not mentioned;
14) Monitoring is not mentioned;
15) The diverges from the DoW is not explained in the summary.

This is quite a critical verdict regarding the Implementation Plan of Amsterdam South East. If these remarks would have to be adjusted prior to delivering the documentations to the European Commission, the Climate Office would have one month (March 2015) to make adjustments.
This brings us to the evaluation of the project.

4.1.2 Evaluation

Transform was off course more than only Work Package 4, regarding the SUL implementation plan. Focusing on this Work Package, how can the implementation plan for Amsterdam be evaluated? The statement prior Transform by Baron "Everybody agreed on having ambitious climate goals, and there were loads of ambitious intentions by the city, but nothing too much happened actually" (Baron, 2012, p.2). Does this statement seem relevant in the case of Transform as well? This chapter evaluates the following:

1. Ex Ante – Ex Post;
2. Process
3. Projects
4. City level

1. Ex Ante

The Transform results (ex post) are described in the roadmap for developing an Implementation Plan (IP) and are afterwards compared with reality (ex post) in (TRANSFORM. (2014b). There is quiet a gap between the objectives and the results as showed in the next table 6-1.

A remark regarding this table, is that these original (Ex ante) statements, are written down in 'the road towards making the implementation plan – Amsterdam', these are not directly the objectives as stated in the Description of Work with the EU, among which the main promising objective was that: "*These Implementation Plans and cities´ and stakeholders' commitments will ensure implementation of the measures after the project ends*." (TRANSFORM, 2013a, p. 32). Although when interpreting 'the measures' as installing a project manager, forming a partnership and continuing the collaboration, than this objective has been achieved.

Table 6-1 Comparison of IP: ex ante-ex post

Function of the IP within the city development – ex ante (source D4.1)	Experiences – ex post
The IP is a visionary framework to speed up a multiplicity of existing and planned transformative projects, and thereby link local needs with key themes and considerations of the city's transformation agenda. The products of the implementation plan should have added value for (a) implementation speed-up, (b) creation of buzz in South East to attract new initiatives, (c) learning factor for other areas in Amsterdam and (d) learning factor for other cities.	The making of the IP resulted in (1) a knowledge base regarding energy (2) the creation and testing of project ideas (3) creation of a buzz in the area (4) The application of a programme manager that will work on behalf of the city, ArenA stadium and other main stakeholders in the area.

The table 6.1 on Transform objectives and results shows that the first ex ante statement (a) 'implementation speed-up', hasn't been experienced ex post, although it might be in the creation and testing of project ideas. This gap is also mentioned in an interview "if you judge from the perspective of which projects realised a reduction of the CO2emission, you get the short end, but if you judge from the milder perspective of EU-subsidised projects to create a foundation, then it was successful" (den Boogert, 2016, p.c.). Based on the collaboration, the synthesis report of the Transform team, qualifies the Southeast SUL approach as 'very successful', because it helped cities to start and intensify discussing energy planning within the administration and with stakeholders (TRANSFORM, 2014b). Mainly due to the set-up of this new public-private partnership "The Amsterdam Transform team is very happy with the achievements that were made in the SUL during the Transform period . . . and signed to contribute to these goals in the coming years"(TRANSFORM, 2014b, p.32). In which the goals seem to be intentions.

2. Process

International Transform Process

On an international level: "One of the biggest values of Transform, as acknowledged by all interviewees, is the collaboration across all stakeholder groups (cross sectorial, cross cultural, cross departmental . . . fuelling innovative ways of working locally which are intended after the end of the program. The EU plays a crucial role in enabling this" (Van Warmerdam et al., 2015, p. 24).

In the Transform synthesis report (D4.3) 'good governance' is stated as 'the secret to success':

> By starting a development process governance issues will immediately come to the fore: Integrating energy planning, urban development, housing and economic development as well as infrastructure planning in an innovative way is a highly demanding task, which goes far beyond business as usual on both levels, political and administrative**.** (TRANSFORM, 2014b, p. 34).

On a more critical level, the general barriers found, are:

> Since smart urban development and the transition towards a smart district is not a part of the daily work of major local stakeholders (like companies, building developers and administrators, offices, etc.) support for implementation is needed. It takes a lot of persuading, personal resources and time to innovate and knowledge how to come from an idea to an investment decision. (TRANSFORM, 2014b, p. 59)

Reflecting on the objectives after Transform, the international coordinator found that the EU indicators were unrealistic because:

- Energy transition is beyond the direct influence of politicians and municipal service managers;
- The European level (international coordinator) lacks management power and the possibility to steer on the quality of the output;
- The stakeholder representatives defined the quality, not the subsidizing body. So there was no objective external judgement on the quality of the results.

Local process

Locally, the major result of Transform for Amsterdam is the awareness and willingness among stakeholders to continue the collaboration in the SUL. In the evaluation report is stated that "only in Amsterdam, a clear bottom-up process was initiated by municipal actors with the aim to put local stakeholders in the lead for the development." (TRANSFORM, 2014b, p.81) The stakeholders agreed that:

> The SUL Amsterdam, Energiek Zuid Oost, is an area for experimentation, learning and becoming more sustainable. A public-private partnership forms the basis of transformation. Stakeholders support the transition towards new economic concepts like the circular and smart economy. They are aware that collaboration is the way to success and govern (and pay for) the local development (TRANSFORM, 2014b, p. 73).

In the Transform project evaluation afterwards, some critical remarks are made concerning the followed strategy. "The strategy was to let thousands flowers blossom. Sometimes it would have been better to test at an early stage whether the big bosses of possible partners were enthusiastic or not" (TRANSFORM, 2014a). This is also expressed by some interviewees who explain the lack of concrete results by a lack of agreed measurable targets. "No hard targets up front"(de Leeuw, 2016, p.c.) "The core question 'what's in it for us' is often repeated. Apparently the objectives were not clear enough. All communication and all collaboration is heavily influenced by this question" (Wenzler, 2016, p.c.). "Targets should be determined at executive level by the partners and agreed upon at the beginning. Otherwise there is a risk on ineffective behaviour provoked by the external funding" (den Boogert, 2016, p.c.). "Discuss upfront with stakeholders what the collaboration could mean for them, to determine, offer and demand and the shared values to build upon" (Maris, 2016, p.c.).

The interviewees see a relation between the composition of the core team and the final results of the project. "I think it would be wise also to invest on the management level in the collaboration" (Maris, 2016, p.c.). "No one is really made accountable in this situation, if each stakeholder performs some actions. The implementation gets a fairly ad hoc character" (den Boogert, 2016, p.c.). "People who were responsible in the cities were policy makers, not people who translate policy to implementation" (van Warmerdam, 2016, p.c.). "Partner AMC was reserved because of the possible risks and a very late involvement of the Board, that's why its investment remained uncertain for a very long time. It remained a toy for the policy makers for too long, and they had an unclear mandate. The result is an unclear vision at the level of the board" (den Boogert, 2016, p.c.)

Also on an international level, questions have been raised about the core team: "Members of the AB [Advisory Board] were proposed by the cities. It turned out that the composition was too one sided and consisted of people with the same kind of expertise. There was no financial expert, no legal expert and no political expert in the board." (Van Warmerdam et al., 2015, p. 23).

The Climate Office also mentions that a pure local strategy (in the form of a SUL) might not be ideal for an energy strategy:

> It is necessary to consider the overall systems linkages and energy flows in a city. Including an overall system logic, however, may lead to different strategies and results of optimization: Energy systems that are considered optimal within the boundaries of a SUL may not look so ideal when considering the entire energy system of the city or even beyond. (TRANSFORM, 2014b, p. 27).

According to some interviewees the planning was sub-optimal. The European funding does not contribute to an optimal anchor in the stakeholder organizations, making the stakeholders behave to freely: "in some way it [EU funding] even hinders this [being goal oriented] because stakeholders are not financially responsible" (van Warmerdam, 2016, p.c.). In retrospect, the municipality concludes from the SUL experience that:

> It is highly relevant to integrate the overall, city-wide perspective in the planning and decision-making on the energy strategy for individual urban quarters. While the area-focused planning approach is recommended, it is necessary to include city-wide system information and framework conditions in the local area's planning processes. (TRANSFORM, 2014b, p. 27).

ILS: The methodology to start in the area and bundle existing enthusiasm and projects was of crucial importance**.** There were already good relationship with some of the major stakeholders in the area, like the ArenA stadium. Without the enthusiasm of the ArenA and the involvement of NUON and AMC and others this would not have been possible. To make an innovative transformation plan in a specific area, it is necessary to have strong and committed actors in the area itself. These partners can more easily reach and stimulate other organisations in the area. (TRANSFORM, 2014a, p.33) Success factors mentioned by the climate office are the existence of the ASC network, and the partners that delivered data for the Energy atlas. "The ILS helps in building a stakeholder platform . . The presence of stakeholders is valued. . . Suggestion is to involve the stakeholders more during the next Intensive Lab Session. It is important that stakeholders are present at the same time, to provide stakeholder exchange (Gemeente Amsterdam, 2013b, p. 31).

Sometimes the Amsterdam workshop was too dynamic. (1) People coming and going, (2) multiple principals: local stakeholders, local politician, SMART-city, director Climate & Energy, and (3) two "end"-presentations (Gemeente Amsterdam, 2013b)(p.31).

Captains Dinner: According to some interviewees, the Captains Dinner occurred too late in the project to result in concrete commitment for projects during TRANSFORM. This is expressed as a lesson learned in the evaluation: "Always engage both the operational and the CEO level, right from the start. This will optimize working procedures" (TRANSFORM, 2014a). On a positive note, an interviewee states that "if the Captains Dinner wasn't organised, than the commitment for continuing collaboration wouldn't be there among the stakeholders" (Maris, 2016, p.c.).

Energy Atlas: The positive effect of open data**:** "The Amsterdam case of building intensively on motivation and empowerment of stakeholders to engage in the urban development process shows that: using data and information may considerably support the willingness of actors to engage" (TRANSFORM, 2014b, p. 59). On an international scale data exchange was a difficult challenge: "It is not easy to induce commercial stakeholders to open data" (Wenzler, 2016, p.c.).

> The energy atlas was the underlying knowledge base to stimulate people to think about sustainability and hinted at possible solutions. This collaboration has shown to be a success factor for the energy atlas, but not so much for other projects**.** The energy atlas forms an

important basis for monitoring within the entire city of Amsterdam. (TRANSFORM, 2014b, p. 33)

A problem showed to be that "More activities are done parallel than would be optimal for the planned progress, with a lack of consistency between the separate activities" (Wenzler, 2016, p.c.). This statement refers to building the Energy Atlas (DSE tool) parallel to the making of the implementation plan, while the Energy Atlas should have been used as a starting point for the implementation plan. This idea is supported by van Warmerdam, in his recommendation report:

> The project had a duration time of 30 months, starting in January 2012 and finishing in June 2015.The three before-mentioned work packages WP2, WP3 and WP4 were executed at the same time and finalizing the separate deliverables was planned on month 27 (Van Warmerdam et al., 2015, p. 11).
>
> The idea was to use for instance the DSE tool [Energy Atlas] to calculate implementation plans of Work Package 4 and support negotiations between stakeholders. This turned out to be impossible due to the fact that the prototype of the tool was still under construction and thus not ready to be used during the Intensive Lab Sessions (ILS) in the cities. (Van Warmerdam et al., 2015, p. 11).

3. Products (Implementation Plan)

Work package 1, should have described the gap between sustainable attitudes and concrete behaviour (e.g. lack of long-term orientation, path dependencies). However Specific (SMART) objectives or targets for Amsterdam South East are not set at this stage of Transform. They are presented as output of Transform for the long-term, referring to Amsterdam's 2040 targets. The tension between the short term Transform project approach and the long term targets is signalled by van Warmerdam, and Transform members of the climate office, as a barrier for the entire Transform project.

Different projects have been tested, some projects are mentioned in the Implementation Plan as key project for impact on CO2 reduction. For example, the use of Hospital waste heat (AMC) is studied, and mentioned in the evaluation, as "Key project for impact on CO2 reduction" as wel as 'using local waste to generate (green) gas' (TRANSFORM, 2014b, p.79-80). While these projects never have been realised.

The Transform documents are not very detailed and lacking transparency on fail factors regarding the decision making processes, the selection, and implementation of projects that make the implementation plan. The documents are stating 'reasons varied', regarding these failures. Other unexplained fail factors are: "no business case and uncertainty about future developments" (TRANSFORM, 2014a, p.33). Two barriers for implementation are mentioned in a table in the reflection chapter: 'local land use plan' and 'possibly: waste treatment legislation', without any further explanation. In an interview with Maris, it showed that "The logistics of waste treatment is bound to regulations, for example waste from the hospital has to be handled by a specific municipal waste collector, this hampered collaboration on this topic in the area'" (Maris, 2016, p.c.).

In the view of the coordinator much of the Transform results are presented in a format to please the EU, selling the success of their funding, rather than showing what is factually realised, thus saying these plans are lacking transparency or accountability. This lack of accountability is also reflected in the MoU: "The MOU of Transform is more a political statement with undefined results and more based on wishful thinking. It all remains vaguely, perhaps because nobody wants to burn his hands"

(van Warmerdam, 2016, p.c.). In his recommendation report the main bottlenecks found regarding the transformation plan are: "political commitment, financial support, collection of data, being critical towards your own city, being concrete and concise, and how to restructure the governance to make the transition possible" (Van Warmerdam et al., 2015, p. 13).

4. City level: Amsterdam Smart City in relation to Transform

I find it remarkable that, although Amsterdam has received positive international attention for their approach and results, the interviewees are on the whole not that positive about the results of Transform. This critical retrospective of the interviewees is quite different from the general appreciation for Amsterdam in the literature on Smart Cities; perhaps this is caused by the results and image of the more generic Amsterdam Smart City (ASC) Platform. Therefore, In addition to this case study of Transform, with the aim to 'put things into perspective', I have matched the transform project with the Amsterdam Smart City case analysed by Bolici & Mora. I made a quick and dirty comparison of what Mora found on a city level, in relation to Transform as a project. I analysed his statement on the scale of Transform and found a rather different view. The analysis (text in red) shows where I disagree with his city viewpoint on the scale of the Transform project for WP4 in SouthEast. As Bolici & Mora analysed Amsterdam on a city scale. They found that;

> *The success of Amsterdam in the field of smart cities results from an approach closely linked to strategic urban planning principles. To manage the complexity of smart city strategies, the city has effectively combined the importance of new ICT infrastructures and digital services with many other non-technological but yet critical factors that are widely discussed in smart city research. For example: leadership and political commitment; governance and funding capability; coordination, sponsorship and support across departments; collaboration between stakeholders and organizations across multiple sectors; innovative business and operating models; long-term vision, performance metrics and commitment from the top; the capability to connect short-term projects and initiatives to real local needs, and benefit from the enormous innovative potential of grass-roots efforts (Bolici & Mora, 2015)*

This analysis shows out of this statement made by Bolici & Mora, I disagree with at least 10 of them on the scale of Transform.

The documents of Transform Amsterdam highlight successes, but do not go into detail regarding the barriers find or unimplemented projects. Possibly to please the EU, and promote Amsterdam as being a successful Smart City. Possibly because this deviation between the documents and reality, relates to the set-up of the European program, in which the timelines stated that local implementation plans needed to be delivered a half year prior to the finalization of the actual project, thus being a 'snapshot' in time, rather than the actual outcome of the project, as written by the Climate Office. Therefore the documents could include 'wishful' thinking on possible project outcomes. While in reality some projects, like the Ikea project, already proved to be unsuccessful

4.2 Adjust and modify

This phase in Bolici & Mora's description model concerns the adjustments to continue the SUL activities after Transform under new conditions and with new possibilities.

4.2.1 Process

Van Warmerdam warns that the 'holistic' Smart City approach in the research literature and EU-vision documents is too complicated to execute in reality. He promotes to 'Keep it simple', and focus on key projects. A way in keeping it simple to set specific targets and strategies for specific areas.

The Testing phase should be "about finding if the goals and concept projects are possible to implement. It is about checking whether the goals are realistic, what different scenarios will deliver for output and what kind of barriers are there in the institutional and organizational context. "(TRANSFORM, 2014b, p. 56). Transform did not provide an 'all-encompassing' product for this phase. As tip is given: "there should be a moment for prioritization the phase is ideally delivering more specific studies on legal aspects, technical aspects, business cases, stakeholder commitment" (TRANSFORM, 2014b, p. 56). In an Interview Maris stated: "We are now trying to be transparent about our investment agenda, so each stakeholder knows what the possibilities to collaborate are" (Maris, 2016, p.c.). He also mentioned that to prioritize and create a 'sense of urgency', administrative pressure would be beneficial: "if the alderman (Choho; sustainability) put extra pressure on the process of collaboration, commitment would be created more easily"(Maris, 2016, p.c.). Now there was a lack of power in decision-making, since only operational managers were involved: "There was a lack of soundboard on a directional level, and a continual shift between the setup of collaboration and securing of intention. Both top management and operational management need to be on board, and a soundboard should answer questions as 'are we on the right path?' ",

ILS: "The ILSs are a way of work which Amsterdam envisions to carry on." (TRANSFORM, 2014a, p. 19). The points of improvement of the ILS are to focus on the presence of important actors and key stakeholders , increase media attention and communication and focus on main and actual problems. It is absolutely valuable to put the main problems on the table. "For the next ILS, stakeholders should be involved in the organization of the ILS - to be precise: to formulate the assignment and search for the question behind the question." Therefore it should be clear what the position of the ILS is in a bigger transformation process/agenda as a central roadmap. It would help for the ILS if the next steps are already clear. Place the Intensive Lab into the context. (Gemeente Amsterdam, 2013b, p. 31).

Partnership Circular Southeast

On Jan of 2015, about a half year prior to the end of the Transform period, the start of an actual partnership with the working title 'Circular Southeast' was announced. This partnership with the key stakeholders of 'Energiek' Southeast from the Transform project (Amsterdam Arena, heating and cooling grid company NUON, the AMC hospital, the district of Southeast and the municipality) will join forces and invest through human resources. Other stakeholders are invited to join the initiative and take part in projects. (TRANSFORM, 2014a, p. 43). Focus lies on themes like energy, waste (and water), mobility and connectivity. This partnership will run until the 1st of January 2019 (Technical Faculty HvA, 2015). After Transform, the management for this organization will be in hands of TNO, a knowledge institution. Management fees are funded by the partners in order to set up new initiatives, manage and monitor current projects, finance and marketing. More focus will lie on learning, communicating and evaluating:

> By involving a knowledge institution [The Amsterdam University of Applied Sciences and TNO] in the programme of Southeast Circular, learning shall be fostered. The aim is learning from own experiences and from initiatives and techniques from other places and communicating these results to others. By regularly evaluating the projects and administrating, it will become clear and explicit what the realized projects are able to contribute to the objectives. (TRANSFORM, 2014b, p.88)

The Transform document states that the organization of this partnership (Southeast Circular) will consist of six companies, who will work together on the themes of energy, mobility and waste, with the following horizontal governance structure:

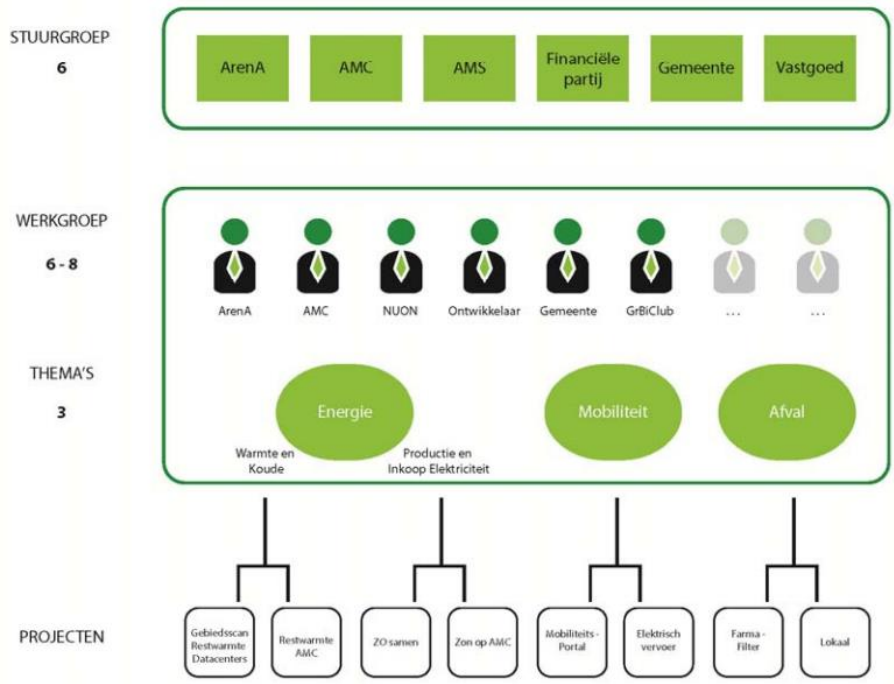


Figure 6-13 Horizontal Governance Structure Partnership Circular South East (Transform, 2014a, p.44)

Stabilizing the status quo between the stakeholders in the continuing activities post-Transform can have an inhibitory effect on the innovation activities. The Transform team is aware of that and warns for this possible effect:

> After the setting up of the network the leadership role in the coming period will be less clear. With partners who have a strong position within the area, less urgency might be felt for new and innovative solutions. Therefore it will be the role of the city and the knowledge partners to stay alert and to foster openness, learning and experiments (TRANSFORM, 2014b, p. 82).

In line with this lack of clear leadership (den Boogert, 2016, p.c.) says "Although there is a follow up activity initiated, there still is no shared agenda with clear goals, actions, monitoring, financing etc., so no implementation plan". After Transform, the continuity, up scaling and or maintenance of solutions will be problematic. Because then external (EU) funding is no longer available. This is enforced by a lack of knowledge-with the local stakeholders in the field of Smart (energy) Districts.

For next steps in implementing future Smart City initiatives as follow-up a number requisites are formulated:

- overall objectives (on the city level, but broken down to quarter level),
- innovative strategy development (relating to energy, urban development and mobility) and
- Defining measures which include both, framework conditions (legal, institutional, economic) and direct interventions (through projects and processes). (TRANSFORM, 2014b, p. 12)

In order to live up to the above mentioned requirements cities need to redesign their governance systems. With the focus on main governance factors like "institution building, open knowledge and data provision, smart/sustainable city guidelines and targets, framework conditions, and binding agreements" (TRANSFORM, 2014b, p.12). How this should be done is not further specified.

On the bright side, as a result of this new partnership, on the 8th of September 2016 a new initiative by Circular Southeast was started, to develop a logistics collaboration model 'Cross Chain Control Centre' for waste collection and processing. In which waste collectors, start-ups, knowledge institutions are working together towards the realisation of a circular economy and decreasing mobility and CO2 emission (Technical Faculty HvA, 2015). This project should run from the beginning of 2017 until March 2018 as a sponsored pilot project.

Figure 6-14 Partners Cross Chain Control Center, with key transform stakeholders.

Recommendations from the Project Coordinator

At the end of the project, the Amsterdam Coordination Team wrote a recommendation report from the position of the Project Coordinator, from a managerial point of view "why results differ from the Description of Work (DoW) and the aim is to find an explanation for these deviations, seen from a governance point of view" (Van Warmerdam et al., 2015, p. 8). Ten recommendations are proposed. Chapter 3 (p. 17-24) of this recommendation report, is about "organization, coordination and project governance". The main research questions are "Is it a research and development project or is it also about implementation? How is it organized, how is it governed and is the way the project organization is set up supporting high standard outcomes?"(p. 18) Keep in mind that these recommendations are related to the entire project, not just on the Amsterdam scale. Nonetheless, the recommendations are very relevant to the local situation as well, and give insight in critical governance issues (Van Warmerdam et al., 2015).:

1. The Project Steering Committee (PSC) in Transform consisted of participants from the operational level. This is a questionable composition, since these people might not be able to make decisions related to quality, constraints and uncertainties. "To steer uncertainty and quality a more independent body seems more effective"(p. 20). The recommendation is to compose the PSC of directors of the departments of the cities and the most important partners, meeting at least twice a year.
2. "The PSC can act as a client body, as a platform for the coordinator to discuss constraints progress on finance and other governance issues. By positioning the PSC higher in the organizations the implementation of plans will be easier as well"
3. "Cities and partners should put personnel with specific experience in charge of Work Packages; a research package should be led by a researcher, a policy package by a civil servant, and a design of prototype task by a designer or developer. – In the case of South East the implementation plan is written by policy makers.
4. "The composition of the Advisory Board could have been more in line with the description of the DOW . . . more than one candidate to be interviewed and chosen by the coordinator after discussion, approved and/or decided on by the Project Steering Commission." (p. 23)
5. "An Advisory Board [should] gain more influence and power to improve outcomes. . . To enforce quality or meeting objectives cities could only be paid upon verified completion of promised tasks. If the PCS and AB are given power to withhold the payments by the E.C., the quality of the deliverables could be forced to be improved." (p. 23)
6. "Cities [Like Amsterdam] are . . more or less dependent on the private parties, the owners of infrastructure, the housing corporation and other building owners for transition. In these

cases cities don't have direct influence but they could be influential via permits, building codes, taxes, procurement." (p.27) For future EU funded programs "when translating these collaborative plans into tangible results . . . A study [should be done] for legislative changes that will enable or disable the energy transition, reaching climate goals and their societal impact, for instance related to producing energy and the openness of the infrastructure." (p.24)

In regards to the European Smart City policy three recommendations have been formulated:

7. "The EC Smart Cities policy needs a thorough review (possibly executed by a 3rd independent party) based upon a rigorous gap analysis of what are the problems, in some order of priority, that prevent the rapid development of smart, sustainable cities."(p.28)
   As far as we understood none of the key EC Smart City (FP7 and H2020) strategy papers do this adequately - they are just a kind of buffet of ideas with no coherent gap analysis and no demonstration that funding criteria and priorities are based on some coherent theory of social change. At the moment, there is an excessive focus on technologies and tools, as if their existence will get them implemented, and not enough on building long-term local capacity to manage change and develop control over finances. (p.28)

8. "Based upon the completion of this gap analysis it would be good to state clearly what the role is of public EC grant funds in addressing which specific gaps need to be bridged, and show how other sources of finance cannot do this. The logic should be clear and powerful: here are the problems, here is why EC funds are needed to address them, here is how we will measure results."
9. "Pay more attention to Smart City project management at the design level to reduce complexity, and to deliver strategic verifiable results. It feels like Smart City projects are too complex at all levels, project design, management and deliverables. Too much time is spent on coordinating amongst cities, and writing lengthy reports no one really needs or will read."(p.28)
   "At the same time, more thought is needed upfront about what are the minimal, strategic results needed for EC Smart City projects (based upon a real gap analysis, and clarity about the role of EC funds), and how to develop more effective ways to monitor the quality of this work, both within the project, and in Brussels. More accountability and feedback is needed during implementation." *(p.28)*

Clearly, Van Warmerdam sees many points for improvement of these European funded Smart City projects. Ranging from Quality control, and accountability (1, 2, 5, 7, 8, 9), to the right personnel within the partnership (3,4, 5), collaboration (6), Communication and transparency of EU policy (6, 7, 8), Leadership in reducing complexity (9)

Analysis Governance monitoring/evaluation phase

Based on the 'success' indicators for a Smart City, by the European Commission, as mentioned in this report, Transform clearly was a Smart City initiative (it included a significant role for ICT enablers, based on an international triple helix partnership, to increase the quality of life in the Transform cities).

The three challenges signalled by Mantel & den Boogert in 2013 (the abatement curve, the changing energy chain and the appeal to stakeholders) have not been completely tackled during Transform which resulted in an Implementation Plan far less concrete then planned for at the start of Transform. A clear roadmap of scaling up is lacking in the Implementation Plan, but the focus on participatory models has stayed.

The final Transform evaluation report (TRANSFORM, 2014b) gives credits for the success to the private parties. In reality this 'success' is based on the continuing of the process, rather than commitment to specific projects. Transform, on the level of WP4 in Amsterdam South East, can thus partially be seen as 'successful initiative'. In relation to the EU definition of a successful Smart City initiative: there are observable indicators through the life cycle of the initiative (ex-ante – ex-post), and the initiative is attracting support in the area (new partnership Circular Southeast), however it has no clear objectives formulated in SMART terms, its concrete outcome is a process environment of collaborating partners in search of viable ideas, no solutions are being imitated or scaled. The role of ICT was mainly on the background in the form of the energy atlas**.** ICT did not play a substantial role in the project ideas of Amsterdam South East!

The making of the implementation plan was not contributing effectively to achievement of EU 2020 targets on the short-term, since no projects have been (given commitment to be) implemented. For the long term, the new partnership might be beneficial to the quality of life in the area and in working towards the EU2020 targets. In line with this partnership the key to success in the smart urban labs appears to be the ability to work together (Mantel & den Boogert, 2013, p. 21). How was the Smart City initiative governed? I will zoom in on the 'process' and the final 'products' of WP4 in Amsterdam South East.

Process

In the evaluation is concluded that the lack of knowledge with the local stakeholders on how they can act in the field of Smart (energy) Districts, what technologies are available, what is the effect, how to come from an idea to an investment decision in this field of work, is a relevant barrier for these kind of initiatives. Stakeholders have learned a lot about this domain but the learning effect replaces the targeted results and concrete commitment on the implementation plans for specific projects. The international coordinator found that the objectives of Transform are unrealistic, in which the process of energy transition in The Netherlands is beyond the direct influence of politicians and municipal service managers. He pleads for a simple approach, with the focus on key projects.

The facilitating leadership style in which the Climate Office was enforcing the stakeholder network can be seen as a success factor for collaboration, even though this was never institutionalized. An issue was that this led to unclear leadership on a project level. In the evaluation report is therefore stated that leadership was shared among the main stakeholders. In reality only the active role of the ArenA is supported in the interviews in driving sustainability. AMC does not see itself so much as a leading organisation, and NUON only got involved lately in the process, and was not mentioned as a key partner to contact for this research by the climate office. I conclude that the leadership within the stakeholder group is diffuse, and inherent to the chosen strategy to develop a kind of 'own responsibility' among all stakeholders. As recommendations is given to include moments of prioritization for specific projects and to include a directional level soundboard to see if the collaboration process is on the right path.

The stakeholder management in Amsterdam was 'admired' by the other Transform-cities. The Climate Office is capable of building bridges between the different stakeholders due to their 'neutral' position, but the Transform project was not of strategic importance to all involved stakeholders. A lack of communication and transparency about rent issues in social housing transformation seem to be the reason why these actors left during the intensive lab sessions.

ILS: The Intensive lab sessions helped in building the stakeholder platform, however extra attention needs to be paid in the structure and approach of this three day collaboration event., for example "participations were coming and going, making the workshop too dynamic". This relates to a lack of shared values and lack of appeal of importance/need of energy transition. Interviewees opt for more

political pressure from the politics to create a sense of urgency, and to focus on the 'main problems' in the area: it should be clear what the position of the ILS is in a bigger transformation process/agenda as a central roadmap.

Energy atlas. Amsterdam can be seen as a 'best-practice' regarding data-exchange, since it collected data for nearly 180.000 buildings. The importance of data exchange and open data for the energy atlas to support the decision making, confirms that it is a governance factor supporting collaboration and stimulating participation in Smart City development. However, this is what the formal reports tells us. One interviewee states that the Energy Atlas, still is not sufficient enough to base actual decisions on.

Captains' dinner: The reason of the lack of leadership can be found in the lack of involving top CEO's from the start. The Captains Dinner was held towards the end of the project, thus it occurred too late in the project to involve top management CEO's of the key stakeholders, and to get political support for the plans. While these stakeholders have already been introduced in the writing of the call, this commitment should have been checked in an earlier stage, as early as possible.

Projects (Implementation plan)

A Transform city overview of 'commitment on the Implementation Plan', from July 2014, shows that the Amsterdam South East stakeholders, as well as the city administration have given 'commitment' towards the IP. This however does not define what in the IP is actually committed to (lack of transparency). The stage political commitment was foreseen, but not given yet.

Many points remain unclear during the project execution and regards the Implementation plan. For example 'how the city alderman tested the project plans'. In a second round interview including a list of 25 open questions, to verify the thesis results and further explore the outcomes, answers stayed vague, especially regarding the 'projects' of Transform.

The reflection of the Implementation Plan gives an overview on 'best practice for implementation'. The business cases of different projects (local waste heat, for solar for big consumers, for locals waste to energy, and for demand supply management) are defined as 'best practices' together with the funding by the Amsterdam investment fund for 'solar on ArenA' and 'the orange gas station'. How these business cases are developed hasn't been clarified nor are there references to other documentation. This is mentioned by the project coordinator, during the process, but has not been adjusted in the final products. In my perception, a 'best practice' is a technique, methodology or activity that has proven itself to be more effective as any alternative. To be available for other 'users' it should be very well documented. Since no references are given it seems that these 'best practices' are not accessible. I find the conclusions of the project team in this way unsatisfactory, unverifiable and not transparent, or well communicated.

An exception to all project ideas, is the project of 'solar on Arena'. This project was 'an appealing result in the area during the Transform period'. It is now known, that Transform builds forward on existing projects, and that the ArenA project is not a result from Transform itself. The project is partly funded through an Energy Fund which is set up during Transform. I think it is mainly realized because of the leadership, entrepreneurship and innovative spirit of the Amsterdam ArenA, supported by the municipality, in order to achieve the high ambition of being CO2 neutral in 2015.

Van Warmerdam warns that the 'holistic' Smart City approach in the research literature and EU-vision documents is too complicated to execute in reality. He promotes to 'Keep it simple', and focus on key projects. A way in keeping it simple is to set specific targets and strategies for specific areas. From his recommendation report shows that Smart City initiatives should include the right quality control, and accountability, the right personnel within the partnership, a clear collaboration and legal

transparency, Communication and Leadership in reducing complexity. There should be a moment for prioritization of projects, to deliver more specific studies on legal aspects, technical aspects, business cases, stakeholder commitment. To prioritize and create a 'sense of urgency', administrative pressure would be beneficial, for example by including the alderman of sustainability to put extra pressure on the process of collaboration, commitment would be created more easily.

Now there was a lack of power in decision-making, since only operational managers were involved. Both top management and operational management need to be on board, and a local soundboard should guide the transformation process. This leadership issue is continuing in the new partnership, as foreseen in the evaluation report: in which was stated that the setting up of the network the leadership role in the coming period will be less clear. Today there is a no clear implementation plan initiated, or clear goals, actions, monitoring, financing. But on the bright side, the key Transform partners are piloting 'Smart projects in the area, like the 'Cross Chain Control Centre', for waste collection and processing. This is a clear result of the Smart City initiative with the main focus on 'Smart' collaboration (Dutch: Slim samenwerken).

6.5 Communication

For communication within Transform a specific technical platform was available, however as fas as I can see, project communication went via email or telephone, with occasionally face-2-face events, international meetings and trips to partnering cities. This phase is basically out of scope for the Work Package 4 of making an implementation plan. A short overview is given regarding internal and external communication

5.1 Communicate and promote the smart city strategy

Figure 6-15 Van Warmerdam: "We have to accept that life is very complex"(final internal newsletter Transform)

The Work Package 6, led by the Project Coordinator (van Warmerdam) has the task of "coordination of the project, . . . taking care of communication, knowledge sharing, active website maintenance, newsletter updating, Memorandum of Understanding, political support, etc. "(Van Warmerdam et al., 2015, p. 20)

Internal communication (within Transform consortium and local stakeholders)

Interpretation of the Description of Work (DoW). Van Warmerdam states that "The outcomes of other work packages are not clearly defined as "products". The outcomes of some work packages (WP2, WP4 [IP] and WP5) were insecure at the start of Transform and defined in the DOW more as ambitions than as strictly defined products. During Transform, team members discussed about the interpretation of paragraphs of the DOW and the final interpretation were defined during meetings. In discourse theory it is the language employed in the communication occurring in organizations that shapes organizational reality [Clegg et al, 2009, p 305]. And this was the case in Transform." (Van Warmerdam et al., 2015, p. 19).

As a solution, van Warmerdam states :"Projects need to be able to adapt and cope with this change by being flexible, by handing over information, by supporting new team members to get acquainted with the project etc." In Transform this didn't always happen: "Part of the people involved in writing the DOW left the project making it hard for other (new) "Transformers" to

interpret the DOW in the intended way. (p.22). In line is noted by an interviewee that in South-East "stakeholders are focused on the issue of the day, and barriers relate to the availability of their people. It [The Transform project] should not be dependent on one single person in an organization" (Maris, 2016, p.c.). However, this was the case at stakeholders like AMC, Ikea and Hogeschool van Amsterdam.

A bi-weekly newsletter has been sent to the internal Transform partners of the consortium (of which two are added in the Appendices VI and VII, with the focus on governance and participation). To increase internal feedback on the progress the newsletters did not receive a lot of input, but it was well read by the partners (based on a digital monitoring system). Furthermore a special glossary was developed to define a 'shared language' with concepts and definitions and to avoid misunderstanding (WP1).

On a local scale, meetings by the municipal project team were scheduled on a weekly basis. However these meetings did not include all the necessary stakeholders from the area, only within the municipality, and occasionally in collaboration with Accenture (WP3).

Den Boogert mentions that to better anchor the Transform project within the municipality, "we could have communicated about Transform internally more often and involved our colleagues at the different departments more often, we didn't have a monthly meeting scheduled for the department". He continues, saying that communication within the area has happened very intense, but internally within the municipality this process could be improved. For example, the climate office did publish an update of the project in their municipal magazine 'Plan Amsterdam' (referring to Mantel and den Boogert, 2013), however this is usually used to describe finalized projects and results.

The first stage of the implementation plan development on a district level was managed on three levels: First a small process management was installed for 2 years (Transform period). Secondly the working on the development process was structured with interventions or feedback moments every half year. This created a continuous workflow. Thirdly, a project management was organised to develop ideas towards business cases (and possible implementation) (TRANSFORM, 2014a, p. 3).

International meetings were scheduled every two month. This was a low frequency according to the international coordinator: "If you meet each other every two months, the collaboration remains superficially. That's why we suggested to limit the collaboration from 6 to 3 cities, so people could put more effort and time in real international collaboration" (van Warmerdam, 2016, p.c.).

External communication

Already during the start of the process, In line with European strategy of promoting Smart cities, Transform has been promoted by the municipality of Amsterdam as "one of the main projects and actions in Amsterdam achieved in 2013" (Gemeente Amsterdam, 2013c). Also on a European level "Platform members have indicated the important role that projects such as 'Transform' can play in providing a space for cities and other stakeholders to experiment" (Smart Cities and Communities, 2013). This shows that the promotion was up and running from the start of the project in 2013. Also after the project was finished, the promoting of the project continued. The website of the municipality of Amsterdam, on 25th of august 2015, is published that, they think Transform has set standards in energy planning:

> Transform supports those local stakeholders, responsible for investment and policy decisions, to turn their CO2 ambitions into a Transformation Agenda [Work Package 2] and into tangible Implementation Plans [Work Package 4]. Plans that focus on both the strategic and long term horizon, combined with executable projects. Plans that focus on both the city

and regional level, combined with interventions in specific neighbourhoods. Plans that take into account all relevant energy flows, environmental aspects, urban mobility, water and waste. Transform stands for an integrative approach to smart city development, including strong stakeholder involvement, data analytics and smart tooling, financial strategies and methodologies for co-creation, like service design thinking. The outcomes set standards for future European Smart City projects. (Amsterdam, 2015)

Transform has its own website where their documentation was made widely available. The creation of 'Buddy cities' and the organization of master classes to share knowledge and experience was also set up. Other platforms like ASC promoted the project of Transform as an example for urban transition.

Memorandum of Understanding

Figure 6-16 signing of MoU by city representatives on the 3rd of June 2015 (TRANSFORM, 2015)

On international level, one of the Transform project results was a signed Memory of Understanding (MOU) between the participating cities containing 11 statements on their future intentions based on the Transform experience. This was part of the call, in order to oblige to the Description of Work, which needed to raise 'political commitment' towards the project.

On a less positive note, van Warmerdam writes in the recommendation report, regarding to the lack of people with power in this defuse decision making arena, that the "powerlessness is maybe also the reason why the Memorandum of Understanding is a rather weak document containing general statements, not defined for instances as a clear list of clear formulated future commitments and actions" (Van Warmerdam et al., 2015, p. 21). As ironically portrayed in the newsletter fig 6-16, referring to the 'small text' of the MoU, which is actually missing; no concrete goals are written down, 'to burn their hands on'.

Figure 6-17 final Transform newsletter: MoU, "Sign here please - Don't forget to read the small text"(Van Warmerdam et al., 2015).

Analysis Governance communication

Communication played an important part in the area, especially during events like the ILS and the design thinking sessions. At these times, all stakeholders communicated with each other and this governance process intensified. After these intense 'moments', companies went back to 'business as usual', taking on their daily routines. Since sustainable developments is no core business.

Internally within the municipality, and within certain organisations, like AMC, Ikea, and others, the Transform goals and values could have been communicated better.

From my point of view, the local meetings for Transform could be unstructured, I feel this was in line with the city being unable to steer and get grip on the transformation process. The meetings were not too documented or going according a strict checklist of plans, actions and follow up checks, but rather done as an 'update on the processes'.

Den Boogert mentions that to better anchor the Transform project within the municipality, “we could have communicated about Transform internally more often and involved our colleagues at the different departments more often, we didn’t have a monthly meeting scheduled for the department”.

The magazine used for the Transform publication (Plan, 2013), has not been used to publish their final results (which is usually the case). This raises questions why this hasn’t been done. Maybe the lack of their final results, since they are not promoted on the local scale of Amsterdam.

6.6 Conclusion on Governance Processes

The interviewees for this research looks back on the Transform project mixed feelings, referring to different governance processes and their barriers and success factors. Since the project is already terminated some time ago, they have taken some distance of the work and find it relative easy to give their opinion on success and fail factors. During the five interviews, the interviewees made about 141 statements explicitly regarding the governance factors. Most of the attention is drawn to the first two factors (Collaboration and Leadership) with less priority for the third (Participation & Partnership). The presence of the other factors are less dominant. The interviewees confirmed – sometimes very explicit – that the eight factors are presented in order of importance.

Interviewees are critical towards the end results, referring to almost twice as many barriers as success factors. Especially in the factors Collaboration and Leadership & Champion the scores are dominated by the barriers. Accountability and transparency are more issues for the international coordinator as for the local participants. The next table shows the spread of mentioned (or interpreted) success factors and barriers over the different governance factors. Some statements are qualified as ‘factual’ meaning they are more neutral statements, in that there was no clear designation to them being a success factor or barrier.

Table 6-2 Division of statements from the first round of interviews

	Governance aspect/ nr statemen	Transform	%	SF's	Factual	Barriers
1	Collaboration	45	32	13	4	28
2	Leadership & champion	43	30	12	1	30
3	Participation & Partnership	24	17	13	3	8
4	Communication	4	3	4	0	0
5	Data-exchange	10	7	5	2	3
6	Service & application integration	2	1	1	0	1
7	Accountability	8	6	0	1	7
8	Transparency	5	4	1	0	4
	total statements	141	100	49	11	81

The collaboration of Transform is built upon the selection by the municipality of larger private organisations, being active in the SUL-area, often already participating in the ASC-platform. The side effect is that smaller local companies were not involved from the start. However, the strategy was to focus on the high energy consumer, thus focusing on the larger private parties in the area. Collaboration is based on the awareness that partners need each other to solve complex energy issues in the area.

While the European tender calls for concrete implementation plans including reusable knowledge, data, models and procedures, the stakeholders in Amsterdam, led by the Climate Office, agreed to focus on a 'sustainable platform' for long term development. Since Smart City initiatives are mostly long term developments, the advice from the Transform team is to select stakeholders as possible partners with strong commitment, active in the area with a long-term perspective and an image that is partly depending on the area. This was not the case in Amsterdam, and can be seen as a lesson drawn. Interviewees add to this that it is useful to "Select parties that are involved in the area and also have a future interest to invest in the area" and "Select partners with an image that is related to and partly dependent on the area".

Almost 50%, of the counted barriers in the quantitative analysis of statements made by the interviewees, involves the lacking role of top-management in envisioning a Smart City and championing the initiatives. Leadership is shown by the city by taking the initiative, addressing stakeholders and creating a SUL. This active leadership, driven by high ambitions and a chance for EU funding, gave Amsterdam a coordinating role in Transform. The local leadership is realised in a facilitating mode, since the city really needs the stakeholders to realise sustainable energy planning. The leadership within the stakeholder group, and later partnership 'Circular South East', is diffuse, inherent to the strategy to develop a kind of 'own responsibility' among all stakeholders, and inherent to the critical role of governance. Although the city of Amsterdam was 'in the lead', the commitment was mainly present at the level of the involved policy makers and not at executive level from the start, thus forming a barrier to drive through change and innovation to achieve quantifiable objectives and concrete results. This kept the project isolated from the normal execution processes at the stakeholders, making 'implementation power' insufficient available when needed.

The partnership on the international level was built as a consortium, but only for the durance of the Transform project. On a local level, the partnership is mainly focused on as a public private partnership, with occasionally involving triple-helix collaboration in specific projects. Quadruple helix collaboration is not used in Transform. Partnership is the beginning based on ad hoc commitment, thus referring more to collaboration. Some major actors have been constantly involved in this transformation process (the municipality, ArenA, AMC, Liander and later NUON) but many names come and go in the diversity of website publications, and official documents, which makes the collaboration unclear with a diffusing effect on accountability and transparency. This approach seems to be chosen by the municipality as a strategy to avoid central leadership and responsibilities and to stimulate others to take up responsibilities with the adjacent funding. The format of the 'Captain's dinner' to speak out commitment on executive level is appropriate, but it would be better to arrange this in the early phase of the project, to underpin collective ambitions and objectives, and create more 'power' to implement ideas. Without specific projects or ideas, it is difficult to just 'blindly' commit to collaboration.

Participation of citizens is in fact not realised since there are not many inhabitants in the chosen mono-functional business and offices part of the eastside area South East. Some participation of small size firms is initiated in a later stage.

Data-exchange has been the success in generating the Energy Atlas. This stimulated collaboration, improved decision making, communication and transparency, according to the Transform documents. And in retrospect, the energy atlas wasn't as useful as claimed in the documents. It can still not be used for decision making on energy strategies, even though it is being developed and piloted in another Amsterdam area. Other than the Energy Atlas, data exchanges, hasn't been used during Transform.

Communication was sorted on an international scale, but not always on a local scale. Although moments of increased communication, like the design thinkers meeting and the intensive lab session, sparked collaboration and created project ideas, during the follow up period communication weakened. This led in many project cases to a stop the collaboration. External communication between partners was showed to be an issue, as well as internal communication within organizations like AMC and the municipality.

In this research, service or application integration has only been mentioned twice! Clearly this aspect of Smart City projects is extremely under exposed in this research and or in this Smart City initiative. From my perspective, If I look at some of the projects, this process of governance has taken place at times when for example consultancy services have been combined with knowledge research input, or at the energy atlas in the form of application integration and data exchange. Apart from the energy atlas, I cannot name a project in which application integration played a role.

Accountability and Transparency were not given the attention needed to create clearness on the collaboration. “If you all perform a little bit of the action, nobody is really responsible for the result and the work becomes quite ad hoc organized” and “The executives should state at the start what is important and what not, so it can still be supported whenever the subsidy is ended”(den Boogert, 2016, p.c.). “If the project-cooperation is not part of each executive’s personal targets they will never be made accountable” (Maris, 2016, p.c.). As stated in the recommendation report: more accountability and feedback is needed during implementation

Transparency in relation to the process and products is lacking. On the process level, negative findings from the interviews have not been documented. The project descriptions are mostly somewhat vague, responsibilities unclear and so is their final status. Most projects are limited to the stage of idea-concept, leaving unclear why the idea is not (yet) realized. Also the main person involved in from the Climate Office was not available for feedback. The transparency in their documentation is not as high, as in the interviews, thus new insights can be given.

It shows that constructing a sound financial business case is still a major bottleneck. Transparency factors are only mentioned by the central coordinator and the municipality. The focus is on encountered barriers, mainly on quality assurance aspects: “Quality is an issue here. The cities involved were the only parties to decide about the quality level of their results. Quality check should be done independent with possible sanctions in case of a clear lack of quality. Just very few people are asking the question “why is it that we don’t realize our objectives?” and are trying to understand this” (van Warmerdam, 2016, p.c.).

The Climate Office concluded that governance is the key to success. Since there are many ‘keys to success’, based on literature and practice, governance must be the ‘skeleton key’ towards successful Smart City implementation. As it is with all barriers and success factors, they can basically be interpreted both ways:

Figure 6-18 Transform internal Newsletter # 25 June 2015: "The main problem with energy planning is: governance!"

Looking back in my mailbox, I found an internal Transform newsletter with this image of "the main problem in energy planning: governance!" It contains the essence of this thesis, referring to the critical role of governance in Smart City implementation. Even though this critical role of governance is underlined, a clear definition for governance is not given in the Transform documents, or during the project. The Transform-team did signal relevant governance factors (institution building, open knowledge and data provision, smart/sustainable city guidelines and targets, etc). These governance factors are in line with the ones mentioned in this thesis, however missing critical aspects like leadership, partnership, participation and collaboration.

As mentioned at the transparency analysis, Bob Mantel, urban developer of the city of Amsterdam, project manager of ASC and Smart Urban Lab coordinator in Amsterdam South East, was not available for an interview during this research. In an interview for www.smart-circle .org, he mentioned that within ten years, Smart Cities will have become a much more common phenomenon. "Governance will be much more driven by the public, by ICT and through media", according to Mantel. He states that the main challenge cities are dealing with in getting 'smart, has to do with "organizing this process in such a way that public-as well as private parties and the people that live in the city feel committed to it: essential for the success of a smart-city-project is that all these three parties share the values of it and participate in it, in an open manner"(Hazebroek, 2015). This is basically the narrowed down version of what my definition of governance is all about.

7 Case Triangulum

The case of Triangulum is described in mainly chronological order using the model of Bolici & Mora (2015) as a reference framework: the paragraphs 7.1 to 7.5 and their subdivision. At the end of each phase a short governance analysis is made. Since Triangulum is still ongoing, the final evaluation phase is not defined in this analysis. The research question is similar to the previous case study: How are governance factors used in the implementation of the Smart City initiative Triangulum in Eindhoven?

To tell the story of this specific Smart City initiative, unlike Transform, no official 'work package' documentation was available for this project, only one small part (14 pages) of the Description of Work was made available by the project coordinator. Unlike at Transform, I did not have insight information or personal relations as an intern. Therefore the descriptions mainly come from the interviews with the key stakeholders as well as from webpage, scientific and government publications about the project. Citations from interviews are marked with the name of the interviewee, 2016 and p.c., for 'personal communication'.

The case will show demonstrate good collaboration between the stakeholders based on earlier developed visions, facilitated by public and private leadership, based on a ex ante commitment for the partnership and including citizen participation with decision making power. Data exchange is crucial for some activities, while service integration can be an objective. Transparency and accountability have their limitations. Limited information on the activities is made available through public media, however some interesting and critical Triangulum reports have been found. The main documentations for this analysis are the Smart Impact baseline report and the Spotlight on Smart City Eindhoven report. Since the context of a Smart City initiative is critical, this model starts with an analysis on a city level.

7.1 Starting

1.1 Grow up the idea to become smart

The former mayor of Eindhoven, Rob van Gijzel, has been actively involved in developing the Smart Society from the beginning. Eindhoven has a local culture of research and experimentation, related to the founding of the Philips factories and the former world famous Philips NatLab. Currently it is the high tech region of the Netherlands with the only high tech campus, promoting itself as 'the smartest km2 in the Netherlands' with a focus on open innovation. In 2011, 'Brainport region Eindhoven' won the challenge for smartest region in the world (J. Brouwers, 2016). This title gave an enormous boost to the city of Eindhoven, attracting businesses and people towards the city, and can be seen as a start towards becoming a Smart City.

> Throughout the last 5 – 10 years Eindhoven has started several important pilot projects. With two different districts under redevelopment, Eindhoven is experimenting how to convert a brownfield and former production site [Strijp-S] and a social housing area from the 1960s [Eckart Vaartbroek] into smart districts (Duncan, 2015).

On the first of June in 2015, The New Institute and the municipality of Eindhoven have announced and started a new cultural programme for the period of 2015-2017, on the changing relation between citizens and the government. Here, the city of Eindhoven announced it would like to become a Smart, healthy, caring, innovative and adaptive city (Brouwers, 2015a).

1.2 Define the motivation and take the leadership

1.2.1 Motivation

"Eindhoven has the ambition to be energy neutral by 2045 to contribute to a drastic reduction of the overall CO2 emissions and to sustain human life in the city". Therefore the municipality published a document 'Eindhoven – Energy Neutral'. With this document is aimed to minimalise the energy demands of residents, businesses and council organisations within the municipality and that the energy required is generated sustainably (Gemeente Eindhoven, 2014b).

"For Eindhoven creating a "Smart Society" is the way how to achieve these ambitious goals." (Duncan, 2015, p. 80). The achieve this high ambition, the city of Eindhoven has strong commitment towards its citizens to enhance the quality of life, by mobilizing the creative power of triple helix parties and citizens (quadruple helix) all together. It is also opening the city itself as a real life testing ground for products and services. As the mayor states: "We should strive towards more smart solutions which connect all sorts of activities like entrepreneurialism, mobility, health, and energy. Only then we can reach a higher goal through the concept of the Smart City, like for example a Smart Society" (Van Gijzel, 2016).

The budget of Eindhoven of 2016 shows that their vertical hierarchical systems of organising city transitions is not functioning anymore in this changing society. Therefore the city wants to use living labs and focus on co-creative collaboration, to discover how these new ways of working are paying off in practice. In their coalition agreement they speak of the development from city towards a Smart City, or Smart Society, looking at digital developments in society and making optimal usage of the force of technology and ICT, and design thinking, so ICT can contribute to the energy neutrality and quality of life in the city. In this, the changing role of the government in a 'horizontal' network society, asks for this different approach in the municipal organisation. This accounts for the people working at the municipality, but also for the internal systems, processes and structures to become more flexible (Gemeente Eindhoven, 2015, p. 10):

> Eindhoven now wants to take the next step and make use smart solutions and smart processes as the normal way of providing urban services and developing and operating the city. Therefore it needs to make sure that it enhances municipal learning and communication process, provides for new finance and investment models and fully engages with civil society around the deployment of open data and data-driven urban services (Duncan, 2015, p. 80)

1.2.2 Take the Leadership

According to Van Oers, executive vice president at KPN, the municipality of Eindhoven, and the mayor in particular, is the driving force in becoming Smart (Daalhof, 2016). Since 2008, the mayor of Eindhoven has been profiling Eindhoven as the Brainport, Tech City, and lately also as a Smart Society. "The philosophy behind Brainport is the Triple Helix (nowadays often called as Quadruple Helix, including end-users)" (Szigeti, 2016). The vision is to build a Smart Society through a long-term approach for the soft-infrastructure in the city enforcing bottom-up developments. Co-creation will be stimulated, and (financial) collaboration will be searched for, to develop new business models. The city of Eindhoven states:

> We want the city and its citizens to benefit from our companies' developments. In order to be a living lab, we have to experiment, research and develop new ways of working and collaborating. It will not success straight away, and investment are made upfront the

benefits. To realise these ambitions in the current coalition period €0,6 million euros have been reserved for 2016. (Gemeente Eindhoven, 2015, p. 16)

The municipality of Eindhoven will take a number of measures on the road towards a smart society. Through the programme 'resident and municipal participation', the municipality of Eindhoven wants to increase local participation (Brouwers, 2015b). Until 2018, about 1,8 million euros will be spent extra to 'become Smart'. This will contribute among others to optimal usage of ICT and data-exchange. Eindhoven has been a promotor of Open Data for years and active in the field of privacy regarding open data. This shows for example in the yearly Open Data Conferences and the organized 'Living Data Game Challenge', a way to stimulate the use of open data and the participation of citizens in the creation of practical solutions for actual issues in the city. The leadership role by the mayor, and the municipality of Eindhoven, was internationally recognised at the CIO CITY congress in Amsterdam of this year, where Van Gijzel earned the title 'European Digital Leader' for promoting Eindhoven as one of the best Smart Cities of the world (Unknown, 2016a).

1.2.3 Local leadership in Strijp-S: PSB

As many interviewees have stated, prior to the Triangulum project a long trajectory preceded of pushing the 'Smart' Agenda and developing an infrastructure in Strijp-S suitable for this transition. Park Strijp Beheer (PSB), a public private partnership (PPP) between construction company VolkerWessels and the Eindhoven Council, existed for many years and worked as an engine to keep the community going. There have been plans for redeveloping Strijp-S, ever since Philips Electronics sold the site in 2002 to Park Strijp Beheer (PSB). An urban plan was developed and approved by the City Council in 2005, to accommodate the growth of companies in the area by renovation and new building production, including the creation of at least 2,500 new homes, space for small-scale business activities as well as leisure and cultural activities. The development strategy was to give the area a new identity as a 'creative city' actively fostering an atmosphere of cultural innovation and creative entrepreneurship. In their road towards becoming a Smart City, a state of the art data-net has been built, and Smart City knowledge has been gathered in a yearlong collaboration with Cisco and TU Eindhoven.

1.2.4 Local leadership in Eckart Vaartbroek: Woonbedrijf

In 2012, The Dutch ministry of Infrastructure and Environment together with Woonbedrijf, the main housing association in Eckart Vaartbroek, researched the meaning of Smart Cities, in discussion with citizens. The central question was "How can technology improve issues in the area?". Their answer was "by connecting bottom-up and top-down initiatives into a customized approach" (Unknown, 2012). They found that an important addition of the Smart Cities-thinking was that apart from existing sectoral and technology driven initiatives, the urban and spatial side needs to be included. By looking at the area it will become possible to look for cross sectorial, integral solutions matching local tasks and organisations (Gemeente Eindhoven, 2014c). In Eckart Vaartbroek the city of Eindhoven makes the choice for a bottom-up approach, starting at the individual. All kinds of participation is encountered. For example for Eckart in 2012 a covenant was signed using the slogan 'Citizens to move'. In Eckart project success is heavily depending on the right participation.

Mid 2013, Woonbedrijf launched the Woonconnect tool in a neighbourhood called 'Airey' in Eindhoven as a pilot project to test this ICT tool for further upscaling. This tool is one of the key projects in Triangulum for the area Eckart Vaartbroek. Woonbedrijf has assigned itself the task to make the urban area of Eckart Vaartbroek future proof. Woonbedrijf sees this transformation process with a steering role for the residents. Physically, in the form of renovation and redevelopment, as well as in the form of mental ownership. (Gemeente Eindhoven, 2014c).

1.3 Identify the department responsible for the development of the strategy and form a planning team

1.3.1 Department responsible

The city of Eindhoven has installed a Smart City board in which the main city sectors are represented This board functions against problems of silos in the municipality, and will focus on integral urban area development. The board contains the most important managers of the city, who come together to discuss and plan an area in the city, and who are in some way involved with the Smart City concept. They are having monthly meetings. This new planning team, started 1.5 years ago, first with informing, sending information, and creating awareness, but is now also creating commitment (Beijnsberger, 2016, p.c.).

A critical note regarding the strategy and management in Eindhoven is mentioned in the 'Smart Impact Baseline report' (2015). This report lead by the Manchester City Council and Fraunhofer institute – currently partners in the Triangulum project - mentions several challenges, among which:

> A lack of knowledge on the availability of smart solutions and their potential benefits has a significant impact on strategy. An unclear picture of own benefits leads to unclear priorities and often also unclear targets with respect to smart solutions. Eindhoven needs to improve its strategic grip on smart solutions, coming to an integrated management of urban development and maintenance processes based on clean and connected technologies, which is based on clear objectives and cross-sectorial management. (Duncan, 2015)

The content for this Smart Impact baseline report has been assessed in September 2015. Thus the Smart City board should have already been installed during this baseline review.

1.3.2 Triangulum planning team in Eindhoven

The initiator for the Triangulum project was the 'man in Brussels', van de Ven, Head of the Brussels Representation of the Eindhoven Region, who also was head of Policy development for EUROCITIES from 1995-2005. He activated the different stakeholders, and notified the relevant people in Eindhoven about this European call. In this the 'Smart' motivation was amongst others to receive European funding for already growing ideas.

On 3 December 2013, the executive board of the city of Eindhoven decided to agree on the positive reaction of the municipality to reply to the call (Triangulum) of the European Commission to propose projects in the Smart Cities & Communities programme. This initiated a European consortium, under the lead of Eindhoven, with key partners involved from the triple helix (Gemeente Eindhoven, 2014c). With this decision, the municipality and Woonbedrijf together aim for integral urban area development in the Smart City framework.

In October 2014, the stakeholders for Triangulum got together to talk about the contract which was settled in three months before the project took off 1st of January 2015. The consortium in Eindhoven would consists of five partners: VolkerWessels (as part of Park Strijp Beheer), the Technical University of Eindhoven (TU/e), Woonbedrijf, KPN, and the municipality of Eindhoven. This local consortium receives 6.4M € from the European Commission.

In this period of forming the Triangulum partnership, Woonbedrijf that a risk was that the renovation of social housing would turn these houses into higher segment housing, making them available for the 'free market'. This would go against the core goals of the housing association. Therefore they discussed this with the municipality, to make sure that the rents would not go over

the maximum monthly cost for social housing. Woonbedrijf says this transparency is crucial so each partner knows upfront what is at stake.

Reasons why Eindhoven won the call are formulated in a presentation during the Triangulum project presentation SCC Networking cocktail: “We read the call very carefully and ticked all the boxes . . . We boldly went beyond the call” (Unknown, 2014, p. 15). On the same slide is mentioned that partners still need to be specific about how much KwH, CO2 they are going to save. And that they need to “be realistic! E 25 mln is not that much for what you have to deliver!” (Unknown, 2014, p. 15).

For Triangulum in the municipality of Eindhoven, the alliance manager Henk Kok is part of the municipal sector strategy. This sector is part of the portfolio of one of the three members of the executive board, Roy Beijnsberger. He is responsible for the Smart City strategy in Eindhoven, therefore he takes at times different roles, from being a sponsor, ambassador, ‘crowbar’, or ‘greaser’ (Beijnsberger, 2016, p.c.). For example in the role of ambassador and sponsor, van Beijnsberger takes on international activities, like recruiting a manager to implement Woonconnect, a specific project within Triangulum. Beijnsberger sees his leadership more on a strategic than operational level. He has based his Smart City strategy on collaboration:

> We don’t have a heavy in-house Smart City organisation, unlike many other municipalities, but approach the Smart City from a network and collaboration perspective, since we are convinced that Smart City aspects are everywhere in the organisation, and that the emphasis should be on external collaboration. Therefore we are collaborating with the TU/e, Philips, Heijmans, etc. Therefore we have a light in-house Smart City structure. (Beijnsberger, 2016, p.c.)

Analysis Governance Starting Phase

The municipality of Eindhoven and the active role of the mayor demonstrates leadership on the way towards a Smart City/Society, with a vision and high ambitions. The city of Eindhoven say they have strong commitment towards its citizens to enhance the quality of life trough quadruple helix collaboration in living labs, enforcing bottom-up developments, and supports this by providing upfront ‘Smart City’ investments to realise these ambitions. The municipality has installed a Smart City board to increase cross sectorial municipal collaboration and service integration. The board sees ‘data’ and ‘external parties’ as essentials to improve integral urban area development, in which emphasis should lie on external collaboration, in relation to their lack of financial resources. But apart from these upfront ‘Smart City’ investment, and the set-up of a Smart City Board the city of Eindhoven seems to lack commitment based on the baseline evaluation report: stating that the municipality has “unclear priorities and often also unclear targets with respect to smart solutions.” (Duncan, 2015)

In reply to the EU call for the Triangulum project, Eindhoven has ‘boldly’ gone beyond this call, which shows their high ambition favouring Eindhoven over other cities. In contrast, the Eindhoven Triangulum team says realism is needed, now the call is won, which shows they might already have lowered their ambitions and expectations, proving that these European programs are set up to ‘aim for the moon’, and that even if you shoot for the starts, or the clouds for that matter, since securing funding is what is most important in this phase.

Locally in the areas Strijp-S and Eckart Vaartbroek, key stakeholders have been in close contact with the municipality. In both areas, bottom-up activities, innovation, and research projects regarding the Smart City concept are welcomed or strived for. To promote this, PSB published a Smart Vision document for the area to communicate their views on active participation in the area. In Strijp-S a

state of the art data-net is developed to use ICT in area for service innovation. Woonbedrijf in Eckart Vaartbroek is an ambitious and committed housing organization willing to steer on 'Smart' transformation, showing leadership by providing financial support for renovation projects. For Woonbedrijf, transparency is a crucial factor. Especially concerning communication with the municipality regarding the Woonconnect project and considering their core business of providing social housing, while also being transparent towards the citizens about their transformation plans, making sure the data-exchange does not affect their privacy, guaranteed by signing privacy documents with the involved parties.

7.2 Planning

2.1 Rebuild and analyse the strategic framework of the city

2.1.1 Analyse Strategic framework

According to Depla, the loco-mayor and alderman of economic development of Eindhoven, a Smart Society is a city filled with technical possibilities and innovations to improve the quality of life (Daalhof, 2016).

The city of Eindhoven defines its development into a Smart City and Smart Society as follows:

> *Smart City Eindhoven is: a city that uses the power of technology, ICT (open data and fast connections) and design (thinking) for the benefit of its citizens. A city that actively offers test labs for business and knowledge institutes, with the aim of enhancing welfare, jobs and sustainability. Application fields are for instance energy, traffic, public space and smarter and better organization of care, education and culture (Duncan, 2015, p. 81).*

I could not get this Smart City vision from a municipal website, that quoted it from the 'Smart Impact Document', by Duncan, in which he has no reference of his citation. Duncan made the following observation:

> However there is no strategic framework or measurable overall smart city development goals that Eindhoven [is using]. Strategies start at a lower, sectoral level: Eindhoven works with jointly developed thematic roadmaps. The Energy roadmap, Lighting roadmap, the Sustainable Urban Mobility Plan ('Eindhoven Op Weg!'), setting out the overall vision and strategic goals, and also the expected timeline and means necessary to achieve these results. Stakeholder and citizen awareness, participation and engagement are of vital importance to the city and have only become more acute in recent years as the municipality has been forced to deliver more with less. . . With this strategy Eindhoven and its triple helix partners, are setting out a smart sustainable future for the city and region. At the same time Eindhoven continues to place the engagement of all stakeholders at the centre of its policy processes. (Duncan, 2015, p. 83)

This introduction shows that although Eindhoven does not have a city level strategic framework, but rather a thematic one, towards a Smart City. The city focuses on using Data and ICT, while actively involving the quadruple helix, on project level.

Depla, alderman in Eindhoven for economic affairs, gives citizens a central position in the usage and production of Smart 'solutions'. Next to this top-down driven, 'bottom-up' participation strategy, she points out that collaboration is the key in this effort of becoming Smart. In Eindhoven, the 'Smart City' process starts with simple projects, like smart parking or smart trash handling, and can further develop when demand rises, so the city can become smarter. There is awareness that 'getting smart'

is a continuous effort with endless possibilities (Daalhof, 2016). The area of Stratumseind, the most crowded entertainment area in the city, is an example of an intense collaboration where municipality, the police, the technical university and higher education, together with companies like KPN, Atos and Philips are working towards a more safe public space (Daalhof, 2016).

Apart from ICT, participation and collaboration, information is noted as an essential part of the Smart City approach: "Information to create solutions, to get information on effects and to foresee relevant developments. For this the usage of multi-stakeholder information (data) is key." (Duncan, 2015, p. 83).

According to Neeltje Somers, strategic advisor of the municipality of Eindhoven, transparency and openness of data is an absolute must for the success of the Smart City: "Everyone needs to be able to access all data, if not companies will try to make money out of it . . . Innovation is only possible in total openness" (Unknown, 2015b). Eindhoven has stricter standards on privacy compared to the national guidelines

*Eindhoven recently [February 2014] installed the Socrata platform and made available governmental data. Socrata contains already several datasets (>40). It processes this data and presents it on a 2D-platform. . . This creates **openness and transparency** and enables first steps for **citizen participation** and the further development of an **app-ecosystem**. Currently the app-ecosystem involves several large Eindhoven enterprises (Philips), Brainport Development, App developers (mostly small sized SME's), educational institutions such as TUE and Fontys, higher education and several secondary schools, and the local sensor industry.*

Figure 7-1 Socrata platform Eindhoven

2.1.2 Plans to Rebuild the Strategy

To operationalise this process of open data: "Eindhoven *plans* to roll out a robust (open) data platform, including a processing unit and dashboard and data analytic tools" (Duncan, 2015, p. 83). The "Eindhoven Kompas", as this system is called, takes the next steps to extend the use of this enabler for Smart City developments:

> Government, citizens and business alike *plan* to offer their data, according to common and agreed standards, and develop and implement the integrated solutions that raise the quality of life in Eindhoven. In this way technology contributes to achieving the behavioural change they need for increased energy efficiency in housing and mobility leading to reductions in energy consumption and environmental improvements. (Duncan, 2015, p. 83)

The Smart City Strategy Eindhoven (to be finalized end of 2016) plans to:

- create one solid (integral) communication program around Smart City (projects), their future and their benefits;
- develop better access to financial means;
- develop multi-stakeholder business cases for a future proof realization;
- Up scale the living labs, from successful solutions from Living Labs to city level and beyond. improve the government (internal & external) (Duncan, 2015, p. 86).

Furthermore a roadmap will be defined, in the form of an Integrated Action Plan (IAP). This will include "a roadmap to planning, financing and operating smart solutions and services as key aspect of everyday city development and maintenance." (Duncan, 2015, p. 81).Eindhoven's Integrated Action Plan will focus on 'strengthening the social base'. Part of the IAP is:

- Developing workable models to enhance and finance regular maintenance/governance programs in order to get a step-to-step transformation of city areas towards a smart city while the public space become Smart City and field lab;
- Developing a vision/strategy for the city centre;
- Realisation of state-of–the-art city beacon program in the center of the city, including development of pilots for multi-thematic usage;
- Development of suitable third party cooperation on creation, analysing and using (open) data based ambitions. (Duncan, 2015, p. 81)

2.2 Formulate a long-term vision, and define objectives, approach and lines of action

Eindhoven has formulated different roadmaps for future developments like for example the 'Vision and Roadmap Urban Lighting Eindhoven 2030' and roadmaps for energy and education. These are used for guiding the developments, among others to select relevant partners by executing a European tender.

2.2.1 Long-term vision Triangulum

The Triangulum smart cities and communities project aims to upgrade the quality of life for the citizens of Eindhoven and the rest of Europe (Kok, 2016, p.c.). Triangulum aims for demand driven area development based on a shared vision to improve the quality of life of the citizens. The vision for Eckart Vaartbroek is in line with this Triangulum vision.

2.2.2 Vision Strijp-S

In 2014, PSB initiated the 'Smart Strijp-S Vision'. In the making of this vision, stakeholders were gathered to express intention to collaborate on roadmap projects, under the umbrella of the Smart City concept. This vision is used to respond to current problems and needs in the area whilst capitalizing on the innovative Living-Lab position of Strijp-S (Mak & Roodbol, 2014) and in order to prioritise core activities that lead to an implementable roadmap. "The goal of Smart Strijp-S is to activate urban innovation for value creation that enhance the general well-being of individuals and the community" (Goulden, 2015, p. 1):

> The vision for S-mart Strijp-S has emerged from within an overarching position of Strijp-S as 'creative city' and 'living-lab'. . . The S-mart Strijp-S vision incorporates a broader perspective on resource sustainability, going beyond natural resources to incorporate an equal emphasis on urban and human resources; nurturing the conditions for both a thriving and a resilient community (Goulden, 2015, p. 1).

Van Eijkeren, property developer active in Strijp-S, says that local support can only be acquired by sharing visions and dreams based on bottom-up possibilities. According to him, this creates an innovative climate which attracts human capital and businesses (van Eijkeren, 2016, p.c.). However, according to van Dieren, in Strijp-S "still a lot of personal communication and an extent of resourcing is needed to evoke participation" (van Dieren, 2016, p.c.).

2.2.3 International Objectives Triangulum

The European objectives are that Triangulum will see Eindhoven, Manchester and Stavanger address energy, mobility, innovation and (open) data in an effort to improve the quality of urban living in general and of sustainable energy and mobility in particular. The first newsletter of Triangulum started with: "We have a clear objective: Triangulum is going to demonstrate, disseminate and replicate innovation, urban solutions and a detailed framework in order to co-create our future 'smart' cities'" (Triangulum, 2015, p. 1).

2.2.4 Objectives Triangulum Eindhoven

What are the objectives on the local scale? Eindhoven will be "developing smart districts through a combination of Energy- Mobility, - Building technologies and integrated infrastructures." (Duncan, 2015, p. 89). Thus including both service and infrastructure (physical) types of Smart City projects.

The Triangulum objectives for Eindhoven were agreed upon during the consultation phase prior to responding to the call. From the Discription of Work the following has been formulated in the Grant Agreement in fine detail:

The core of the Smart Eindhoven approach is the roll out of a robust data platform, including a processing unit and dashboard. Government, citizens and business alike offer their data, according to common and agreed standards, and make use of this data to develop and implement the integrated solutions that raise the quality of life in Eindhoven. In this way technological innovation in the field of refurbishment and sustainable mobility contributes to achieving the behavioural change we need for increased energy efficiency in housing and mobility leading to reductions in energy consumption and environmental improvements.

The implementation activities in Eindhoven will lead to innovative and "connected" urban neighbourhoods. The overarching aim of the Eindhoven partners in the context of TRIANGULUM will be to achieve a Smart Eindhoven through three main transformations that characterize our city:

1.The first transformation in Eindhoven consists of the creation of highly energy efficient buildings and transport systems, which is a city-wide need and is shared all over Europe. In line with the 2011 decision of the City Council, Eindhoven has the ambition to be energy neutral by 2045 to contribute to a drastic reduction of the overall CO2 emissions and to sustain human life in the city and on our planet. To achieve these aims, measures are needed in both the area of the built environment and in the field of urban mobility. Furthermore, the city has a strong ambition to embrace the information age and develop and implement modern ICT solutions to achieve a better quality of life and support a new way of delivering its services.
2.The second transformation will happen in the area of Strijp-S. It comes from the need to transform the functionality of the area from a closed industrial site within the city, where R&D and production of consumer products of the Philips enterprise took place, into a vibrant, multifunctional, open and creative urban environment that can serve as a European Smart City Lighthouse District. In addition, the location of the area within the city requires an approach focusing on the reuse of existing infrastructures for an optimal support to create a mixed use area of citizens, SME's and creative start ups and entertainment serving the new economy. This economy must be sustainable in terms of energy consumption and mobility.
3. The third transformation refers to the integration of citizens and urban planning into the smart city development. The need for urban development in the area of Eckart – Vaartbroek - a lower price residential district from the 50s and 60s that can be found in almost every larger European city in a similar form - is based on the fact that the housing, services, public space and the social atmosphere do not fit well with the current mix of the population. The inhabitants from the 'first hour', many of whom are senior, retired, citizens, and the new groups of citizens, which have moved in – young middle class families, often from another cultural background – request a quality upgrade of public space and social environment. Of the 4,553 houses in the selected area, a total of 1.900 are owned by, and fall under the responsibility of the housing corporation Woonbedrijf, one of the partners in the Eindhoven consortium. The other houses, including apartments, (2.653) are owned privately or by other housing organisations.

TRIANGULUM will develop the selected areas as urban living labs, where new technologies and innovative approaches will be tested, with a view to successfully replicate solutions to other neighbourhoods within the city and beyond. From the start of the project, the Follower Cities and, at set moments, other interested local authorities, will be engaged in this process, with a view to ensure the development of solutions with a replication potential across Europe. Within Eindhoven, the selected neighbourhoods are Strijp-S and Eckart-Vaartbroek. The city has opted for two areas that, while situated close together, have

Figure 7-2 Objectives Work package 4 Triangulum, from the Description of Work

The objectives shows that "implementation activities in Eindhoven will lead to innovative and "connected" urban neighbourhood", relating to "nearly zero or low energy districts, integrated Infrastructures and sustainable urban mobility". The core of triangulum is to the roll out of a robust data platform, with the focus on three areas are mentioned: The creation of highly energy efficient

buildings and transport systems; Strijp-S redevelopment, focusing on the reuse of existing infrastructures for an optimal support to create a mixed use area of citizens, SME's and creative start ups and entertainment serving the new economy; and the integration of citizens and urban planning into the smart city development in Eckart Vaartbroek.

How are the districts transformed into 'nearly zero or low energy districts', is described in the Grant Agreement, below an overview of the impact of the objectives is given.

- Significant increase in joint ownership of Smart City Eindhoven among users. Citizens and other relevant actors will be engaged in the process of investing into Eindhoven as a Smart City;
- new, smarter way of working of the city administration that allows true integration of Smart City aims and objectives within and outside the municipal organization;
- the implementation of innovative energy saving technologies that will reduce energy bills and limit CO2 emissions with a factor three (67%) in the smart office;
- data infrastructure and sensor network got a boost, when the open data platform further facilitates smart city developments;
- people know they've been consulted and projects are being implemented in co-creation;
- there's been a sustainable transformation of public space, and housing is still affordable;
- there's an uptake of smart solutions and a redefining of quality of life (Triangulum, 2016a).

The list of objectives for Triangulum is quite long, and it will be difficult to measure, monitor or evaluate these objectives since only one objective is quantifiable: '2/3 of CO2 reduction' is aimed for in the Smart Office project.

2.2.5 Approach

International project manager Radecki, at Fraunhofer, who is in the lead role in Triangulum, says "To achieve this [innovative urban solutions] we're implementing pioneering concepts for sustainable energy supply, mobility, and information technology"(Fraunhofer IAO, 2014). How are the 'pioneering concepts' planned to be implemented?

In the concept report 'A Spotlight on Smart City Eindhoven – How can Eindhoven become a Smart City faster?' by Mol, Khan, Aalders and Schouten (2015) Triangulum in Strijp-S is studied. The authors state that "The Triangulum project will demonstrate how a 'systems innovation approach' based around the European Commission's Smart Cities and Communities *Strategic Implementation Plan* can drive dynamic smart city development" (Mol, Khan, Aalders, & Schouten, 2015a, p. 56). This is in line with what Willemse, from KPN, states "The approach of this project is strongly directed by the EU-demands presented in a comprehensive bookwork. These demands are forcing the stakeholders to go through a collective process to present a clear vision. The EU has also demands for the documentation which gives some support to the transfer of knowledge if whished for or become necessary by changes in the teams. Communication, transparency and accountability is hereby enforced". The exact meaning of a 'systems innovation approach is not found in this studies.

Data exchange is a central in this innovative approach: "Eindhoven has . . . combined a set of technology-based projects to enhance energy-efficiency in buildings, provide renewable energies and sustainable mobility to the districts based on an ICT and data-related approach" (Duncan, 2015, p. 89). By combining this systems innovation approach, with the living lab approach, ICT & Telecom becomes part of the development process; which (hopefully) leads to more integration and more openness;

A ‘FI-ware’ (Future Internet-ware) standard is used in Strijp-S as ‘base architecture’. According to van Dieren, Strijp-S is a living lab in which ideas can be tested to further enrol in the rest of the Netherlands, the same is possibly so for Woonconnect and the other projects in Eckart.

Partners in Triangulum use the ‘the value model’ as a method to develop projects in this Smart City initiative. Not only the municipal project leader and the housing association Woonbedrijf are using value cases as a strategy in Smart City implementation, this applies also to other parties. In this approach, actors are focusing on the social/societal added value, instead of only the financial feasibility of projects. A hot topic, the ‘Value Case’ is the key theme in this years’ Smart City congres in The Hague. Van Oers (KPN) agrees on the necessity of the value case approach for Smart City projects. KPN even promotes this method on the website ‘www.ibestuur.nl’ (Oers, 2015). It is explained in line with Michael Porter’s ‘creating shared value’, in which the well-being of the community surrounding the company is mutually dependent to the competitiveness of the company:

> A business case is seen from the perspective of one party/company, while the value case is referring to creating value for all stakeholders. A value case the value that every party for themselves create within a project or programme. It is mainly suitable for complexe projects of which the direct (financial) value is not explicit, tangible or feasible, but which have a considerable societal impact value. This is what make the value case eminently suitable as a basis for collaboration within Smart Cities. The joint development of such a case will give Smart City-project participants insights in the societal effect of their initiative, and makes sure that each participant will reap benefits. The shared value case forms the basis for the individually to be developed business case. (translated from Dutch)(Oers, 2015).

The requirements for this approach, as mentioned by KPN, are that the process will be dynamic instead of linear, which comes down to conditions like trust, willingness to be transparant about interests and ambitions, and the capability to come towards creative solutions and deal with complex planning issues. Working in all this ‘openness’, demands time, patience and courage. It will be a demanding and difficult trajoctory. If a Smart City initiative really wants to be successful, all parties should strive for the same objectives, only then cities can become smarter! (selectively translated from Dutch) (Ogunjuyigbe, Monyei, & Ayodele, 2015)

In the area Strijp-S, according to van Dieren, developing a ‘value case’ is easier said than done: “The municipality makes the step towards a value case, but for businesses this will not pay for your people. Financial feasibility stays an issue”(Van Dieren, 2016, p.c.). According to von Radecki (as written in Kumar, 2016) the risk of the value case is “connected to achieving the benefits. If it has not been proven that, e.g. an e-car-sharing solution frees up public space in a certain district by a certain amount of m2 . . . investments will not happen.” (Kumar, 2016, p. 309). Therefore he underlines that “prospected benefits of smart city solutions need to be proven under reproducible circumstances in order to convince future beneficiaries to become smart city investors” (Kumar, 2016, p. 309).

2.2.6 Lines of action

The two Triangulum smart districts in Eindhoven will have different lines of action related to the local needs. In general, van Eijkeren, states “Top down development doesn’t work in The Netherlands, it only works when society is widely supporting the developments, therefore we are aiming at including citizens in the entire process, that is our way of building a Smart City” (van Eijkeren, 2016, p.c.). This view forms the basis for participatory urban development.

In Strijp-S, Park Strijp Beheer, already for some years now, has initiated multiple projects. PSB is functioning as an incubator to test solutions to be rolled out elsewhere. According to van Dieren,

> The lines of action are not pre-defined since they will have to be based on the input from participants: By the mix of players a new integrated domain arises. Cooperation in the ecosystem implies a demand driven approach. In this, data and applications add a new layer to urban area development.The Strijp-S-area is further developed with the input of young citizens and start-ups. Participation in the design phase should lead to participation in the exploitation phase. Therefore we have set up the foundation of a special fund to stimulate innovation activities in the SME's. (van Dieren, 2016, p.c.)

The local needs in Eckart are different from the 'creative business sector' in the Strijp-S area, focusing on the 'quality of living' and energy reduction:

> A different set of challenges is posed by the Eckart Vaarbroek district, where energy-efficiency renovations will be carried out on the social housing stock that predominates in this area. In order to precisely calculate energy savings, the project will use an IT-based instrument capable of modeling costs and yield in a 3D visualization of the district (Triangulum, 2016a, p. 2).

2.3 Select the fields of action

The Living Lab strategy is used for Triangulum. The TU/e has described sustainable transformation of cities and districts (or neighbourhoods) into a 'Living Lab', if a consortia of the government, industry, SMEs, citizens and knowledge instituions are working together on innovative subjects which have been defined and are actually being implemented; where all parties take account of the sustainable future of the 'Smart City', of which, on the long-term, the entire world can (and want to) learn (Nelissen, 2015, p. 17) Two of these districts have been defined for Triangulum: Strijp-S and Eckart Vaartbroek.

2.3.1 Strijp-S

The Strijp-S area is located north east of the city center (as shown in paragraph 2.4). It is the former business park of Philips. Since the year 2000 first conversation were held on the redevelopment of the area. Since then housing has been developed in the area, as well as businesses from the creative sector. In 2012 the area gets its first permanent residents. The area is further developed and is attracting young residents, in the year 2015 about 78% of its residents are between the age of 20-34 years old (Wikipedia, 2016a).

Figure 7-3 Overview area Strijp-S

Allthough, the amount of residents in Strijp-S is low, and the buildings are mostly (empty) office buildings, plans for the area are that:

> The former Philips industrial complex will become a creative smart district. A district-wide ICT solution will allow residents to access different kinds of infrastructure, such as booking electric vehicles from a district car sharing scheme ore using smart parking concepts. In this way, the IT-based tool will help residents to develop sustainable patterns of energy and mobility behavior. (Triangulum, 2016a, pp. 1-2)

2.3.2 Eckart Vaartbroek

Eckart, is located in the Woensel-North area, north of the center of Eindhoven (as shown in paragraph 2.4). This typical housing area dates back to the 1960s and consist of about 5000 single-family housing, privately owned or owned by housing association Woonbedrijf. Although the housing types are quite uniform in their building type, the social composition of residents is diverse. Central in this area is the Amandelpark, with a pond, which has been redeveloped in 2007 (Wikipedia, 2016b).

Figure 7-4 Overview Area Eckart/Vaartbroek

2.4 Set up a team responsible for the implementation of the strategy and establish roles and responsibilities

On a meta-level the consortium is aligning activities with the Frauenhofer Institute as overall coordinator on the EU-level.

2.4.1 Implementation Team Triangulum

The stakeholders in Eindhoven have been familiar with each other for a longer period of time, together they were willing to make a step forward stimulated by EU-funding. To apply for the EU call a partnership has been formed. According to Hijdra from Woonbedrijf "Transparency is key in this phase; transparency about clear targets, and the existing regulations per partner. It is mainly about the agenda of the different organisations, and of course also about the process of execution and administration. For example clear performance indicators and how to report these"(Hijdra, 2016, p.c.). She finds accountability "is internally sorted by the partnering organization by linking the project to the vision, mission and strategy [of that organization]." On the other hand, "external accountability is sorted by meeting legislation and accountancy conditions"(Hijdra, 2016, p.c.).

After the granting of the EU-funds the partnership is contractually formalized, thus creating ex ante commitment (Weening, 2006) for the implementation of the projects. The consortium consists of five partners: VolkerWessels, Woonbedrijf, KPN, the Technical University of Eindhoven, and the Municipality of Eindhoven. The partners developed agreements, rules are for example: having only one external voice; decision making based on consensus, with specific procedures in case consensus is not reached; and having a yearly 'General Assembly'. The grant agreement with the EU acts as the basis for agreements on property of data, information and project outcomes: "General responsibilities are that the work is done in good harmony, open communication and a positive-critical attitude towards each other, transparent and mutually defiant. There are no hidden agendas", according to Willemse from KPN (2016, p.c.). According to Kok, alliance manager from the Eindhoven municipality "Within the context of an EU-project there is always a strong focus on legal and financial frameworks. This helps in building a basis for collaboration between stakeholders."(Kok, 2016, p.c.)

When asked about the aspects of collaboration, according to van Dieren, from PSB "Collaboration demands for a good match between the involved personalities and for each stakeholder the right representatives that can act on different levels. The group individuals should be able to be complementary to each other, for example in having a more content or more organization oriented focus".(van Dieren, 2016, p.c.)

2.4.2 Roles and responsibilities

This step in the process closely relates to the previous described objectives for Triangulum, in which each partner has their own projects to work on.

The municipality is the coordinator and external (inter)national voice for the partnership. Henk Kok of the municipality has the role of 'alliance manager' or 'shepherd' as the first among equals offering facilitating leadership. The responsibilities for the alliance manager are on the one hand, chairing the table of the Eindhoven consortium partners and on the other hand coordinating the municipal activities in the project. Communication is one of his major activities, reporting on the results to the EU; coordination of the activities of the consortium with the other international partners in the project, and communication to Eindhoven and the European citizens about the results (Kok, 2015). Yang, Postdoc at the TU/e working for Triangulum Work package 2, states "this time it is different, they are the leader, they put a lot of effort into making it happen . . They have to make sure procedures of the project are going well. So they put effort each project goes on time." (Yang, 2016, p.c.) According to Yang, responsibilities are clearly defined within this project: "We have a well-structured organisation. With clear manager, a general board of different partners of Triangulum, and there are different project managers for each project. Each partner knows their role to play, their responsibility is relatively clear" (Yang, 2016, p.c.).

The development of indicators and actual monitoring and evaluation is a cooperation activity between the Technical University of Eindhoven and the project managers. Partners agree that this collaboration with a knowledge institutions is necessary to make sure to objectively evaluate projects: "If not, we can mark our own paper", according to van Dieren. The TU/e is working on a monitoring and evaluation methodology, with general indicators for all cities and more specific indicators per project. However, since the objectives are not clear yet, also the indicators are still 'under construction'. To decide on these indicators, input is gathered from the specific projects and project managers, to create a customized approach, making this activity less independent than it seems.

Next to this monitoring Work Package, the TU/e has set up a 'Smart Cities Centre', with six core members, of which Bauke de Vries and Dujuan Yang have been interviewed for this research. The main goal of this centre is to develop concrete research projects based on the needs of internal TU/e as well as external partners (Nelissen, 2015, pp. 14-16).

There are public and private partners in the lead of the Triangulum team, this differs per project, as shown in fig. 7-5. Next to the municipality, PSB and Woonbedrijf are mentioned as leaders by the different interviewees. This also is stated in an official document of Triangulum: "Partner Woonbedrijf is leading in the renovation process of 200 town-houses. Moreover, in close cooperation with KPN, they want to report on the progress and intermediate conclusion drawn out of the first implement of the Woonconnect tool in the retrofitting process"(Triangulum, 2016a, p. 3). Woonbedrijf has agreed with the residents to sign a contract for data sharing and securing their privacy, in collaboration with the energy company. The same document states that "the municipality of Eindhoven will take the lead in a Smart lighting project around the pond in Eckart Vaartbroek and they will develop a dashboard of performance and a basis for an App around the ICT open data platform in both areas [Strijp-S and Eckart Vaartbroek]."(Triangulum, 2016a, p. 3)

Partner VolkerWessels [VW] is, as most partners, involved in more projects. One of them is the backbone. The backbone is a system of complex hardware and software that monitors and controls street lighting, mobility, houses, offices etc. of the 'smart city' (Triangulum, 2016a, p. 3), required to support a more innovative and intelligent public lighting system.

The different stakeholders playing a leading role, results in a somewhat shared leadership. According to van Dieren this brings up the best in the different actors:

> The ideal qualities of a good leader - knowing what's at hand, familiar with the different cultures, profile of a business developer, fast acting, good communicating change manager- are looked after in the different people involved. Stakeholders take responsibility and show leadership for specific tasks in their own direct influence and have to check on the relevance of sharing knowledge with the other stakeholders. (van Dieren, 2016, p.c.).

Strijp-S implementation team:

Not specified per projects: Smart Office, Smart Parking, Smart Lighting,

- SDK Vastgoed (Real Estate Developer)
- Park Strijp Beheer (lead)
- Local SMEs and citizens/residents
- Eindhoven University of Technology

Eckart Vaartbroek implementation team:

Project Woonconnect	*Project windturbine*	*Project Public Space*
Woonbedrijf (lead)	Woonbedrijf	Woonbedrijf
De Twee snoeken	Start-up IBIS Power (lead)	
KPN		KPN
Municipality		Municipality (lead)
TU/e	TU/e	TU/e
Local residents	Local residents	Local residents

Open data platform: The Municipality of Eindhoven

TU/e is monitoring and evaluating the projects & Smart City Center

Figure 7-5 Overview of the two Triangulum smart districts in Eindhoven and project stakeholders

As shown in the stakeholder overview, and according to van de Ven (Head of EU Office City of Eindhoven) other parties will be introduced to enforce participation: "The consortium brings in two citizens driven initiatives, the STIR Foundation, focusing on air quality, climate change and health, and the Morgen Groene Energie foundation, focusing on facilitating the energy transition among citizens"(van de Ven, 2014). This announced collaboration with the STIR foundation and the Morgen Groene Energie foundation, is not further recognizable in any of the plans or publications, and has not been mentioned in any of the interviews.

Willemse from KPN stresses the importance of a good informal understanding, "the 'spirit' or actual motivation and commitment, is more important than the 'law' [the comprehensive contracts and agreements to the letter]"(2016, p.c.). He states participants are able to act in a not to restricted environment to support real innovation, in which the focus lies more on the shared vision and the right attitude to make things happening, than on the shared contracts.

2.5 Establish how to produce and select ideas

How exactly ideas are produced is not clearly defined. My impression is that most project ideas were already being studied at the moment of writing the call for Triangulum. This also relates to the TRL level, in which projects already have to be tested. This phenomenon of bringing existing project ideas under the scope of a subsidised program is also a finding from Haarstad in one of the first research publications on Triangulum activities: "However, the Triangulum project does not itself constitute a radically new set of initiatives and projects in technological terms or in terms of policy goals. It is a new policy frame that allows local actors to place those largely pre-existing projects under a common umbrella, and opens up new ways to think about how they fit together". (Haarstad, 2016) .This is in

line with what Yang says “In Strijp-S they [PSB] do not only have the Triangulum project, they have their own plan, it is just one small part off their whole plan.” (Yang, 2016, p.c.), and with findings regarding projects like Woonconnect and the Biomass power plant (paragraph 7.3).

Only for the, financially smaller innovative projects in Strijp-S, the selection still needs to be done. Therefore, on the 28th of June in 2016, the municipality of Eindhoven, together with VolkerWessels and the TU/e opened an ‘iCity Tender[2]'; an international competition in which small and medium enterprises, or start-ups and entrepreneurs can sign up with a ‘smart’ application for the area. Five ideas will be picked by a jury. Each plan can get maximum of 5000 euro (in phase 1) to further develop, with a possibility to receive another 20.000 euro in phase 2. (Unknown, 2015c). Parties need to take the following into account when submitting project proposals:

- Be innovative (10%); “we are searching for innovative products, services and crossovers. The used techniques does not have to be completely new”
- Improve the quality of life (20%); “we are not aiming for technological gimmicks […] products and/or services have to add extra value [directly/indirectly] to the end-user”
- Be developed within the described Smart City layers (10%);
- “The cloud [data] layer, the liveable layer [tangible part of city], and the infrastructure layer [roads, pipes, cables]. The interaction between these layers makes the city smart. New products and/or services need to be developed within these layers. They also need to stimulate crossovers: solutions based on interaction between the different layers.
- Have an influence on the public space (5%);
- Be generic and replicable (20%);
- Be scalable (10%);
- Increase employment within the area Strijp-S (5%);
- Have a solid business model which is based on competitive prices (20%); have a solid and transparent business model (Unknown, 2015a).

Van Dieren states that “the plans need to be commercially and technically viable, in every city. They need to have a business plan, and connection with daily reality” (Unknown, 2015c).

2.6 Define a monitoring and evaluation methodology

The monitoring and evaluation of the implementation is part of Triangulum Work Package2, under the lead of the TU/e.

In the project organization of Triangulum monitoring is a build in function because of the existence of the ‘follower cities’. On a European level, Beijnsberger says that “. . . through which you are getting adjustments and improvements of the things you are doing. That is how you keep each other sharp and to learn from each other” (Beijnsberger, 2016, p.c.).

Locally, the University of Eindhoven has set up general baseline indicators for monitoring and assessment purposes of all projects in the three lighthouse cities of Triangulum. In Eindhoven the TU/e together with the different project managers have then discussed per project what the additional indicators will be. Indicators for measuring progress are to be set by all partners in cooperation at the start of the implementation activities. For many projects, the exact indicators are still to be discussed. The Multilevel Impact Assessment and Monitoring is described in the current Baseline Report for Work Package 2 (Triangulum, 2016b). This report is still in its first draft, and first

[2] iCity is a new VolkerWessels company aiming at developing Smart City knowledge and services and to remarket these.

results cannot be shared yet, therefore no examples can be given. About this methodology, Yang from the TU/e says “We started a baseline data, for some indicators, for example energy usage is used from companies, this data might not be very accurate, but we use this as a baseline. We do a yearly evaluation and update of indicators” (Yang, 2016, p.c.).

2.6.1 Monitoring on a project level

The Smart office: Sensors will be installed to monitor people’s usage of the office and try to control the usage of the heating. Thus energy/emission reduction will be measured. Other soft indicators (extended) are related to the level comfort of the people working in the building. By adjusting behaviour and the sensor of control (two components; an app for each office users and a central control for when people left the building). Below the Smart Office, as explained in the DoW:

> *A significant potential exists to reduce the energy consumption of the Strijp-S office buildings through measures that induce behavioural change of the workforce. An innovative concept has been developed that includes the following elements:1) the individual control of working pace by occupants; 2) self learning capabilities of the control algorithm; 3) dynamic working hours prediction.*
>
> *The partners anticipate an estimated 20% of energy saving on heating by active peak shaving, based on predicted energy consumption. The pay-back of the system is less than 10 years. It stimulates energy-efficient behaviour through an incentive system and has a high degree of potential success due to the fact that an attractive app invites this behaviour while the total concept does only in part rely on the behavioural change of the user. The other important energy saving capacities result from the self learning capabilities of the system which allows it to recognise patterns and adapt the energy management system accordingly. The pilot consists of the installation of a number of sensors in 148 office spaces together with a central controller. In addition a cloud based controls algorithm will be installed across the buildings to enable peak shaving. The size of this pilot (about 7,500 m2), which is based on the positive initial results from a test trial, should be convincing for future large scale roll-out.*

Figure 7-6 Monitoring information Smart Office (Partners Triangulum Eindhoven, 2014).

- Indicators are energy consumption/ efficiency.

Smart parking: There are different monitoring ideas, but it is not concrete yet. Possibilities are:

- Relating to the quality of life, increased efficiency of the parking, and possibly reduce the parking, by improving other transportation.
- Indicators: increase of parking efficiency
- How to reduce parking time, detailed indicators will be measured.
- Something that we can sure have as a measurement: the amount of EVs

Smart lightning:

- Overall objective is to improve the quality of life, measurements will be ‘soft’ factors, like safety.

The round around the pond:

- Soft indicators will be formulated to understand residents feeling about this road, by interviews.

Woonconnect: For Woonconnect “we are monitoring energy consumption and their procedures to renovate the building. The promise they made that it will be in coherence with the residents living there. The ultimate goal is to increase the energy efficiency, at the same time we are also monitoring their procedures, and to report the process, regarding to the residents feelings of comfort of the renovating procedure.” (Yang, 2016, p.c.).

- So there are hard (energy) & soft measures (procedures).

Analysis governance planning phase

The stakeholders interviewed for this research, show awareness of the impact of different governance factors in the planning phase, by underlining the importance of these processes. The Eindhoven municipality is active in their Smart City strategy collaborating with many stakeholders to realise Smart projects. High ambitions and expectations of the Smart City start in Eindhoven with planning 'simple' projects. This is feeding criticasters in their perception that Smart City initiatives as an urban policy narrows down into smaller deliverables with minimal effect. The phenomenon of bringing existing project ideas under the scope of a subsidised program is also a finding from Haarstad (2016), as well, as it was for Transform and is the case for Triangulum in Eindhoven.

The **collaboration** within Triangulum is based on an earlier developed long-term strategic vision and intense conversations at the set up between possible partners on the availability of resources and openness about agenda's. During this planning period a Smart Strijp-S vision document has been made available to stimulate collaboration. This way citizens are informed and activated through intense **communication** with people in the area with a focus on SME's participation. For Eckart Vaartbroek this process happened prior to the planning phase.
The EU is more than just a funding organization, European documentation, with a set of agreements, like the grant agreement, forms a basis for collaboration. Especially transparency is mentioned as a key component towards successful collaboration: "**Transparency** is key in this [planning] phase; transparency about clear targets, and the existing regulations per partner" (Hijdra, 2016, p.c.). Willemse underlines that there are "no hidden agendas". Van Dieren stresses that for good collaboration it good match between the involved personalities is needed, as well as "having the right people for the right tasks"(2016, p.c.). I find transparency about the clear targets is still missing for the specific projects within Triangulum, while transparency on the process level seems to be well sorted within the partnership.

A contractual local **partnership** and implementation team for the specific projects is created with ex ante commitment, which is enforced by the EU in their communication, transparency and accountability. The spirit, commitment and motivation of the partners is for some participants more important than the underlying contracts.

The **leadership** skills mentioned by Kok and van Dieren, relate very much to the ones found in literature, and my definition of leadership in Smart City governance: in situations where there is no hierarchy to steer from, understanding concerns and interests of all stakeholders is crucial. On a project level, leadership is clearly defined. Each partner is responsible for specific projects to implement. Projects are based on key themes and have an 'integrated approach' which refers to the combination of data, ICT, and citizens in the area development, and possibly combining different technology aspects. Yang states the central facilitating leadership role of the municipality makes them more active than usually in other projects.

The municipality aims, and claims, that bottom-up **participation**, co-creation, transparency of data, and optimal ICT usage is their approach towards becoming a Smart City. While most Triangulum projects are planned top-down, some of the projects, like WoonConnect, are in desperate need of citizen participation to make this project development a success. Therefore I see this process as a demand driven middle-out approach. Participation should be increased by the two different foundations STIR and Morgen Groene Energie, however no signs can be found that this is the case. Organizing participation from a top-down perspective shows to be a difficult process.

Hijdra says **accountability** internally "sorted by the partnering organization by linking the project to the vision, mission and strategy [of that organization]" and "external accountability is sorted by meeting legislation and accountancy conditions"(Hijdra, 2016,p.c.). I see 'improving quality of life' as a very broad vision without clear objectives, which can lead to a lack of accountability. The list of objectives is long, while it will be difficult to measure, monitor or evaluate, these objectives. As Yang says "Data might not be very accurate"(Yang, 2016, p.c.), underlining the difficulty of the TU/e task. The development of indicators and actual monitoring and evaluation is an independent activity of the university, however still 'under construction'. Partners agree that this collaboration with the TU/e is necessary to make sure to objectively evaluate projects. The TU/e has set up a Smart Cities Centre to improve collaboration on the topic of Smart Cities.

It is not transparent on what basis the different Triangulum project plans are selected, apart from the iCity tender, neither is it clear to what degree the projects actually contribute to the goals and objectives of Triangulum. I did not found out what the sanctions will be for the specific partners if project objectives are not met.

In this phase, direct barriers regarding data-exchange are citizens not willing to share their household information, in a project like Woonconnect. In this stage, about 200 households have shown to be willing to collaborate and signed a contract with the energy company and Woonbron for sharing information, creating a trusted third party for citizens data ownership. In the future, for the other households the same approach will be chosen to safeguard the data. Service and application integration will get shape in planning to combine energy, mobility and building technologies in the different Smart City projects.

7.3 Development of projects

3.1 Activate the implementation team and start the activities for implementing projects

The first Triangulum newsletter posts that "The Triangulum project started highly motivated with a kick-off meeting in Manchester in February 2015. On the following weeks, Lighthouse Cities started detailing the implementation process of smart solutions within their lighthouse districts"(Triangulum, 2015). In October 2015, "local experts from the implementation layer and from political and administration bodies helped enhancing the knowledge about Triangulum activities" (Triangulum, 2015).

> The Eindhoven partners will realize 20 activities that will improve mobility and energy in a sustainable direction via the use of innovative ICT solutions that make use of open data. Stakeholder involvement - citizens, (local) business, knowledge institutes and the local government work in a co-creation process towards shared aims to create demand driven solutions. Through demonstration and monitoring, resulting in evaluation these solutions will be made robust to be able to replicate them elsewhere (Kok, 2015).

To improve co-creation and transparency, four-weekly consultations within the triple helix partnership are held, with all relevant stakeholders on operational level, in which the decisions are made under the chair of the municipality. Sometimes external experts are available at these sessions, but top executives or CEOs from the stakeholders are not involved, since the parties are already on board.

3.2 Generate, select and organize project ideas to achieve your objectives

3.2.1 Generate

The Triangulum project has multiple sub-project objectives. The generation of ideas is an ongoing process and started before the Triangulum call was finished. It seems that most project ideas for Triangulum were generated prior to this project, by the partners that are already active in the area's. The projects are combined under the umbrella of Triangulum. Some projects still have to be developed. For example, 'innovative energy saving technologies' still have to be invented and developed. To do this, Triangulum is offering E 840.000 for the development of such technology (Fraunhofer IAO, 2015). The projects are ranging from being generated from a top-down, sometimes the middle-out approach

In 2014, The middle-out approach is used to generate ideas in the Eckart Vaartbroek area. The municipality of Eindhoven and Woonbedrijf organised design sessions around three theme's: care & housing, energy and public space. Six ideas were developed focussing on innovative use of public space, smart transformation of buildings and energy supply (Tijl, 2014). It seems like these design sessions have been a starting point for selecting projects in Eckart for Triangulum.

Also in Strijp-S, a middle-out approach, or co-creation, has been chosen to generate some project ideas:

> PSB organized interviews with residents in the area, to identify potential problems, after that they figured out the safety issue is one of the most important ones. So they planned to improve that by installing a sound sensor together with a lighting pole, which is activated when it detects a 'strange' sound is detected. Lighting colours or styles will show something is wrong. This alert will be connecting with the communities who are taking care of the gardening of the neighbourhoods, so they have an idea what is going on, and can have a look or take other actions if necessary. (Yang, 2016, p.c.).

According to Yang, "Partners in Strijp-S have quit good knowledge of the area, about the office buildings and residents, so their communication is quite well, they are 'on the ball'. In Eckart Vaartbroek, the municipality [and Woonbedrijf] puts a lot of effort, into figuring out what the problem is of this area, to try to figure out how to improve the area. (Yang, 2016, p.c.).

A bottom-up approach is chosen for innovative projects funded through the iCity tender at Strijp-S.

3.2.2 Select

Strijp-S: In Strijp-S seven projects have been selected: " Seven projects are conducting in Strijp-S covering Energy, mobility and ICT perspectives, such as smart office, smart mobility, smart charging of electric vehicles, smart lighting, sustainable energy supply and soil sanitation, optimization heat provision in existing buildings of Strijp-S." (Unknown, 2016c). By what criteria these projects have been selected stays unclear to me.

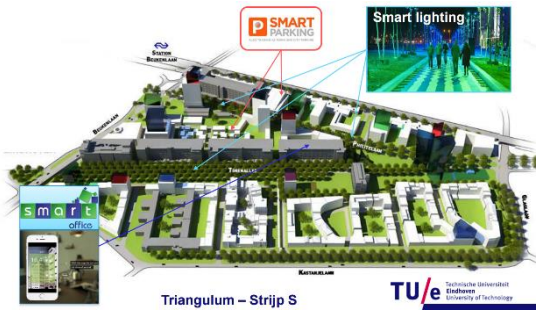


Figure 7-7 Three/seven planned projects on a map of Strijp-S: Smart Parking, Smart Lighting, Smart Office (De Vries, 2016, p. 10).

According to Yang, Smart lighting is not strictly speaking smart lighting: "they [VW] are doing some backbone, increasing of the ICT to link all the components to wifi, data management for strijp S area" (Yang, 2016, p.c.). The backbone makes it possible to monitor and control the innovative lighting

installations of Light-S (smart street lighting system) (Triangulum, 2016a, p. 3). About this backbone, Triangulum website posts: “A district-wide ICT solution will allow residents to access different kinds of infrastructure, such as booking electric vehicles from a district car sharing scheme or using smart parking concepts. In this way, the IT-based tool will help residents to develop sustainable patterns of energy and mobility behaviour.”(Gemeente Eindhoven, 2014a)/ The backbone thus seems to be the perfect example of Smart City service and application integration in the list of Triangulum projects.

In addition, VolkerWessels is involved in a soil sanitation project together with sustainable energy supply and a new connection to newly build biomass power station (Triangulum, 2016a, p. 3). The biomass power station is built by HoSt supplies heat to the district heating net of Eindhoven. The plant burns wood chips and produces green electricity as well as heat. This project originates from pre-Triangulum. The ‘new connection’ to this station are a way of connecting buildings to this heating grid, since the “innovative concept to clean up contaminated land will double as a means of producing energy.”(Gemeente Eindhoven, 2014a). Within Triangulum VolkerWessels will provide in-building installations and pipelines for connecting the buildings to the CHP plant (Partners Triangulum Eindhoven, 2014).

The ‘Smart Parking’ project is still undefined, possibilities for this project that can be selected are:

- Build more EV car chargers, to have more access points, so electrical driving is stimulated;
- Build a Smart Charging App, to motivate people to remove their car after fully charged;
- Build an app/sensors, to guide users to have a nice parking location in the strijp-S area;
- Offer green transport modes, such as electrical bikes, for people to borrow in the area, so they can leave their car in the area.

Eckart Vaartbroek: The three projects chosen for Eckart Vaartbroek are Woonconnect, the kilometer public road around the pond and the Windgenerator. These projects are initiated by Triangulum and will be executed in collaboration with the residents. A short description of these three projects:

1. Project Woonconnect: The development and roll out of Woonconnect, a digital tool built by KPN in collaboration with architects ‘de snoeken’. In the beginning of this pilot project, about 200 houses will be tested for renovation. The Housing supply in the area will be digitalized by Woonconnect. Scale and the (national) 165standardization of this tool are of importance for the level of success of Triangulum: In the refurbishment process, the dwellings will also be made interactive, allowing the tenants to manage their energy consumption through the use of innovative ICT applications. In order to visualize chosen measures and presents the cost effects in terms of rent; enable tenants to compose the combination of measures and plan the moment of realization energy costs simultaneously; create a database of possible solutions and measures matching to a specific type of housing; create a live 3D BIM archive of the housing stock to be used for future maintenance. About 5000 houses will be digitalized (Unknown, 2016b).
2. Improvement of public space by a Smart Lighting project for a ‘kilometre around the pond’: The area around the pond is badly lit, which makes it an unsafe public space at night. Smart lighting should adjust the lighting to the actual use of the area by citizens, and therefore create a safer environment.
3. Installation of PV Windturbines on building: Woonbedrijf is in cooperation with a start-up company who is developing the PV Windturbine. Woonbedrijf made a building available for testing this project in real life. If the project is feasible, guaranteeing a reasonable payback period, than the tenants living in this building, can cut down on their energy bill.

Open data platform: A project which is not area based, is the open data platform. The Municipality has to build a (digital) open data platform. Fraunhofer IAO has great expectations of this ICT architecture that is one of the important deliverables of the project. Yang, responsible for the assessment and monitoring of the projects in Eindhoven says that "This [open data platform] is a complicated data hub, considering the privacy issue of the ownership, and how continuity is in place after Triangulum is finished" (Yang, 2016, p.c.). The project is still under construction, under the name of The "Eindhoven Kompas", it is building forward on the existing Socratas platform.

Another project is the development of the Data Hub, of which University of Stavanger is taking the lead, which will be have different data structure and might be based on different standards.

3.2.3 Organize project ideas

This step closely relates the roles and responsibilities defined in the planning phase.

The Triangulum project aims to be demand driven, but most projects have already been selected prior to citizen involvement. Now, during the development phase different partners see different priorities. From the municipal point of view collaboration is key in this effort of Smart City implementation. The municipality has no power of hierarchy, therefore the municipality steers on collaboration, showing active facilitating leadership by managing the partnership and chairing the monthly meetings. In contrast to this view, Willemse, from KPN says "Most parties are working on projects that they can execute by themselves. Thus here collaboration is not a full-time job"(Willemse, 2016, p.c.). The following figure shows the organization/objectives of the specific projects:

The objectives in each of the areas; nearly zero or low energy districts, integrated Infrastructures and sustainable urban mobility are briefly summarized below.

For the robust open data platform, or The "Eindhoven Kompas", as this system is called, takes the next steps to extend the use of this enabler for smart city developments. The objectives are: 1) To offer a platform where not only governmental organisations, but any party willing to offer its data according to agreed standards, can exchange their data; 2)To analyse data to improve olicy decisions. 3) To stimulate and provoke the development of integrated new services and tools for energy, mobility and quadruple stakeholder involvement 4) To develop a dashboard of city performance in these fields. 5) To make sure the solutions (App's) that come out can be shared with the other countries (creating an API and just inserting the data).

For the Eckart-Vaartbroek area, the partner Woonbedrijf (WB) will realise a transformation of 1300 single-family omes from the social housing stock in the area towards a low-energy standard, amounting to an approved and allocated investment of € 59 million from WB's own resources. The goal is to make these neighbourhoods future proof for at least another 20 years and to establish a society of participation with responsible, self-reliable inhabitants while ensuring that the rents remain affordable, allowing no, or only a very slight increase over time. As the objective is to create a full low-energy area also the privately owned houses in the area will be included in the work package All tenants (1300) and the owners of the other dwellings 2,654 will be approached with the help of an ICT-driven tool that offers a clear calculation for energy reduction, the costs for energy in relation to the investments (or increase in rent) in tailor made energy packages pictured in 3D for the individual dwelling.

For the 1300 homes under the ownership of Woonbedrijf, partners will realise an improvement of the energy efficiency of a large share of buildings (> 20000 m2 living surface) by upgrading them from energy label F to energy label B or higher resulting in an overall reduction of energy use of 3.9 Mio KWh/a (-73% to status quo). This will be achieved through insulation, improved glazing, sophisticated installations and an increased use of renewable energy.

Although from 2015 the VW will realise 300 new dwellings in the Strijp-S area (investment not in this proposal), this proposal focuses on innovative elements of locally produced sustainable energy solutions, like more efficient energy management and the integration of energy production with soil sanitation (Strijp-S is an industrial heritage with a partly contaminated soil which is being cleaned up through an innovative process, SANERGY) allowing energy production. In addition, these processes will be carried out with the continuous involvement and coaching of the inhabitants and provide them with tools to support a change of their energy and mobility behaviour and to create their own low-energy house. Furthermore, the partners will create a truly "smart city environment" through the integration of ICT infrastructures, including public lighting, more efficiency in the use of (rental) cars and their use of public space, parking, and propulsion method.

Figure 7-8 Triangulum Organizing towards low energy districts in Eindhoven (bron)

The figure above shows that the local partnership of Triangulum is fairly specific in their objectives and organization of the different projects. Below extra information on the organization of two projects Smart Office and WoonConnect is given:

Smart Office: According to Yang, This project is exploring office workers' opinion at this stage. It looks more like a top-down approach, since the decision is not based on individual willingness of the office users. However, both the company who pay the energy bill and the user who are using the office are assumed to be beneficial from this project (Yang, 2016, p.c.).

WoonConnect: In order to organize the WoonConnect project, the digitalisation of the houses can lead to a 'customized approach' in redevelopment and restoration of the housing sector. The application 'Woonconnect' offers residents and organizations insight by integration of data and functionality. Central function is the support of interaction between residents, housing association and building companies. To improve this interaction, 'City Studios' are used as physical meeting places in which citizens are invited to discuss the challenges within their district. By communicating with the potential suppliers solutions are developed for existing issues. The municipality facilitates this process and undertakes to (co-)implement the solutions that are defined jointly (den Ouden et al., 2016, p. 9). Yang says, that "the Woonconnect project is a different story. It is more a bottom-up approach. We need communication with the residents living (Yang, 2016, p.c.). The 'WoonConnect'

digital platform includes an online survey to engage residents. Here every household can give their opinion on different topics, like renovation. Besides this survey, they can see their own house in a digital 3D model. For the first 200 households, that will be renovated, Woonbedrijf gathers this information in a personal interview. Luckily, the Woonbedrijf owns the social housing, so they can approach the residents much easier than the private housing part. Approaching people in the private houses will be much more difficult. The private house part will start soon, so we will see." (Yang, 2016, p.c.). For WoonConnect, data is registered together with the residents. Two 'forms' or 'contracts' are in use to regulate permissions of the use of the data. "We don't use data as a source of profit but create trusted third party and citizen's data ownership." (Hijdra, 2016, p.c.)

3.3 Ensure financial support to the projects

In the previous step, 'organizing projects', a first insight is given regarding the financial support for the specific projects. Here it is further specified, therefore some duplications can be found.

The Smart City initiative is supported by municipal financing. Triangulum subsidies should support the selected projects in their living lab testing phase, together with the investments made by the different partners. About the European subsidies Beijnsberger, from the municipality, states he does not recognise a risk of subsidies "you will always have to be responsible and accountable for the subsidies in the results you deliver" (Beijnsberger, 2016, p.c.). Furthermore in Strijp-S a relative small fund, iCity, is going to stimulate and ensure innovative projects financially.

Partners are collectively in search of suitable business models for repeatable business that will make it affordable to upscale proven solutions. Some partners are in a transformation process from business case driven to value case driven operations (as mentioned in paragraph 7.2 Planning – approach). A Triangulum report on Eindhoven shows "some are also testing public-private co-investment strategies into smart technologies, yet these approaches are still at an early stage and need further verification and refinement." (Duncan, 2015, p. 88). Indeed, van Dieren finds that "when partners come together, an issue can be that they have different business models, due to the mix of products and services. Some partners are thinking in "selling plans (*abbonnementen* in Dutch)", when this is either not realistic or useful, or incompatible for the project involved." (van Dieren, 2016 p.c.).

In Eckart Vaartbroek, financial support for the WoonConnect tool and building renovations is partly provided by Triangulum and Woonbedrijf. The residents are expected to contribute to the renovation of their housing, when a better energy label, over level 'B', is wished to be reached. If they do not collaborate, the housing association will have to take on the investment, or nothing will happen at all. Therefore the housing association has reserved € 59,5 million euros for large maintenance and renovation of the existing building stock of 1306 single family dwellings in the period of 2014-2023. Furthermore Woonbedrijf has set aside about 100.000 euros from the yearly budget, to stimulate initiatives for ownership and coherence. They think this can reap societal as well as financial profits (Gemeente Eindhoven, 2014c). Woonbedrijf clearly believes in the value case.

The Technical University of Eindhoven will stimulate a fund for innovative services (Triangulum, 2016a, p. 3).

3.4 Implement the projects

"Triangulum is currently in the implementation phase. By 2018 all smart solutions will be installed" (Duncan, 2015, p. 89). Henk Kok, alliance manager, states about the Smart Society Eindhoven "we stopped only talking about it and we now implement it . . . [In doing so] the development in an atmosphere of co-creation between partners and stakeholders" has his special interest (Kok, 2015).

This shows the municipal needs for collaboration and highlights their facilitating role. But what Smart City projects actually have been implemented?

On the site of the TU/e, four Triangulum projects are listed. However, only the first two of the actual 'links' to these projects are working (University of Technology Eindhoven, 2016). Their implementation status is unknown. So far, I cannot tell how much projects will actually be implemented. Many Interviewees stayed unclear about the actual status of the implementation of the projects. Nonetheless, the following facts can be presented:

1) Smart district - Locally produced renewable energy

Responsible company: IBIS Power Involved parties: Woonbedrijf Eindhoven, Municipality Eindhoven Technology University of Eindhoven. Funding Triangulum: 150.000 Euro.

For the windturbine, financial feasibility will be the main bottleneck regarding up-scaling of the project. Nevertheless it will be built in the coming months, thus making it the first project in Eindhoven to actually be implemented.

The refurbishment of the Eckart Vaartbroek district will go along with the provision of local energy-production from renewable sources, in this case by the placement of 2 wind turbines on strategic buildings in the area. Where useful, other techniques can also be applied, like for example solar boilers and energy storage facilities. Two locations have been chosen for the wind turbines which are Tarwelaan and Andromedaplaats. A turbine in open air would generate 400 kwh/year and 1692kwh/year at Tarwelaan and Andromedaplaats respectively. Due to lower startup speed, IRWES will generate energy 88% of the time it is running. In total, the energy is sufficient for 5 to 7.5 appartments or public space usage.

2) WoonConnect: Renovation homes Eckart & Vaartbroek & participative society.

Partners: Woonbedrijf Eindhoven, De Twee Snoeken and KPN, Funding: Triangulum(1.225k Euro)

Woonconnect is now being tested to use in renovation or retrofitting of social housing in Eckart Vaartbroek. In the first Triangulum newsletter of November 2015, the status is described as:

> In Eckart Vaartbroek we are almost ready to start the interactive process with the citizens . . . The partners, KPN, Woonbedrijf and the municipality of Eindhoven, do this in close co-operation. . . . Before we start with the renovation of the family homes**,** one of the most important tasks in the project has to do with citizen participation and co-creation. Together the partners made an analysis of all the relevant players, which are in one way or another related to the renovation . . . The aim is not only to encourage sustainability projects, but also to stimulate the engagement and participation of residents (Triangulum, 2015).

The importance of Woonconnect goes beyond the tenant-housing association relation, since the technology offers the possibility to include architects, and construction managers. Woonconnect as ICT is used to improve the communication process. All actors will start talking the same language as used in the application. In stimulating participation for this project, Hijdra from Woonbedrijf concludes that "Communication to improve participation is very time consuming" (Hijdra, 2016, p.c.). Not all residents are willing to collaborate. The implementation started with people who are tenants, but Yang and Hijdra especially foresee difficulties when owners need to be activated to implement sustainable housing solutions, since Woonbedrijf has no say over their private homes (Yang & Hijdra, 2016, p.c.).This process will start at the end of 2016. Finally, the WoonConnect tool is also for Woonbedrijf a new way of working. The relevance of tool is based on the database behind WoonConnect: The advanced BuildingConnect Library. This is a 'BIM-ready' central source of information, with a huge amount of specified products, make sure all parties in the construction supply chain can individually work much more efficient.

Analysis Governance development phase

The Triangulum project aims to be demand driven, but most projects have already been selected prior to citizen involvement. Now, during the development phase different partners see different priorities. From the municipal point of view **collaboration** is key, while in contrast to this view, KPN focuses more on individual leadership.

As Kok says “Eindhoven partners will aim to realize 20 activities that will improve mobility and energy in a sustainable direction via the use of innovative ICT solutions **that make use of open data**. Stakeholder involvement - citizens, (local) business, knowledge institutes and the local government work in a co-creation process towards shared aims to create demand driven solutions.” However, these high ambitions of improving sustainability is sometimes missing, since the co-creation process towards shared aims, shifted the focus of some projects to increase the feeling of ‘safety’ rather than sustainability. Other projects like smart parking, when focusing on EV charging, stimulates electrical driving, while socially exclude people without electrical cars.

Even though project **leadership** has been made transparent in the planning phase, I do foresee issues regarding leadership in the development phase. According to Willemse (KPN) leadership is mainly related to ‘your own’ work, and about taking the responsibility to complete this work, and to test whether the right knowledge is available for others (2016, p.c.). The risk here is that the (missing) linkage between the specific objectives or KPIs for Triangulum will not be matched with the specific projects, especially for the undefined projects in Strijp-S. Resulting in projects without a clear impact on reducing co2 emissions. Here a task lies for all parties involved, but especially for the municipality, driven by input from the TU/e, should warn the partnership about linking their projects to the objectives. I see that projects in Strijp-S are more linked to ‘increasing safety’, as well as for the project ‘1km around the pond’, than they are to reaching sustainability goals. By increasing (the feeling of) safety, the quality of life might be improved, but the European202020 goals are out of sight.

The **partnership** has already been formalised in the starting phase of Triangulum, but since collaboration is also based on **participation** of residents in this project, I would say collaboration is still key in this project. Woonbedrijf and KPN need residents to participate in their WoonConnect project in order to successfully implement renovations. This also accounts for the other projects, like the Smart Lightning project and the iCity tender.

To improve **communication** and **transparency** in co-creation four-weekly consultations within the triple helix partnership are held, with all relevant stakeholders on operational level, in which the decisions are made under the chair of the municipality.

In the **communication** towards citizen participation shows to be is more complex than planned to activate residents. An intensive personal approach has shown to be necessary by Woonbedrijf in connecting and discussing matters about WoonConnect with the residents. The different Triangulum projects and its results will be depending on the less predictable willingness of citizen participation. Communication in Strijp-S, seems to go via many websites publishing about the iCity tender, organizing local meetings, but also through organizing local events.

Data-exchange is a core theme in both Triangulum areas, for most of the different projects. In Strijp-S a backbone, will result in **service and application integration**, and the possibility of data management for the entire area, improving monitor and control, trying to increase the feeling of safety and improving services, but also getting one step closer to the big brother-effect. In Eckart Vaartbroek the Woonconnect project relies heavily on data exchange, especially in the form of the database behind to tool. Finally the municipal open data platform is seen as a complicated data hub,

which still is rather unclear about the (international) privacy issues and the ownership of data, causing data-exchange to be a crucial aspect of implementation.

To make sure that all the people **accountable** for the project Woonconnect are included, the partners made an analysis of all the relevant players, which are in one way or another related to the renovation. Issues will come to the fore, when residents who are owning their house, and thus solely responsible for renovation, will not collaborate in this project. Woonconnect is an application in which different services for architects, construction managers, residents are integrated, to improve the communication process.

7.4 Monitoring and evaluation

4.1 Monitor progress and evaluate results

4.1.1 Monitor progress Eindhoven

The Smart Impact Baseline report (Duncan, 2015), based their findings on monitoring sessions in Eindhoven done in September 2015. Seven main findings on the city level of Eindhoven, regarding the delivery of smart solutions and the realisation of smart districts are given, I analysed the findings regarding the current issues (red) and successes (green):

- Individual sectoral/thematic roadmaps and ambitions which lack an integrated holistic geographical approach. Also smart city projects still tend to be isolated from colleagues in the municipal organisation. Currently an integrated action plan around Smart Cities is being developed for the upcoming two years [Smart City Board];
- From isolated Smart City living labs in dedicated areas, Eindhoven is moving towards larger integrated solutions at district level;
- The increasing importance of joint development of durable social/economic value and/or business cases. Projects with a number of public/private partners based on expertise often have intrinsic friction with their business models;
- Eindhoven has developed clear policies on ownership and usage of data however there is no practical experience with the use of these policies;
- Dissemination – there is a backlog of usage of knowledge and experiences from Smart City solutions to other projects, activities and colleagues that needs to be shared;
- Challenges to integrate in public space, required for Smart City transitions, in "regular" city projects and programs;
- Smart city development means iterative steps, flexibility to react on the unexpected and an open mind set (Duncan, 2015, p. 87)

Another city level analysis comes from the concept report 'Spotlight on Smart City Eindhoven – How can Eindhoven Become a Smart City Faster' by Mol, Khan, Aalders, and Schouten (2015) similar issues and success have been found. In contrast to the analysis by Duncan (2015) this report emphasizes more on the fact that Eindhoven has not managed to upscale towards a city level Smart City strategy (Mol et al., 2015a).

4.1.2 Progress Triangulum

The first newsletter of Triangulum (November 2015) stated that "first visible results have already made their appearance with […] new governance processes in some cities (Triangulum, 2015), without further elaborating on these 'new' governance processes.

Van Dieren says all representatives are dedicated to make this project into a success. He mentions process continuity as success factor, so stakeholders strive to keep their employees involved during the entire project. According to him, the partnership collaboration performs well due to bi-weekly meetings facilitated by the municipality, in which the stakeholders are respected in their specific roles and interests (van Dieren, 2016, p.c.).

Bottom-up and SME approaches are stimulated, like with the iCity tender and the start-up developing the windmill. Radical change does not seem to happen, since most of the technologies used are already available.
Mol et al. find that Strijp-S shows to be innovative in collaboration for a number of projects, exploiting ICT and new lighting solutions, making it a location for experimentation (Mol et al., 2015a, p. 54). However, critical notes to the situation in Strijp-S that the scale is too small "it has found its size is insufficiently critical to determine what services should be next." Therefor "it is currently difficult to get advice on the type of services that should be developed next. No market party is giving advice that is free of a clearly identifiable self-interest". As effect "development now seems to freeze at isolated showcases."(Mol et al., 2015a, p. 69). It is not clear to what extend these statements directly relate to Triangulum, but they give the impression about the failing of up scaling of Smart City projects in Eindhoven, and especially Strijp-S.

It is too early now to reflect on the status of open data platform project. On topics how to deal with open/big data also the municipality of Eindhoven has a leading role "We have a specific protocol in regards to privacy aspect" (Beijnsberger, 2016, p.c.). On the other hand an investigation of the 'Rekenkamer' by van den Biggelaar and Kok, published in June 2016, on the use of data in the social domain shows clearly that additional measures should be taken in both Eindhoven and Amsterdam. They conclude that the privacy policy of Amsterdam is outdated and of Eindhoven is lacking (van den Biggelaar & Kok, 2016).

Sharing data within the partnership is often not a problem because partners have signed for confidentiality. According to de Vries from TU/e the EU direction towards open data is much more problematic: "There are many juridical hordes to take and many uncertainties. Very often even the lawyers don't know what is allowed and what forbidden"(de Vries, 2016, p.c.). Also Yang, from TU/e sees data exchange as a possible barrier **"**Most of the time a company owns the data, now we want the data to be shared. The Law and regulation is not clear defined yet on how ownership is defined". She explains that another hurdle to take is to protect the data if it is obtained: "we need to have regulation in place to protect the data, sharing and streaming real-time data is an issue, for statistical or historical data this is less of a problem" (Yang, 2016, p.c.).

In Eindhoven, the open data platform, developed with the municipality in the lead, is exploring the possibilities of sharing data. "Even if citizens are willing to share their data, national law might be blocking this" (Yang, 2016, p.c.). According to Kok, permissions to use data is often limited to a specific context so not open for general use. The TU/e is involved in developing the data platform to share experiences between the participating cities. It is too early yet to judge the progress in this domain of European ambition. They are monitoring the outcomes of the projects regarding their objectives and baseline measurements.

De Vries (TU/e) finds that the European cooperation is complicating the work: "It is difficult to keep the three lighthouse cities, Manchester, Stavanger and Eindhoven on the same track, since there is a high demand for local customization"(de Vries, 2016, p.c.). The alliance manager, Kok, also experiences the EU as a complicating factor saying "it is often difficult to have a conversation with the EU on matters of content since the control function is focused on formal procedural aspects and not on the content" (Kok, 2016, p.c.). According to de Vries, upscaling can become a problem in the

future. “Products like ‘Woonconnect’ are owned by specific partners. This might limit future re-use and up scaling because of the needed investments. In the case of Triangulum, up scaling is more relevant in the vision of the EU, less relevant for some partners involved in the partnership”(de Vries, 2016, p.c.).

In the Triangulum monitoring workshop on June 14th 2016, Schmidt and von Radecki (Head of Competence Team Urban Governance Innovation at the Fraunhofer institute, and project leader for the Triangulum consortium) reported the following main issues about Eindhoven in the context of Triangulum. I analysed the findings regarding the current issues (red) and successes (green):

1. Eindhoven came from a crisis - but at the end this was only the basis for people talking to each other (quadruple helix)
2. Main unique thing is the ecosystem;
3. Licence to fail; meaning they are open about the possibility of failures, keeping expectations low (can be seen as a success factor by avoiding too high expectations and as a barrier by having an excuse for failure)
4. Main area of development is energy: Strijp-S and Woonbedrijf;
5. Clear city mantras and good communication (technology and design);
6. Competing with Amsterdam: “not the most beautiful girl in class, but the most interesting”;
7. Smart - is a main mantra driven by the mayor;
8. Eindhoven is doing good and internationally working hard;
9. BUT: few of its inhabitants are excited about it - work to be done (Radecki & Schmidt, 2016, p. 6)

Many positives notes are made and correspond with success factors identified in the preceding pages. Point 3 is rather particular, mentioning a “licence to fail”. This might be used to prevent that expectations will be much higher than the possible outcomes. Especially the last point (10) underlines that citizen participation is identified as a potential bottleneck for this project. Linda Vlassenrood, program manager from the New Institute for ‘The state of Eindhoven’ signalises that the municipality does not have an answer on the basic question ‘why should citizens participate’ and finds that the much-vaunted citizens initiatives only succeed in mobilizing a handful of citizens (Vlassenrood, 2016).

4.1.3 Evaluate results

“The Triangulum project is only meaningful in as far as the consortium can show the benefits it brings.”(Gemeente Eindhoven, 2014a). Concrete results of the lighthouse cities [within Triangulum] will only come available in 2017/2018 to be re-used by the follower cities in 2019/2020. This step can only be finalized after Triangulum is finished in 2020, or already in 2018, when on the scale of Eindhoven, projects should be implemented.

On a project level it shows that projects still have to show their ‘meaningfulness’, in relation to the original objectives. For example, the lighting projects in both Eckart and Strijp-S relate to ‘safety’, rather than ‘sustainability’. These projects can improve the ‘quality of life’, and they can be ‘efficient’ in energy usage by using led, however, these are not innovative projects contributing to a greater extent to the energy neutral goals of Eindhoven in 2045.

What are the results on city level of Eindhoven? Duncan evaluates Smart City development in Eindhoven as being successful, with only a remark, about the lack of a strategic framework in the form of measurable goals:

> Over the past years the city of Eindhoven has developed and successfully implemented a large amount of pilot projects and inspiring IT-based solutions. Eindhoven is clearly one of

the most advanced cities in Europe when it comes to innovation and living labs for sustainable and connected urban technologies. The triple helix approach has been successfully implemented in Eindhoven and can now serve to push the smart city agenda for Eindhoven. Yet, there is no strategic framework or measurable overall smart city development goals that Eindhoven is following. (Duncan, 2015, p.91)

4.2 Adjust and modify

On the Triangulum level no adjustifications or modifications are mentioned in the interviews, or in the available literature. I will elaborate on the improvements, adjustments and modifications on the Eindhoven city level. How could Eindhoven improve Smart City implementation?

4.2.1 Eindhoven Smart City/Society

The Smart Impact Baseline report mentions that the following challenges needs to be addressed for a successful development of smart districts in Eindhoven in the future, on a city level. These are two mainstream investments within city administration, acquire better knowledge on the smart city, and find new forms of public-private co-investment:

The final version of the article 'Spotlight on Smart City Eindhoven - How Can Eindhoven Become a Smart City Faster?' proposes a "pragmatic 7-step programme for Eindhoven to become smart (or for any party that wants to take the lead in such an effort)":

1. Ensure that competent staff orchestrate and build the system;
2. Build on technical standards that are open, clear and stable;
3. Organize for leadership to emerge and allow for clear informed decisions;
4. Realize a co-created vision and keep on iteratively updating that vision collaboratively;
5. Work with competent partners and suppliers on vendor-independent solutions and ensure the ability and competence to evaluate their work;
6. Ensure the applications have (financial and non-financial) meaningful results on the short mid and long-term;
7. Set up an evidence and metrics-based continuous improvement process. (Mol, Khan, Aalders, & Schouten, 2015b, p.25)

Apart from the 7-step approach, 10 recommendations are given to adjust the Smart City approach in Eindhoven:

1. Set up an Eindhoven Smart City Architecture team. This team should review, approve and oversee all smart city projects from an architectural integrity and continuity perspective
2. Appoint leaders from current efforts and welcome initiators of new proposal, from the Municipality of Eindhoven and others in and around the city of Eindhoven. Set up the leadership team to initiate, approve, foster and terminate Smart City projects. Explicit attention to governance will be required.
3. A substantial, creative, mobilizing effort is needed to drive the initiative and engage the citizens. Invest in that effort.
4. Engage with stakeholders from industry, academic/research and Eindhoven Municipality.
5. Co-create a vision with the leaders and keep on iteratively updating that vision collaboratively.
6. Set up an independent Security and Risk Assessment audit team for all operational smart city projects. Define guidelines to have security embedded into solutions from the beginning.
7. Base operational programs on common architectures and platforms. Consider the desired solution as a City Platform. Partner with others to co-create a better, interoperable, jointly tested City Platform faster and to ensure future support commercially.

8. From the options available, select a vendor independent, non-proprietary reference architecture based on open standards and specifications.
9. Ensure people see and experience the (financial and non-financial) results as meaningful on the short, mid and long term to keep the strategic momentum going.
10. The way to increase the odds that Smart City efforts will create a city that is social and sustainable, is by ensuring that steps along the way contribute directly to realizing that objective. In organizing, organic approaches should be preferred over classical hierarchical templates. (Mol et al., 2015a)

Mol et al. (2015) conclude on three essential focus points: Co-creating a holistic vision and strategy for 'Smart City Eindhoven'; building a platform to align and speed up projects; Stimulate innovation and new business development (this will require even more talent, leadership and partners, within the city, the region and with international public and private partners).

Analysis Governance monitoring and evaluation phase

For most of the Triangulum projects it is stressed that solutions should be specific for local problems. It will not be easy to define results on a level where they can be easily replicated in follower cities. De Vries stresses the difficulty of European collaboration, due to the local customization, and also Kok sees the EU as a complicating factor since it focuses on formal procedure rather than content

The two risks of network governance (Khan, 2014) policy increasingly carried out by closed elites and networks of established interest tend to preserve status quo can both be found in Triangulum. On a local and international scale, giant ICT companies like KPN are involved. Therefore up scaling can become a problem in the future, since products like 'Woonconnect' are owned by these specific partners, which can limit future re-use and up scaling. According to one interviewee up scaling is more relevant in the vision of the EU, less relevant for some partners involved in the partnership. Another issues is that market parties do not give advice free of identifiable self-interest, of which Mol et al, found in 2015 that developments seem to freeze at isolated showcases.

Process continuity is mentioned as a success factor, keeping employees involved in the entire process. But now that the mayor van Gijzel is not in charge anymore, political leadership, in driving the Smart Society, might be missing or attenuate in Eindhoven. With other position switches, like Beijnsberger from the municipality to Woonbedrijf, discontinuity in the leadership is a threat.

To citizen participation SME approaches are stimulated, as with the iCity tender and the start-up developing the windmill. The findings by Duncan (2015), and from this case analysis show a clear approach of the City of Eindhoven being a top-down, demand-driven, triple helix collaboration pushing the Smart City Agenda, in search of a middle-out approach. This is in contrast with the promoted 'Smart Society' the municipality of Eindhoven is aiming for, an ambition probably based on financial motives of the city. It shows to be really difficult for Eindhoven to mobilise quadruple helix co-creation, as noticed "few of its inhabitants are excited about it", underlining that citizen participation will be a major bottleneck in this project, especially since the citizens don't see the reason to participate.

While Mol et al (2015) find that Strijp-S is innovative in collaboration for a number of projects, the Triangulum partners experience the complexity of collaboration between completely different organisations in the consortium and on the European level of working together with different cities, who are having different interests. The fact that these stakeholders are aware of this in an early stage makes it possible to act on this experience and gives hope for the future. Interviewees have stated to be understanding towards each other, respecting differences in cultures or organizations.

Attention for monitoring is structurally woven into the project organisation by giving the assignment to the TU/e to monitor and evaluate project results. Also the incorporation of follower cities should enforce the monitoring function and result in a more objective process of monitoring, adjustment and evaluation, according to some interviewees.

The interviewees have mixed feelings about the sharing of data. Some experience no problems and point at the 'specific protocol', or that the partners have signed for confidentiality, and that European regulations are sufficient. Others are expecting problems concerning the ownership of data and related laws and privacy regulations. For example Kok mentions that the use of data is often limited to a specific context. Like in most initiatives the(limited) possible use of data will remain a barrier. On a local level Triangulum partners say to have internally sorted their legal and technical issues regarding data exchange, but might be struggling with the social aspect of citizens willing to cooperate. However, Yang says that regulations need to be in place regarding sharing and streaming of real-time data, as she clearly states "Even if citizens are willing to share their data, national law might be blocking this"(Yang, 2016, p.c.). This is underlined by an independent research by the Rekenkamer in June 2016, which shows Eindhoven lacks a privacy policy. Therefore the municipality is still exploring these issues for the open data platform 'Eindhoven Kompas'.

In the Triangulum monitoring workshop on June 14th 2016, the international project leader Radecki, mentioned a "licence to fail" for Triangulum in Eindhoven. This might be used as a success factor to prevent that expectations will be much higher than the possible outcomes. However, in a worst case scenario, this can also relate to parties not being accountable when projects fail, thus creating an environment in which a lack of leadership and collaboration can stop projects from being implemented.

7.5 Communication

5.1 Communicate and promote the Smart City strategy

In the book 'Smart Economy in Smart Cities: international Collaborative Research (2016), by Kumar, the article 'Holistic Value Model for Smart Cities' is published by Alanus von Radecki (integration manager at Triangulum and Satyendra Singh. They state that "through EU funding, a range of barriers has been overcome within the . . . project Triangulum, leading to a successful implementation of a broad range of smart city solutions in Manchester, Stavanger and Eindhoven in an integrated manner" (Kumar, 2016, p. 305). Of course this is a biased statement, since von Radecki has personal interest in promoting the Triangulum project as a success. A similar bias might be valid for the Smart Impact Baseline report, written under guidance of the lead expert von Radecki, by Mark Duncan fom the municipality of Manchester, which is one of the three lighthouse cities in Triangulum. This report states that "Eindhoven is highly advanced as a "Smart City" and is successfully transforming two districts into "smart districts" (Duncan, 2015, p. 10). This statement seems to be promoted by the local key actors in Eindhoven, who are interviewed for this report, rather than that it is based on the results. In order to create a positive image about the city and promote the Triangulum project.

As can be seen in the described previous phases, communication is an influential factor during the entire cycle of a Smart City project since it is often fully integrated with other activities. To promote the activities to the public a number of newsletters is published on the internet.

There are communication tool, communication events based on a clear communication plan: "The role of the city's communication department is to streamline, to give direction and to stimulate the

communication, as well as assist in the co-creation processes. The communication process will continuously be evaluated, to maximise the effect of the communication resources."(Partners Triangulum Eindhoven, 2014).

According to Kok the consortium has decided to have 'one voice' for external communication. Internally they have clear communication procedures to reach consensus. This decision making in stakeholder meetings seems to work out very well according to the positive experiences of the interviewees. According to Willemse (KPN) "the partnership of Triangulum forms a structure to guarantee the progress of the project, and to stimulate coherence. When different interests are in conflict with the goals, than this will be discussed" Willemse, 2016, p.c.) Also according to Yang from the TU/e "Every 4 weeks, in the general meeting everything is discussed. So the transparency is high, potential problems and issues are discussed, and all the board members are noticed, so everyone can help to solve the problem" (Yang, 2016, p.c.). Willemse agrees to that: "Decision making takes place in plenary sessions of partners in which they look for a feasible business model and search for scaling up and standardization of the ideas."(Willemse, 2016, p.c.) Van Dieren stresses the role of communication in signalizing on solving potential conflicts within the partnership: "the partnership offers structure to guarantee the progress in the projects and the coherence of activities. Because when there is a conflict between the stakeholders' interests and the project objectives it is discussed and solved in the partnership collectively."(van Dieren, 2016, p.c.)

In Strijp-S, the different projects developed by partners who each have their own point of view, result in different business models due to the mix of products and services. According to van Dieren this different thinking in products and services works inhibitory to set up a business case.

Although van Dieren thinks the partnership collaboration performs well (as mentioned in 7.4), he finds that, language barriers play the part in the collaboration process. He notifies that the different worlds (building sector, ICT, housing coorporations, the municipality, knowledge institutions, etc) are coming together, which leads to communication issues, in which different parties really have to learn to understand each other.

Issues are based on thiking in different business models, having different cultures of organizations, and hidden agenda's and goals. All these issues relate to the observations by (Tauw Consultancy, 2013) (chapter 4.3), in which (communication) the language barriers is the main bottleneck for successful collaboration in integral urban development. Van Dieren promotes to "develop a shared language and make sure to include a connecting leader in the project" (van Dieren, 2016, p.c.).

Stakeholders experience differences between their organisations that can negatively impact the collaboration. Van Dieren mentions misunderstanding is sometimes caused by different interpretations of the partners coming from different sectors. In order to maintain collaboration *the right chemistry* needs to be in place between the individuals. Van Dieren stresses that building trust takes time: "Sometimes people without knowledge of the content are involved in the process. Especially with new peopl and organisations trust has to grow, since it can be difficult to interpret their motivations".(van Dieren, 2016, p.c.) Also to Willemse, it is important to realize that organizations all live in a somewhat different context which makes it easy to create misunderstanding.

An important communication medium in many EU-projects is the publication of a Memorandum of Understanding (MOU). Beijnsberger, from the municipality says, the use of a MoU needs to be discussed. Therefore he is in discussion with the chairman of the Smart City Board of the Technical University of Eindhoven how to formulate the MoU: "Global aims and objectives are often written down in these MoUs, we are really translating these to straightforward actions and concrete results" (Beijnsberger, 2016, p.c.).

Yang signalized that the latest occurring problems were concerning data sharing, and building the data hub: “This is shared within the partnership, Kok takes the lead, after which we make schedules of meetings, how to solve the problems step by step” (Yang, 2016, p.c.). So communication within the consortium is working well to signalize problems and find solutions.

The Frauenhofer report by A.Schmidt & A. von Radecki stresses as a success factor the possibility for involved employees to shortcut information: “Many employees of the city or city related services stand on a second foot (i.e. have a second employer) - therefore information exchange is natural”(Radecki & Schmidt, 2016).

The natural step approach is actually integrated into the Triangulum project. It seems to be working as a useful marketing tool, in promoting their sustainable process approach, but it is not clear to what extend the stakeholders area really implementing this approach.

Another way of promoting the Smart Society goes through marketing organization ‘Eindhoven365’. This organization has made a strategic plan for the coming five years: ‘ Strategy 2016-2020’ (Kentie et al., 2016), in which the “Smart Society” is one of the five pillars. This strategy document actually admits that “projects are currently being developed in isolation, and projects are being successfully portrayed in the media, to generate [global] attention. A clear strategy is actually still missing, lacking real strength on an international level.” (Kentie et al., 2016). For 2016, they are aiming at building an open innovation hub, take on the role of branding for the Eindhoven Smart Society, and develop an online open innovation platform. The marketing organization is pushing for nothing less than becoming the number one in the ‘European Smart City’ Ranking. Besides that there have to be at least 10 international state-of-the-art living labs in the city, in which citizens have an important development role (B. Brouwers, 2016).

Analysis communication phase

Communication between stakeholders seems to fulfil the needs openness and transparency to build and maintain trust, credibility and commitment. It clearly is a core task of the facilitating municipal leadership. At times it is based on clear target groups, for example in the case of an iCity tender contacting SMEs for innovative projects, or the face-to-face contact with residents in Eckart Vaartbroek. This makes the communication process interactive collecting feedback from all sorts of actors, wether from partners or citizens. In the future possibly even on an international level through the still be developed open data platform, set in place as an infrastructure to improve effective communication. Or, as is the case with ‘the backbone’ in Strijp-S.

Within the municipality of Eindhoven the communication in the Smart City board improves possibilities for service and application integration. Beijnsberger was in discussion on the use of the MoU, but now that he has left his position, maybe this effort, will also have less priority within the municipality.

The communication within the Triangulum consortium is well sorted by having organised meetings, clear procedures, and open discussions. This improves decision making and collaboration, since the notified problems are tried to be solved together or appointed to a specific partner to solve.

Internal communication is guaranteed by open and transparent discussions on the rising issues during the project, after which the team jointly tries to solve the problem at hand. Meetings are clearly structure, resulting in a step by step action plan. On the down side, language barriers due to service integration seem to play the part. A shared language should be developed, which will take time and trust to happen, to avoid misunderstanding.

The potential misunderstanding by the use of different branch related vocabulary is signalled and contested with a glossary of terms. The municipal chairman plays a coordinating role in different communication processes. It is unclear whether specific employees are responsible for communication within the partnership and between the partnership and the outside world.

Different media like websites, newsletters and vision documents are used to communicate with the environment. All partners communicate about their involvement by web-publishing without any direct references to each others sources. This gives the impression that the communication to the public is not intensely coordinated. This way it is very hard to get a good overview of the Triangulum project and about its local impact. For example, no website defines a line or path from vision, via objects, to projects and targeted results.

External communication is guided by a set of rules, like having 'one voice'. While I did not noticed this one voice approach, during the interviews with the key partners within Triangulum, since they all shared with me their individual ideas on the project.

Communication is used to promote the success of Triangulum, even prior to actual successes have been made. Which shows the promotion part, as underlined by Bolici & Mora, is well understood. Whether some of these success stories will actually turn out to be true, still has to show…

7.6 Conclusions on Governance Processes

In the initial stage, six interviews with representatives of stakeholders have been conducted. During these interviews the interviewees made 101 statements on the different governance factors. Most of the attention is drawn to the first three factors (collaboration, leadership, and partnership/participation) with relatively less attention for Leadership. The interviewees confirmed spontaneous – sometimes very explicit – that the factors are presented in order of importance. One interviewee, Hijdra, puts 'transparency' on top of the list, stating that "it all begins with transparency, to explicit stakeholders objectives and effective rules and legislations", if not, you will bump into problems you cannot overcome anymore (Hijdra, 2016, p.c.). It shows that the governance factors are strongly intertwined which makes it hard to distinguish on what comes first, or what factor is more important than any other in what phase of the process. Such questions can only be answered by the stakeholders in a specific Smart City initiative since there are many local factors relevant to determine the impact of the different governance factors.

In a second round of data collection, two additional interviews were held with Beijnsberger and Yang to check preliminary conclusions. These interviews were not added to the set of statements from the first round since they served other objectives with a different set of questions.

The interviews confirm that in Triangulum, governance is mainly experienced as a mixture of collaboration, leadership, partnership and participation. The presence of the other factors is less dominant. This reflects the use of the term 'governance' by the stakeholders and points at the fact that the other factors are more or less 'out of sight' as connotations of governance, or they just found it less relevant, or more risky to talk about.

The climate was fairly optimistic in the first round of interviews. The interviewees so far have a positive experience with the Triangulum project with a clear dominance of signalized success factors, some factual (neutral) statements over a low amount of barriers (16/101). The project is nearly finalising its second year and expectations are still high about the outcome, it seemed to be difficult

for interviewees to determine possible barriers or fail factors yet. Potential and unsolved barriers are being discussed internally, to come up with an action plan of solving them.

Table 7-1 Division of statements from the first round of interviews

	Governance aspect/ nr statemen	Triangulum	%	SF's	Factual	Barriers
1	Collaboration	33	33	22	2	7
2	Leadership & champion	13	13	8	5	0
3	Participation & Partnership	26	26	19	4	3
4	Communication	7	7	6	0	1
5	Data-exchange	5	5	2	1	2
6	Service & application integration	7	7	4	2	1
7	Accountability	4	4	4	0	0
8	Transparency	6	6	4	0	2
	total statements	101	100	69	14	16

The table shows that within Triangulum the main focus lies on the governance factor collaboration, to realize agreed on objectives. Prior to Triangulum, the partners were already orientating on the possibilities of Smart City project, while writing and negotiating the call, they decided that Triangulum would be the opportunity to strengthen development, and cover part of the risk of innovation in their Smart City projects if they would join forces. The collaboration has agreed regulations and standards, and materialize in a triple-helix partnership.

The municipality is leading in promoting the Smart Society vision, in which the role of citizens should be more central. Unfortunately there are many references to Eindhoven's Smart Society ambition but there is no reference to a document or website found, where this vision is presented, as mentioned in the communication phase. The vision itself therefore remains vague. Communication to fill this gap is lacking, however the marketing organisation 'Eindhoven365' is making an effort by publishing their strategy for 2016-2020. They find, like the Smart Impact Baseline report, that "there is no strategic framework or measurable overall smart city development goals that Eindhoven is following" (Duncan, 2015).

The municipality takes a facilitating leadership role to bring partners and stakeholders together and to connect the local activities with the European level. The leadership is also striving to a holistic approach from the municipality, installing a Smart City board to improve integral urban area development, and support strategic alignment. To determine how concrete projects are contributing to reach the high level objectives is merely still a missing link. As described in the governance model, there is a steady link between the leadership role and the communication process, as in this case shown in the description of tasks of the municipal chairman Henk Kok. In order to build trust and credibility, and creating attitude towards real action on shared values.

Participation is said to be a central part of Eindhoven's vision on becoming a Smart Society and seen as a necessary condition. However, realizing participation in practice is still a firm challenge, since citizens show not to very excited in collaborating. Related to this I conclude that most of the project initiatives are top-down selected, although the promoted vision is that only bottom-up could be successful. The effect of the iCity tender, call for proposals on citizens participation is not yet to be estimated.

In essence the Triangulum partnership can be seen as a triple-helix partnership in pursue of quadruple helix collaboration. Partners in the consortium like Woonbedrijf and PSB have formulated

their own vision on the opportunities in the Smart City concept, preceding their participation in Triangulum. Projects have been selected prior to the partnership formation, as effect partners are willing to take responsibility for their own project initiatives from the start. The partnership is formalized and special rules are developed to work together in the partnership, and build a coalition of interest. The regulations from the EU are mainly seen as contributing to effective rules to develop a transparent and accountable partnership and to communicate within the partnership and on the international level. This partnership has a strong local government as key player, which creates a pro-active government, willing to take action, rather than a government who is reacting to the urban development plans. Although stakeholders are aware of the (language, and working) differences between the organisations in the partnership, it is mainly seen as a possible source for misunderstanding. Co-creation is mentioned as an opportunity but synergy is never mentioned as a driver. This gives the impression that joining forces is more driven by other advantages and that synergy between disciplines and organizations is not a major objective in this Smart City initiative. The possible risk is that under the umbrella of Triangulum each partner will mainly be busy realizing its own projects, forgetting to optimize the collaboration.

Data exchange is seen as a necessary prerequisite, that's why the design and implementation of a specific ICT architecture (open data platform) has a central position in the project. The sharing of data is a crucial success factor for the WoonConnect project. Service integration is potentially supported by the municipal Smart City Board, and by the promoted integrative approach although there are no concrete examples known yet.

Communication is seen as a positive factor for success, as well inside the partnership as related to the environment. The importance of communication is clearly noted by assuring one voice to the external relations. Newsletters are published to give some transparency to the public, but as in Transform, this is not an objective source to check the status of the developments because of an optimistic marketing bias. If communication problems might pop up, it will probably be related to different expectations of the Triangulum project. As long as the objectives are not very 'SMART' and measurable formulated it will be very difficult to manage expectations of the community concerning the outcome that can realistically be expected the coming years.

Accountability will remain a point of attention as long as the project goals are not explicitly related to the higher level ambitions. The necessary indicators are still under development to be able to monitor progress during the project, but also for evaluation and accountability.

A transparency issue in Smart City projects found in literature and practice is the difficulty to create transparent investment metrics, due to difficulties in measuring results and ensuring actual sustainability. Partners in Triangulum use the 'the value model' as a method to develop projects in this Smart City initiative, which go beyond the basic business case, and include social value, as well as value for stakeholders in the chain of Smart City development.

I find that transparency about the clear targets is still missing on a project (product) level, while transparency on a process level seems to be sorted within the partnership. The available documentation on the project so far, is limited. Only a part of the document 'Grant Agreement' could be shared at the times of writing this thesis. This limited amount of public information makes it for citizens hard to get a good overview of what is going on, which projects are planned with which concrete objectives. If this would not improve the coming years a lack of transparency could become an issue for example in driving participation. On a more positive note, the interviewees seemed very open, transparent, and helpful to collaborate in this research.

7.7 Recommendations

Since Triangulum is still running as a Smart City initiative, I will elaborate on the recommendation for this project.

In 2015, a number of recommendations for the City of Eindhoven to become Smart, are presented based on a study by Venturespring under the title ' How can Eindhoven become a Smart City, faster?' (Mol et al., 2015b). Their recommendations were concerning the full spectrum of influencing factors and incorporated a few governance related items. Their recommendations include:

- Set up an Eindhoven Smart City Architecture team;
- Appoint leaders from current efforts and welcome initiators of new proposal, from the municipality of Eindhoven and others in and around the city of Eindhoven;
- Set up the leadership team to initiate, approve, foster and terminate Smart City projects.

Explicit attention to governance will be required;

- A substantial, creative, mobilizing effort is needed to drive the initiative and engage the citizens. Invest in that effort;
- Co-create a vision with the leaders and keep on iteratively updating that vision collaboratively;
- Set up an independent Security and Risk Assessment audit team for all operational smart city projects;
- Define guidelines to have security embedded into solutions from the beginning.

Matching the overview of success factors that can enforce implementation power (see chapter 4 and appendix III) and the case analysis of found success factors and barriers, I noticed a number of possible success factors that were not (yet) operationalized in the case. This match results in a number of recommendations for the current Triangulum partners to optimize the possible effect of success factors:

- Define the area's in which synergy is expected to grow from the cooperation between partners and evaluate this aspect'
- Mobilize local entrepreneurial individuals;
- Define some Champions between the stakeholders that promote the vision and strategy;
- Recognize which people fulfil the role of strategic visionary leadership and link these people to the more operational leadership;
- Gather and maintain political support from elected officials;
- Secure the involvement of CEO-level of the different partners;
- Define citizen's based ex-post satisfaction criteria to assess project outcomes;
- Support with a frequency personal interaction between the stakeholders and possibilities for short circuiting information;
- Define the consequences of the accountability for decision making and the use of mandates;
- Find out if accountability leaves room for innovation;
- Enforce the transparency about the project by publishing more detailed information for citizens and organizations that could be interested.

8 Conclusions

This thesis presents a governance framework for the study of the phenomena of Smart City initiatives. The objective of this thesis is to gain insight and understanding of the different governance factors used in two Dutch European funded Smart City Initiatives. In this chapter I will present the final conclusions of this research. The conclusions will focus on the main research question: How are governance factors used in the implementation of Smart City initiatives Transform in Amsterdam and Triangulum in Eindhoven and how can governance factors improve their implementation? To answer this question an introduction to the Smart City concept in the form of urban development is given (chapter 1 and 2), a Smart City strategy framework (chapter 3) together with a governance framework (chapter 4) is developed from literature. Chapter 5 described the specific research methodology which is used for this thesis. The governance framework and roadmap for Smart City strategies are used to describe the specific cases (chapter 6 and 7).

8.1 Conclusions Transform

Transform is finished in June 2015, thus we can answer our main research question: How are governance factors used in the implementation of the Smart City initiative Transform in Amsterdam?

The analysis of the Transform case shows clear flaws relating to two governance factors that are vital to Smart City implementation: Leadership & Champion and Accountability. Concerning Leadership & Champion, a lack of private party top management involvement is found, which corresponds with a lack of concrete shared objectives and accountability for project plans. In fact, this can be seen as a vicious circle: because there are no shared objectives the commitment of top management is non-committal, therefore there is no push on defining shared objectives. As expressed by some interviewees: 'nobody is accountable'. The lack of short term concrete objectives, in relation to the long term Key Performance indicators in the Transform project make it hard to monitor any progress and evaluate the programme at its finalisation. The municipality lacks public leadership by not using legal enforcement, creating a legal and regulatory 'free' zoning plan for the area, and they lacked in facilitating leadership by not using *stakeholder mapping* or *power modelling*, failing to map the accountabilities of the parties involved, necessary to commit on the specific Smart City projects, contributing to the sustainability goals.

In the eyes of the European Commission, successful Smart City initiatives are viewed both:

> [1] as instrumental means of tackling specific problems and [2] as a way to build a community of interest or overarching awareness of the potential of such joint initiatives to provide a platform for continued progress that adapts to changing circumstances (European Union, 2014, p. 59).

The first aspect of tackling specific problems has not been successful in Amsterdam South East in the form of implementing Smart City projects, but the second aspect of building a community of interest, by providing a platform for continued progress on sustainability topics, has been successful.

Although leadership and collaboration have been lacking, the governance in the Transform project can also be described as mainly relying on the processes of Collaboration and Leadership, cherishing the ad hoc partnership between some major players in the SUL, sharing data to create knowledge and learning experiences, and to develop insight to deliver integrated solutions. The implemented

governance processes in Transform on the scale of the Smart Urban Lab in Amsterdam South East were fitted to serve the process oriented objectives of the main stakeholders, developing long-term collaboration in the area, and creating a partnership. But the governance processes did not served the formal product oriented objectives, as stated in the DoW, in which the EU strived for with this project: concrete measurable results, in the form of implementation plans including political commitment, which were ready to upscale and roll out. The European funded program did provide transferable knowledge, tools and best practices for other European cities, in trying to become Smart.

On the process level, a journey "towards common sustainability projects", was set out in the beginning of 2012. The *Design Thinkers session* (in the process towards the Transform project) and finally the *ILS* intensified face-to-face communication and have shown to be useful in starting and continuing local collaboration. The Design Thinkers sessions stimulated participation of local stakeholders, according to their needs, resulting in 8 specific projects. This is where a deviation to the DoW finds its origin, by focusing on three themes which were not directly linked to the themes in the IP/SUL.

The energy atlas stimulated communication and creating awareness about the problem by data analysis, reflecting the needs for energy reduction. This gave insight in various topics like energy usage, on key performance indicators (KPIs) like the reduction of co2 emissions. It also stimulated research projects and feasibility studies for projects like the Hospital Waste Heat.

The three day ILS, is seen as an 'essential intervention' as a pressure cooker event to work towards an implementation plan and to create shared value between the involved stakeholders, in which the municipality in their facilitating role, slightly lost track of the Transform key performance indicators. For example by testing projects (like AMC-Arena electricity) which have more economical or social advantages than they would have effect on the KPIs of reducing CO2 emissions. In this process private partners took matter into their own hands, in line with the ad hoc commitment in this partnership. The ILS sessions, should have placed more emphasis on involving al the necessary stakeholders, clear communication based on a defined problem analysis, and to be positioned as part of a follow up programme, rather than just a specific moment in time to create temporary synergy, in which collaboration is a journey, not a goal.

During Transform the partnership was not formalized in a legal entity and citizen participation is not really pursued, which causes the two pillars for collaboration to be shaky to build on. Citizens do have little power regarding the infrastructure in an energy transformation process, but can improve the implementation of other 'smart' solutions, thus they should have been included in the process. Nevertheless, the *ILS* and the *Captains Dinner* did assure to provide funding to take on the process of collaboration in the area under guidance of a project manager in the post-Transform period.

Communication through data-exchange stimulated collaboration in the form of the Energy Atlas. However, the Energy Atlas was finalized to late in the process to be used as input on decision making. Therefor preliminary results had to be used. Also the final result of this tool has shown to be insufficient in its outcomes to be useful for decision making in urban development. In that sense, and regarding the status of the Smart City projects, the documents of Transform was not completely transparent about the actual outcomes of the project.

I use the conceptual model of Governance processes (fig 4-11) to give a visual impression of the impact of the governance processes on the implementation power and the project results.
Green processes have had mainly a positive influence; orange processes have had partly positive and partly negative influence; red processes had mainly a negative influence or their influence was largely lacking. In the processes one or more examples from the conclusions are presented with a +

of - label. The translation from the conclusions above to this visual representation is of course a subjective one, since there are no objective measuring criteria available to determine the contribution for each process. Being aware of this limitation the visual offers in one view the strengths and weaknesses in a Smart City initiative, based on my case analysis. It also offers a handle to compare the different analysed initiatives on a higher level of abstraction, concerning the impact of the governance processes. The main problematic governance factors for Transform are shown in figure 8.1.

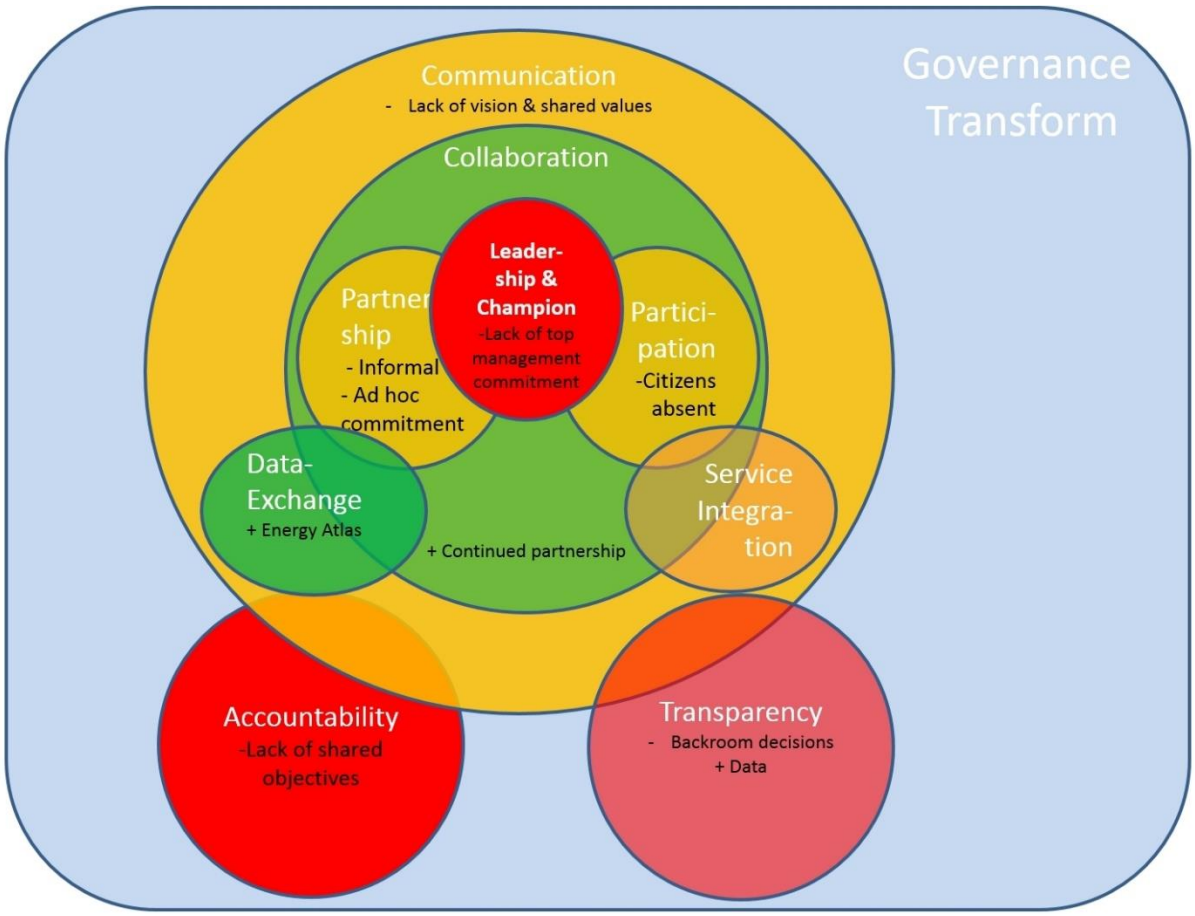


Figure 8-1 The main problematic governance factors of Transform (in red and orange)

Other main findings concerning leadership are that the EU as a sponsor cannot fulfil the role of main client. In a traditional demand and supply situation, the client has defined the need and objectives, and steers on relevant aspects as timelines, budget and quality. In the EU-projects the EU steers on timelines and budget but not in an integrated relation to the desired outcome and quality. There was a monitoring and evaluation team put in place in the form of the Advisory Board and the project coordinator, but these actors did not have the power to use sanctions, when quality of products was insufficient and needed improvements. Not 'having' a main client resulted in a lack of guidance on the development activities and a lack of quality control, in the form of absent sanctions on the final deliveries. Here the municipality in the form of the Climate Office, the local alderman or even the city mayor, should have taken the lead more, stopping actors from 'doing their own things', and working more towards common ground. Especially since it would not make sense for the EU to steer act as a client on such a specific local scale of urban area development.

European Funding

The external European funding provided space for the lack of involvement of public and private top management. Since management fees to bring parties together have already been paid for, these top managers do not decide on the financing of most activities, they are not necessarily involved in the decision-making. Top management not being adequately involved leaves too much room for policy makers and results in too little emphasis on the resources and capacity needed to really implement change in the city. Transform initially came up with a 'stakeholder mapping'/power modelling approach to visualise the involved powers for the needed urban transformation. Unfortunately this was not used at the start of the project in Amsterdam South East.

The external funding even has some negative effects on the behaviour of the partners. Because of the available funding, the execution of activities becomes more important than the optimal planning and coherence of targeted results. This situation could only continue because the leadership culture was more process-oriented than result oriented, and the commercial drive of partner organizations was not aligned with SMART project objectives.

Another, more general disturbing element is that the chosen domain 'Energy' is very complex and that the partners involved had little knowledge about it. This had a negative effect on the transparency process. Changes in this domain ask for a long-term commitment, which does not fit well with the time frames of EU-sponsored programs. The relations between the different main barriers found are shown in the figure below.

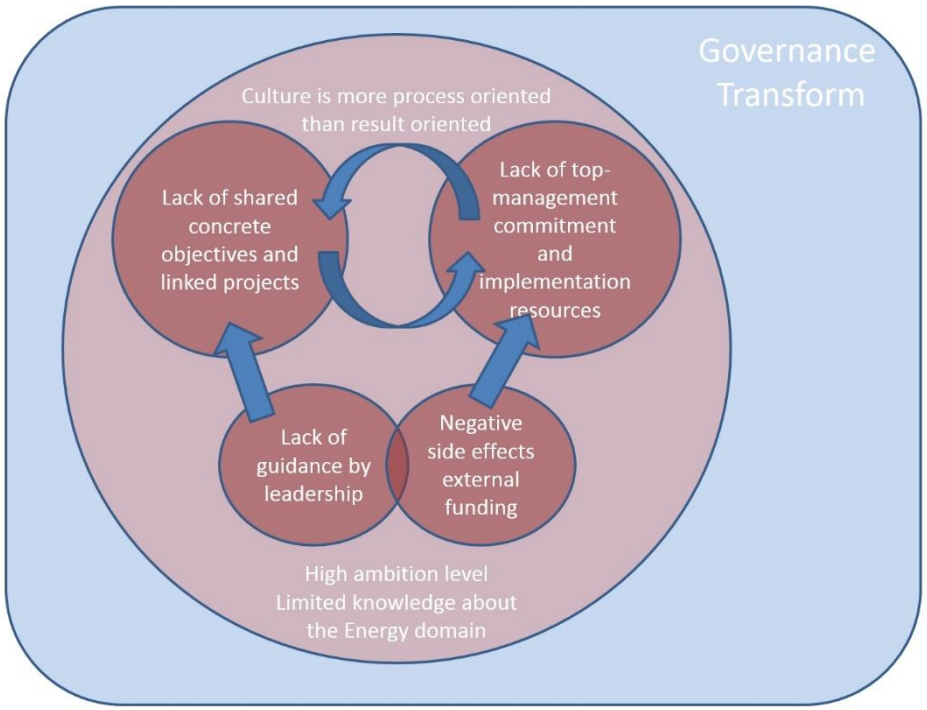


Figure 8-2 Relations between governance barriers found in the Transform project

These governance barriers might not only be specific to Smart City implementation. The difficult link between high-level ambitions (e.g. reducing CO2 emission to improve the quality of life in the city) and the needed operational projects and actions in a complex environment (Energy) is a typical Smart City phenomenon. The other barriers are related to complex collaboration in an externally (EU) sponsored program, and play an important role in conventional urban area development.

Van Warmerdam supports these conclusions, and adds to it: "I think we should create a new type of platform, a new kind of 'company' in which important stakeholders like housing corporations and

energy suppliers, investors and scientific expertise are involved. This platform should be able to offer the needed leadership and holistic vision, with clear targets (KPI's), investments and a clear long-term vision." (van Warmerdam, 2016, p.c.)

8.2 Conclusions Triangulum

The Triangulum project in Eindhoven is nearly halfway its planned lifetime, since it started in 2015 and the projects in Eindhoven need to be implemented in 2018. Therefore it is hard to formulate conclusions concerning the success of the project, without knowing the final results. This means that the conclusions are concerning the first phase of the project, focusing mainly on the process of implementing Smart City projects, rather than the final result. An answer will be given to the main research question: How are governance factors used in the implementation of the Smart City initiative Triangulum in Eindhoven?

Prior to the start of the Triangulum initiative, the city of Eindhoven, showed active leadership, especially the mayor was a 'champion' in pushing the 'Smart' agenda. In the road towards writing the Description of Work for Triangulum a sort of stakeholder mapping was done to determine the relevant parties necessary for the collaboration. This led to transparency and clear communication about the partners and their accountabilities from the start. After local stakeholders 'boldly' went beyond, and won the European call for Triangulum, a local partnership with ex ante commitment for the initiative and on projects is formed. This partnership includes five triple helix actors: VolkerWessels, Woonbedrijf, KPN, The municipality of Eindhoven, and the Eindhoven University of Technology.

The formed partnership includes one partners who has developed a Smart City vision (PSB in strijp-S) for the area. Communication between the partners seems to develop well, but more clearness concerning the actual Smart City vision and the impact of a Smart Society needs to be provided, for example by publishing city vision documents and relevant roadmaps. Especially the municipality lacks a clear Smart City strategic framework in which to position initiatives and projects.

During Triangulum, the governance in the project can be described as having a dedicated partnership, led by the municipality in a facilitating way. The reason why certain projects have been chosen is not clear. Projects seem to contribute to the broad goal of increasing quality of life, but not all projects contribute to the high ambitions of C2 reduction, because a focus towards more social aspects like 'safety'. Each specific project has different partners in the lead, making them accountable for the implementation. Therefore collaboration seems less demanding within these projects, because the work is often already divided. A risk here is that these projects might not fully profit from the possible synergy between the different partners.

Participation is central in the municipalities' undefined vision of a 'Smart Society', but most Triangulum project ideas are top-down generated, by the partners. Only a few projects are generated using a middle-out-approach, and only in Strijp-S, the Icity-tender call contributes to actual bottom-up approaches, by providing funding to SMEs who apply to their Smart City project criteria. Nevertheless, some of the key projects of Triangulum, like WoonConnect, are still heavily leaning on public participation and data exchange to succeed, which in practice shows to be a highly time consuming process, using face-to-face communication, and not always lead to citizens joining the collaboration. This makes communication with the community an extra point of attention to manage realistic expectations of the outcomes of Triangulum.

Service and application integration within the municipality seems to be put in place via the overall Smart City Board to work horizontally instead of through siloes, to achieve an integrated urban Smart City development approach. The municipality is working on the open data platform as an application for the integration of management services, and facilitating and coordinating collaboration among city departments and the community. With this approach open data increases transparency to establish involvement and cooperation in various segments of society and the economy. In Strijp-S, service and application integration will be improved by the infrastructure 'ICT backbone', while in Eckart Vaartbroek, this integration is in place via the application WoonConnect.

The main issue regarding communication in the municipality of Eindhoven is the lack of a detailed vision: "Eindhoven aspires to become a smart city but struggles with creating an inspiring narrative" as stated by Linda Vlassenrood (Vlassenrood, 2016). However, there is no roadmap or shared vision is in place. The social actors underline the importance of a value case, while the private partners are still thinking and talking in business cases.

Data exchange is a serious factor to bring most of the Smart City projects towards implementation. Here it seems that not all necessary requirements, for open data, are met yet to guarantee project implementation. For example the city lacks a clear privacy policy, currently even if the citizens are willing to share data, national law can block this. Therefore the needed open data infrastructure and conditions need full attention.

Accountability seems to be strictly limited to partners own projects, but it is not sure to what extend the partners are able to fail their projects, or to what level sanctions can be used. The TU/e is accountable for the quality control, but since the Key Performance Indicators, still have to be developed in collaboration with the partners. I see difficulties regarding the actual monitoring and evaluation of the different projects. Especially since it already showed to be fairly difficult to set hard and soft indicators for each project.

Transparency in the communication is externally – based on the available documents and public information – quiet limited. Internal transparency on communication is well sorted between project partners, by agreed standards and procedures, creating openness for decision making, avoiding backroom decision and creating trust. The internal transparency activates collaboration, towards fining shared solutions of problems at hand.

The figure 8.3 gives an overview of the impact of governance factors in Triangulum at this moment. Participation and Communication are asking for some adjustment, while accountability and Transparency really need more attention of the stakeholders.

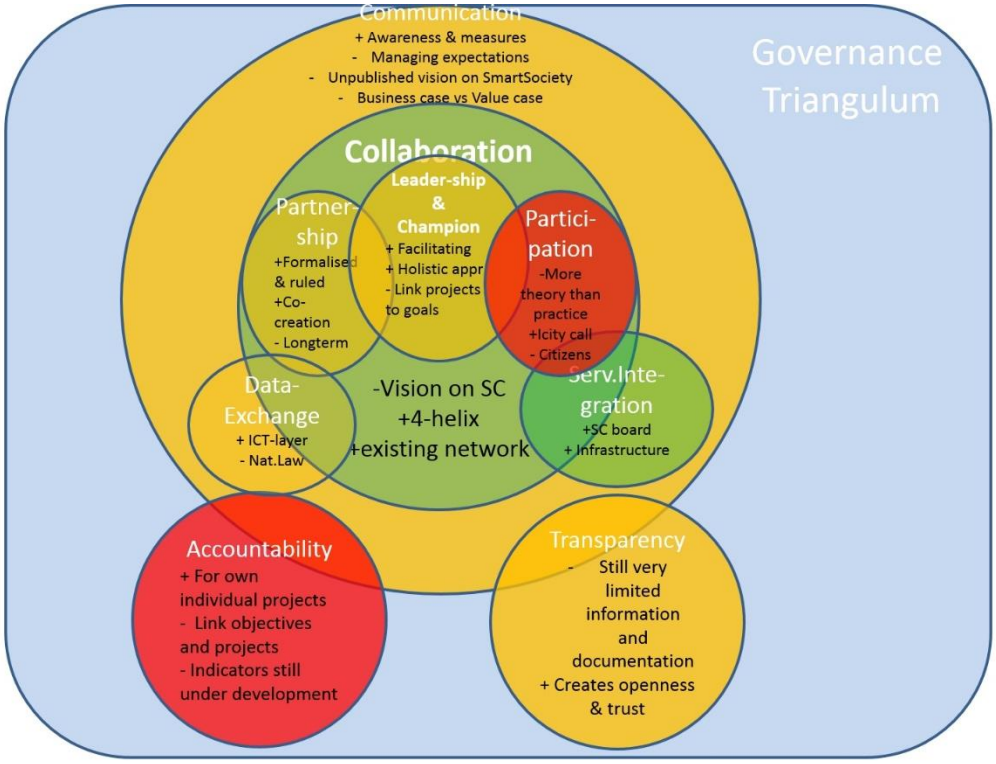


Figure 8-3 Overview of the main governance factors in Triangulum-Eindhoven

Looking into the future

The expectations on the result based on the monitoring actions is that Triangulum could be successful according to the EU definition: the necessary indicators are still under development, it is attracting wide support although participation is a barrier, it has clear objectives although the relation between the objectives and EU-targets is somewhat loose; the type of projects selected have the potential for imitation and upscaling. As mentioned, in the eyes of the European Commission, successful Smart City initiatives are viewed both:

> [1] as instrumental means of tackling specific problems and [2] as a way to build a community of interest or overarching awareness of the potential of such joint initiatives to provide a platform for continued progress that adapts to changing circumstances (European Union, 2014, p. 59).

As Radecki underlines "prospected benefits of smart city solutions need to be proven under reproducible circumstances in order to convince future beneficiaries to become smart city investors" (Kumar, 2016, p. 309). This is clearly what is happening now in Eindhoven. Triangulum is being used as an instrumental means, in which the partners are 'working hard' to tackle specific problems, like safety, energy reduction, smart parking, cleaning contaminated soil, sustainable (social) housing transformation, building an open data platform, including ICT as a means in trying to improve the quality of life in the two living labs Strijp-S and Eckart Vaartbroek. But it still is unclear to what extend these different Smart City initiatives will actually be implemented. It is also unclear to what extent Transform will build a community of interest, or a platform for continued progress. A high risk is that after the European funding stops, collaboration will deteriorate. Or as Linda Vlassenrood, programme leader of the State of Eindhoven states: "How do we go beyond the approach of just another participatory project, and above all, how do we start a movement that will have a lasting effect? It is not only in people's heads that change must occur; behaviour, too, must change over the long term. How can we prevent participants from reverting to business as usual

afterwards?"(Vlassenrood, 2016). In 2018, or 2020 at the latest, we will see if 'the licence to fail' will become a 'licence to prevail' for the partners in Eindhoven. And see if Eindhoven, in competition with Amsterdam, actually is "not the most beautiful girl in class but the most interesting" (Radecki & Schmidt, 2016).

8.3 Conclusion Smart City Roadmap

In this paragraph, I will look back on the use of the "Roadmap for developing Smart City strategies in large European cities", as described in paragraph 3.1. Bolici and Mora (2015) have tried to make a model including the essential steps for developing successful Smart City strategies. I used this model to describe the two cases of Transform and Triangulum. As far as I know, this is a second attempt in testing this roadmap to empirically validate this theory for developing Smart City strategies.

General Findings

The intention of a subsidy deadline is to put some pressure on the speed of the process to reach targets within the granted budget. In the case of Transform and Triangulum, this served its function definitely. However in Transform it also let to frustration, since the IP did not contain the actual Smart City plans with commitment as they should have, so that they could be implemented in the next five years.

There is one clear deviation regarding this roadmap and the two cases described in this thesis. The cases are both European funded Smart City projects with (more or less) specific targets, instead of the objective to develop an overall Smart City strategy. Thus Transform and Triangulum are described as part of the city wide Smart City development process in Amsterdam and Eindhoven, elaborating on their context. Therefore, sometimes the reality of the projects did not completely match the steps in time of the specific phases as described by Bolici & Mora. It mainly means that in practice some steps are done earlier in the process, since this is demanded by to EU in order to win a call for Smart City funding. At times it was hard to separate city scale and project scale in the different phases. Since both scales are relevant throughout the process. Nevertheless, I found the five phases, and the specific steps, of the development process to be very relevant in relation to Transform and Triangulum, in describing how these projects are organized (and governed). I will describe my findings per phase below.

Starting

The three steps in this phase, all relate to both cases Transform and Triangulum. The final step (1.3) 'identify the department responsible for the development of the strategy and form a planning team ', shows to be a complex 'step' in both cases. Not only identifying the municipal department and municipal planning team, but also identifying the different key stakeholders for a planning team, as this is demanded by the European Commission, in applying for the call of an EU Smart City project.

In line with this, the European Commission demands for both projects to have picked their specific urban area for creating Smart Districts, already in the starting phase (instead of in step 2.3 'select fields of action' in Bolici & Mora's model). In that sense, the European Smart City Funding program, can be seen as a pressure cooker, accelerating the development process of a Smart City. Pushing actors towards the specific deadlines as defined in the project.

Planning

Step 2.1, 'rebuilding and analysing the strategic framework of the city' was not so much part of the scope of the European funded programs'. Nevertheless, the Living Labs or Smart Urban Labs used in these cases, are definitely closely related to their cities, and thus should put more focus on this step. In both cases the stakeholders found it difficult to elaborate on the long-term Smart City vision and objectives (step 2.2). The lines of actions are rather clear.

From the six steps noted in this phase, apart from step 2.3 'select the fields of action' also step 2.4 'set up a team responsible for the implementation, and establish roles and responsibilities' has been 'pushed' to the starting phase in the practice of the cases.

The step 2.5 'establish how to produce and select project ideas' could not be clearly described in both cases. Not so much 'how to produce' project ideas, but rather for the selection part, both cases are vague regarding the selection criteria for projects to be developed. This step should definitely receive more attention, since the selection of the right project ideas, will essentially determine the outcome and to a large extend the success of the specific Smart City project.

Step 2.6 'define a monitoring and evaluation methodology', is mainly defined on the level of the entire programme (bundle of projects) rather than on a specific project level. In Transform is chosen to use an ex ante, ex post analysis. For Triangulum an entire work package is dedicated to this step, on a program as on the specific project level.

Development of Projects

In essence this step should have been out of the Transform scope, since the idea was to generate Implementation Plans only. However, due to a strategic chance, in which the Climate Office decided to start testing project ideas, this phase actually turned out to be very relevant.

The four steps in this phase, have all shown to be very relevant in describing the development process. Step 3.2 ' generate, select and organize project ideas to achieve your objectives' builds forward on step 2.2, 2.4 and 2.5.

Step 3.3 'ensuring financial support to the projects', is set fairly late in the process, as a final step towards actual implementation of the projects, and has shown to be an actual bottleneck in the case of Transform. Triangulum is trying to create a 'value case' to ensure this step; if that will work, still needs to be proven. Within these European funded cases, this step is already partly taken in the starting phase by receiving funding up front. For Transform, this step was still very relevant in the development phase, since the EU funding did not go to the local stakeholders, but only to the Climate Office for managing the project, establishing local relations. In Triangulum the local parties do receive funding for their projects in the starting phase, only because the local parties themselves committed (financially) to the development of these projects in reply to the call.

Monitoring and Evaluation

Both steps in this phase have shown to be very relevant. Step 4.1 'monitor progress and evaluate results', is completely executed for the case of Transform. For both Transform and Triangulum, I used this phase to describe both city level progress and project level progress. Only for Transform the final evaluation could be made, since the Triangulum project is ongoing.

The second step 4.2 'adjust and modify', falls partly out of the scope for Triangulum. For Transform, I used this step to describe the bigger picture of the Smart City development process in Amsterdam. This step is completing the circle and also starting a new one, by describing the circular South East partnership, underlining the continuation of the Smart City development process: step 1.3 'form a planning team'.

Communication

For the communication phase, I found it rather short-sighted that Bolici and Mora only defined the step “communicate and promote the Smart City Strategy”. A step which has shown to be very relevant, but I think focuses too much on ‘promoting’ the Smart City strategy, rather than includes steps on creating effective communication throughout the process. I think this phase should more strongly be included in all steps of the development phase. For example in the starting phase as a step ‘define a communication strategy’ or ‘create a shared language between partners’. But also in relation to data: for example that data structures need to be provided in a city-wide, inclusive way.

The Model as described by Bolici & Mora, is much more elaborative than the 7 step approach mentioned by TRANSFORM in their Synthesis report (p. 14), But some of these 7 steps, should be integrated in the Bolici & Mora model: for example ‘inventarisation of investment agendas’ in the starting/planning phase, ‘analysis of the physical part’ (building stock, energy system) in the planning phase, and finally ‘replicate successful projects and erect structural collaboration’ as a final step in the development phase. Since upscaling of Smart City projects, and the continuation of collaboration define the Success of Smart City projects.

8.4 Revised Governance Framework

The experience with the use of the governance framework for the analysis of the two cases leads to an improved revised framework based on more insight on the relations between the different processes.

The eight governance factors that are found to be relevant in the literature have also been found in the case study:

1. Collaboration
2. Leadership and champion
3. Participation and partnership
4. Communication
5. Data-exchange
6. Service and application integration
7. Accountability
8. Transparency

The statements of the interviewees in both cases are categorized within the eight governance factors. For example the statement “stakeholders were familiar to each other, and had positive experience in working together” is labelled as proof of presence of the success factor for collaboration “collaboration between stakeholders and organizations across multiple sectors”. The resulting table with absolute figures and percentage numbers shows how the attention of the interviewees in both case studies is divided over the different governance factors, based solely on the quantity of their statements. This way each statement is equally valued, and the possible differences in impact are ignored, since they are not measureable within the context of this thesis.

Although this way of ‘mapping’ the role of governance factors within a certain Smart City initiative is a ‘rough’ approach, it gives clear indications of the extent in which governance factors are consciously used to enforce the implementation power and thus the possible success of an initiative. Low scores on one of the governance factors, like for example ‘participation’ is an indication of

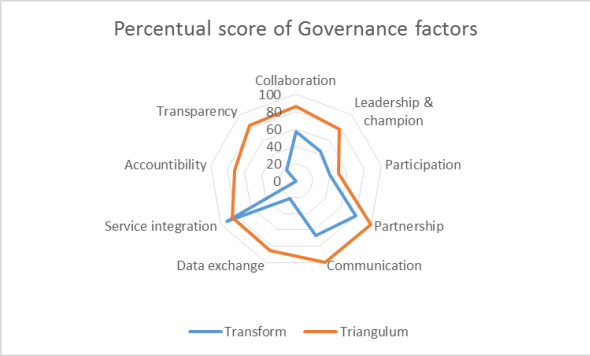
unsolved barriers and/or un operationalised success factors, resulting in a sub-optimal or maybe even bothering effect of this governance factor.

Table 8-1 Division of statements from the interviews in both cases

	Governance aspect/ nr statements	Transform	%	Triangulum	%
1	Collaboration	45	32	33	33
2	Leadership & Champion	43	30	13	13
3	Participation & Partnership	24	17	26	26
4	Communication	4	3	7	7
5	Data-exchange	10	7	5	5
6	Service & application integration	2	1	7	7
7	Accountability	8	6	4	4
8	Transparency	5	4	6	6
	total statements	141	100	101	100

The top three governance factors found in the literature (collaboration, leadership & champion, participation & partnership) are also apparent in the case interviews; there is a focus on 'collaboration' in both cases, other factors seem to be less prominent. No new governance factors have appeared. The factors communication and data-exchange were less prominent in the cases than expected based on the literature. Service integration, accountability and transparency are less prominent in theory as well as in practice. Of course this does not mean that they are addressed enough. To my idea the impact of these factors is underestimated in practice. One interviewee of Triangulum specifically mentions transparency (and implicitly accountability) as the main critical factor for successful Smart city implementation: "If you aren't transparent from the start, than along the way you will bump into expectations which are not manageable anymore . . ." (Hijdra, 2016, p.c.).

In chapter 4 characteristics for each governance factor have been collected from the literature and used to determine a definition for each factor. For both cases I added a score whether characteristics proved to be present in the case descriptions I presented in chapter 6 and 7.
The figure below shows the comparison of these scores for the governance factors between the two analysed cases. For every factor the number of characteristics determined the scale and the number of found characteristics per case determined the total score in a percentage on the scale. This was done because the numbers of chosen characteristics varied per governance factor between 4 and 12. It shows clearly that the Triangulum initiative has a broader scope concerning the governance aspects than the Transform initiative. Possibly what we see here is a learning effect, showing that Eindhoven is more aware of the impact of governance factors than the stakeholders in the earlier Transform project were. The extreme absence of the factor 'accountability' in the Transform project is directly related to the set-up of the Transform call, in which local stakeholders are not directly committed to the objectives for its projects.



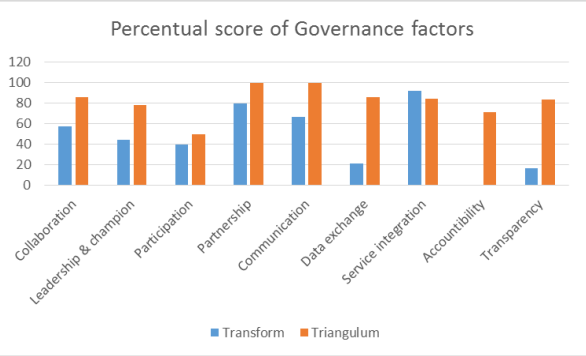


Figure 8-4 Percentage score of Governance factors I

Figure 8-5 Percentage score of Governance Factors II

During the case studies no new relations between the governance factors are found besides those already expressed in the governance model. The relations between the eight different governance processes can now be expressed more accurate than in the first representation (fig 4.11) as in the figure 8-6.

The model illustrates that 'collaboration' is the core process of governance. 'Participation' and 'Partnership' are separate processes because they concern different types of stakeholders and different informal and formal forms of collaboration with the corresponding rules and policies. The processes 'leadership & champion', 'Participation' and 'Partnership' are processes iteratively influenced by and also influencing the collaboration (expressed by the green arrows). In fact they can best be seen as sub-processes of the collaboration process. Collaboration with other cities or institutions (like the EU) is transcending the collaboration process and therefor marked as a meta level of attention.

The three processes communication, data-exchange and service-integration are very depending on the collaboration (for example the objectives and agreements made) expressed by the red arrows. For example successful data-exchange is depending on the willingness of stakeholders to share and will strengthen the collaboration between the stakeholders by offering new possibilities and synergy. Also the communication process has such a relation with the collaboration: it is depending on the collaboration (for ambitions, objectives, budgets, etc.) and at the same time it should enforce the collaboration by supporting the interaction between the stakeholders and by disclosing the right information at the right moment. The processes for accountability and transparency are forming a basic platform for all other processes to act on. They should offer the checks and balances for all other processes to determine whether the appropriate levels of transparency and accountability are realized.

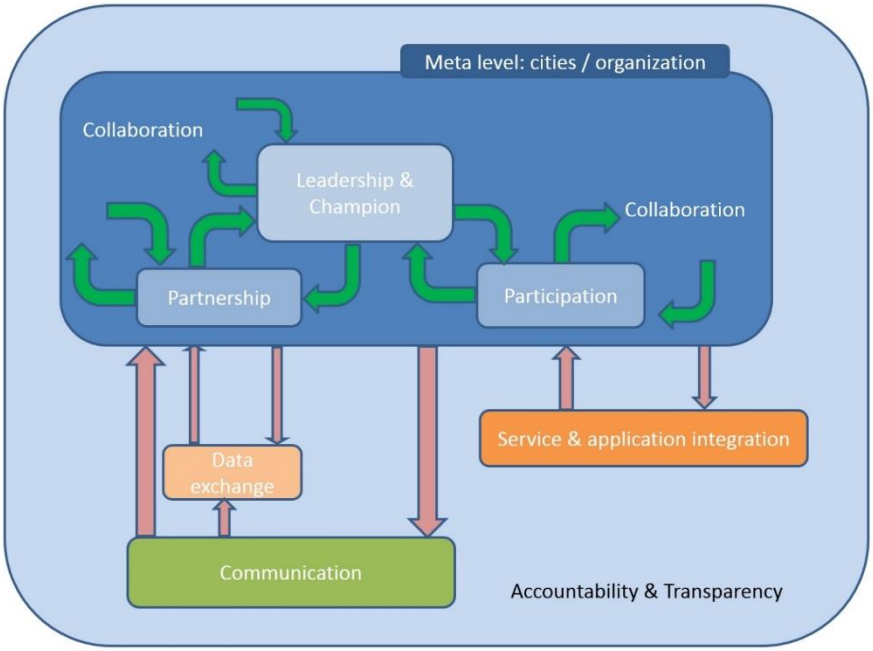


Figure 8-6 Revised model of the relations between governance processes for local SC initiatives

Overseeing the characteristics of the eight factors/processes of governance and its presence in the analysed cases, I can now draw some conclusions with respect to each of the identified factors and its impact on Smart City implementation.

Collaboration is the core process of governance. Most initiatives need to start with people and institutions seeking collaboration to realize their objectives, especially since Smart City initiatives are focused on triple or quadruple helix collaboration. During the life cycle of any Smart City initiative, at each point in time, the collaboration process will take place. In the cases we see that the Smart City initiatives are built on existing collaboration experiences between different stakeholders which lead to shared support for certain project ideas prior to the development of an initiative. In both cases this is seen as a success factor. Stakeholder mapping up front was only done in Triangulum and was missed as a success factor in Transform. Collaboration will be targeted towards common and individual goals, based on a shared vision and set of values, guided by leadership. It can be realized in many forms, concerning a wide range of actors, sharing data, information, and resources to create the needed synergy. Partnership and participation can be seen as results of the collaboration process, establishing and maintaining collaboration, to shape more formal or stable relationships. Leadership, partnership and participation are expected to contribute to the overall collaboration within an initiative. Therefore collaboration is essential for the internal planned innovation process of an initiative as well as for the external process of building relations with parties outside of the initiative.

Leadership and champion is an essential role and process within the Smart City initiative. In order to build momentum, generate commitment towards targeted results, and engage stakeholders to ensure sustainability of the program. Mainly the importance of political leadership is mentioned in research, however executive (local) support, seems necessary as a mandate for action. A mayor can draw policy directions, build on alignment between different departments, and stimulate citizen participation. Building credibility and trust among the stakeholders is the core task of this role and process. Leadership is key to 'keep things moving' and keep stakeholders focused, therefore it is in intensive interaction with the collaboration process as influencer and as result of collaboration. This interaction is shown by the green arrows in the model.

Participation and partnership are two different processes of collaboration with a comparable objective. Participation can be a formal or informal process of commitment, in order to involve and empower stakeholders to reach consensus and acceptance of Smart City solutions. Actors referred to in this process are mostly citizens and local companies. A partnership is a coalition among stakeholders who share rights and responsibilities based on agreements in the more formalized form of contracts and policies. Actors in partnership can have many different roles, often with a key role for local government. As in the case of participation, partners cooperate in activities to support communication and the decision making processes to create synergy and added value. Partnerships and participation, both are essential to collaboration but tailored to the characteristics of a specific initiative and highly influenced by leadership and communication.

Communication facilitates all governance processes and is crucial for sharing information in various forms and interaction between all stakeholders. The main objective is to build and maintain trust and credibility between stakeholders, their initiative and their context. In this leadership is critical. Mass-communication can be needed at certain points in time, but personal interactive communication between stakeholders will remain essential. Communication in Bolici & Mora's model is focusing on the branding and awareness of Smart City initiatives instead of the communication as constituting part of the governance processes.

Data-exchange is an important process of (digital) information delivery, sharing among different authorities. There are many issues related to data exchange, especially in the form of open-data, regarding standardization of data-collection and privacy issues. Data exchange can strengthen the collaboration, management and governance since it offers a shared base of information to support a more open culture. Good policy is needed to determine what data can be made available to who at which point in time and on what level of detail or aggregation. If not, data exchange can create pitfalls to hinder the collaboration.

Service and application integration is supposed to unite different systems and functions to enhance the quality of living in the city. These integration activities, together with the data exchange form a technological pillar under many Smart City initiatives to support effective use of ICT-technologies, like for example the use of the Energy Atlas in Amsterdam. Integration is hereby a form of collaboration between the stakeholders, like for example the Smart City board in Eindhoven of aligned municipal departments. Organizational and policy innovation will often be needed as conditions to improve this process. Therefore service and application integration closely relates to collaboration, partnership and leadership to make this change happen.

Accountability is the process of willingness to accept responsibilities, enforcing collaboration, and facilitating democratic control. In order to be accountable, objectives need to be measureable, and decisions need to be logged. Being responsible entails that stakeholders can impose sanctions on each other when responsibilities aren't met. Accountability describes roles and responsibilities and thus the power and influence within collaboration.

Transparency determines a process of being open. It makes collaboration, partnership and participation, communication, data-exchange, service integration and accountability, visible to stakeholders involved. The quality of transparency is necessary to create a clear environment for all and to establish and support collaboration between different stakeholders and levels. Transparency is mainly concerned with the decision making processes and thus accountability and communication within the initiative.

This analysis of the governance processes underpins the visual model of the relation between governance processes. This revised governance-model, the characteristics per process and the

conclusions above can be used as the basis for the organization and evaluation of governance in specific Smart City initiatives.

New empirical findings

In the finalized Transform case, I see a balance between experienced success factors and barriers. Most success factors and barriers found in the research literature (see paragraph 4.3) are recognized in the cases. In the ongoing Triangulum project respondents focus on the success factors—not many barriers have been experienced or mentioned. Of course this can change in the future, depending on the extent to which objectives are realized by the stakeholders and the transparency of the results.

All interviewees encountered a number of success factors and barriers that are identified in the literature. Mainly from the Transform project, but also from Triangulum, a number of success factors and barriers have been encountered that did not explicitly occur in the analysed literature in chapter 4.3:

1. Collaboration

- Success is largely dependent on the extent to which stakeholders have existing relationships to build on. This statement is made on the basis of the Energy Atlas in Transform for which Liander already agreed on delivering the data, but also on other Amsterdam Smart City partners who got involved in Transform. Also in Triangulum existing collaborations are mentioned as a success factor. Building relations takes time and effort, and needs trust and openness (Transform/Triangulum);
- External funding by a third party (like the EU), with largely payment in advance is a risk for it can stimulate extrinsic motivation, where declaring working hours and costs is more important than the optimal contribution to a specific goal; It can be demotivating to work on the program. This requires extra attention for a decent business case, good project organization, setting clear objectives and planning of activities and a vision on the post-project situation and responsibilities (Transform) This risk is not notified by Triangulum partners;
- Sudden funding changes can cause issues in the planning of the project (Triangulum)
- Over-ambition is a real threat: a too complex subject (CO2 reduction/sustainability) with too many partners in different local situations, with little knowledge of the (energy) domain, lacking a good selection process for the employees from different partners, can never be fully successful. As in Triangulum is stated “we boldly went beyond the call” (Unknown, 2014) while on the same slide is mentioned that partners still need to be specific about how much KwH, CO2 they are going to save. And that they need to “be realistic” since the funding is not that much (Transform and Triangulum).
- For synergetic collaboration different types of people are requested, for example with a process and a product orientation, making sure that the way of working together gets enough attention and that the energy is focused on concrete creative solutions. Entrepreneurial ‘Business developers’ are mentioned as example (Triangulum);
- Intensive lab sessions and design thinkers meeting helps to stimulate collaboration (Transform);

2. Leadership

- Having a pro-active municipality writing calls for European projects pays off. It helps having insiders in the European Commission/Parliament who can promote or tip about upcoming programmes (Transform/Triangulum);

- External funding reduces the need to involve CEO-level managers of the stakeholders, keeping the initiative on a distance of the core activities with an additional post-project gap (Transform);
- Get all levels involved from the start (Operational, Tactical and Strategical level) and besides policy makers also include 'hands on' implementation specialists. Top level commitment is critical from the start (Transform);
- Define an independent quality assurance unit to monitor progress and to test the results according to pre-defined quality criteria, and who can possibly hold money back until results are qualitatively satisfying (Transform);
- Include 'Iconic leadership', by involving stakeholders in the process who have specific goals and ambitious targets, and are able to translate these goals into concrete actions, like the Amsterdam Arena who has become CO2 neutral (Transform).

3. Participation & partnership

- During the planning of projects an implementation 'power modelling' should be made of the involved actors. Participation can have its limitations, especially when responsibilities and risks are getting involved. The municipality has chosen not to involve citizens, but rather focus on businesses as partners. Especially in the energy domain, the private parties and municipality are in control (Transform);
- Select partners with a sustainable interest in the area who will keep investing in the area for a long time and for whom the transformation and implementation activity is important for their branding and public relations. Select stakeholders that are intrinsically motivated embracing shared objectives, like Accenture where the CEO was pushing for a sustainable world and the Amsterdam ArenA who wanted to be climate neutral in 2015. Or like Liander who already joined the ASC, thus being in the smart city mind-set and open towards sharing data (Transform);
- Organize the needed dedicated resources to make progress and don't lean on employees who 'do it on the side' (Transform).

4. Communication

- Stakeholders use different terms and expressions, a shared glossary has been a useful tool to prevent misunderstandings. In Triangulum, for Strijp-S a Smart City vision document is created to promote goals and objectives and their strategy for the area. In Transform a communication document is provided on different terms and definitions. These documents contribute to shared understanding. However, many interviewees note that miscommunication between people from different sectors needs people to be patient. "Everyone needs to realise and be aware of the fact that they are working in different contexts, which can lead to misunderstanding", according to van Dieren (2016, p.c.) (Transform/Triangulum).
- Make sure to include a 'sound board' on the CEO level, to secure the level of involvement and the intention towards the project execution (Transform)

5 Data-exchange

- Signing special 'documents on privacy' to guarantee the type of usage of the shared data helps to commit citizens. Create a 'trusted' party of which the citizens are owner (Triangulum).

- The systems exchanging data, should be closed systems working together, improving service integration, 'Fi –ware' (a core platform for the future internet) can help with this (Triangulum)
- A base architecture form of data should be developed, so data can be compatible for different usage and exchange, thus creating a digital communication code (Triangulum)

6 Service application & integration

- Create demonstrable cross overs between branches to help people think of innovative possibilities. Show that collaboration can lead to service application and integration by realising 'low hanging fruit' projects (Triangulum/Transform).
- Setting up a Board of Smart City in the municipality can help integration of services, in which bi weekly or monthly meetings are scheduled to discuss progress on this theme (Triangulum)

7 Accountability

- Include 'project leadership', by making certain stakeholders accountable for the lead and implementation of specific projects (Triangulum).

8 Transparency

- Projects fail because of lack of entrepreneurialism. Innovation of Smart City projects always involves risk for the stakeholders involved.
- Transparency about new business models, can mean that projects have to be abandoned after testing phase (Transform).
- Transparency is critical in the starting phase. When signing up for a consortium or collaboration, everyone has to be clear about his/her objectives and regulatory procedures. If this does not happen at the start, unmanageable problems will rise on the road towards implementing Smart City projects (Triangulum).
- Results towards the EU need to be transparent, in order to improve the funding system. For example "Energy Atlas" key in open data exchange and in getting insight in the energy usage of a city (district) (Transform).

Impact on the definitions

Based on the newly found success factors and barriers in the two case studies, some of the definitions for the respective governance factors can be made a little more specific. The added elements are given in red.

Leadership and champion, the process and roles on executive level to give guidance to the collaboration, create credibility and trust, help selecting and binding the stakeholders to targeted results and overcome barriers to maintain an action oriented mode securing the right capabilities in the team and an independent role for quality assurance and monitoring.

Participation and partnership should be seen as two separate sub processes and therefore should have their own definition:

Participation: process to create and maintain participation of citizens to assure the right focus on problems to solve and solutions to be acceptable

Partnership: process to create and maintain partnership between public and private institutions to guarantee optimal involvement of the stakeholders with a sustainable interest in the area and willing to supply dedicated employees.

8.5 Revised Integrative Framework

The governance framework presented here is positioned as a zoom in level of the integrative framework for understanding Smart cities of Chourabi et al (2012), see figure 3.5. In their framework governance is an important element from the context of Smart City initiatives, like for example the natural environment and the built infrastructure. This implicates that the governance is a given environmental factor, hard to be influenced from a Smart City initiative and certainly not in a short period of time. Governance can be a more contextual factor if we consider Smart City initiatives like for example Singapore, where a governance model and belonging policies and procedures are worked out to govern the activities over middle- and long- term and the state is in full control of all urban development. Alawadhi et al.(2012) published some case studies based on their integrative framework for the cities of Philadelphia, Seattle, Quebec City and Mexico City, all on the American continent. In their view of governance they focus on governance models and infrastructures as given aspects of the environment paying less attention to the governance processes as I have done in this thesis. *For the European situation a focus on the governance processes as part of the internal influencing factors seems more effective.*

After exploring the eight governance factors summed up by Chourabi et al. by literature research and case studies, I concluded that the eight governance processes have high impact on the implementation and are executed by the direct stakeholders (chapter 4). As such these activities are not a part of the context but core to the Smart City initiative itself! This is stressed by the success factors and barriers found by Chourabi et al. for the core influencing factor 'Management & Organization' (M&O). Many of these operational factors have a direct link to the defined governance processes. For example they mention 'alignment of organizational goals' as M&O factor, where in my definitions this has a direct link with the factors 'Leadership & Champion' and 'Partnership'; they mention 'identification of relevant stakeholders' as M&O factor, which has a direct link to the processes of 'Partnership' and 'Participation'. They mention 'end user involvement' which refers to the Participation process, and 'good communication' which refers to the Communication process (see Appendix V for more examples).

Concluding that 'governance' is not a given contextual factor but an intrinsic part of a Smart City initiative (even part of its nature, see paragraph 2.2) with intensive relations to the operational management & organization, technology and policy factors, I suggest to revise the model of Chourabi et al. in a format that reflects this core position of Governance (see fig. 8-7).

Chourabi et al. reserve a special place for the Technology factor: "Technology may be considered as a meta-factor in smart city initiatives, since it could heavily influence each of the other seven factors" (Chourabi et al., 2012, p.2294). Based on the analysis of the two cases in this research I cannot find evidence to support this special position of Technology. Most of the technology used in the different

projects within Transform and Triangulum is proven technology or in an advanced state of development.

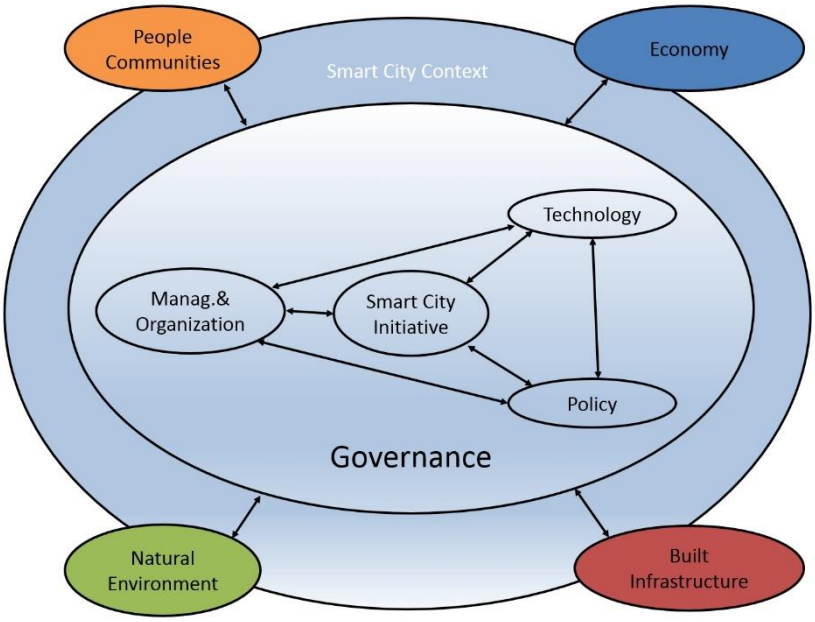


Figure 8-7 Revised Integrative Smart City Framework

The more prominent role of Governance as a core factor of Smart City initiatives can be found in models of some other researchers, like for example in the 'Smart City comprehensive schema' of Dameri where governance is one of the four core factors, together with, land, citizens and technology (Dameri, 2013; p.2549; see Appendix I)

Governance is the collective governing in complex networks of stakeholders without hierarchical structure and line of command and control, meaning to bundle activities of all relevant parties and create an optimal environment to realize agreed upon objectives. This governance environment can include technology, management & organization or concern the policy of some or all stakeholders. Governance is shaping an initiative, more so than the external factors, which are influencing an initiative by influencing targets, limiting possible change in the environments, limiting legal possible actions, offering societal support for specific actions. But for governance there is a stronger interaction: a Smart City initiative is, or should be, shaping the governance it needs in order to be implemented. In doing so, the governance framework aims to be a guide in analysing and shaping the necessary governance of a Smart City initiative.

8.6 Recommendations for Further Research

The scope of this research excluded many topics regarding Smart City implementation which need further investigation. I have formulated some recommendations on the topics of European funded projects, Smart City implementation, Governance processes and Smart City strategies.

Regarding the Concept of a Smart City:

Provide more empirical results on Smart City projects in relation to the existing critique towards the concept. Discover what the added value is, and try to find a measuring method for CO2 reduction.

Regarding European funded Smart City projects

Analyse the set-up of European project calls, and evaluate the deviation between project calls and their actual outcomes. What is the actual learning effect of these international partnerships?

Within Smart City implementation

Analyse the differences between a Smart City approach on a city level and developing urban districts.

Elaborate on the value case of Smart City projects as a replacement for the business case.

Test the revised integrative framework for other Smart Cities in the Netherlands.

Develop a model or tool, to better include citizen participation in these Smart Districts, and actually increase the bottom-up participation process.

Analyse and define and different partnership models to implement Smart City projects

Regarding governance processes

Developing the governance framework, as provided in this thesis, to a more practical instrument would ask for additional research to be done.

To test this governance framework with its definitions of core processes and relations a quantitative or more qualitative studies would be needed, for example to hold a survey among different European Smart City stakeholders to test the definitions and the relations in the framework, or to in-depth analyse the partner cities in both European projects.

To determine whether governance is optimal for a certain Smart City initiative, a classification of the Smart City initiatives maturity levels need to be determined for each governance process. This would make it possible to establish the link between the characteristics of a specific Smart city initiative (for example from a low scale intervention using solar panels to reduce the CO2 emission, to a large scale intervention in all mobility and safety aspects in a district) and the best fitting governance profile to make it successful. Maturity models for governance could be developed making use of the first suggestions of Lee & Hancock (2012) in combination with IDC's five stages of the Smart City Maturity Model (April 2013, IDC Government Insights). Then matching of classes of initiatives with the desired maturity of governance processes could give guidance to the teams leading those initiatives.

Smart City initiatives should be classified in means or end oriented, with measures for their size and impact.

9 Reflection

In this chapter I will reflect on my personal experience conducting this research process, in particular regarding the following:

1. The steps taken and the improvements that could have been made in hindsight;
2. The scientific relevance and the validity of the results;
3. The Societal relevance;
4. The utilisation potential, especially regarding the expected relevance as stated in chapter 1
5. What advice to give students

1. Steps taken and improvements that could been made

Previously to this research I performed an internship at the municipality of Amsterdam, for Transform as assistant to the project coordinator as well as assistant to the Work Package 4 coordinators, who were in charge of making the Implementation Plans for all the involved European Cities of Transform. This gave me access to the different contacts in the Transform project, as well as insight information about the actual practice of Smart City implementation in Amsterdam and other cities in Europe. All these cities were supposed to be frontrunners in the field of Smart City implementation, but it showed all cities were having a lot of difficulties to actually implement Smart City projects. This, together with the many ideological Smart City events and meetings I have participated or attended, made me feel very biased towards the Smart City concept. I felt it was more about window-dressing than actually sustainable city development. Findings which were substantiated by doing pre-research and interviews on this topic. I had to make sure not to be (too) biased about the topic before starting this thesis, or at least being aware of my bias, and not to let it influence the research in a negative way. However I could not ignore the facts I faced, during this internship, which showed me the rough practice of Smart City implementation in 'the real world', and the long run of urban development projects in general. Apart from practical experience, which showed really useful, especially in such a conceptual topic as the Smart City, the internship provided me with a network of people who were very helpful in guiding my graduation. I got support from the people working at the municipality of Amsterdam, making time for discussion and giving me valuable insights as well as motivational support. I can imagine, and know from experience, this can be different in an environment other than a municipal organization, for example in a private organization. I guess it all depends on the agreement you make with your company coach from your internship or graduation company. In this case I did not combine the writing of my thesis, with the Transform project, since the Transform project finalised in June 2015.

During the initial phase of my graduation thesis, an exploration study was done towards the research on Smart City implementation. This showed to be a very broad field of research, with many insights from many different perspectives. The research resulted in an overload of information, ranging from more popular sources, to a dense academic base. Instead of trying to make sense of all models and describing all the different models available, a concise analyse should contribute to the right choice for a specific model to use as a theoretical framework. Since the different models for Smart City implementation were very broad general frameworks, at first this resulted in choosing to test the complete general model by Chourabi et al. (2012) for Smart City initiatives in practice. I presented this at my P2 presentation, motivated with the choice to improve this model based on contributions from other research perspectives, like project management and process management, which would result in an improved model for Smart City implementation. This work was done after the P2

presentation, where I thought the research model was to be improved, so it could be used for case studies. So I developed a complete checklists of success factors and barriers for all influencing factors of Chourabi's model, also based on literature on programme and project management frameworks. However, it showed to be irrelevant, since the scope of the research was still too broad, which would lead to general findings. As I later noticed in other Smart City research outcomes, who did use this framework. Although I discussed with my mentors to converge my research after the P2 presentation, I actually started diverging again. This is something to look out for after the P2 presentation, since more questions rise to the surface. The first meeting with my mentors was scheduled about 6 weeks after this P2 presentation. In retrospect, I should have kept monitoring the progress in between to check if I was on the right path, building on the general framework.

In discussions with my two mentors and based on findings from other academic articles, the focus narrowed down to researching strictly the governance factors in Smart City implementation. As a consequence, the literature study took about an extra two months' time, since the focus shifted from a more general perspective, to a specific topic in Smart City implementation and urban development. Trying to avoid the previous mistake of describing the container concept like the Smart City, now I had to make sure not to fall for the same trap again. Thus, I described the field of governance from a more specific perspective, focusing on urban governance and especially Smart City governance. Here I had to make decisions about which interpretation to choose from. I spend too much time postponing this decision, eating into my case study research time. In hindsight, I should have been more secure about my analysis of governance, and continued on the path I was on. Actually choosing for my governance definition based on the sub processes: collaboration, participation, partnership, leadership, communication, data-exchange, service and application integration, accountability and transparency. This showed to be relevant for further case study research. In the interviews the respondents answered in similar terms, when examining the barriers and success factors of governance processes, only sometimes including policy and other barriers in their answers.

The size of this thesis is about twice the amount of pages, of which is given as a guideline at our faculty. At my 'Go/No-go' P4 presentation, prior to the summer holiday of June 2016, this thesis was about that size: 100 pages. However, I didn't pass the presentation, since the actual case studies were only described specifically regarding the governance factors, thus not elaborating on the 'story' of both Smart City projects as described now in the five phases from the Smart City Roadmap. Elaborating on this development process from starting to monitoring and evaluating, using many detailed descriptions, is the main reason why the size of this thesis is out of proportion. Another reason behind this, is that I found it really hard to take on the advice I got from my mentor Tom Daamen, to work backwards: from my conclusions towards the introduction. I found it hard to define my conclusions, at a stage where 'the body' or story of the case had not been explained yet properly. Planning wise, it took too long to describe the details of the case, in order to draw up relevant conclusions, after which I could work my way back and separate the main from the side issues. This has been an iterative process for me, in which at times, I even had to reassess my literature study. To improve this, I should have either focused on describing only one case, since both cases are complex in their nature, or I should have kept for example a page limit in describing the different phases, thus forcing myself to pre-select the story I want to share, and to make sure it would be in line with my conclusions. As I got as advice the weekend prior to handing in this thesis: "Cut the crap and kill your darlings". In hindsight, I think I could have probably better sticked to describing only one case, since I think the amount of detail and context is necessary in order to understand the conclusions, and in order for practitioners to see whether the outcomes and results relate to their context or not.

2. Scientific relevance and validity of results

The content of the case study research is about two European funded Smart City projects in The Netherlands, thus the outcomes of the two projects cannot be one-on-one relevant for other Dutch or European cities in becoming Smart. Both programmes are in different phases and of different types: Amsterdam being a more research and planning focused programme, and Eindhoven more of an implementation programme. Nevertheless since Transform deviated from the original objective of only describing an implementation plan, but actually tried to implement projects, both cases can be compared, as in this study.

The Transform project is already finished, making it possible to evaluate the entire process, and look back on the actually achieved results. Whilst Triangulum, on the other hand is on its way, to implementing the Smart City programme, making it harder to draw conclusions on the governance processes. This may have influenced the outcomes of the research. For example, the people in Eindhoven may have been more optimistic about the project, or less open then they should be, trying to spread a positive signal. For the people in Amsterdam, who have already finished the project in the summer of 2015, the information and their interpretation of the process could have been influenced over time. However, it seemed to me I got very honest opinions during both the interviews on the process of implementation, in which the interviewees were being quite critical towards the actual outcome or process of the projects.

It showed to be possible to involve and interview almost all the key actors in the Smart City implementation process of both cities. I did not get the chance to speak one key figure in the Transform project. This person knows all ins and outs, and is still involved in the area development process, but was not available for feedback. A risk of doing qualitative research, and in doing interviews is one in which the interpretation of information is subject to the researcher itself. A limitation to this qualitative research is that it hasn't made a quantitative interpretation of the importance of the different governance factors. Most interviewees announced this was an irrelevant or impossible task. However, it should be possible to make a governance maturity model, interpreting the different levels in governance processes by measuring the impact of each factor, based on measuring the eight governance sub-processes.

Reflection concerning the interviews

- Warmerdam, the international coordinator of Transform, and Wenzler, consultant from Accenture, both had an international role in Transform. In these interviews it was sometimes hard to distinguish between the EU-programme level and the local Amsterdam Southeast city-project level. Thus here a possible margin of error can be taken into account, regarding the interpretation of their answers. This relates to the complexity of the project and the role of the interviewee. For example when talking about the success of the program, how it is managed, and what the issues have been for implementation, answers might be given on a EU level, whilst I interpreted them on a local level, or vice versa.
- The time limit of an interview urges to focus on the main governance topics. That's why I have send all the interviews an overview of the governance factors including a detailed description of my definitions and research questions prior to the interviews. This way the interviewee could prepare him or herself. A risk here is that it narrows down the outcomes to only discussing the proposed factors, while actually other factors could play their part. On the other hand it also functioned as a checklist, making sure all governance factors would be touched in the conversation. By using a list of eight factors, and asking them what they find most important, without scaling them, the first three (leadership, partnership and collaboration) governance factors got the most attention. The interviewees had more distinct opinions on these factors

than on the others. If the list was in a different order I would suggest the results would be the same, based on the often open questioned interviews, where I let the interviewee start off with what he or she found the most important governance factor. However, I found interviewees answering freely, and only mentioned with exception that a certain answer should be rephrased. A clear notification here is the deviation between the empirical interview outcomes and the literature review, regarding the importance of the factor data-exchange. Data showed to be fairly important for Smart City projects in literature, but it was more on the background in the interviews not being a main governance concern for most interviewees.

- What I have learned about the semi-structure method of interviewing, in which the interviewees are made aware of the main question and the specific focus points, is that it has been helpful to guide the conversation and to keep the main plot line insight. It helped as a structure for time management. Furthermore I noticed the interviewees were prepared in their answers, being able to categorise certain facts and factors, and not felt overwhelmed by the different subjects used in the interview. A negative side effect of this method could be that interviewees could prepare themselves better in order to exclude certain information, rather than being 'caught off guard'.
- I have send the results of the interviews back to my interviewees, in order for them to confirm whether I have interpreted their questions and answers in the right way. I received feedback in which mostly only minor adjustments have been made, thus excluding interpretation errors.

3. The Societal relevance

The actual outcomes of this research can be used to inform other European cities, or stakeholders who want to join a partnership for a European Smart City initiative, to make sure they keep an eye on the right governance processes for successful Smart City implementation. This can inspire them in making plans and develop working procedures by showing them how to act on the different governance processes and relations and how to overcome the barriers on the road by optimising the effect of success factors mentioned in this thesis, if relevant in their specific context.

4. The utilisation potential

This research only focused on two Smart City projects in the Netherlands, and especially on European funded Smart City initiatives. Therefore results are not generalizable. As context is always a very important influencing factor for Urban Development and Smart City projects, it is always difficult to generalize results. However, although the actual outcomes may not be generalizable, this research has shown the proposed governance factors to be relevant factors to include in decision making about a Smart City initiative. All interviewees were convinced these factors were very relevant, with the main focus on collaboration, leadership, partnership, participation and transparency. The offered definitions and checklists with success factors and barriers can help them in developing dedicated governance processes and clear terminology and working agreements between the stakeholders. There is not such a thing as a spontaneous agreement on 'governance', it has to be developed time and time again dedicated to the situation.

5. Advice to fellow students

- Create a clear literature framework, specify a clear research approach and set boundaries to focus the research, stick to your research questions, but be flexible enough to deal with change when your questions or theory is not compatible to your results;
- In order to create a clear literature framework, specify the main and key researchers in your specific field, and elaborate on their findings. Stay close to the core body of research regarding your topic and define up front a closing date for ending the retrieving of new information. I

personally found it almost impossible to stop collecting new information, because almost every day new publications saw the light;

- Contact your study advisor if you feel blocked. Also communicate this with your mentors. They are here to help you to outshine;
- Sign up for an internship, in relation to your graduation thesis. It showed to be very useful to be involved in the internship at Transform for the municipality of Amsterdam and Dienst Ruimtelijke Ordening. This way I got insight information and I could learn from observation, connect with relevant contacts and specialist in the field, and gather project documents. A well-known risk here is to get stuck doing work for the actual project itself, instead on your thesis. Therefore you have to be transparent with your company mentor on how many days to work for them and how many days to work on the thesis. I experienced this first hand during two months in which Transform had to deliver documentation to meet a European deadlines, thus obstructing my research steps;
- Keep information properly structured and sorted. Make sure you have useable ICT and or physical infrastructure to keep articles, documents, comments, images, videos, newsletter, basically any kind of information, well organized, also make sure to make backups in the cloud in case your computer breaks down;
- Sign up for Events, meetups, and gatherings, to discuss the topics, get insight in newest developments, meet people from research and practices, join networking possibilities, see the topic from different perspectives, and motivate yourself, and convince yourself about the relevance of this topic you are dedicated to;
- Everyone is graduating in his or hers own pace, stay motivated and never give up, it can be a run with a longer distance than you planned for;
- Graduating is an individual process, try to share your experiences, and make it fun!
- Discuss your findings during the entire process with your mentors, a group of fellow students, friends, family, or experts in the field. Continuous feedback can be very helpful. But make sure to stick to your main plot line!

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Events & Meetings

Regarding this topic I have attended the following events :

- Smart City Event Amsterdam 2015, June 2nd – June 5th.
- AMS Euro-Case: Engineering Smart Cities of the Future, 2nd of November 2015, Aula Delft University of Technology
- Smart Cities Event Schiedam, 2nd of February 2016.
- ECP inspiration Session 'The future of technology and the human being', 21st of April 2016, Spui Theatre, The Hague
- PBL-academy lecture by prof. Rob Kitchin and prof. Albert Meijer in the Royal Schouwburg in the Hague at 25th of May 2016.

- Amsterdam Smart City meeting with Emma van der Veen, 12th of December 2015, at the Economic Board of Amsterdam
- Kees Jansen, teacher at Smart & Sustainable Cities at SBO/Euroforum, 25th of April
- KPN Consultancy, 9th of May 2016, with Richard Vermeeren and Dani de Bode.

Appendix I Smart City frameworks

I show the most relevant frameworks regarding the research scope, thus including influencing factors in smart city implementation.

As we have seen before many publications stress the fact that Smart City initiatives originate frequently from a technology push with a high risk to neglect other relevant factors. According to Nam and Pardo (2011) the Smart City concept is an organic connection among technological, human and institutional components. However, like Mora (2015), they state that not technologies, but social factors are central to failure or success of smart cities (Nam & Pardo, 2011a). To illustrate this the simple iceberg metaphor is used to express the risk of neglecting these critical factors.

Figure A 1.1 Managing smart city strategies: technology and other factors smart city implementation (Mora, 2015)

In the same line of thought is the model presented by Nam and Pardo (2011). The model identifies three core factors of influence to countervail the pre-dominant focus on technology: institutional, human, and technology factors. Due to this mix of influencing factors, according to Nam and Pardo (2011) *"a socio-technical view on smart city is needed"* (Nam & Pardo, 2011a). These three components are influencing the six characteristics of a Smart City, which can be seen as objectives for the Smart City initiative but at the same time as strength or 'smartness in certain areas'. These characteristics match those defined by the EU (European Union, 2014).

FigA1.2 The relationship between components and characteristics of Smart City

Dimension	Innovation How can we change the way government delivers service?	Risk What are risks from innovation?	Way to Success How can we deal with risks while innovating?
Technology (to serve as a tool for innovation)	▪ Leveraging transformational potentials of advanced ICTs	▪ Lack of knowledge ▪ Incompatibility ▪ Too much hope ▪ Security	▪ System interoperability ▪ Integration of systems and infrastructures
Organization (to manage innovation)	▪ Enhancing efficient, effective management (front-office and back-office) ▪ Improving interoperability within or across organizational boundaries	▪ Organizational conflict ▪ Resistance to change ▪ Misalignment between goals and projects	▪ Enterprise interoperability and business modeling ▪ Cross-organizational management and managerial interoperability ▪ Leadership
Policy (to create an enabling environment)	▪ Redesigning relationships between government and actors ▪ Policy experiment	▪ Inconsideration of multiple stakeholders ▪ Political pressure ▪ Conflict with other policies	▪ Policy integration ▪ Marketing ▪ Governance ▪ Collaboration ▪ Partnership
Context	▪ Physical dimension ▪ Environment		▪ Consideration of context

Fig A 1.3 Framework of Smart City innovation

From this *socio-technical* viewpoint, Nam and Pardo (2011) focus on the Smart City as Urban Innovation. They provide a Framework for Smart City innovation, which shows *four dimensions* (Technology, organization, policy and context) in relation to *ways to change the government service delivery* (innovation), *related risks* (Risk) and *ways to deal with this risk* while innovating (way to success). These *ways to success* are generic and

vague solutions and recommendations, as 'governance' is the way to success. How this governance should be implemented is undescribed. They do propose the need for system interoperability, integration of systems and infrastructures, cross organizational management and managerial interoperability, leadership, policy integration, marketing, collaboration, partnership and consideration of the context. However, finer detail on how to deal with these sub success factors is lacking. They do stress the strategic directions of a Smart City for Technology factors is *integration*, for human factors is *learning,* for Institutional factors is *governance*.

Walraven (Walravens, 2015) expresses the importance of a holistic view on the Smart City concept and therefore puts the accent on three so called characteristics 'Collective' (aiming to tackle grand societal challenges), 'Contextual' (making sense out of the data flood) and 'Collaborative' (working with all stakeholders, including citizens, using open innovation methods).

In an attempt to write a definition for the Smart City Dameri (2013) has produced two models defining the essential elements of the concept. A pyramid model showing the development path for top-down and bottom-up initiatives, and a circular comprehensive schema suggesting a kernel and flow. The pyramid model underlines the key influence of Governance, located at the top and its direct relation to vision, policy and rules. In this model Governance and vision seem to be a final stage in the development path.

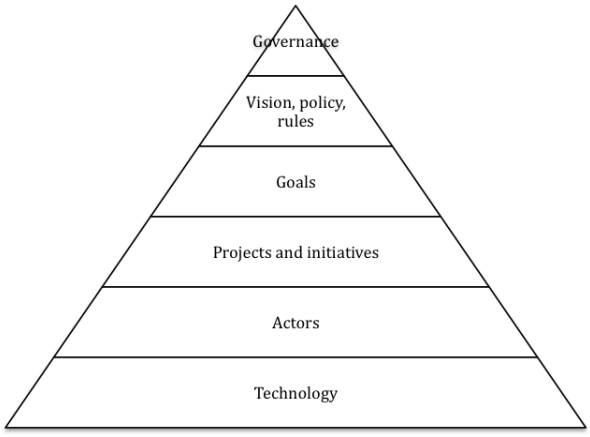

Fig. A 1.4 Bottom-up smart city development path(Dameri 2013)

The circular model emphasizes Governance as core factor of the smart city initiative, together with citizen, land and technology. These factors work together within a certain scale towards one or more objectives in the outer circle (well-being, participation, intellectual capital and environment). These objectives are seen as mutually influencing factors with a causal relation. In this model the land factor relates to the physical urban aspect of Smart City development. In both the comprehensive scheme and the development path of a Smart City, Dameri gives a central role to governance.

Fig. A 1.5 Smartcity comprehensive schema (Dameri 2013)

Mosannenzadeh and Vettorato present a keyword search based framework to define a Smart City initiative. Central in this model are the high level objectives to address like improvement of the quality of life. In the first shell intermediate objectives are placed. The realization of a specific set of these intermediate objectives, like for example Social Development and Economic growth, will contribute to the realization of the high level objective(s). Relevant subsystems are gathered in the second shell. These subsystems are the building blocks of the urban society. They can become 'smart' by themselves and contribute to the success of a Smart

City initiative. The relevant stakeholders involved are gathered in the third shell, making clear that a Smart City initiative is a complex arena because of all the different persons and institutions involved, with mostly their own vision, expectations and interest. The framework presents a slightly more detailed insight in relevant factors that influence the smart city initiative. In this model the four factors on the right (purple) can be seen interpreted as governance factors, namely integration of sub-systems, Applying ICT in services and integration, investment in social capital, collaboration of stakeholders.

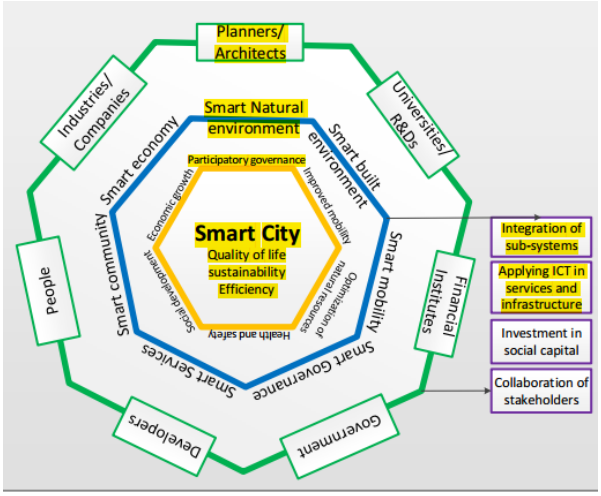

Fig A 1.5 Defining Smart City. A Conceptual Framework Based on Keyword Analysis (Farnaz Mosannenzadeh, Daniele Vettorato

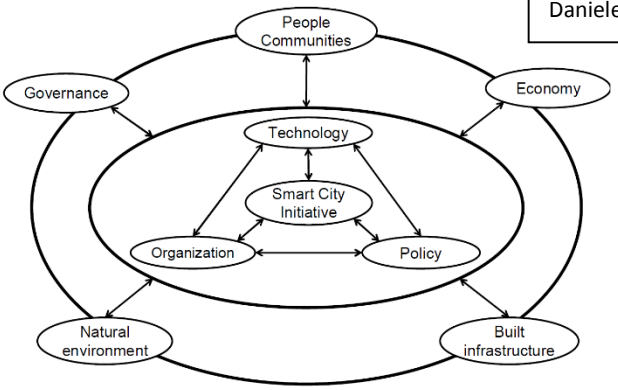

Figure A 1.6 Understanding Smart Cities: An Integrative Framework (Chourabi et.al 2012)

(1) management and organization

Original paper: Based on E-government success factors and barriers for M&O: Project size; Manager's attitudes and Behaviour; Users or organizational diversity; Alignment of organizational goals and project; Multiple or conflicting goals; Resistance to change; Turf and conflicts; Project team skills and expertise; Well-skilled and respected IT leader (tech-social skills); Clear and realistic goals; Identification of relevant stakeholders; End-user involvement; Planning; Clear milestones and measurable deliverables; Good communication; Previous business process improvement; Adequate training; Adequate and innovative funding; Current or best practices review.

Main findings M&O: The role of a leading organization is essential, managing involves interdepartmental collaboration, the initiatives change organizational culture and vice versa, the role of the top management and leadership is critically important, limited funding continues as a major challenge.

(2) technology

Original paper: The integration of ICT with development projects can change the urban landscape of a city and offer a number of potential opportunities, they can enhance the management and functioning of a city. City managers should consider certain factors when implementing ICT with regard to resource availability, capacity, institutional willingness and also with regards to inequality, digital divide and changing culture and habits.

Main findings technology: New technologies for back office functions are used for the initiatives, social media and smart phone are increasingly used, the lack of staff and budgetary constraints are main challenges.

(3) policy

Original paper: Political components represent various political elements (city council, city government, and city major) and external pressures such as policy agendas and politics that may affect the outcomes of IT initiatives. Institutional readiness such as removing legal and regulatory barriers is important for smooth implementation of smart city initiatives. E-government success factors identified are legal, regulatory, institutional and environmental challenges. Smart city initiatives face similar challenges which influence the policy context.

Main findings policy: Interdepartmental agreements shape the policy context, the executives' policy directions shape policy context

(4) governance

Original paper: Governance, involves the implementation of processes with constituents who exchange information according to rules and standards in order to achieve goals and objectives. Stakeholders' relations is one of the critical factors to determine success or failure. "Stakeholder relations" refers to four main issues: the ability to cooperate among stakeholders, support of leadership, structure of alliances and working under different jurisdictions. The recollected factors are: Collaboration; Leadership and champion; Participation and partnership; Communication; Data-exchange; Service and application integration; Accountability; Transparency.

Main findings governance: Various types of governance models and governance bodies exist, governance encompasses programmatic directions, budgetary and resource allocations the interactions with external actors as well as internal partnerships with other departments agencies.

(5) people and communities

Original paper: Projects of smart cities have an impact on the quality of life of citizens and aim to foster more informed, educated, and participatory citizens. Additionally, smart cities initiatives allow members of the city to participate in the governance and management of the city and become active users.

Main findings: Smart City initiatives aim to better understand people's wants and needs, involve citizens, businesses, and other stakeholders, and also improve the citizen-government relationship.

(6) the economy

Original paper: Smart economy includes factors all around economic competitiveness.

Main findings: Smartness in the context of urban economy indicates overcoming economic challenges, creating new jobs and businesses, and increasing regional attractiveness and competitiveness.

(7) built infrastructure

Original paper: ICT infrastructure includes wireless infrastructure and service-oriented information systems. There is a little literature that focuses on ICT infrastructure barriers of smart cities initiatives. IT challenges can be grouped in three dimensions; IT infrastructure, security and privacy, and operational cost.

Main findings: Smart City initiatives develop information and communication infrastructures, and in turn those infrastructures promote smart city initiatives. Smart power grids and smart traffic control and steering are among such initiatives.

(8) the natural environment

Original paper: Core to the concept of a smart city is the use of technology to increase sustainability and to better manage natural resources.

Main findings: Smart City initiatives help create desirable conditions for a livable and sustainable city by preserving and protecting the natural environment, which in turn increases the city's attractiveness and livability (Alawadhi et al., 2012).

Appendix II Interview Structure

Questionaire interviews

0 Introduction interview, research questions etc.

1 Global description of the initiative and own position (to get focused)

2 Verifying the definition of governance

3 Checking the influence of the eight governance factors

4 Verifying the relation between governance and other aspects of the model.

5 Global characterization of the initiative, strategy.

6 Any missed relevant aspects?

7 Closing interview

1 Global description of the initiative and own position (to get focused)

How would you describe the smart city initiative you are involved in? - as a project / program / projectportfolio/ different (from this point use the interviewee's term instead of 'initiative')

What are the main objectives for this initiative?

What is your position / are your roles within the initiative?

2 Verifying the definition of governance

For the thesis the definition of Governance is:

the collective governing in complex networks of stakeholders without hierarchical structure and line of command and control, meaning to bundle activities of all relevant parties and create an optimal environment to realize agreed upon objectives.

Governance consists of 8 major processes: short explanation of the model based on the definitions of the 8 processes.

Are these 8 aspects the core aspects of governance in your opinion? Is anything missing?

What Governance aspects are addressed in plans and strategy of this initiative?

What governance factors have you encountered in your role(s)? (If more than 2 or 3, ask to prioritize because 3 factors (x, y, z) will probably be the maximum to analyze in the interview)

How do sub-factors x, y , z you have mentioned contribute to the success of the implementation?

(to what extend, by which influence, etc)

3. Checking the influence of the eight governance factors

G1. Collaboration

How was the collaboration started and by who?

Who are the (current) stakeholders and what is their background?

Check points: yes/no questions

- Are triple or multiple helix partners present?
- Do all stakeholders share a vision and offer the same kind of commitment?
- Are the roles of all stakeholders clearly defined and communicated?
- Is interdepartmental collaboration necessary for success?
- Are there potential barriers in the collaboration between specific stakeholders?
- Were all stakeholders involved in the startup phase?
- Is/was the collaboration successful? Yes/no / in what proportions?
- Do stakeholders collaborate with other cities/initiatives to exchange knowledge and expertise? If yes; is this crucial for the development of the initiative? If not: do gaps remain existent?

Open questions:

- What organizational measures were taken to guarantee the effectiveness of the collaboration?
- How is success / failure measured?
- What main factors enforce or hamper the collaboration?
- What is the relation between collaboration and partnership and participation?

G2. Leadership and champion

Does this process play an important role? What are concrete results?

Which people fulfill these roles, and from what stakeholders?

Is there a relation between the complexity of the stakeholder group and this role?

What is their influence on the governance aspects and specific on the collaboration process?

Is the leadership: yes/no questions

- determining the level of citizen participation?
- determining the government commitment over different silos?
- determining effective policy directions?
- dominant political (power oriented) or driven by vision and expert knowledge?
- contributing to an action oriented culture/environment?
- contributing to the level of trust and credibility between stakeholders?
- replaceable without effecting the organization deeply? (for better or for worse?)

G3. Participation and partnership

<u>Partnership</u>

What partnership form is established? (PPP – SPV, other) And why this choice?

To what extend is the partnership form related to the composition of the stakeholder group?

Are all relevant/needed partners on board? Did some refuse to participate?

Is any party dominating the partnership? If Yes, public or private? If No, is this the desired situation?

Does the partnership create synergy between the partners? If yes: can you give examples for the different stakeholders? If no, what is the effect on the implementation?

Participation

Is participation a relevant governance factor in this initiative?

What is the objective and how is it organized?

Is participation:

- Related to more traditional democratic government aspects?
- Involved in the decision making process?
- influencing the agreed objectives of the initiative? If Yes: in what form and on what moment(s) or in which phases? If No: why was it not involved? Does that influence the implementation success?
- influencing the outcome of the initiative? (in what form: quality, acceptance, other..)

G4. Communication

How is communication organized? What roles and responsibilities, what media, what frequency etc.?

How is communication related to the other sub-factors of governance, especially Leadership and champion?

Is improvement of the city communication infrastructure itself part of the objectives?

Does communication:

- Perform well between all stakeholders? Is real interaction going on?
- Support and improve collaboration?
- Make use of specific governance supporting tools?

G5. Data-exchange

Is data exchange or open data relevant for the success? If yes, what data are published/shared? between all participants?, or between only a number?, or even spread collectively?

Has data (non-)sharing:

- All required data available? If yes: are there any other barriers on this domain? If no, what is missing and how is this handled?
- Influence on the collaboration process? (cultural influence?, enforce participation? Improved services and decision making?)
- Resulted in unexpected growth of partnership and/or participation?
- Resulted in specific policies developed for the regulation of the ownership, the publication and use of data?

G6. Service and application integration

Is service or application integration identified as: an objective of this initiative?; a relevant mean to reach other objectives?

What are the main measures to guarantee the required level of integration? What barriers have to be solved? Have specific organizational measures been taken to support this process?

- Is risk avoiding behavior limiting or slowing down this process?
- Is integration based on a long term strategy of service innovation?
- Are specific tools used and or developed for this integration? If yes: Which tools and with what specific capabilities?
- Does data exchange enforce the collaboration between stakeholders?

G7. Accountability

Yes/no questions:

- Are roles and responsibilities of stakeholders clearly agreed and described?
- Are decision making processes clear to all stakeholders and is the execution monitored and reported?
- Is there a distinction between management and supervision in the internal organization?
- Are rules, norms and values sufficiently shared between stakeholders?
- Does accountability improve the collaboration between stakeholders?
- Does accountability reduce risk taking to a level of avoidance behavior obstructing progress?

G8. Transparency

Yes/no questions:

- Is decision making transparent to all stakeholders and based on agreed standards and procedures?
- Is evaluation (during and after implementation) an integrated activity of the implementation plan?
- Does transparency support accountability?
- Do accountability and transparency contribute to a more citizen centric approach and to growing participation?

4. Verifying the relation between governance and other aspects of the model.

Has Governance influence on the (kernel)factors in the model: Technology, Organization, Policy? Describe the influence.

Can you give examples of positive / negative influence for each of the three aspects?

Is governance a success and or a fail factor/ barrier in this initiative?

What is your idea/perception/definition about/of governance in the context of the smart city project?

5. Global characterization of the initiative, strategy.

What is the implementation strategy used? - top-down / bottom up / middle out

What is the effect of context factors from the model on the initiative?

6. Any missed relevant aspects?

Did you miss any relevant aspects of Governance influencing factors in this interview?

7. Closing interview: Thank you. Summary of thesis appreciated?

Appendix III Governance Barriers and Success factors

	A	B	C	D
1	nr.	**Governance factor**	**S/B**	**Description**
2	1.1	Collaboration	S	collaboration between stakeholders and organizations across multiple sectors
3	1.2	Collaboration	S	interdepartmental collaboration
4	1.3	Collaboration	S	cooperation through sharing information, resources, and sometimes authorities
5	1.4	Collaboration	S	collaboration among different functional sectors and parties (government, business, academics, non-profit and voluntary organizations, and others)
6	1.5	Collaboration	S	among different jurisdictions within a given geographical region
7	1.6	Collaboration	S	partners who share the vision and commitment.
8	1.7	Collaboration	S	regulations and standards for stakeholders
9	1.8	Collaboration	S	government and market parties can be breed into new supply chain collaboration
10	1.9	Collaboration	S	clear roles agreed upon between the different stakeholders
11	1.10	Collaboration	S	collaboration is formalized in specific organizational forms
12	1.11	Collaboration-Meta	S	working together with other cities to exchange expertise, knowledge and best practices,
13	1.12	Collaboration-Meta	S	city experienced in international networking and member of various networks and city alliances that they can leverage
14	1.13	Collaboration	S	promote the digital presence of the city (website, social media). Such promotion will underpin efforts towards becoming smart and engaging stakeholders in this process
15	1.14	Collaboration	S	public authorities, private companies and local communities show leadership by initiating ideas, sharing commitment and data, creating innovative solutions together.
16	1.15	Collaboration	S	stimulating synergy between different actors, and creating informal partnerships in which actors from all fields can join forces
17	1.16	Collaboration	S	synergy driven by the local governance by creating regulation-'free' areas as smart 'living' labs
18	2.1	Leadership & Champ	S	leadership has a more strategic focus.
19	2.2	Leadership & Champ	S	a clear vision of the role of smart in the city
20	2.3	Leadership & Champ	S	top management in envisioning a smart city and championing smart city initiatives. The executive support facilitates citywide and organizational commitment.
21	2.4	Leadership & Champ	S	political support from elected officials
22	2.5	Leadership & Champ	S	strong political support [mayor's office/executive team] and clear mandate
23	2.6	Leadership & Champ	S	the mayor's policy directions shape the city's overall strategies to make it smarter
24	2.7	Leadership & Champ	S	commitment from the top to drive through change and innovation to achieve quantifiable objectives
25	2.8	Leadership & Champ	S	people able to innovate and act entrepreneurially, to play an active role in seeking out new opportunities
26	2.9	Leadership & Champ	S	building credibility and trust with their internal clients
27	2.10	Leadership & Champ	S	city leaders, managers and administrators can work in partnership with providers
28	2.11	Leadership & Champ	B	big cities tend to sit on their hands a lot. They debate, they investigate, studies are done and nothing happens.
29	2.12	Leadership & Champ	B	without the right attitude in the local authority it will be a hard transition to make
30	2.13	Leadership & Champ	S	willingness of government to work with the community
31	2.14	Leadership & Champ	S	to boost a city's capabilities and organizing capacities to design and execute innovative strategies for sustainable competitiveness
32	3.1	Participation	S	ensure that an initiative has the focus on solving the most important problems with solutions that will be generally positively valued by the involved community
33	3.2	Participation	S	participation is materialized in very different formats like Urban Living Labs, Urban Transition Labs, Innovation Districts etc.
34	3.3	Participation	S	different levels of citizen participation: provision of information to citizens, consultation of citizens, existence of partnerships with citizens, control by citizens over decisions
35	3.4	Participation	B	it depends on the presence of public e-services and on the digital awareness and culture of the city population
36	3.5	Participation	S	citizens involved both in the plan phase and in the smart city implementation steps
37	3.6	Participation	S	communication is at the center of a shared participation in defining smart city goals and in spreading awareness about the smart city role and benefits for people
38	3.7	Participation	S	citizen participation in decision making, monitoring city services, and providing feedback
39	3.8	Participation	B	being the wish or favor of an existing power
40	3.9	Participation	S	the adoption of ex-post satisfaction criteria to assess projects outcomes

41	3.10	Participation	B	governance models that include preliminary goal setting leave less room for the flexibility required by stronger citizen participation
42	3.11	Participation	S	governance permits readjustments of goals are characterized by partnership or socially innovative typologies of citizen participation
43	3.12	Partnership	S	a wide range of partners and stakeholders playing different roles
44	3.13	Partnership	S	a strong local government partner as a key strategic player and co-founder
45	3.14	Partnership	S	a coalition of business, education, government and individual citizens
46	3.15	Partnership	S	active involvement from every sector of the community is essential. United efforts create synergy
47	3.16	Partnership	S	foster participative environments that facilitate and stimulate business, the public sector and citizens to contribute
48	4.1	Communication	S	exchanging information about all aspects of an initiative at the right moment with the right target groups
49	4.2	Communication	S	intensely related to the activities from the leadership and champion(s)
50	4.3	Communication	S	city government shares concepts (promotional identity and brand), visions, goals, priorities, and even strategic plans of smart city with the public and stakeholders
51	4.4	Communication	S	shows the ability to understand the level and nature of the complexity of the smart city
52	4.5	Communication	S	focus on the interaction aspects of communication
53	4.7	Communication	S	face-to-face contacts between people remain of crucial importance.
54	4.8	Communication	S	ICT-based communication infrastructures can be very helpful
55	5.1	Data-exchange	S	open data initiatives were designed to enable collaboration between city and stakeholders
56	5.2	Data-exchange	S	open data to enable collaboration among different smart cities initiatives
57	5.3	Data-exchange	B	ownership of the data

	A	B	C	D
1	nr.	**Governance factor**	**S/B**	**Description**
58	5.4	Data-exchange	B	willingness to share the data
59	5.5	Data-exchange	B	the availability of required data
60	5.6	Data-exchange	B	possibility to use data from different sources
61	5.7	Data-exchange	B	differences in attitude between the stakeholders
62	5.8	Data-exchange	B	conceptual and technical limitations making it almost impossible to combine data from different sources without additional investments in the underlying data-infrastructure
63	5.9	Data-exchange	B	municipalities don't work integrated
64	5.10	Data-exchange	S	the use of open data as a form of data-exchange
65	5.11	Data-exchange	S	open data is seen as a chance to overcome the growing barriers between public and politics and to re-assure public involvement with city politics and the quality of services
66	5.12	Data-exchange	S	information about public services can be provided as 'open data', offering numerous possibilities to improve city management and services
67	5.13	Data-exchange	B	realizing this level of exchange is more demanding for trust and credibility between involved parties since the targeted advantages will probably be less concrete
68	5.14	Data-exchange	S	carefully consider the terms under which this data is opened up, at which level of aggregation and to which actors
69	5.15	Data-exchange	S	government regulations protect data and model development, appropriate interfaces, security of access, questions of confidentiality, IPR, privacy etc. under a smart city framework
70	5.16	Data-exchange	S	the use of open data seems to have a vast link to the local culture
71	5.17	Data-exchange	B	growing 'culture of control'
72	6.1	Serv/Applic integr.	B	disaggregated management and ownership structures in cities and the siloed behaviour that characterizes them
73	6.2	Serv/Applic integr.	S	choosing to place the smart city vision in a department that already works horizontally across city siloes
74	6.3	Serv/Applic integr.	S	alternatively adding in new groups to their organizational structure that are able to act as umbrellas for a host of existing activities
75	6.4	Serv/Applic integr.	B	city management is focused on eliminating and avoiding risks, to assure continuity and quality of the services
76	6.5	Serv/Applic integr.	B	the focus is on the politically charged short-term delivery of goals and results, lacking a long-term strategy of service innovation
77	6.6	Serv/Applic integr.	S	to create a better understanding between the public and private sector
78	6.7	Serv/Applic integr.	B	a need for specific technical tools to support these activities
79	7.1	Accountability	S	clear how responsibilities are shared by the stakeholders and more specific how they are divided between public and private sectors

80	7.2	Accountability	S	clear whether objectives are met, investments are responsible and the right decisions have been made in public interest
81	7.3	Accountability	S	the possibility to judge the formal legitimacy and the extent to which relevant norms and procedures were respected.
82	7.4	Accountability	S	the possibility to judge and proclaim sanctions in case rules were violated
83	7.5	Accountability	B	accountability has a negative effect on the drive to take risk and innovate in the public sector
84	8.1	Transparency	S	processes and especially crucial decision making is being done by agreed standards and procedures
85	8.2	Transparency	S	evaluation of programmes is an important aspect
86	8.3	Transparency	S	the precondition for any evaluation is that there are clear, measurable objectives and the evaluation is independent

Appendix IV Coded interviews

	A	B	C	D	F	G	H
1	**Proj**	**MOR**	**Anr**	**categor**	**S/B**	**bron**	**omschrijving**
2	A	2,2	1.01	COLL	B	AMC	Je het moet opknippen en klein maken, om te laten zien dat het kan, dat het werkt, dat je met elkaar, vanuit verschillende belangen, toch kern belangen deelt en daarmee dus ook elkaar moet inspireren.
3	A	2,2	1.01	COLL	F	Arena	Meer praatgroepje dus de netwerkfunctie, want minder duidelijke doelstellingen en dus minder resultaat gericht.
4	A	2,5	1.01	COLL	B	AMC	Het is nodig dat je een aantal keer laat zien dat samenwerking loont, door een aantal 'laag-fruit' concepten te realiseren. Zodat je partijen kan overtuigen dat ze daar geld voor inleggen, zodat partijen daar regelvermogen kunnen inkopen, zodat we daarna weer meer kunnen laten zien, een soort vliegwiel versterking.
5	E	0,0	1.01	COLL	S	JvE	PPP Strijp-S bestond al. Al vele projecten ontwikkeld.
6	E	1,1	1.01	COLL	S	TUE	Samenwerking verloopt heel goed dankzij tweewekelijks overleg met een actieve rol van de gemeente.
7	E	1,1	1.01	COLL	S	TUE	Partijen kenden elkaar al goed en dat is nodig om in een gesubsidieerd project een stap vooruit te komen.
8	E	1,1	1.01	COLL	S	WB	Samenwerking bouwt voort op eerder ontwikkelde langetermijnvisie.
9	A	1,1	1.02	COLL	S	ACC	De plannen zijn grotendeels geschreven door een kleine groep: Gemeente, AIT, Accenture, DKU. Binnen de gemeente waren verschillende diensten betrokken, dat was uniek.
10	A	1,3	1.02	COLL	S	ACC	Verschillende betrokkenen binnen de gemeente Amsterdam vormden samen de top.
11	A	2,3	1.03	COLL	B	Arena	Proberen een gezamenlijke investeringskalender op tafel te krijgen.
12	A	2,4	1.03	COLL	B	Arena	(On)beschikbaarheid van mensen, bedrijven erg gedreven door de waan van de dag. Reorganisatie, overnames, met als gevolg verschuiving van belangen.
13	E	1,2	1.03	COLL	S	KPN	Goede harmonie, open communicatie, positief-kritisch naar elkaar, transparant en onderling uitdagend. Geen verborgen agenda's.
14	A	1,3	1.04	COLL	B	AMC	Veel lokale bedrijven waren niet aangesloten bij de startfase. Langzaam maar zeker verdwenen ook de woningcorporaties van tafel. Mogelijk zaten daarvan niet de juiste mensen aan tafel: te operationeel en samenwerking niet centraal in hun functie.
15	A	1,3	1.04	COLL	S	Arena	Beide partijen(gemeente-Arena) zochten deze samenwerking.
16	E	1,2	1.04	COLL	B	VW	Partners werken vanuit een geheel andere structuur en cultuur; vraagt veel gewenningstijd.
17	E	1,2	1.04	COLL	B	VW	Iedere partij heeft andere onderliggende doelstellingen en businessmodellen.
18	E	1,2	1.04	COLL	S	VW	Samenwerking met het hele ecosysteem, inclusief burgers, impliceert vraaggestuurd werken.
19	E	1,2	1.05	COLL	B	TUE	Wetgeving zit experimenten in de weg.
20	E	1,2	1.05	COLL	B	WB	Deelnemers hebben in verschillende mate last van wijzigende omstandigheden zoals beleid en regelgeving die hun gedrag beinvloeden.
21	A	1,2	1.06	COLL	S	Arena	Partijen konden elkaar vinden op het gezamenlijke label 'duurzaamheid'.
22	A	1,3	1.06	COLL	S	ACC	Instituten/bedrijven zagen het belang van investeren in duurzaamheid en zochten geen competitie.
23	A	2,2	1.06	COLL	B	RvdW3	Echte samenwerking vindt pas plaats als je echt gezamenlijke doelen hebt
24	A	2,4	1.06	COLL	B	GdB	Captains dinner gaf (relatief laat) commitment op hoog niveau, maar meer intentieverklaring dan doelen door het ontbreken van een concreet plan. Nu wel vervolg olv TNO als regisseur in het gebied.
25	A	4,1	1.06	COLL	B	AMC	Een organisatie valt – ondanks de gedeelde ambities – toch weer snel terug op de core business en de eigen problemen. (vb: zonnepanelen)
26	E	1,2	1.06	COLL	S	KPN	Vooraf doelstelling en maatschappelijk belang vaststellen, zodat de juiste partijen aan elkaar geknoopt worden.
27	E	2,4	1.06	COLL	S	TUE	Indicatoren voor het beoordelen van vooruitgang worden door alle partners vooraf besproken en vastgesteld.
28	E	2,1	1.06	COLL	B	VW	De gemeente maakt de stap naar value cases, maar als bedrijf kun je daar je mensen niet van betalen. Financiële haalbaarheid blijft dus een issue.
29	E	4,1	1.06	COLL	B	VW	Soms zitten mensen wel in het proces maar mis ik inhoud. Bij nieuwe mensen en organisaties moet het vertrouwen nog groeien en is het lastig te interpreteren wat de drijfveren zijn.

30	A	2,2	1.07	COLL	B	RvdW1	Als je zo'n call leest, dan staat er ontzettend veel in waar die steden aan moeten voldoen. Je ziet dat bij Transform, wat eigenlijk leidt tot project failure. Omdat het zo complex is, kun je niet al je doelen halen, verzand je in allerlei discussie over misschien alleen al het systeem. Ik denk dat door de complexiteit je de helft van je doelen niet haalt.
31	A	2,4	1.07	COLL	B	AMC	Een grote organisatie werkt langzamer dan een kleine commerciële organisatie met een heldere strategie. Lastig om dan elkaars snelheid in besluitvorming te respecteren en tot een resultaat te komen.
32	A	5,0	1.07	COLL	S	Arena	Informatie moet binnen het partnership vertrouwelijk blijven.
33	E	2,4	1.07	COLL	S	KPN	De door EU vereiste structuur ondersteunt informatie-uitwisseling.
34	A	1,3	1.08	COLL	F	GdB	Samenwerking met diverse partijen vanaf het begin daar werd Adam om benijd door anderen.
35	A	2,4	1.08	COLL	B	AMC	Er is verbinding nodig tussen de partijen die wat willen, die partijen die wat beschermen (afvalmarkt, energie netwerkbeheerders) en partijen die het juridisch mogelijk kunnen maken.
36	E	2,4	1.08	COLL	S	JvE	Goede inbreng vanuit de TUE voor kennis, monitoring en meten van resultaten. Dit is innovatieve samenwerking.
37	A	2,2	1.09	COLL	F	Arena	Geen doelen vooraf bepaald en geen harde eisen gesteld aan de samenwerking. Wel intenties, geen afrekenbare doelstellingen.

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1	**Proj**	**MOR**	**Anr**	**categor**	**S/B**	**bron**	**omschrijving**
38	A	2,4	1.09	COLL	B	GdB	Partner AMC terughoudend vanwege risico's. Bleef lang onduidelijk doordat RvB er te laat werd bijgehaald. Te lang een speeltje van diverse beleidsmakers geweest en die hebben een onduidelijk mandaat. Daardoor hebben de directies ook geen duidelijk beeld voor ogen.
39	E	2,4	1.09	COLL	S	KPN	Verschillende partijen hebben onderwerpen die ze vrij zelfstandig kunnen uitvoeren.
40	E	2,4	1.09	COLL	S	TUE	Iedereen respecteert elkaar in zijn/haar rol.
41	E	2,2	1.09	COLL	S	VW	Samenwerking met een kennisinstelling is een vereiste om tot objectivering te komen in de evaluatiemomenten.
42	A	2,1	1.10	COLL	B	RvdW3	Al die partijen die wel belangen en invloeden hebben, en meebeslissen, waarom breng je die niet samen onder een noemer, een platform en sluit je een contract met elkaar, zodat je plotseling veel meer structuur en lijn brengt in de besluitvorming en het acteren. Moet je niet een PPS constructie verzinnen voor de transitie van een stad, waarbij alle stakeholders een bedrijf 'ik noem het even een bedrijf/ of een special purpose vehicle', oprichten.
43	A	2,4	1.10	COLL	B	AMC	Bevorderen van samenwerking is voor de meeste mensen niet hun functie. Heeft een hoog 'nice to have' gehalte. De korte termijn zit daarbij de lange termijn behoorlijk in de weg.
44	A	2,4	1.10	COLL	B	AMC	Mensen van verschillende niveaus (directie, beleid, operatie) aan tafel bemoeilijkt de voortgang, levert verschillende verwachtingen en vraagt een lange adem van betrokkenen.
45	A	4,2	1.10	COLL	B	AMC	We zijn van een initiatief van de Gemeente, naar een soort samenwerkingsprocess gegaan in het gebied, maar het is nog niet geformaliseerd. Circulair ZO noemen we het nu, er staat een projectleider boven, maar het is nog niet echt iets waar we allemaal aandeel in hebben, niet daadwerkelijk.
46	E	1,2	1.10	COLL	S	JvE	Technische kennis intensief ontwikkeld in samenwerking PPP en Cisco met TUE.
47	E	4,1	1.10	COLL	S	KPN	EU eisen dwingen de stakeholders samen een proces te doorlopen en hun verhaal helder te verwoorden. Communicatie, transparantie en accountability worden hierdoor versterkt.
48	E	2,4	1.10	COLL	S	KPN	EU stelt ook eisen aan documentatie waardoor overdracht enigszins wordt ondersteund.
49	A	1,3	1.11	COLL	B	RvdW3	Als je elkaar een keer in de maand, of in de twee maanden ontmoet, dan blijft de samenwerking oppervlakkig. Daarom zeiden we dat je met drie steden moet samenwerken en dan kan je meer energie stoppen in echt samenwerken 'to the core'
50	A	2,6	1.11	COLL	B	RvdW3	De mensen die op het operationele vlak daarmee bezig waren, die bepaalden dus feitelijk zelf de uitkomst. Maar die worden niet gecontroleerd of die uitkomst nou valide is, of zinvol is voor de stad. De focus werd heel smal. Dan is het puur persoonlijk dat keuzes gemaakt worden wat betreft Focus. In Kopenhagen bv, deden ze waar ze zin in hadden, en zeiden ze de tool vaarwel, Amsterdam deed de tool en zei andere dingen vaarwel. Genoa, ging op politiek niveau niet op inhoudelijk.. Er kon niet meer gestuurd worden…
51	E	2,4	1.11	COLL	F	GEM	Consortium stemt af met overall coordinator Frauenhofer Instituut. EU streeft naar gelijk speelveld, maar projecten lopen onder nu nog sterk verschillende nationale regelgeving. Binnen een EU project is sterke juridische en financiële afkadering. Over inhoud moeilijk met EU te spreken, control functie heeft geen kennis en kijkt naar formele zaken, niet inhoudelijk.

52	E	2,4	1.11	COLL	F	TUE	Universiteit ontwikkelt platform om ervaringen te delen met andere steden. Is Europese ambitie en te vroeg om een uitspraak te doen over mogelijk succes.
53	E	4,1	1.11	COLL	B	WB	Veranderingen bij de EU soms verstorend (urenverantwoording, budgetwisseling). Het kost veel energie om de drie lighthouse steden op één lijn te houden vanwege de behoefte aan lokaal maatwerk.
54	A	2,4	1.14	COLL	S	AMC	Selecteer partners van omvang en naam om anderen mee te trekken.
55	A	2,5	1.15	COLL	S	AMC	Subclubjes zijn ontstaan die verder praten over andere samenwerking zoals rond warmte uitwisseling.
56	A	2,5	1.15	COLL	S	Arena	Design Thinkers was eerste contactmoment.
57	E	4,1	1.15	COLL	S	KPN	Samenwerking vereist ook een klik tussen de betrokken individuen, met per partner ook echt de juiste functionarissen die op verschillende niveau's kunnen acteren.
58	E	2,2	1.15	COLL	S	TUE	Actieve bevolking in een cultuur waar experimenteren gewaardeerd wordt.
59	E	2,2	1.15	COLL	S	TUE	Universiteit is goed verankerd in de stad.
60	E	2,2	1.15	COLL	S	VW	Door de mix van totaal verschillende spelers ontstaat een nieuw geïntegreerd vakgebied.
61	A	4,2	1.16	COLL	B	AMC	Voor sommige activiteiten zit wetgeving of gemeentelijk beleid in de weg. Gemeente zou regelvrije zone moeten vaststellen.
62	E	2,2	1.16	COLL	S	VW	Strijp is een soort kraamkamer om ideeën te toetsen die elders in NL kunnen worden toegepast.
63	A	1,3	1N	COLL	S	GdB	--Bestaande goede relaties met KPN en Arena. Link HvA –AdamZO bestond wel maar niet tav energie.
64	A	1,3	1N	COLL	S	GdB	--Bestaande contacten, interactie en beschikbare data.
65	A	1,3	1N	COLL	S	GEM	--There were already good relationship with some of the major stakeholders in the area, like the ArenA.
66	A	2,1	1N	COLL	B	RvdW1	--in al die steden speelt een ander soort vraagstuk en is men bezig met andere soort problematiek. Misschien drie steden. maar zes dat wordt al een beetje blur. Omdat Het zes ingewikkelde systemen zijn die proberen te leren van vijf anderen. Ingewikkeld is dat. G4 ik ben een groot voorstander van 'keep it simple'.

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1	**Proj**	**MOR**	**Anr**	**categor**	**S/B**	**bron**	**omschrijving**
67	A	2,2	1N	COLL	B	GEM	--Knowledge with the local stakeholders on how they can act in the field of Smart (energy) Districts. What technologies are available, what is the effect, how to come from an idea to an investment decision in this field of work, etc.
68	A	2,2	1N	COLL	B	RvdW1	--De complexiteit van energie en de verwevenheid van energie in de stad is ontzettend groot. Het heeft met veel technieken te maken, veel stakeholders, veel regelgeving, en ontzettend veel investeringen en belangen te maken.
69	A	2,4	1N	COLL	B	ACC	--Veel activiteiten parallel ipv sequentieel. Planning is niet ideaal door randvoorwaarden - zoals korte doorlooptijd - van de subsidiegever. Iedereen wil parallel werk doen om daarvoor subsidie te ontvangen.
70	A	2,4	1N	COLL	B	RvdW2	--Als we een project, welke mensen komen er dan op? Wat zijn de kwalificaties van die mensen? Zijn die mensen gewend om projectmatig te werken? Hebben die mensen mandaat om hun... Wie is de opdrachtgever van die mensen in deze stad? Kan deze man/vrouw slagvaardig werken ja/nee. Dat moet je weten.
71	A	2,5	1N	COLL	B	GdB	-- De link tussen projecten en doelstellingen was niet goed gelegd.
72	A	3,3	1N	COLL	F	ACC	Een stad neemt niet deel vanwege het project maar vanwege deelname/subsidie in toekomstige EU rondes.
73	A	3,3	1N	COLL	B	GdB	--Gebrek aan goede business cases remt de implementatie.
74	A	3,3	1N	COLL	B	GdB	--Europese subsidie wordt gebruikt om initiatieven uit te bouwen, maar draagt niet bij aan verankering in de organisaties. Partijen zouden deze samenwerking ook zonder de subsidie moeten ambiëren.
75	A	3,3	1N	COLL	S	GEM	--Transform provides the needed extra financial means to be able to test. Also Transform brings external expertise… create a sense of urgency…. Bring in knowledge and widen up the scope of possibilities. Being part of an European programme legitimates the actions in the SUL.
76	A	4,1	1N	COLL	B	RvdW3	--Dat komt door het betaalsysteem van de EU, die betalen 75% van te voren, niet zonder reden, want veel steden kunnen dat niet zelf voorfinancieren, maar dat is meteen een incentive om niet heel erg op het resultaat te sturen, want de betaling vind vooraf plaats, en niet achteraf. Dat is ernstig.

77	E	2,2	1N	COLL	S	WB	--Voor goede samenwerking heb je verschillende typen mensen nodig die elkaar aanvullen, bijv. inhoudelijke en organisatorische gerichtheid.
78	E	2,2	1N	LEAD	F	KPN	--Leiderschap is vooral gericht op het werk dat je zelf in beheer hebt en het toetsen op de relevantie van kennis voor anderen.
79	A	1,3	2.00	LEAD	F	Arena	Arena haakt aan bij initiatieven. *(dus toch meer passieve dan actieve opstelling!)*
80	A	1,3	2.01	LEAD	B	ACC	Niet voor alle partijen strategisch belangrijk.
81	E	2,2	2.01	LEAD	S	WB	Iedere vertegenwoordiger deelt de drijfveren om het geheel te laten slagen.
82	A	1,2	2.02	LEAD	S	ACC	Managing director was fanatiek visionair die ook financiële inbreng mogelijk maakte.
83	A	2,5	2.02	LEAD	S	GdB	Gemeente kiest drie thema's uit de oogst voor de ILS-sessies.
84	E	2,2	2.02	LEAD	S	KPN	Het gaat meer om de geest dan om de letter van het (zeer omvangrijke) contract. Mensen moeten zich daar wat los van kunnen maken.
85	A	1,3	2.03	LEAD	B	RvdW3	De organisatie structuur van TRANSFORM deugde niet. Veel te veel mensen op het operationele vlak, veel te veel mensen bij gemeente waren op beleidsniveau. Als je een stad/bedrijf ziet als een gelaagde organisatie waarin de bazen bovenin de politiek van de organisatie bepalen. Mensen in het tactische, management vlak en het operationele vlak werken. Maar als je niet ALTIJD het tactische en management vlak in de organisatie aangehaakt houdt, bij de voortgang en twijfel, beslissingen, oplossingen, dan wordt je losgezongen van de werkelijkheid. En dat was de makke van TRANSFORM. Er was een te dunne lijn met de politiek en een te dunnen lijn met de beslissers binnen de stedelijke organisaties. Waardoor rapporten in de la komen te liggen.
86	A	2,1	2.03	LEAD	B	ACC	Complexiteit van de gemeentelijke organisatie is een barriere. Er is gebrek aan regie over alle gemeentelijke diensten en afdelingen, waardoor infrastructurele verbeteringen nog achterblijven.
87	A	2,1	2.03	LEAD	B	GEM	The strategy was to let thousands flowers blossom. Sometimes it would have been better to test at an early stage whether the big bosses of possible partners were enthusiastic or not.
88	A	2,2	2.03	LEAD	B	ACC	De kernvraag "what's in it for us " wordt vaak gesteld. Kennelijk doelen onvoldoende duidelijk. Alle communicatie en alle samenwerking is v oor het grootste deel beïnvloed door die vraag,
89	A	2,4	2.03	LEAD	B	AMC	Ik denk dat het goed is als er ook op directie niveau wordt geïnvesteerd in de verbinding.
90	A	3,3	2.03	LEAD	B	AMC	Ik zelf heb intentie overeenkomsten laten sluiten tussen directeuren ArenA en AMC en toch gaan we weer over tot de orde van de dag. Het is zoveel lastiger, om een intentie daadwerkelijk te realiseren.
91	E	2,2	2.03	LEAD	F	JvE	Leadership should come from public and private sector.
92	A	1,2	2.04	LEAD	B	RvdW3	Wisseling van wethouders, drie directeuren DRU achtereen, drie afdelingshoofden klimaatbureau; telkens moest het project weer opnieuw aan hen 'verkocht worden'.
93	A	1,2	2.05	LEAD	B	RvdW3	Ook op internationaal niveau wisselde de aansturing/coördinatie.
94	A	2,2	2.05	LEAD	S	ACC	Er was sprake van een stabiel politiek mandaat in Amsterdam.
95	E	2,1	2.05	LEAD	S	TUE	Burgemeester Rob van Gijzel zeer actief betrokken en uitdragend. Gericht op de Smart Society als doel, ontwikkeling van onderop.
96	E	2,4	2.06	LEAD	S	JvE	Gemeente en rol burgemeester bij opstarten initiatief. Ook vanwege relaties in Brussel en ervaring met calls.

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1	**Proj**	**MOR**	**Anr**	**categor**	**S/B**	**bron**	**omschrijving**
97	A	1,2	2.07	LEAD	B	GdB	De borging met de Raad van Bestuur was niet goed belegd, het was vooral een ambtelijke/beleidsmakers exercitie.
98	A	1,2	2.07	LEAD	B	GdB	Vooral een ambtelijke/beleidsmakers exercitie, niet op het hoogste niveau.
99	A	1,2	2.07	LEAD	B	RvdW2	Ik had toch het idee dat bij Transform toch een aantal mensen loshangend in die organisatie waren. Misschien een soort vrije spelers, maar je moet een opdrachtgever hebben om resultaten te kunnen bereiken. (grow idea; EU)
100	A	2,2	2.07	LEAD	S	Arena	Arena profileert zich meer binnen het gebied. Zo kwam leiderschap van beide kanten.
101	A	2,2	2.07	LEAD	B	GdB	Doelen moeten van het begin af aan op directieniveau van partners worden overeengekomen en vastgesteld. De subsidie lokt gedrag uit dat niet gebaseerd is op intrinsieke motivatie.
102	A	2,4	2.07	LEAD	B	AMC	Het duurde lang voordat ik de directie heb kunnen overtuigen. Misschien heb ik dat niet goed aangepakt.
103	A	2,4	2.07	LEAD	B	GdB	Poging de top te betrekken in captains dinner betekende terug naar af. Wel intentieverklaring, geen duidelijke doelen.

104	A	2,6	2.07	LEAD	B	ACC	Belangen verschillen veel tussen partijen. Partijen proberen de subsidie stroom te gebruiken om hun eigen doelen te realiseren en die sporen niet altijd voldoende. Dan gaan ze soms dingen doen die niet zijn afgesproken in het programma.
105	A	4,1	2.07	LEAD	B	GdB	**Hoewel er een vervolg activiteit is ontstaan ligt er nog steeds geen agenda met duidelijke doelstellingen, acties, monitoring, financiering etc.. Er is dus nog feitelijk geen implementatieplan.** ***(dus doel niet behaald)***
106	E	2,4	2.07	LEAD	S	GEM	Partijen nemen verantwoordelijkheid voor bepaalde taken.
107	A	2,2	2.08	LEAD	B	ACC	In elke call een beperkt aantal trekkende partijen. De rest probeert mee te liften.
108	A	2,2	2.08	LEAD	S	AMC	Vooral inspirerend voor de andere deelnemers; Arena vertoonde dit voorbeeldgedrag.
109	E	2,4	2.08	LEAD	S	VW	Een goeie kopman die verbinding kan maken: weet wat er speelt; kent de culturen; profiel van een business developer; heeft mandaat; kan snel schakelen; communiceert goed; mens gedreven; change manager.
110	A	2,2	2.09	LEAD	S	RvdW3	De grote motor is vertrouwen; het gevoel blijft een grote rol spelen. Partnership van gelijke gezinde partijen is een cruciale factor.
111	A	1,2	2.10	LEAD	S	ACC	Amsterdam is zelf niet krachtig genoeg om resultaten te bereiken, heef de andere partijen echt nodig en vervult daardoor de rol van samenbindend en faciliterend leiderschap. Geen top-down situatie dus.
112	A	1,2	2.10	LEAD	S	Arena	Gemeente is onafhankelijke partij, “die komt niets verkopen en komt overal gemakkelijk binnen”. Bouwt dus de bruggen. Vervolg belegd bij TNO als onafhankelijke partij met expertise.
113	E	2,4	2.10	LEAD	F	GEM	‘Alliance manager’ of herder, maar dan eerste onder gelijken op verzoek.
114	E	2,4	2.10	LEAD	F	TUE	Gemeente generiek, PPP Strijp-S olv Volker-Wessels, Eckart olv Woonbedrijf.
115	E	2,4	2.10	LEAD	S	WB	‘Man in Brussel’ was aanjager.
116	A	2,5	2.11	LEAD	B	RvdW3	Omdat het een netwerk is dat beweegt en flexibel is, zie je dat besluitvorming heel langzaam gaat en ingewikkeld is, en soms stopt.
117	A	1,2	2.13	LEAD	S	AMC	Gemeente heeft het initiatief genomen en de methode Design Thinkers ingebracht. Speelt altijd een verbindende rol.
118	A	1,3	2.13	LEAD	S	ACC	De gemeente nam het initiatief voor de vorming van de groep partners.
119	E	2,4	2.13	LEAD	S	WB	Gemeente vervult faciliterend leiderschap.
120	A	1,1	2N	LEAD	S	ACC	--Ook ASC werd vanuit dezelfde groep geleid (ACC). Bestaand eco-systeem.
121	A	1,1	2N	LEAD	S	Arena	--Arena had in 2009 een eigen vijfjarenplan mede aangejaagd door de tak van de gemeente die de deelnemingen organiseert. Gemeente wil verduurzamen en heeft hiervoor een platform ingericht. Transform kon hier op aansluiten.
122	A	1,2	2N	LEAD	B	RvdW1	--Energietransitie: daar gaan steden of politici niet over, en ze kunnen dat dus ook niet besturen. Ze kunnen proberen dat te faciliteren, verleiden, of subsidiëren. “als je de macht niet hebt, moet je niet proberen de indruk te wekken dat je het hebt.”
123	A	1,2	2N	LEAD	B	RvdW3	--Elke stad/natie heeft een andere mentaliteit. Dus de hoofd coördinator rol is uitermate complex, op landelijk en politiek stedelijk niveau, heb ik ook nog met bedrijven te maken. Mensen van Accenture, die zitten totaal anders in de wereld. Dat is commercieel doorpakken. Projectmatige mensen, dan de mensen van de universiteiten,.
124	A	1,3	2N	LEAD	B	ACC	--Gemeente wil niet kiezen tussen concurrerende aanbieders (bijv. decision support tool) en probeert iedereen blij te maken. Dat houdt de bestaande versnippering in de markt eerder in stand. Onderdelen binnen de gemeente kiezen dan voor verschillende concurrerende samenwerkingspartners, dat is uiteindelijk niet in hun belang.
125	A	2,2	2N	LEAD	B	Rvd3	--Als je naar die enorme ambities kijkt binnen 2-3 jaar tijd, dan is de helft gehaald, maar hoe moet je sturen op de helft van het resultaat? Hoe kun je zien als coördinator, als we minder dan 100% van de doelen produceren, welk deel gaan we dan wel produceren dat goed is? Dan heb je geen baseline, en ben je eigenlijk stuurloos.
126	A	2,3	2N	LEAD	B	RvdW3	--Kies eensgezinde partijen die een doel omarmen, uit zichzelf gemotiveerd zijn, het willen meesleuren van partijen die niet al zelf gemotiveerd zijn is verspilde energie.
127	A	2,4	2N	LEAD	B	GEM	--Always engage both the operational and the CEO level, right from the start. This will optimize working procedures.

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1	**Proj**	**MOR**	**Anr**	**categor**	**S/B**	**bron**	**omschrijving**
128	A	2,4	2N	LEAD	B	RvdW2	--Mensen die leidend waren in steden, waren ‘policy makers’, en waren geen uitvoerders of mensen die beleid kunnen vertalen naar de praktijk.

129	A	2,6	2N	LEAD	B	RvdW3	--Bij Transform was de project steering committee (PSC), dat waren de mensen uit het team, en dat werkt niet… Want dan is het de slager keurt zijn eigen vlees.
130	A	3,3	2N	LEAD	B	GdB	--De inbedding in de organisaties wordt niet gestimuleerd door de externe financiering. Het project loopt zo op beleidsmakers en een beetje buiten de normale orde om.
131	A	4,1	2N	LEAD	B	GdB	--Poging tot kortsluiting van de proj.leider resulteerde in grotere betrokkenheid op Europeesniveau van de verschillende steden, dat had helaas niet de lokale focus.
132	A	4,1	2N	LEAD	B	RvdW2	*--Je moet coördineren tussen de verschillende partijen en mensen, een **vrij 'softe' manier van managen** . En ik heb weinig.... of in ieder geval de coördinator, heeft weinig instrument om op kwaliteit te sturen. Dat was een van mijn bezwaren op deze rol, dat je geen middelen hebt om op kwaliteit te sturen, of op output. De kwaliteit van de output wordt door de steden en door de partners bepaald. Niet door de coördinator. En zelfs niet door de advisory board (AB). Geef het project op de een of andere manier meer pressiemiddelen.*
133	E	2,4	2N	LEAD	F	GEM	--Sturing geschiedt door de in de GA met alle partners afgesproken taken en deliverables. Deze GA valt onder een regelgeving die geldt voor het gehele Horizon2020 programma van de EU.
134	A	2,3	3.00	P&P	B	Arena	Positie AMC was problematisch, onduidelijkheid over belangen en mogelijkheden.
135	A	2,4	3.00	P&P	F	GdB	Spin off ontstond op vrijwillige basis, weinig vooraf bepaald en geregeld.
136	A	2,5	3.00	P&P	F	GdB	Beperkt tot HvA-studenten voor project "hoe krijg je bewoners betrokken bij verduurzaming van hun woning*? (dus geen bewoners participatie)*
137	E	3,4	3.01	P&P	B	KPN	Project afhankelijk van de bewoners van de stad. Bewoners staan centraal in de aanpak.
138	E	4,1	3.01	P&P	S	TUE	Eindhoven kiest voor bottom-up benadering, vanuit het individu. Het gebied Strijp S wordt met de (jonge) mensen en start ups samen verder ontwikkeld. Ook Eckart wordt nu in nauw overleg met de bewoners gerenoveerd. Bewoners meekrijgen is lastiger dan gepland. Persoonlijke benadering is noodzakelijk.
139	E	2,2	3.01	P&P	S	VW	Een nieuwe aanpak van stadsontwikkeling op basis van participatie ontdekken van de vraag en met bewoners en ondernemers tot een gezamenlijke visie komen.
140	E	2,4	3.01	P&P	S	WB	Participatie van burgers staat centraal in de aanpak. Convenant was al eerder gesloten met de Gemeente onder slogan 'burgers aan zet'.
141	A	2,5	3.02	P&P	F	GdB	Amsterdam wilde de aanpak van een Intensive Lab sessie graag demonstreren.Imago?
142	A	2,5	3.02	P&P	S	GEM	Intensive Lab Sessions (ILS) helped defining projects, especially around the key challenge of public participation.
143	A	2,5	3.02	P&P	S	RvdW2	De ILS (intensive lab sessions, een innovatieve manier van werken) was het platform voor die steden om met stakeholders in discussie te gaat over specifieke problemen in de stad. Dat werkte ontzettend goed.
144	E	2,4	3.02	P&P	F	GEM	Allerlei vormen van participatie komen voor.
145	A	1,2	3.03	P&P	B	ACC	Geen participatie bij Transform, wel bij Smart City Adam lokale partijen in de SMART LABS, geen bewoners. Het was daarmee meer een top-down project.
146	A	2,4	3.04	P&P	B	Arena	Betrokkenheid van bewoners (in bijeenkomsten) wordt vaak gemist.
147	A	2,5	3.05	P&P	S	GdB	Start met deze algemene sessie met veel partijen in het gebied zelf.
148	A	2,5	3.05	P&P	S	GdB	Begonnen met algemene sessie in het gebied met alle partijen "Design Thinkers"; participatie vanaf de start.
149	E	2,4	3.05	P&P	S	JvE	"Top down development doesn't work in The Netherlands, it only works when society is widely supporting the developments, therefore we are aiming at including Smart Citizens in the entire rocess, that is our way of building a Smart City".
150	E	2,4	3.05	P&P	S	VW	Participatie in de ontwikkelfase moet leiden tot participatie in de gebruiksfase deels eigenaarschap.
151	E	2,4	3.06	P&P	S	JvE	" Local support can only be acquired by sharing visions and dreams based on bottom-up possibilities. This is how an innovative climate is created, which attracts human capital and businesses.
152	E	2,4	3.11	P&P	S	VW	Fonds gaat participatie van MKB stimuleren om innovatie te prikkelen.
153	A	3,1	3.12	P&P	B	ACC	Elke partij wilde een eigen tempo aangeven, compromispoging in een gezamenlijke 'agenda'.
154	A	4,1	3.12	P&P	B	Arena	Voor sommigen kwam het project te laat (Rochdale net uit geïnvesteerd) voor anderen te vroeg.
155	E	2,4	3.12	P&P	S	KPN	Partner wordt actief bij de uitrol, tijdens participatiefase meer op de achtergrond aanwezig. Biedt kennis t.a.v. mogelijke opschaling, security e.d. om risico's te reduceren.
156	E	2,4	3.12	P&P	S	KPN	Partnership biedt structuur om de voortgang van de projecten te waarborgen en de samenhang te stimuleren.Als belangen botsen met de doelstellingen dan komt dat op tafel.

157	E	2,4	3.12	P&P	B	TUE	Producten zoals woonconnect zijn eigendom van bepaalde partners. Prijskaartje en mogelijke herbruikbaarheid.
158	E	1,2	3.12	P&P	S	TUE	Park Strijp Beheer PPP bestond al jaren en is de spil om de community draaiende te houden.
159	E	2,2	3.12	P&P	S	TUE	Opschaling is een EU-doel, ook de partners zoeken naar mogelijke business model.
160	E	2,5	3.12	P&P	S	WB	Stevige gesprekken vooraf tussen de mogelijke partners over de inzet van mensen, claimen van kosten etc; openheid van ieders agenda.
161	A	2,4	3.13	P&P	S	GEM	The commitment of local stakeholders. Commitment, strengthened with organization power – facilitated by the city - brings the potential for transition.

	A	B	C	D	F	G	H
1	**Proj**	**MOR**	**Anr**	**categor**	**S/B**	**bron**	**omschrijving**
162	E	2,5	3.13	P&P	S	KPN	Gemeente is coördinator en spreekbuis.
163	E	2,5	3.14	P&P	F	GEM	Consortium 5 partijen. Speciale agreements uitgewerkt. Lokale spelregels: één stem naar buiten, besluiten op basis van consensus, jaarlijks Grand Assembly, procedure voor besluiten bij gebrek aan consensus e.d. Daarnaast Grant agreement met de EU als basis, vooral aandacht voor eigendomsrechten van gegevens en informatie.
164	E	2,5	3.14	P&P	F	GEM	Gezamenlijk op zoek naar een verdienmodel voor herhaalbare oplossingen zodat opschalen mogelijk wordt.
165	E	2,4	3.14	P&P	S	JvE	Na toekenning subsidie is de samenwerking in het partnership contractueel geformaliseerd op basis van gezamenlijke doelen.
166	E	2,4	3.14	P&P	F	TUE	Contracten onder de huidige samenwerking gebaseerd op EU-voorschriften en kaders.
167	E	2,5	3.14	P&P	B	VW	PPP resulteert in andere businessmodellen door de mix van producten en diensten. Verschil in denkwereld tussen de partners werkt remmend.
168	E	3,0	3.14	P&P	S	VW	Kennis van de andere domeinen wel zelf in huis halen (Icity). Spreek de taal van je partners.
169	A	1,3	3.15	P&P	B	RvdW2	Ja, gemeenten moeten volgens mij veel beter nadenken over 'wie zijn mijn partners en kunnen wij tot effectieve samenwerking komen' in plaats van… 'zoek ik m'n partners een beetje at random op, omdat ik vriendelijke/leuke relaties heb'. 'Wij kunnen wel goed samenwerken.' Dat is altijd wel belangrijk, maar prioriteit moet zijn 'werken naar een doel'.. en dat is ook de reden waarom de helft van die Transform partners toch heel weinig inbreng hebben/leveren. Want het blijkt niet een goeie match te zijn..
170	A	2,5	3.15	P&P	S	GdB	De kernpartners hebben veel partijen om zich heen verzameld; daar zijn veel (andere) projecten uit voort gekomen. Sneeuwbaleffect door synergie.
171	E	3,0	3.15	P&P	S	KPN	Procescontinuiteit is belangrijk, door mensen van het begin af aan betrokken te houden is ieder doordrongen van de geest van de samenwerking.
172	E	3,1	3.15	P&P	S	KPN	Als organisatie maken we een omslag van business case gedreven naar value case gedreven handelen.
173	E	3,1	3.15	P&P	S	VW	Data en applicaties vormen een extra laag binnen de traditionele UAD.
174	A	2,2	3.16	P&P	S	AMC	Vooraf sparren met bedrijven wat samenwerking voor hen zou kunnen betekenen. Vraag en aanbod bepalen en gedeelde waarden bepalen.
175	E	3,1	3.16	P&P	S	WB	Partnership van Woonbedrijf versterkt de participatie van bewoners.
176	A	1,1	3N	P&P	S	Arena	--Duurzaamheidsplatform waarop Transform kon aansluiten.
177	A	1,1	3N	P&P	S	GdB	-- Partners afkomstig uit bestaande netwerk rond ASC trokken andere partijen aan. De Gem. investeerde bijv. al via een overeenkomst met Arena in duurzaamheid ter compensatie van de structurele overlast.
178	A	1,1	3N	P&P	S	GEM	--Some members of the Amsterdam TRANSFORM team were part of ASC, a strategic partnership.
179	A	1,3	3N	P&P	S	AMC	--Selecteer partners met belang in het gebied en een imago dat gekoppeld is aan het gebied.
180	A	1,3	3N	P&P	S	GdB	-- Partijen betrokken die ook in de toekomst belang hebben bij het gebied en blijven investeren.
181	A	1,3	3N	P&P	S	GEM	--To make an innovative transformation plan in a specific area, it is necessary to have strong committed actors in the area itself.
182	A	2,2	3N	P&P	B	RvdW1	--*"citizens involvement vind ik als beweging heel mooi, ik denk ook dat dat wel goed is, maar je moet het niet romantisch maken in de zin als de burger daarmee weer heel veel risico's loopt, dan zal het toch weer een bedrijf worden, of toch weer een overheidsbemoeienis worden." "Dus dat hele idee, als je mensen maar veel inzicht geeft in hun gedrag, daar geloof ik helemaal niks van."*

183	A	2,4	3N	P&P	B	AMC	--Medewerkers van organisaties hebben meestal geen direct aansluitende functie; doen het er een beetje bij. Om stappen te maken heb je vervolgens 'regelcapaciteit' (geld, handjes, kennis) nodig.
184	A	5,0	4.01	COMM	S	ACC	Zonder communicatie is er geen transparantie, alles is met elkaar verbonden.
185	E	3,3	4.01	COMM	S	GEM	Voortgang vierwekelijks aan 'de procestafel' op uitvoerend niveau, soms met experts, geen directies.
186	E	3,3	4.02	COMM	S	TUE	Tweewekelijks overleg binnen de triple helix organisatie met alle belangrijke stakeholders, daar worden de besluiten genomen onder voorzitterschap van de gemeente.
187	E	3,3	4.03	COMM	S	TUE	Bevolking geïnformeerd, geactiveerd, gemotiveerd.
188	E	3,3	4.03	COMM	S	VW	Visie documenten breed beschikbaar, ontwikkeld door een externe specialist.
189	E	3,3	4.05	COMM	S	KPN	Realiseer je dat organisaties in een verschillende context leven en er daardoor makkelijk misverstanden kunnen ontstaan.
190	E	3,3	4.05	COMM	B	VW	Elkaar leren begrijpen, daarvoor moet je een nieuwe taal ontwikkelen. Er wordt veel langs elkaar heen gepraat.
191	A	4,1	4.07	COMM	S	Arena	Bijeenkomsten van top-management relevant (captainsdinner) en uitgesproken commitment wordt aangehaald. Zou wel vaker herhaald moeten worden.
192	E	3,3	4.07	COMM	S	WB	Veel persoonlijke communicatie nodig om participatie van bewoners vlot te trekken.
193	A	5,0	4N	COMM	S	ACC	-- Partijen gebruiken verschillende woorden en definities. Een gezamenlijk jargon moet ontstaan en daarvoor hebben we een glossary ontwikkeld.
194	A	5,0	4N	COMM	S	Arena	--Partijen communiceerden al met elkaar. Ook na het project olv van TNO voortgezet. TNO stuurt de notulen rond. Geen technisch platform voor info uitwisseling.
195	A	3,0	5.01	DATA	S	ACC	Openheid van data is key voor succes. Alle oplossingen zijn gebaseerd op kennis ontleend aan gegevens.

	A	B	C	D	F	G	H
1	**Proj**	**MOR**	**Anr**	**catego**	**rS/B**	**bron**	**omschrijving**
196	A	3,2	5.01	DATA	S	GEM	Intensive stakeholder collaboration using data as an instrument to understand the problems and to set priorities.
197	E	3,4	5.01	DATA	F	JvE	Geen cruciaal aspect, kritisch tav de invloed van data op gedrag en leefomgeving.
198	A	3,0	5.04	DATA	B	ACC	Het is niet gemakkelijk om commerciële partijen tot open data te bewegen. Dat resultaat is onduidelijk.
199	A	4,1	5.04	DATA	B	RvdW2	Steden hadden belooft dat ze bepaalde data zouden leveren maar hebben dit niet gedaan.
200	A	4,1	5.05	DATA	B	RvdW3	Een probleem bij de tool/energy atlas bleek dat de data heel erg onbetrouwbaar is.
201	E	5,0	5.08	DATA	B	GEM	Regels voor verzamelen en bewerken van data. Voorbeeld van nationale situatie. Toestemming vaak alleen voor gebruik binnen een specifieke context, dus niet open!
202	A	3,1	5.10	DATA	S	GEM	Through Amsterdam Smart City (ASC) partners like Liander, energy data is available for the city.
203	A	3,1	5.11	DATA	S	GdB	Liander, aangesloten bij ASC, is voorloper op dit gebied.
204	A	3,1	5.12	DATA	S	GEM	Data provided new insights and defined the specific challenges for Amsterdam South East. Also data enables all kinds of parties like consultancy, foreign experts, business partners and students to get active in the area.
205	A	3,2	5.12	DATA	F	ACC	Voor het bepalen van doelen en maatregelen hebben de steden informatie nodig uit modellen die data gebruiken. Liander had die al beschikbaar.
206	E	5,0	5.14	DATA	B	TUE	Soms binnen het project geen probleem omdat de partners tekenen voor geheimhouding, maar de EU streeft naar open data. Vele juridische hordes te nemen en vooral veel onduidelijkheden. Juristen weten vaak ook niet wat wel en niet mag.
207	E	5,0	5.14	DATA	S	VW	Kies data niet als verdienmodel maar creëer een trusted third party en laat zo mogelijk bewoners eigenaar zijn van de data.
208	E	5,0	5.15	DATA	S	WB	Gegevens vastgelegd samen met bewoners. Twee toestemmingsformulieren om gebruik van gegevens te reguleren. Maakt monitoring door TUE mogelijk.
209	A	2,3	5N	DATA	F	RvdW1	90% van de opgave gaat over NIET data achtige investeringen. Gewoon keiharde infrastructuur, kabels aanleggen, pijpen maken, en power plants aanleggen. Dat gaat over de fysieke wereld. Natuurlijk moet je dat laten steunen en met slimme ICT oplossingen komen, maar isoleren van huizen gaat niet over data.
210	E	5,0	6.01	SERV.I	NB	VW	Silo-denken is van alle tijden en organisaties en verandert slechts langzaam.
211	E	5,0	6.01	SERV.I	NS	VW	De hele keten wordt meer geïntegreerd. ICT en telecom worden onderdeel van het bouwproces. Systemen moeten open zijn en onderling communiceren en data gebruiken.

212	E	5,0	6.07	SERV.I	NS	VW	Fi-warestandaard: basis architectuur om data te kunnen uitwisselen.
213	A	2,2	6.1	SERV.I	NB	RvdW1	In die zin houden de literatuur, en de politici en de EU, natuurlijk elkaar ook een beetje vast. Het is allemaal holistisch, dus het moet holistisch zijn. Dat is een soort 'self fulfilling prophecy', daarmee is het kringetje rond. En ik denk die holistische benadering is te ingewikkeld.
214	A	2,1	6N	SERV.I	NS	RvdW1	--" Keep it simple"
215	E	5,0	6N	SERV.I	NS	KPN	--Woonconnect geeft bewoners en organisaties meer inzicht door integratie van gegevens en functies. Ondersteuning van de interactie tussen bewoners staat centraal.
216	E	5,0	6N	SERV.I	NF	TUE	--Is geen doel maar soms wel nodig voor onderdelen.
217	E	5,0	6N	SERV.I	NF	TUE	--Analogie met Internet, basis is noodzakelijk maar niemand kan voorzien wat daarop allemaal tot bloei kan komen.
218	E	5,1	6N	SERV.I	NS	VW	--Creëer demonstrabele cross overs tussen de verschillende sectoren (mobiliteit, ICT, Energie) om mensen op een ander denkspoor te zetten voor innovatie.
219	A	2,2	7.01	ACCOU	B	RvdW1	"non-compromise on core values" Ik vind hem een beetje vaag; je moet je doelstelling niet uit het oog verliezen staat hier eigenlijk, als ik het goed vertaal. Nou, als je 25 core values hebt, dan gaat het fout. Dat was bij Transform zo. Te complex, nou stop maar denk ik dan... Het is wel goed mogelijk als je 1,2 of 3 core values hebt, dan kun je dat nog wel handelen.
220	A	3,3	7.01	ACCOU	B	GdB	De grote bazen moeten vooraf zeggen dat ze iets belangrijk vinden, dan wordt ook het vervolg – na subsidie – gedragen.
221	A	4,1	7.01	ACCOU	B	AMC	Uiteindelijk heeft elke directeur een opdracht, en als in die opdracht niks staat over regionale samenwerking, of mogelijk aansluiting bij het TRANSFORM project, dan willen ze er wel iets voor doen, maar - dat sluit aan op accountability-, dan worden ze er ook niet op afgerekend.
222	A	4,1	7.01	ACCOU	B	Arena	Geen afgesproken doelen, dus ook geen metingen! Focus op het creëren van kansen voor betrokkenen in het gebied.
223	E	-	7.01	ACCOU	S	Jve	partnership contractueel geformaliseerd op basis van gezamenlijke doelen.
224	E	-	7.01	ACCOU	S	TUE	Rolverdeling is redelijk duidelijk. Gemeente als facilitator, Univ. Evalueert, Partners brengen oplossingen in. Ieders belang mogelijke toekomstige opschaling.
225	E	-	7.01	ACCOU	S	VW	Heldere rolverdeling tussen partijen; gedetailleerd gedocumenteerd.
226	E	?	7.01	ACCOU	S	WB	Verantwoording intern organisatie door te linken aan visie, missie en strategie. Verantwoording extern door voldoen aan regelgeving en controle externe accountant.
227	A	2,2	7.02	ACCOU	B	RvdW1	De MoU, is eigenlijk een politiek instrumentje. Dat is eigenlijk de 'sense making'... "We willen dit graag...", We zouden dit moeten doen, "dit is ons streven". Zo moet de MoU ook gewaardeerd worden. Dat is natuurlijk een politiek statement, maar daar voel je 'dit is ongrijpbaar'. Het is allemaal wensdenken. En niemand wil z'n handen er aan branden, misschien is dat het wel, blijft het zo vaag omdat niemand z'n handen eraan wil branden.

	A	B	C	D	F	G	H
1	**Proj**	**MOR**	**Anr**	**catego**	**rS/B**	**bron**	**omschrijving**
228	A	2,1	7.04	ACCOU	B	RvdW2	De realiteit was dat de Transform plannen voor het grootste gedeelte bij het brede perspectief bleven hangen, ik zeg het nog maar eventjes, op beleidsniveau.... En de brug slaan naar implementatie plannen makerij, komen tot contractvorming.. dat de steden daar nog niet aan toe waren of kwamen... terwijl dat wel het oorspronkelijke idee was. Omdat de call ingewikkeld is, is het antwoord ingewikkeld, is het resultaat half.
229	A	2,4	7.04	ACCOU	B	GdB	Niemand wordt er in deze situatie echt op afgerekend. "Als je met zijn allen een beetje doet is niemand echt verantwoordelijk." Het werk wordt daardoor behoorlijk ad hoc.
230	A	2,2	7N	ACCOU	F	RvdW1	-- Misschien is een successfactor wel: Puur realisme. Heb ik nou debiele ideeën, of heb ik veel te hoog gespannen ambities. Ok, schroef dat nou eens terug naar wat kan ik waarmaken. Ik denk dat je dan heel bescheiden zal zijn.
231	E	1.2/1	8.01	TRANS	PS	KPN	Een gevolg van de eisen die EU stelt.
232	E	1.3.2.	8.01	TRANS	PS	TUE	Besluitvorming in tweewekelijks overleg tussen alle 'belangrijke' stakeholders.
233	E	2.2/5	8.01	TRANS	PS	VW	Aanwezig door EU eisen.
234	E	2.6/N	8.01	TRANS	PB	WB	Enorme aantal eisen t.a.v. externe verantwoording kan remmend/belemmerend werken.
235	E	3.2/3	8.01	TRANS	PS	WB	Staat op de eerste plaats: helderheid over en weer over doelstellingen en geldende regelgeving per partner. Gaat vooral over de agenda van de organisaties en natuurlijk ook over het proces van uitvoering en administratie daarvan. Bijv. heldere prestatie-indicatoren en rapportage daarover.
236	E	C	8.02	TRANS	PB	TUE	Verdienmodel van de bedrijven/partners is onduidelijk en mogelijk niet haalbaar.

237	A	3,2	8.1	TRANS	PS	GEM	Several business cases are developed which give deeply insight in the feasibility of projects/ideas. Coming to this point of development gives the sense of realism of projects and also contours of the needed investments. Also it creates a feedback loop to parties to set priorities, based on impact and finance.
238	A	4,1	8.2	TRANS	PB	RvdW2	“Hoe kan het nou dat wij onze doelen niet halen”? Volgens mij zijn er toch weinig mensen die die vraag stellen... Of dat toch in ieder geval helemaal tot de bodem toe uitzoeken..
239	A	2,6	8.3	TRANS	PB	RvdW2	“Dan wil ik een onafhankelijke adviseur die die dingen beoordeelt en checkt of de kwaliteit wel voldoende is Ja of nee... Als het niet voldoende is, dan krijg je niet betaald of moet je het herdoen/overdoen...” De advisory board moet uit verschillende disciplines komen, ze moeten niet allemaal energiewetenschapper zijn. Dat werkt niet. Je moet juristen, oud politicus, energy deskundigen, etc, een breed palet aan deskundigen.
240	A	2,1	8N	TRANS	PB	RvdW1	--Ik vind het energie systeem in een stad/regio ontzettend ongrijpbaar. Ik kan het in een paar woorden uitleggen: daar wordt het gemaakt, en zo wordt het geconsumeerd, maar het veranderen van een systeem is ontzettend complex.
241	A	3,3	8N	TRANS	PB	GEM	--Projects fail because of uncertainty about future developments.

Appendix V Integr.Framework: Succes factors and Barriers

1		Checklist_02		"Challenges"			
2		**Factor**	**Aspect**	**Succesfactor**	**Barrier**	**Objective**	
3	**1**	**Management & Org**					
4		M&O Challenges	Project size		X		
5			Manager's attitudes and Behavior	X			
6			Users or organizational diversity		X		Governance related
7			Alignmentof organizational goals and project	X			Governance related
8			Multiple or conflicting goals		X		Governance related
9			Resistance to change		X		
10			Turf and conflicts		X		
11		M&O Strategies	Project team skills and expertise	X			
12			Well-skilled and respected IT leader (tech-social skills)	X			
13			Clear and realistic goals	X			Governance related
14			Identification of relevant stakeholders	X			Governance related
15			End-user involvement	X			Governance related
16			Planning	X			
17			Clear milestones and measurable deliverables	X			
18			Good communication	X			Governance related
19			Previous business process improvement	X			
20			Adequate training	X			
21			Adequate and innovative funding	X			
22			Current or best practices review	X			
23	2	**Technology**	IT skills: IT training programs	X			
24			Employees with integration skills and culture	X			
25			Organizational: cross-sectoral cooperation	X			Governance related
26			Inter-departmental coordination	X			Governance related
27			Clear vision of IT management	X			
28			Politics	X	X		
29			Culture issues		X		
30	**3**	**Governance**	Collaboration	X			
31			Leadership and champion	X			
32			Participation and partnership	X			
33			Communication	X			
34			Data-exchange	X			
35			Service and application integration	X			
36			Accountability	X			
37			Transparency	X			
38	**4**	**Policy**	City council	X			Governance related
39			City government	X			Governance related

40			City major	X			Governance related
41			External pressure		X		
42			Institutional readiness (legal, regulatory)	X			
43			Create conditions for urban development	X			
44			Intergovernmental relationships	X			Governance related
45			Norms, actions, and desired behaviour	X			Governance related
46			Environmental policy	X			
47	**5**	**People & Communiti**	Digital divide(s)		X		Governance related
48			Information and community gatekeepers	X			Governance related
49			Participation and partnership	X			Governance related
50			Communication	X			Governance related
51			Education	X			
52			Quality of life			X	
53			Accessibility	X			
54	**6**	**Economy**	Innovation	X			
55			Entrepreneurship,	X			
56			Trademarks	X			
57			Productivity			X	
58			Flexibility of the labor market	X			
59			Integration in the national and global market	X			Governance related
60			Business creation			X	
61			Job creation			X	
62			Workforce development			X	
63			Improvement in the productivity			X	
64	**7**	**Built Infrastruct.**					
65		IT infrastructure	Integration across government systems	X			Governance related
66			Internal systems have integrating capabilities	X			
67			Knowledge regarding interoperability	X			
68			Availability and compatibility of software and systems	X			
69		Security and privacy	Threats from hackers and intruders		X		
70			Threats from viruses, worms and Trojans		X		
71			Privacy of personal data		X		Governance related
72			High cost of security applications and solutions		X		
73			Accessibility		X		Governance related
74		Operational cost	High cost of IT professionals and consultancies		X		
75			High cost of IT		X		
76			Cost of install, oper. and maint. of information systems		X		
77			Cost of training		X		
78	**8**	**Natural environment**	Increase sustainability			X	
79			Manage natural resources			X	
80			High quality of life			X	

Appendix VI Transform Newsletter WP4 Vienna

SULCo Meeting WP4 in Vienna

On the 6 and 7th of November a SULCo meeting was held in Vienna, Austria. The Work package leaders from Vienna and Amsterdam set up the program of two intensive and interesting days. Together with representatives from all the TRANSFORM partner cities, the following topics have been discussed:

We have focused on the deliverable 4.2 'the Smart Urban Lab Implementation Plan'. The discussion created synergy between the different cities and their implementation initiatives, and was mostly about how to do upscaling of experiences to a general level. In doing this, relevant framework conditions for development in the SULs have been taken into account. After an introduction on the outcomes of the October meeting in Amsterdam, the following three questions were asked: "Which interesting example/initiative would your city like to use from other cities? Is this possible? And why (not)?". All attendees made a Poster presentation of interesting examples from the other cities which could be used elsewhere. According to this overview, a 'wishlist' has been made, to prioritize the most important examples. These examples will be in an elaborative way in the Implementation Plans. For example the energy atlas (Amsterdam, Hamburg), the holistic view on investment (Copenhagen) , the development agency (Lyon and Hamburg), how to gain political support (Genoa) and the mobility fund (Vienna). At last the structure of the D 4.3 Synthesis Report has been set up.

After this session a follow up mail- with specific question per city has been sent to all WP4 leaders, to include and elaborate on in the D.4.2. Focus lies on the possibilities and restrictions in duplication, making use of framework conditions, and recommendations relating to cities, national/EU framework, and the industry.

Apart from the in depth discussions we have had a nice informal dinner Viennese style and an amazing Indian lunch to spice things up and to strengthen our teamspirit!

We wish the WP 4 leaders success in finalizing their deliverable 4.2 and hope to see you again in the follow up meeting in January or in the final meeting in June 2015!

Nikander Hartemink, WP 4

Appendix VII Transform Newsletter WP4 Final meeting

Meeting WP4

On the 11th and 12th of February the Final SULCO meeting on work package 4 took place in Amsterdam. On the agenda was the concept Synthesis report, deliverable 4.3. The days were filled with sharing findings, raising new questions and discussing recommendations on future implementation in the TRANSFORM cities. The outcomes will be useful for other Smart Cities focusing on sustainable energy transformation, as well as for our own cities, since more implementation planning will follow in the coming years.

The Implementation plans have been finalized in December 2014 (deliverable 4.2). Therefore, at the meeting every city had a clear view on their current situation and their next steps. **Most interesting was the discussion about the powers of different stakeholders, the relation with the governance structure and whether, and how the governance should be different in green field or brown field transformation areas.** The debate was also on the question who actually the enduser of an area is. Are that individual persons, like inhabitants and workers, or can this also be building owners and organisations, like hospitals and companies? During the evaluation it showed that TRANSFORMing an urban area is not an easy task. It is hard to realize a substantial CO 2 reduction and it is a lot of work to make an implementation plan with commitment from the different stakeholders. This raised questions about the actual efficiency of TRANFORM. However, by sharing the outcomes of our learning process, TRANSFORM is not onlyreducing CO 2 in our own cities, but it is an example for other cities on how to – and not to - implement energy sustainable solutions.

After focusing on the final report, we also looked at future possibilities on how to share our knowledge and experiences. Ideas range from an interactive website (which is under development), new European projects, to an extended ILS-tour (intensive lab sessions) in collaboration with Smart City conferences. For now the coordinators of Work Package 4 (Vienna and Amsterdam) have their hands full on finalizing Deliverable 4.3, where you can read our findings, conclusions and recommendations. We would like to thank everyone for their valuable input, and hope you will use the final product!

WP4 team Amsterdam