Smart Cities: how to improve implementation?

The Critical role of … in Smart Citiy implementations

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Definitive P2 Report

Technical University of Delft

Faculty of Architecture

Urban Design Management

Urban Adaptation Strategies

Colophon

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Preface

This P2 report is written for the Real Estate and Housing department at the Faculty of Architecture of the TU Delft.

This report will give an overview of my research regarding the implementation of smart city initiatives and their aspects. The final report will be presented at the .XX of June 2016 and will be presented to my first mentor Tom Daamen and second mentor Ingrid Mulder.

This report will elaborate on the research topic and complementary research questions. Furthermore the choice of topic will be motivated and the relevance of the topic will be mentioned. The aimed planning and execution of this research process will also be stated.

Personal motivation:

- Motivated by the need to provide TRANSFORM and Smart City policy makers with a tool to guide their decision in developing their Smart Cities Program.
- To improve the process of implementation and decision making.

Management Summary

2 pages

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1. Introduction to the Smart City concept

This chapter will introduce the topic of Smart Cities, the field of study for this thesis. After a short introduction to the Smart City concept it will introduce the main drivers for this relative new phenomena in Urban Area development. It will also underline the need for a good implementation strategy to realize a specific Smart City concept. The chapter ends up with a short reader's guide to outline the structure of this thesis.

Cities play an important part in the future of urbanized Europe. However, they are confronted with grand challenges, among others far reaching demographic transformations, environmental decay and climatologically change, unequal social participation, and ever-rising mobility trends. This observation calls for appropriate long-range policy strategies for urban areas (Menninga, Nijkamp, Noll, & Polt, 2011) and new and innovative ways to manage the complexity of urban living problems(Chourabi et al., 2012). Making a city "smart" is emerging as a strategy to mitigate the aforementioned challenges according to Chourabi et al (2012), and Dameri & Rosenthal-Sabroux (2014).

The Smart City concept

The phenomena of a Smart City is relative new and has many interpretations. Baccarne (2014) sees the term 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).* According to Wolfram (2012), 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, branding), technology convergence (rapid technology push of ICT companies and system components), industrial convergence (integrating ICT components with other infrastructure and technology) and finally the information society, which becomes more advanced and widespread and in which the role of the internet as enabler of collaboration and city services has become more important for urban development. More on the origin of the Smart City in chapter 3, literature review.

Today, there is a heightened interest by a wide range of stakeholders for the potential of Smart City initiatives implementation as a 'new' approach to the urban area development scene in the Netherlands and throughout the world. Implementing this concept requires for cities to have a suitable urban development strategy.

Main drivers of the smart city concept

How come Smart City development receives such substantial attention in the urban area development sector, in other words, what are the main drivers? We can see multiple main drivers for Smart City implementation. The EU formulated a broad list of challenges in relation to their 'Smart Cities and communities' platform, mainly focusing on sustainable socio-economic outcomes, which is also substantiated by Ojo (Ojo et al., 2014). According to the European Commission, the benefits of Smart Cities are: "a significant improvement of citizens' quality of life, an increased competitiveness

of Europe's industry and innovative Small and Medium Enterprises (SME's), together with a strong contribution to sustainability and the EU's 20-20-20 energy and climate targets" (European Commission & Bartholmes, 2013). Furthermore cities seem to use the Smart City concept as a form of city-branding/marketing, achieving high international rankings to attract people and businesses, stimulating economic prosperity.

From Smart City concept to Smart City 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" (Dameri & Rosenthal-Sabroux, 2014). According to Rodriguez-Bolivar the Smart City concept can serve both in defining means and ends of local economic development (Rodriguez-Bolivar, 2015). However, it looks like Smart City is more a mean in which it can "focus on 'how' to achieve goals like sustainability, innovation, employment. The Smart City concept thus can be seen as a tool to stimulate sustainable development by finding innovative solutions to urban problems, creating employment along the way" (Warmerdam, 2015). According to van Warmerdam, coordinator of the Smart Energy City project TRANSFORM, the industry claims that "Using ICT (thus being Smart), can be seen as a way of improving the process of making cities sustainable, by making it more efficient and effective. Thus Smart Cities promises an era of innovative urban planning, driven by smart urban technologies that will make cities safer, cleaner and, above all, more efficient. However, even though the Smart City strategy may be an appropriate long-range policy strategy for urban areas, it seems the road towards Smart City implementation is rough with potholes, bumps and mud clumps.

Readers guide

In chapter 2 the research proposal and research methods will be described. A review of recent literature on the subject is summed up in chapter 3 to describe a theoretical framework. The development of a checklist of success factors and barriers used in the case studies is described in chapter 4. Chapter 5 introduces the in depth case study's presented in chapters 6 and 7. Conclusions and recommendations are presented in chapter 8. The thesis is completed with a reflection in chapter 9.

2. Research Proposal

2.1. Problem Description

Major challenges cities are facing today are economic recession, less availability of capital, far reaching demographic transformation, rising mobility trends, environmental decay, climatological change, unequal social participation. These challenges have heightened interest in the Smart City concept by a wide range of stakeholders. European Union, governments, other (semi-)public and private parties, and even local communities are involved in the process of Smart City implementation, resulting in higher demand and supply of smart city projects in urban area development. In this context, urban area development has changed by adding ICT as an extra layer in city-making, making this process even more complex.

Cities in Europe are appointing 'Smart Urban Labs' for innovative and experimental Smart city projects, creating playgrounds for these new initiatives. New ways of working, collaborating and networking are put into place, to improve the process of implementation. However Smart City implementation is still hampering. This will be discussed from research, industry and governmental perspectives below.

Literature perspective on Smart City implementation

From literature research multiple issues are mentioned. These can be divided into the following four main categories: technological issues, policy issues, management issues, and context issues (Nam & Pardo, 2011a). However, every source in literature uses their own framework for analysis.

According to Nam & Pardo the following factors are important regarding Smart City implementation: Smart Cities have unavoidable risk (generated by new, untested trials). On policy and organization level, it shows the innovative nature of Smart City projects, does not align with the culture in 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, 2011 #61)

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. Alongside advances in technology, advances in city management and policy are necessary for innovation (Nam & Pardo, 2011b).

Apart from these technical, policy, management issues, Ojo et al. find more issues regarding stakeholders and partnerships, regarding, buy-in, funding, and participation (Ojo et al., 2014), which is underpinned by Dameri & Rosenthal-Sabroux, saying "it's difficult to support investment decisions, and funding of projects" (Dameri & Rosenthal-Sabroux, 2014) and also by Deakin and Al Waer, concluding "Smart City partnerships tend to represent little more than short-term measures at self-

help and exercises in community learning on matters related to 'how best to pull yourself up by your own bootstraps' ".

On top of this, researchers (Deakin & Al Waer, 2011); (Shelton, Zook, & Wiig, 2014); (Baccarne et al., 2014) raise the question, of what the actual added value of smart city projects is (on improvement of quality of life, or co2 reduction) and what the broader relation is towards 'the social reform agenda'. According to Hajer and Dassen "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).

Industry perspective on Smart City implementation

From Industry perspective the following issues for implementation are mentioned, are also related to managing, policy and technological, funding and partnerships:

o Difficulty of managing human capital; having the right people with the right knowledge and skills at the right place. Problematic management on gathering open data, pooling, and processing the data;
o Driving change in a large public sector organization is difficult. There will be resistance within society and the organization. Also due to political agendas smart city implementation can lack political support, and city silo
o Complex procurement legislation. Tight laws on procurement of products and services, make it not able to cope with the 21st century use of ICT services. Protection of privacy, how to provide assurance there is no risk in open data.
o Pilot projects are not being up-scaled to city wide projects. Some projects carry too many unknowns to roll out immediately at scale and resources are not available to roll projects out at scale;
o Shortage of financial capital, cities have to be creative about how to find funding for projects, and it is difficult to create transparent investment metrics;
o Difficulty of measuring results, ensuring actual sustainability, and disappointing results;
o Citizen engagement is lacking.

Thus from industry perspective, the challenges inherent in the smart city concept are complex and multiple (Arup, 2013; ARUP, Cosgrave, Doody, & Walt, 2014; Copeland, 2014)

Government perspective on Smart City implementation

From government perspective, the following issues in Smart City implementation are mentioned:

o Political priorities change
o Business strategy is not clearly articulated
o Decision making is complex
o Strategies gather dust on the shelf
o Plans are not realistic or affordable
o Value is difficult to measure
o Technology is over promising
o Culture and business model do not match
o Capabilities are not present (Haston, 2009)

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In a survey by Cisco based on 668 respondents of North American municipal executives, the following barrier to implementation are mentioned:

o   Financial issues, attracting funding is the biggest issue together with a lack of insights in costs and benefits;
o   Internal organizational challenges, such as the lack of cross-departmental coordination and alignment on priorities, and lack of visionary leader;
o   Missing citizen engagement (Cisco, 2014).

Shared insights on Smart City implementation

Smart City initiatives have revealed several technical, management and governance issues, mainly due to high uncertainty of these smart city projects, increased complexity of the city itself, and the inherent nature of smart city as a complex "socio-technical System of Systems" (Ojo et al., 2014). Next to these scientific results, practical studies, by the European Commission (2013) and Cisco (2012) confirm this last issue. The EU Commission states "When it comes to devising and implementing a Smart City strategy 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). Cisco findings, based on engagements with smart city stakeholders worldwide, show "the complexity of cities (multiple parties, stakeholders, and processes) remains the most significant barrier to adopting Smart City solutions" (Falconer & Mitchell, 2012).

Finally, next to human, technological and institutional factors, external factors (and contextual factors of a city) can play a major role influencing the process and the development of smart city implementation. As Neirotti et al. states "City policy makers are urged to understand the local context factors in order to shape appropriate strategies for their Smart Cities". (Neirotti et al., 2014), ranging from national economic and financial issues to changes in the municipal political landscape.

2.2. Problem Statement

Thus there are multiple problems in the implementation of smart city initiatives which have been identified. Due to complexity of the city, based on human, technological, institutional (partnerships and governance) and external (contextual) factors, many Smart City initiatives are ineffective (bron).

The increased attention and ambition of Dutch and foreign cities to become 'Smart' in combination with the ineffective strategy to actually implement (and upscale) smart city projects presume a need for a method to improve smart city implementation. Realizing Smart City visions, and scaling up smart city projects, we need to understand how to overcome barriers and include success factors in effective smart city project planning.

Main barriers of smart city implementation are the high complexity of cities, and other technological, but mainly social and institutional factors: "The Smart City approach is emerging as a way to solve tangled and wicked problems inherited by the rapid urbanization. Since the wicked and tangled problems of urbanization are social, political and organizational, smart city strategies (for innovation) must reflect consideration of management and policy as well as technology. While commentators

tend to spotlight the technological sides of a smart city, its organization and policy issues have not gained much attention" (Nam & Pardo, 2011b). As Ching points out, "This 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, or to focus on "smart" technologies for short-term solutions without adequately considering the long term."(Ching, 2013).

Thus, there still seems to be limited insight on (1) how to overcome barriers and include success factors in effective smart city project planning, as well as (2) what steps need to be taken towards an effective strategy of smart city implementation.

2.3. Research Questions

Main question: How can Smart City implementation in The Netherlands be improved?

Sub literature questions:

1.1 What is a smart city? How is the concept of a smart city to be defined?
1.2 How is the implementation process organized in Europe/The Netherlands? (*Strategy, Project Planning, Collaboration, chronology, etc.)*
1.3 What can explain the current difficulties experienced in smart city projects?
1.4 How can these difficulties be overcome in future Smart City projects?
1.5 What success factors are experienced in Smart City projects?
1.6 How can the success factors be optimized?

Sub empirical questions for cases:

2.1 How is the Smart City concept defined?
2.2 Is the Smart City concept part of an Urban Development Roadmap?
2.3 What are the Smart City objectives?
2.4 How is the implementation process organized?
2.5 Does implementation planning involve success and fail factors?

Since the research is aimed at quality improvement of the Smart City implementations, we can project the research questions on Deming's PDCA-cyclus.
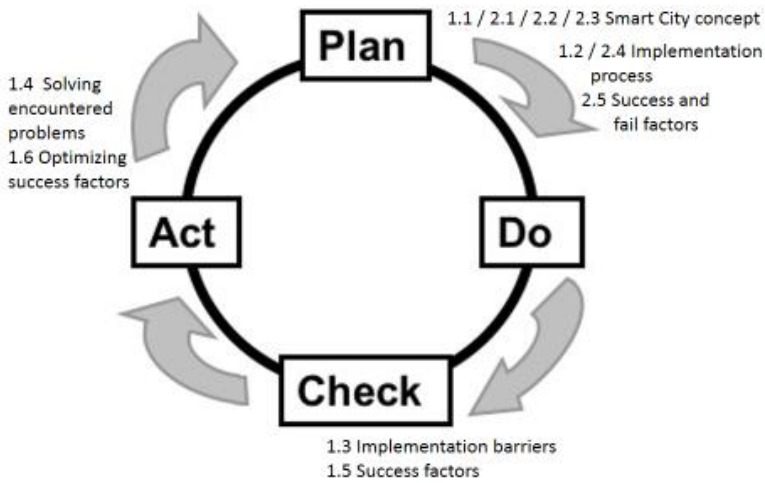
Fig. XX Research questions related to Deming Circle for quality improvement

Since this model is a very generic approach a more specific model is made to relate the research questions to aspects of the Smart City.
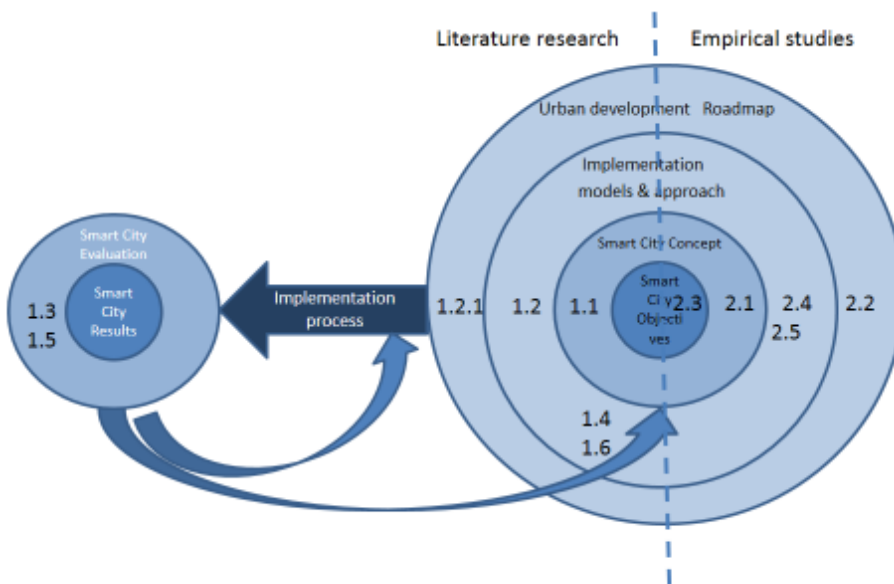
Fig. XX Improvement of Smart City implementation process by literature research and empirical studies

2.4. Conceptual model

The conceptual model gives insight in the implementation process, sub-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 set 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. Depending on the outcome of this realisation phase the results are matching the objectives more or less. Governance is a crucial factor of influence during all the phases. The work is executed within an ever changing context which may influence all aspects of the initiative.
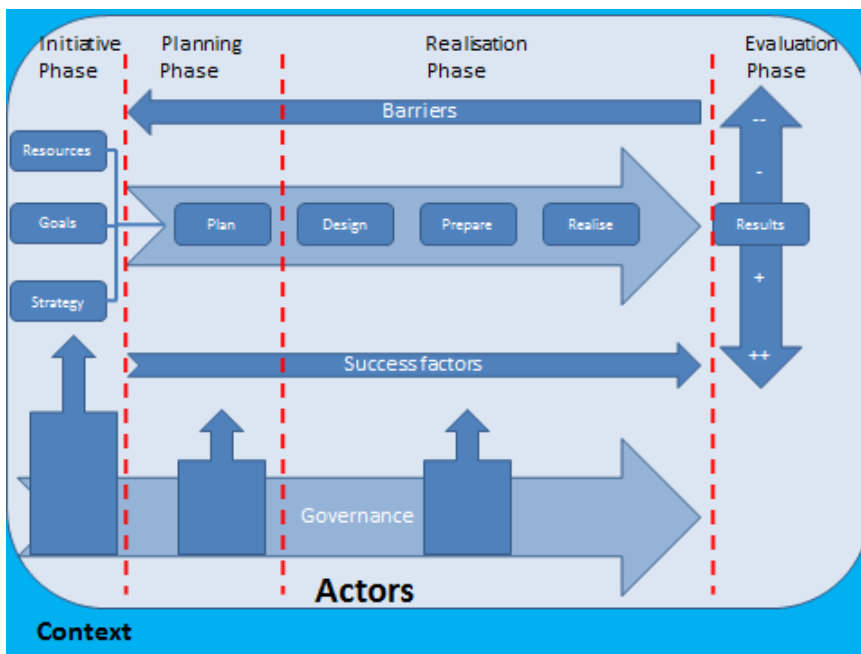
2.5. Research Aim, goal & objectives

The main research goal is to clarify the issues in Smart City implementation and to gain a comprehensive understanding of the complexities and interconnections among social, institutional and technical factors of services and physical environments in a city. We will do so by focusing on the role of success and failure factors.

Therefore, this research will provide evidence-based challenges and solutions towards effective smart city implementation in urban area developments. Focusing on Smart City initiatives/projects in Europe.

The following results are aimed for:

- Providing a framework of analysis;
- Conclusions on general aspects that influence the process of smart city implementation;
- A better understanding of the complex and dynamic context of smart city implementation strategies, and how these strategies work, including insight in the barriers, and key success factors;
- Providing a checklist with success and fail factors which can be used in Smart City planning.

2.6. Scope

In this thesis the focus will lie on effective strategy in Smart City initiatives. This research will specifically focus on success factors like institutional factors, mainly on partnerships and governance, and thus also on the role of the government in smart city implementation. On top of that this thesis will focus on the way different actors are and should be working together preferably.

Within this scope, the focus will be on literature and analysis of empirical studies. The empirical studies are limited to European funded Smart City projects. This implies the use of multiple-helix collaboration, involving public, private, research, and other organizations. These projects are (planned to be) implemented on the scale of urban area development, often to be realised in Smart Urban Labs (SULs).

This thesis will not include detailed technical analysis of Smart City projects and Smart City developments in other parts of the world, other than Europe, like the extreme examples of Smart City developments Masdar and Songdo.

2.7. Research Design
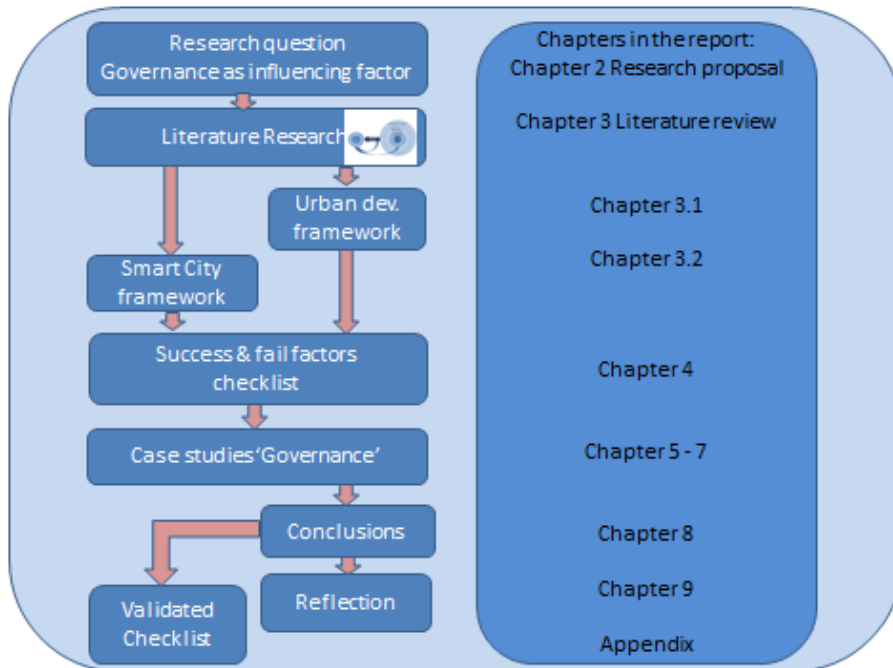
Fig. XX Research design (own ill.)

This research design shows the main steps in this research in relation to the specific chapters. The chapters 1-3 include literature research. Chapter 4 will provide a checklist based on Smart City frameworks and Urban Development theory (chapter 3), which will be used in testing the case studies (chapters 5-7). Afterwards conclusions will be drawn and if necessary the checklist will be adjusted (reflection chapter 9) and validated.

2.8. Research relevance

2.8.1 Scientific relevance

Different researchers conclude that there is an urgent need to develop a practical framework not only based on 'Smart City literature'. The analysis of barriers and success factors can thus fill in a gap. "Discussions in academic literature of relevant theory or frameworks are few; analysis lags behind the actual practice of how different cities, sometimes aggressively, are moving toward transforming themselves into a smart and green city.", "However actual practice often remains fragmented, real world implementation still generally outstrips any discussion in academic literature capable of generalization (Lee, 2012 #52). Ojo et. al point out "While early lessons are informing modest objectives for planned Smart Cities programs, no concrete framework based on careful analysis of existing initiatives is available to guide policy makers and other Smart City stakeholders. Existing frameworks are either conceptual, developed based only on review of Smart Cities' literature, or they narrowly focus on the technological aspects of Smart Cities" (Ojo et al., 2014). As Angelidou noticed

in 2014 "The smart cities' topic is still largely under exploration" however, "the smart city research remains at a preliminary stage." (Angelidou, 2014).

At the Technical University of Delft, Real Estate & Housing hasn't been intensively publishing on the topic of Smart Cities. The last PhD on Smart Cities was at the faculty of Technical Business Management in Delft "Smart Cities – Dealing with insecurities"; on the managing aspects of dealing with smart city implementation (Weening, 2006). However, according to Veeckman and van der Graaf "The fundamental issues of realizing the Smart City implementation is 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). More case studies would reinforce our understanding of how to develop an effective smart city and help research to share best practices in smart city development (J.-H. Lee & M. Hancock, 2012)

Literature review showed most papers and publications on the smart city subject seem to concentrate either on the governance/partnership/management side, or on the technical aspects of Smart Cities, but only very few seem to consider the two as interdependent factors in research. Therefore this thesis will focus on the various technological, human and institutional challenges, barriers and success factors, of Smart City planning and implementation, using real Smart City cases.

2.8.2 Societal relevance

The number of initiatives, plans, publications and websites on the topic 'Smart Cities' is considerable and daily growing. All demonstrate high expectations of the use of the concept of (becoming) a 'Smart City', but current outcomes are scarce and hard to measure. The risk of a hype is there whereas 'Smart City' can be used as the panacea to all diseases.

"The Smart City is nowadays seen like a key strategy to improve the quality of life of billions of people living in cities all over the world." (Dameri & Rosenthal-Sabroux, 2014). "As of 2012, there are approximately 143 ongoing or completed self-designated smart city projects. Among these initiatives, cities in North America (35 projects) and Europe (47 projects) are currently leading efforts to implement smart technologies to address and resolve urban problems such as energy shortages, traffic congestion, inadequate urban infrastructure, and some issues in health and education. In particular the European Union (EU) is investing in smart city strategies for metropolitan city regions such as Barcelona, Amsterdam, Berlin and Manchester. Further, Asian countries are active with more than 40 different projects, including in Singapore, Hong Kong, Seoul, Busan and Songdo; an smart city efforts extend, as well, to as other regions around the world, including South America (11 projects), the Middle East and Africa (10 projects)" (J.-H. Lee & M. Hancock, 2012). This has only been growing since. According to Frost & Sullivan, the Smart City Market is likely to be worth a cumulative $1.565 Trillion by 2020.

Considering the importance of the objectives for Smart City development and the still limited concrete successes, it is clear that any attempt to improve Smart City initiatives and plans can have a reasonable impact. Insight in barriers and success factors can contribute to future successes in this domain of urban development.

2.9. Utilization potential

The results of this research will be useful guidance for policy makers and all people involved with new Smart City initiatives. By using the checklist that will be the result of this research new plans for programme's and projects can be optimized to enlarge the chance of success.

2.10. Research Methods

The answer on the main research question will be based on a 'qualitative and empirical' research, by adopting mainly an unstructured approach (Kumar, 2011). A quantitative approach is unsuitable because of the great variation in characteristics of the different Smart City programs and projects.

Wang and Groat describe a case study as an empirical research which analyses the contemporary phenomena within a real-life context. (Groat, 2002 #134) . Yin states cases studies are preferred strategy when: 'How' or 'Why' questions are being posed, the investigator has little controle over events, and when the focus is on contemporary phenomenon within some real life context. (Yin, 2013 #135)

The research can be classified as an 'action' research. This term refers to approaches that are concerned with producing practical outcomes (the checklist and conclusions). The research emphasizes the production of practical knowledge and new forms of understanding (Reason and Bradbury, 2001). The research can also be qualified as 'evaluative' since the designed checklist will be evaluated by using the checklist to analyze two cases.

According to Baarda, De Goede en Teunissen (1998) and Reulink and Lindeman (2005) includes the method for gathering data in a qualitative research mainly participating observations, semistructured interviews, and gathering of documentation. (Baarda, 2005 #132; Reulink, 2005 #133). In this thesis – and the preceding internship – all these forms will be executed.

The research strategy (Verschuren, 2000 #131) in this thesis contains there for the following main steps:

1. Literature research
2. Construction of a checklist
3. Case studies
4. Validation of the checklist
5. Conclusions

The relation between the different steps in the research process is shown in figure XX.

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Major steps and results

Fig XX Major steps and results in the research strategy

Literature Study

The literature study includes three stages; exploration of the problem and field of research, the creation of a theoretical framework and the final literature study. The theoretical framework is still under construction within the research proposal of the research. This final model will be presented in chapter 4 'Modified framework for analysis'.

The literature is selected form the field of Urban area development and specific from the domain of Smart City development. The literature is selected from different sources: scientific research, industry publications, research and consultancy firms and publications from governments and policy makers like the EU.

Construction of a checklist

The checklist will be based on the findings of the literature study with the focus of identifying success factors and barriers for Smart City implementation. A first draft of the checklist will be based on a suitable selected framework from the literature. Available literature will be re-used to determine possible additionally identified success factors and barriers. Depending on the findings in the literature research the structure and the content of the checklist will be enhanced resulting in the checklist to use in the case studies.

Case studies

Part of the Case study has already started during the internship at Project Management Bureau Amsterdam, joining the TRANSFORM project in 2014-2015. During this internship insight in the different European TRANSFORM Smart Cities is obtained, by being present at presentations/workshops/events, analysing documents, and taking semi-structured interviews. During this internship, insights are gathered in different cases outside of Amsterdam (Copenhagen, Genoa, Hamburg, Lyon, and Vienna) which will be used as reference case study material.

Since most Smart City projects are not ready to be implemented, but still remain in the initiate or planning phase, it will be difficult to test actual results, and focus on the process of implementation.

Therefore the focus will lie on how the implementation process is described in the planning phase, and (if possible) how this is effecting actual implementation.

Although two cases are analyzed in this study, the research design is not comparative. The number of possible differences between concrete Smart City initiatives are extensive which could make the outcomes of the analysis almost incomparable.

Criteria for the selection of the sample

The case study has the following characteristics (selection criteria):

- Scale: urban area
- Phase: planned, started, or finished
- Smart City implementation
- European funded
- Multiple helix collaboration
- Possibility to interview experts who were involved with the implementation of these mentioned Smart Cities

From the available projects in the Netherlands two are selected that fit these criteria: Amsterdam because the project is finished and Eindhoven which is still in execution. The advantage from the Eindhoven case is that it is currently in progress, so the process can be examined closely.

For analyzing the cases available documentation will be analysed and matched with the checklist of success factors and barriers. Additional interviews with stakeholders will be performed to complete the analysis. In this research the central in-depth case study is the Transform Smart Urban Lab 'Amsterdam Southeast'.

When preparing for data collection, the skills required for case study research can be summed up to asking good questions, being a good listener, being adaptive and flexible, although having a firm grasp on the issues being studied, and being unbiased by preconceived notions (thus being open to the contrary).(Yin, 2013 #135)

Validation of the checklist

The experienc in using the checklist in practical analysis will probably lead to further improvements of the checklist. These improvements will be documented and based on the conclusions of the research.

Conclusions

The conclusions will focus on ways to improve future Smart City initiatives by optimizing the success factors and reducing the impact of barriers. The main focus will be on the influence of the governance during the initiative.

Research questions related to the structure of the Thesis

Literature research	Empirical study	Structure Thesis
1.1 Smart City concepts		3.1 Urban area development 3.2 Smart City concept
1.2 Implementation process, -models & relation to urban planning		3.3. Implementation process
1.3 Difficulties experienced		3.3.7 Barriers
1.4 Solutions		
1.5 Success factors		3.3.6 Succes factors
1.6 Optimization		3.4 Explanations and solutions
	2.1 Concepts 2.3 Objectives	6 (and 7) the cases
	2.2 Roadmap 2.4 implementation process	6 (and 7) the cases
	2.5 Fail and success factors identified	6 (and 7) the cases
		8 Conclusions and recommendations
		9 Reflection

2.10.1. Research Phases and planning

September	October	November	December	January	February	March	April	May	June
Literature Research		**Literature Research**		**In depth: Field Research & Analysis**				**Analysis & Evaluation**	
Literature study and Documents review		Literature study & (pre) Field research – Theory & practice		Literature study and Research proposal	(Field) Research: case studies, interviews, surveys - Practice			Research conclusions, recommendations Linking Practice & Theory	
	P1	Selection Graduation Company and case(s)		**P2 (Go- No Go) 15/01/16**			**P3**	**P4 (Go-No Go)**	**P5 Final**
Theoretical framework		Observations; location visits for the case at hand, meetings, etc.		Theoretical framework	Redeveloping Theoretical framework?			Verification results	Research reflections

Table XX: Planning P1-P5 presentation

2.10.2. Ensuring Research Quality

3. Literature review: Theoretical framework

In this chapter the focus will lie on gathering the body of knowledge necessary for this research. It will start with information regarding urban area development before introducing the conditions for the rise of the smart city, followed by describing the discourse.

Literature review showed most papers and publications on this subject focus on either governance, management, stakeholder side or on the technological, however only very few consider both process and project outcomes. The studied literature tends to analyse the challenges and opportunities in Smart City implementation and possible smart city frameworks where little reference is made to new business models and new collaboration models or actual effective strategies in implementing smart city initiatives. Smart city initiatives are still frequently analysed as potential local solutions to global problems. The most central issue in this regard is the actual added value of smart city initiatives is unclear. Overall it became apparent that the amount of research on smart city initiatives in the Netherlands (and the rest of the world) is growing, but that the body of knowledge is too few and from such diverse angels that it seems unsuitable to speak of a robust body of knowledge on this topic. Practitioners are thus faced with problems for whose solution there only seems to be limited, easily available knowledge in theory and research (bron).

3.1. Urban area development

Exploitatie gebied	Initiatief	Haalbaarheid	Realisatie	Exploitatie beheer
	Gebiedsontwikkeling 1.0			
Gebiedsontwikkeling 2.0				
Gebiedsontwikkeling 3.0				

Tabel 1: Ontwikkelstrategieën per ontwikkelfase (aangepast mvm 08-2015; Peek, Remmen, & Tetteroo, 2012)

- Traditional difficulties and challenges
- Layers in city; infrastructure, housing, now also ICT as an extra layer in UAD.

2. De planning fase;
Deze fase start na het formuleren en vastleggen van de algemene ambitie. In deze fase wordt de haalbaarheid vastgesteld en wordt het plan verder uitgewerkt. De planning fase is het voortraject van de realisatie fase.
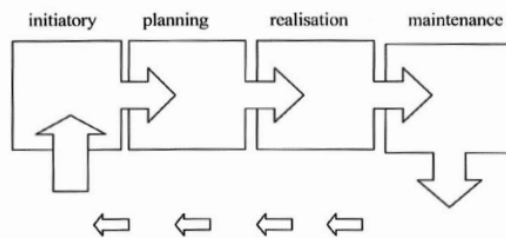
3. De realisatie fase;
Het project wordt uitgevoerd, op

Figuur 16 de vier verschillende fase binnen gebiedsontwikkelingen (Franzen e.a., 2010)

Focus op planning

3.1.1. Planning in UAD

 "From Planning to Projects Large-scale urban projects are often presented as project-focused market-led initiatives, which have replaced statutory planning as the primary means of intervention in cities. Planning through urban "projects" has indeed emerged as the main strategy to stimulate economic growth and to "organize innovation," both organizationally and economically (see Table 4). Large-scale projects and events are perceived as strategic instruments aiming at reshaping the city. Against the crisis of the comprehensive Plan—the classic policy instrument of the Fordist age—the large, emblematic Project has emerged as a viable alternative, allegedly combining the advantages of flexibility and targeted actions with a tremendous symbolic capacity. Essentially fragmented, this form of intervention goes hand in hand with an eclectic planning style where attention to design, detail, morphology, and aesthetics is paramount. The emblematic Project captures a segment of the city and turns it into the symbol of the new restructured/ revitalized metropolis cast with a powerful image of innovation, creativity, and success. And yet, despite the rhetoric, the replacement of the Plan by the Project has not displaced planning from the urban arena. In fact, the case studies reveal that in most examples there is a strong strategic component and a significant role for planning. However, in the process, there has been a drastic reorganization of the planning and urban policy-making structures and a rise of new modes of intervention, planning goals, tools, and institutions" (bron) http://www.tandfonline.com/doi/pdf/10.1080/01944369608975696

3.1.2. Policy framework

Table 2. The main features of the three different policy paradigms (De Bruijn et al., 1993: 22)

	Classic steering (top - down)	**Market model (bottom – up)**	**Interactive network governance**
Characterization of relationships	Hierarchical, command –and – control (government sets goals or tells actors what to do)	Autonomous (government creates incentives and ´rules of the game´, which create context for autonomous actors).	Mutually dependent interactions
Characterization of coordination processes	Government coordinates through regulations, goals, targets	Incentives and price signals coordinate self-organizing actors	Coordination through social interactions and exchange of information and resources
Foundation scientific disciplines	Classic political science	Neo-classical economy	Sociology, innovation studies, neo-institutional political science
Governance instruments	Formal rules, regulations and laws	Financial incentives (subsidies, taxes)	Learning processes, demonstration projects and experiments, network management, vision building through scenario workshops, strategic conferences, and public debates

bron

> **Commented [NH3]:** policy framework conditions to foster "system innovation"with some illustration from an international perspective

Amsterdam is unique in having a Private-Public Partnership Special Purpose Company. (J.-H. Lee & M. Hancock, 2012) (COMPARISON OF AMSTERDAM AS WELL)

- Triple helix model of smart cities: A neo-evolutionary perspective

### 3.1.3. Effective implementation strategies

3.1.4. Barriers urban area development

3.1.5. Success factors urban area development

- Bron; blackboard; "what is successful urban area development F.Hobma
-

    file:///D:/Downloads/Munira,%20Jadeed%20A_Critical%20Success%20Factors%20That%20Influence%20The%20Successful%20Implementation%20Of%20Urban%20Development%20Plans%20In%20Kenya.pdf

bron
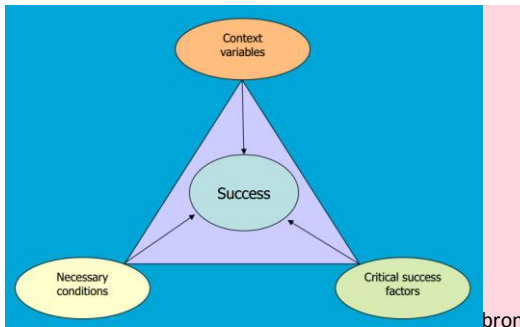
3.2. The concept of a Smart City

3.2.1. Conditions for the rise of the Smart City

The concept 'Smart city' had a boom in 2009 after the 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. Which factors made the concept of Smart City to arise?

A lot of smart city projects and initiatives have popped up as a seeming answer to some societal challenges that cities are facing. Especially in countries in the European Union the 'smart cities' agenda has gained major attention (Komninos, 2002; Paskaleva, 2009). According to Veeckman (2014) "… environmental protection, energy consumption, ageing populations, are demanding new and innovative ways to manage the complexity of urban living. These and other challenges, like rapid technological evolutions, force cities to seek solutions and to invest in the necessary information and Communication Technologies (ICT) infrastructure and human and social capital development" (Veeckman & van der Graaf, 2014). According to Wolfram (2012), the main factors are grand environmental challenges, urbanisation, technology convergence, industrial convergence and the information of society (Wolfram, 2012). Below a more detailed description of the underlying conditions for the rise of the Smart City:

1) **Grand environmental challenges:** Global warming and climate change are dominant on policy agendas across all levels. Think about the Kyoto Protocol and the Horizon 2020 goals for Europe. Knowledge on the dynamics of these challenges and complex interactions with socio-economic structural change has become available only during the past decade, creating increasing pressure for change (Stern, 2007). According to Harvey, the 2009 financial crisis has added to this picture, drawing attention to the vulnerabilities of the existing regime and in particular the role of cities in this;

2) **Urbanization Urban issues**: There is a fast growing need to handle global environment and urbanization problems like population increase and, with a growing share of urban population (e.g. in the EU from currently 75% to 85% by 2050, globally 81% increase by 2030), resource depletion, polarized economic growth, adverse effects of increasing urbanization like air

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pollution, water shortages, energy shortages, traffic congestion, and the complexity of managing urban living;

3) **Technology convergence**: Rapid Technology Push – ICT companies and system components are subject to enhanced convergence facilitating the interconnection of data, soft- and hardware, as well as users, objects and environments in large scale (mobile) networks;

4) **Industrial convergence:** As ICT components become increasingly integrated with other infrastructures and technology, major industrial branches are moving closer together. Convergence of industrial value chains for smart urban infrastructure and applications is pushed by industry and governments to secure participation in emerging growth markets;

5) **Information of society:** Now that infrastructures and social networks become more advanced and widespread, the role of the Internet as enabler of collaboration and city services has become more important for urban development (Wolfram, 2012). Komninos argues the three waves of worldwide web, increase in communication bandwidth and broadband and finally the wireless networks marked a new set of technologies for creating the digital space of cities. (Komninos, Pallot, & Schaffers, 2013)

Wolfram is convinced that the combination of all these factors gave the punch to this new concept: "While actually none of these factors is entirely new or can be convincingly claimed to have triggered 'Smart City' thinking alone, together they have created a dynamic context within which this discourse has been able to unfold through continued reproduction across levels and sectors. Most importantly, it illustrates that the 'Smart City' can hardly be claimed to represent a neutral frame for any urban ICT activities, or define merely a certain epistemological perspective in research. Rather, it clearly establishes a normative reference, since a 'smart city' should be implemented, and it demands the creation of policy addressing this need" (Wolfram, 2012).

Baccarne et al. (2014) 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).

"It is mainly in Europe, and only recently, that the concept of smartness has become extremely popular, especially after the expression ´Smart City´ became part of the complex mechanisms of EU research funding. Furthermore the EU funding programs such as Horizon 2020 are an important driver to promote and support the development of smart cities throughout Europe. (Veeckman & van der Graaf, 2014)

An overview of global investments in smart city development makes clear that this is a serious market, both for enterprises and politicians. Frost & Sullivan research estimates a combined market potential of $1.5 trillion globally for the smart city market in segments of energy, transportation, healthcare, building, infrastructure, and governance. If one compares that to GDP of nations in 2014, the total sum is larger than the GDP of Spain, thus making it the 12th largest GDP in the world. Yet, while the potential is huge, the challenge faced is finding funding and developing the right business model, as many cities in the Western world do not have the finances available to take on some mammoth-sized projects (Vidyasekar, 2013) (Bron).

In India, the nation is embarking an ambitious $90 billion two-phase industrial program to build new industrial cities as smart, sustainable cities of the future, in collaboration with Japan (European Union, 2014). India is planning to spend EUR 66 billion developing seven Smart Cities along the Delhi-Mumbai Industrial Corridor using a mixture of public-private partnerships (80%) and publicly funded trunk infrastructure investment (20%) (Aboullaev, 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 totaling EUR 113 billion (European Union, 2014). In its Five-Year National Planning, China's future "Smart Cities" are to become a main driver of its urbanization process, with a 2 trillion yuan ($322 billion) to be allocated to more than 600 cities nationwide. The Japanese Government created a "FutureCity" and will advance the "Future City" model of urban planning with state-of-the-art environmental sustainability and superb liveability (Aboullaev, 2014). Other emergent countries are developing Smart Cities from the ground up, some countries, such as Armenia, are now branding their whole country as a 'Smart Country'. Europe's global competitors among the emerging economies are pursuing large Smart City programmes (European Union, 2014). The European Union itself has embarked on a long-term strategy for a smart and sustainable growth. In 2014 an overview is made of 468 cities with smart city initiatives in EU (European Union, 2014). The above shows 'smart city' marketing and development is serious business.

3.2.2. Critique on the Smart City

Critique on the Smart City 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'.

The concept

In the Netherlands Maarten Hajer and Ton 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: "The discourse on 'Smart Cities' is everywhere. It promises an era of innovative urban planning, driven by smart urban technologies that will make cities safer, cleaner and, above all, more efficient. Efficiency seems uncontroversial but does it for great cities?". In this book Hajer and Dassen plea for a 'smart urbanism' instead of uncritically adopting 'smart cities'. Walravens finds criticism on different aspects of the Smart City concept: "The various operationalisations 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) A lack of support for Smart City implementation is signaled by Dameri & Rosenthal-Sabroux, "For this reason, to find a sound and shared smart city definition, with clear boundaries and delimited goals, it is necessary to better support the further smart city planning and implementation" (Dameri & Rosenthal-Sabroux, 2014).

The dominant role of ICT

 "The focus of the concept of smart city may lead to an underestimation of the possible negative effects of the development of the new technological and networked infrastructures needed for a city

to be smart (on this topic, see also Graham and Marvin 2001)" (Caragliu, 2011 #2). In a more extreme case, according to Nei rotti, 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).

"There is some hyperbole surrounding Smart Cities today. The Smart City concept has been criticized, a.o. for its self-congratulatory tendency, as well as its focus on I(C)T and the potential consequences towards reinforcing a digital divide (Graham, 2002 and Hollands, 2008). If insufficient attention is paid to this topic, the strong focus on information technologies in the Smart Cities discourse can dramatically impact the digital divide in the negative sense, creating even larger inequalities and social divisions in the city. (Graham, 2002), a far cry from what would be labeled as 'smart' "(Walravens, 2015 #75). Also Hajer and Dassen and van Warmerdam question the reliability of ICT claims in improving the city. (Hajer & Dassen, 2014; Warmerdam, 2015) They are critical towards the Smart City concept and their 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).

The lack of evidence

The previously described view of Hajer is supported by other researchers, like Baccarne, Mechant en Schuurman, who state: "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). In the case there is evidence of the value 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 et al., 2014)

The European study "Mapping Smart Cities in the EU", showed that evaluation 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 (of can be inferred), the data necessary to assess performance are not always collected, made available, or provided at the necessary levels of quality and coverage". (Dameri & Rosenthal-Sabroux, 2014). It has shown difficult measuring added value created by smart city implementation. According to Dameri & Rosenthal-Sabroux the measurement of the results is strongly related to the will to invest in Smart City initiatives. "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, 2014).

Furthermore assessment and benchmarking are also limited by the maturity of smart city projects. 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)

Dameri and Rosenthal-Sabroux confirm this lack of evidence "to date, the assumption of all the reviewed smart city studies and implementation reports is that the smart city is a good thing, but strangely, these provide no empirical evidence to support the claims that it helps to improve the quality of life of its citizens [...] These studies neglect to study the outcome and impact of the technology on the everyday life of the smart city's people." (Dameri & Rosenthal-Sabroux, 2014) They continue saying "perhaps it is not severe when smart city is a pioneering project, but it becomes a real obstacle in obtaining success when the smart city project wants to deliver sustainable returns to large public and private investments" (Dameri & Rosenthal-Sabroux, 2014). Hajer en Dassen also argue "Smart Cities should be judged in terms of their capacity to really add to the transition towards a healthy, safe and ultimately liveable urban future that is embedded in ecological sustainability and regional bio-economies". (Hajer, 2014 #83)

Unplanned risk factors

Beijer addresses the risk of Smart City as a panacea. "Smart cities is the answer, but what was by the way the real problem?" Smart City initiatives face the challenge of evolving from demonstrators towards real sustainable value. Smart Cities often have a technological deterministic, project-based approach, which forecloses a sustainable and growing future for the project outcomes (Baccarne et al., 2014).

"This bias in strategic interest may lead to ignoring alternative avenues of promising urban development; Among these possible development patterns, policy makers would better consider those that depend not only on a business-led model. As a globalized business model is based on capital mobility, following a business-oriented model may result in a losing long term strategy: "The 'spatial fix' inevitably means that mobile capital can often 'write its own deals' to come to town, only to move on when it receives a better deal elsewhere. This is no less true for the smart city than it was for the industrial, manufacturing city" (Caragliu, 2011 #2).

Triple helix model

"This particular alliance is stipulated to form a new kind of governance blueprint for steering 'smart' urban development, emphasizing reflexive arrangements to generate and exploit intellectual capital. Yet, whether such elitist and corporatist coalitions do reflect the demanded "cultural reconstruction at the bottom" (ibid. 57) certainly depends on where that 'bottom' line is drawn. In practice, they are unlikely to be less biased by the respective motives and resources of the parties involved than the 'entrepreneurial city' or 'urban growth coalitions' criticized (cf. Hall & Hubbard 1996; Harding 1991). Hence, if informed by the triple-helix model, urban planning and policy making runs the risk of reifying the kind of neo-liberal distortions it (hopefully) wants to avoid."(Wolfram, 2012 #53)

3.2.3. The concept of Smart City
In the ICT sector we've seen a shift from the focus on automation, via information to the use of business intelligence. The attention has shifted from low level focus on isolated automation, via integrated systems supported by network facilities to large evolving networks of more or less

intelligent systems which are interconnected. Business intelligence is already for a decade a central issue in all major companies and institutions and faces the challenge to create knowledge and insights from the manipulation of all available (BIG) data. Business Intelligence competence centers came into existence and play an important role by supporting the development of new policies.

In city management and urban development the influence of these ICT developments are also visible. We've seen 'digital cities' after the breakthrough of the internet and 'Sim city' as a first virtual platform. As a next step, we've seen the use of the terms 'digital city', 'intelligent city' and 'Smart city' as labels to express that city management and development is based on the use of all relevant knowledge and data in the different areas that are involved. The concept of 'being smart' has different interpretations, as we will see in the literature on Smart Cities.

"The concept of "Smart City" is notoriously liquid, scarcely formalized and, in some degree, subject to different ideological interpretations (e.g. Hollands 2008; Deakin and Al Waer 2011; Caragliu et al. 2001). However, elements like data, information and communication technologies and urban governance are almost ubiquitous in discussions about Smart Cities." (Caragliu, 2011 #2)

The concept: From Smart Growth Movement to Smart City

The origin of the concept of Smart Cities can be traced back to at least the Smart Growth Movement of the late 1990s. According to Höjer and Wangel, Gabrys find the roots for the concept earlier, namely from what they call the "cybernetically planned cities" of the 1960s, in proposals for networked or computable cities in urban development plans from the 1980s onwards (Höjer & Wangel). Harrison and Donnelly note the term Smart City has been used by global technology firms, particularly since 2005 for "the application of complex information systems to integrate the operation of urban infrastructure and services such as buildings, transportation, electrical and water distribution, and public safety" (Harrison & Donnelly, 2011).

According to Lee and Hancock (2012) "The smart city concept originates from various perspectives, including those of the 'information city', 'intelligent city, 'digital city' and (in a similar term to 'smart city' itself) 'ubiquitous city'". These different 'brands' of the city concept have some characteristics in common, as well as individual elements, while the definitions have a different scope and place different emphases. The terms 'smart' and 'intelligent' are used interchangeably throughout the literature (Hollands, 2008, Pardo et al., 2012 and). Originated from these various perspectives, the smart city concept has incrementally evolved into an idea of an ICT-centered or open city (Hollands, 2008).

"These works generally define a smart city as being '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, Del Bo, & Nijkamp, 2011; J.-H. Lee & M. G. Hancock, 2012).

As a means to enhance the life quality of citizen, the smart city concept, has been gaining increasing importance in the agendas of policy makers, urban planner, etc.. However, a shared definition of Smart City is not available and it is hard to identify common global trends (Neirotti et al., 2014).The table XX with most cited definitions for a smart city shows a high life quality people/citizen focus:

"…Self decisive, independent and aware citizens…", "Transfer life in a fundamental way rather than incremental", "high quality of life", "significantly enhance the living experience", "maximizing services to its citizens", "reduce environmental impact and to offer citizens better lives", and "create benefits for citizens in terms of well-being, inclusion and participation, environmental quality, intelligent development". This shows citizens are a central aspect in Smart City development.

Definition	Reference
"A Smart City is a city well performing built on the 'smart' combination of endowments and activities of self-decisive, independent and aware citizens"	Giffinger [37]
"A smart community is a community that has made a conscious effort to use *information technology* to transform life and work within its region in significant and fundamental rather than incremental ways"	California Institute [42]
"A city to be smart when investments in human and social capital and traditional (transport) and modern (*ICT*) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance"	Caragliu et al. [1]
"Smart city is defined by IBM as the use of *information and communication technology* to sense, analyze and integrate the key information of core systems in running cities"	IBM [6]
"Smart City is the product of *Digital City* combined with the *Internet of Things*"	Su et al. [8]
"Concept of a Smart City where citizens, objects, utilities, etc., connect in a seamless manner using *ubiquitous technologies*, so as to significantly enhance the living experience in 21st century urban environments"	Northstream [47]
"A city that monitors and integrates conditions of all of its critical infrastructures, including roads, bridges, tunnels, rails, subways, airports, seaports, *communications*, water, power, even major buildings, can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens"	Hall [36]
"Smart City is a city in which it can combine *technologies* as diverse as water recycling, advanced energy grids and mobile communications in order to reduce environmental impact and to offer its citizens better lives"	Setis-Eu [48]
"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 well-being, 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 [7]

Tabel xx De belangrijkste definities van Smart City (bron: …………)

Many scholars have set out a concept of the smart city economy, smart mobility, a smart environment, smart people, smart living, and smart governance. (European Union, 2014 #87). Ojo researched literature for the elements of smart cities and found the following for their *nature*, *essence* and *approach*:

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)

Table XX Elements of a 'Smart City' (Ojo, 2014 #60).

According to Höjer and Wangel The word "smart" can be seen as either normative or instrumental: Höjer understands 'smart' as a feature rather than a sign of performance. The opposite of "smart" would not be "dumb", but rather "without the use of advanced information and communication technology" (Höjer & Wangel).

However, Hollands, Kitchin and Allwinkle and Cruiskshank, see 'smart' not as instrumental but as an intended outcome, which makes smart normative. Neirotti et al. remark on the importance of not being misled by the word smart: "the number of 'smart' initiatives launched by a municipality is not an indicator of city performance, but could instead result in an intermediate output that reflects the efforts made to improve the quality of life of the citizens". (Höjer & Wangel)

According to Lee and Hancock (2012) "A smart city aims to resolve various urban problems (public service unavailability or shortages, traffic, over-development, pressure on land, environmental or sanitation shortcomings and other forms of inequality) through ICT-based technology connected up as an urban infrastructure. The ultimate goal is to revitalize some of the city's structural (environmental and social) imbalances through the efficient redirection of information. Smart cities are envision as creating a better, more sustainable city, in which people's quality of life is higher, their environment more liveable and their economic prospects stronger" (J.-H. Lee & M. G. Hancock, 2012).

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 #87).

Besides scholars, some institutional agencies in the public sector have also set out their perspectives on the smart city. Amsterdam City Hall posits that the smart city specifically uses 'innovative technology and is willing to change behaviour related to energy consumption in order to tackle climate goals (Amsterdam Smart City is a universal approach for design and development of a sustainable, economically viable program that will reduce the city's carbon footprint) (Lee, 2012 #52). Also (local) government in developing countries, like South Africa, have their view on the Smart City: "A Smart City uses digital technologies to enhance performance and well-being to reduce costs and resource consumption, and to engage more effectively and actively with its citizens. Key 'smart' sectors include transport, energy, health care, water and waste." (SALGA, 2015 #123)

Consultancy firms like the Boston Consultancy Groups define the Smart City as innovative services with specific objectives to be realized by the concept: "Smart Cities possibly improve sustainability (energy efficiency, pollution, resources**),** economic viability (investment opportunities, jobs and innovation), and citizen well-being (public safety, education, healthcare, social care) using innovative services and concepts" (Rubel, 2014). Lastly, research analysis firms propose more specific smart city

criteria: Forrester suggests that a Smart City is one distinguished by 'the use of Smart Computing technologies to make the critical infrastructure components and services of a city- which include city administration, education, healthcare, public safety, real estate, transportation, and utilities-more intelligent, interconnected, and efficient. While Gartner uses an information flow approach to posit that "A smart city is based on intelligent exchanges of information that flow between its many different subsystems. This flow of information is analysed and translated into citizen and commercial services. The city will act on this information flow to make its wider ecosystem more resource-efficient and sustainable. The information exchange is based on a smart governance operating framework designed for cities sustainable' (J.-H. Lee & M. G. Hancock, 2012).

"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, 2014).

Rephrasing all these 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 live; 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').

Therefore in this thesis the very compact working definition for 'Smart City' of the EU will be used: 'A city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based partnership'.
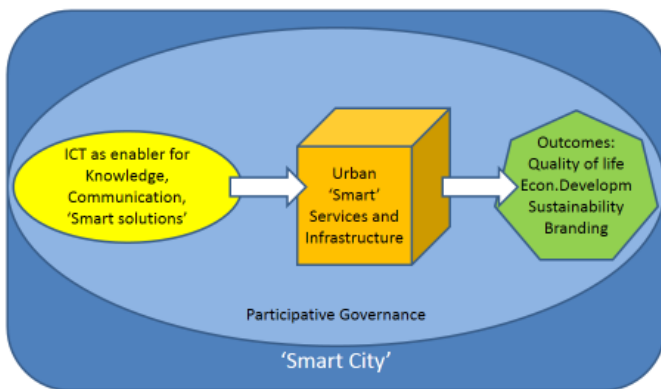
Fig XX Visualisation of the EU working definition on Smart Cities

3.2.4. Smart City Frameworks

Researchers present different types of frameworks suitable to fit their message and support their view on the Smart City concept. This paragraph gives an overview of different frameworks and their application.

As we have seen before many publication 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 (bron). To illustrate this the simple iceberg metaphore is used to express the risk of neglecting the most important factors.

Figure XX Managing smart city strategies: technology and other factors smart city implementation (Luca Mora, xxxx)'

Walravens expresses the importance of a holistic view on the Smart City concept and therefore puts the accent on three so called characteristics 'Collective', 'Contextual' and 'Collaborative' presented in the shape of an iceberg.
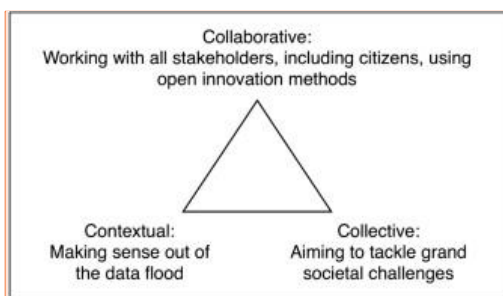
Figure XX (Walravens, 2015)

"As we have illustrated and argued above, 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. We argue that rather than trying to find the perfect definition for what the Smart City is

or should be, closely looking at who is making claims about the Smart City, with which motivations and consequences, is at least equally important. Approaching the concept using the three characteristics presented above is one way of trying to keep this holistic perspective."(Walravens, 2015)

Although the three C's point out at relevant factors to take into consideration, the model and definitions are to global to serve as a framework for developing Smart City initiatives or for analyzing case studies.

In the same line of thought is the model presented by Nam and Pardo. The model identifies three core factors of influence. Due to this mix of influencing factors, according to Nam and Pardo (2011) *"a socio-technical view on smart city is needed"* (bron).Three underlying factors of Smart City implementation are presented to countervail the pre-dominant focus on technology in the past:: institutional, human, and technology factors.
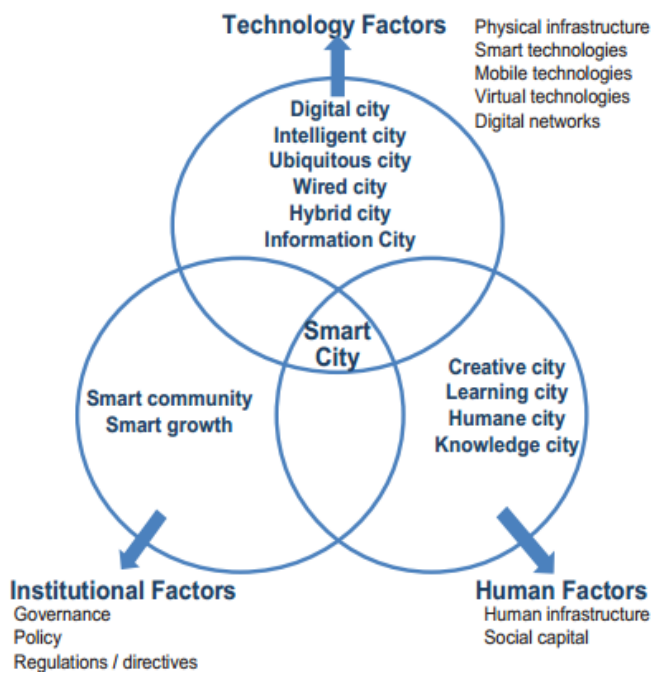
Figure XX Fundamental components of Smart City (bron)

These three components are influencing a limited number of Smart City characteristics, which can be seen as objectives for the Smart City initiative but at the same time as already (partly) developed strength or 'smartness in certain areas'.
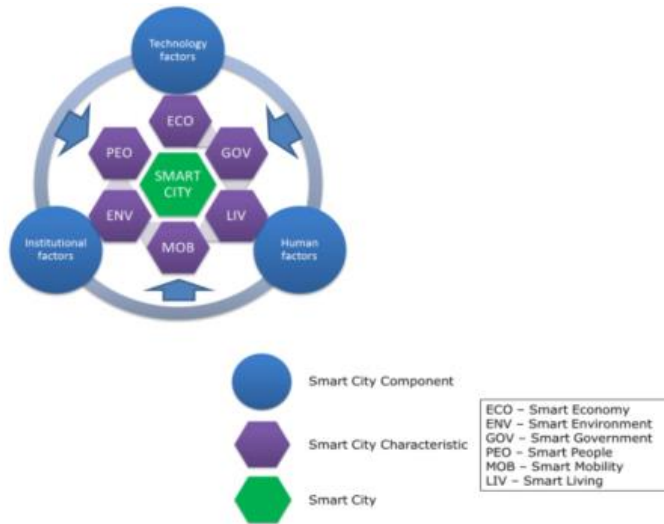
Fig XX The relationship between components and characteristics of Smart City (bron….)

XXX present a more complex framework to define a Smart City initiative. Central in the 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.
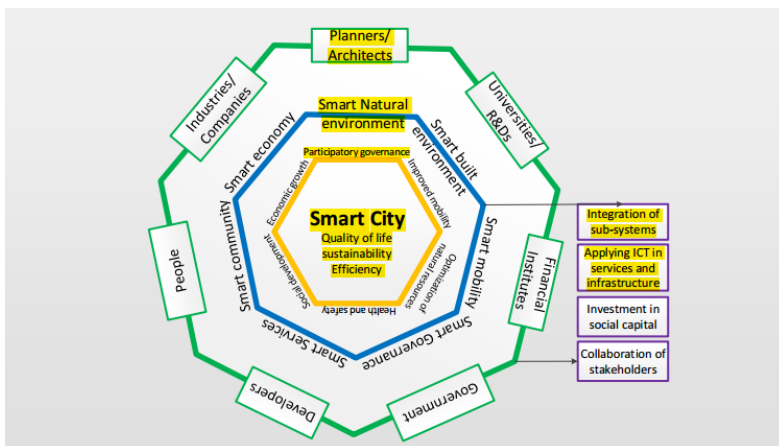
Figure XX Conceptual framework to define Smart City (bron XX)

The framework presents a more detailed insight in relevant factors that influence the smart city initiative. Each factor can probably be seen alternating as a possible barrier or as a succesfactor. The framework could be used to tackle research issues and to address practical development of specific initiatives.

An alternative framework with a comparable level of determination is presented by Hafedh Chourabi et.al. in their paper "Understanding Smart Cities: An Integrative Framework". (Hafedh Chourabi et.al 2012). They identify eight critical 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, Organisation and Policy. This has a high resemblance but is not fully identical to the three-circle model by Nam and Pardo (2011). The second level identifies five major factors of influence on the first level factors. All factors can by itself be influenced by the for a specific Smart City initiative determined objectives. The economy for example can be seen as a factor of influence in positive or negative way, but strengthening the economy by itself can also be an element of the chosen objectives.

Of the presented frameworks this framework has the best integration of all relevant factors as we have seen in the previously described literature. The number of identified factors of influence, and the added hierarchy make this framework better suited for the objectives of this thesis. At a first glance there will be a better fit between the distinguished factors and the description of barriers and success factors found in the research literature.
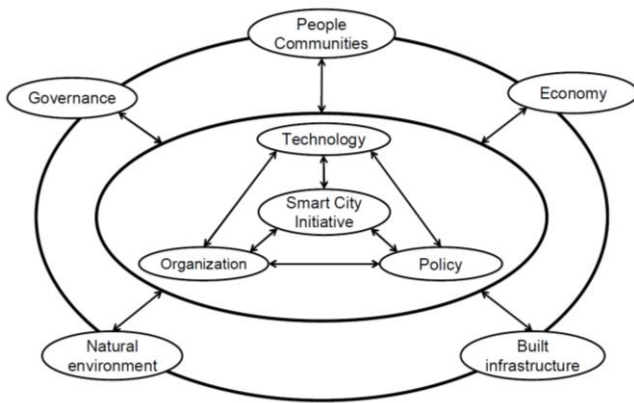
Figure XX Understanding Smart Cities: An Integrative Framework (Hafedh Chourabi et.al 2012)

Because this framework will be used to design the basic form of the checklist to be used in analyzing the cases, the eight influencing factors will be described here by summarizing the explanation from the original paper. For readability reasons ,and because most of the issues are already addressed in the literature review, only the main source reference is included.

(1) management and organization

38

Only a few studies in the academic literature on smart city initiatives address issues related to managerial and organizational factors. Other sources are found in the area of e-Government research. For instance, Gil-Garcia and Pardo [Gil-García, J. R., & Pardo, T. A. (2005). E-government success factors: Mapping practical tools to theoretical foundations. Government Information Quarterly, 22(2),187-216.] suggested a list of success factors and challenges for egovernment initiatives. Smart city initiatives might differ from more general egovernment initiatives in the context and in some of the characteristics of specific projects, but there is much in common between those two types of initiatives because most smart city initiatives are also driven by governments and leveraged by the intensive use of ICTs to better serve citizens.

(2) technology

ICTs are key drivers of smart city initiatives.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. Despite proclaimed advantages and benefits of ICTs use in cities, their impact is still unclear. Indeed, they can improve the quality of life for citizens, but they can also increase inequalities and promote a digital divide. Thus, 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. Ebrahim and Irani [Ebrahim, Z., & Irani, Z. (2005). E-government adoption: Architecture and barriers. Business Process Management Journal, 11(5), 589-611.] have outlined some of the challenges of using technologies in smart cities.

(3) governance

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. Several cities have benefited from the emergence of ICTs that improve their governance. This ICT-based governance is known as smart governance. It widely represents a collection of technologies, people, policies, practices, resources, social norms and information that interact to support city governing activities.

(4) policy

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. Gil-García and Pardo's study on egovernment success factors identified legal, regulatory, institutional and environmental challenges of egovernment initiatives. Smart city initiatives facesimilar challenges which influence the policy context. Government organizations are created and operated by virtue of a specific formal rule or group of rules. In making any kind of decision in IT projects, public managers need to take into account a large number of restrictive laws and regulations. There are also challenges related to a more general institutional framework and the policy environment, in which government

organizations operate [13]. In this context, institutions are not only made up of laws and regulations, but also norms, actions, or behaviors that people accept as good or take for granted.

(5) people and communities

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.

If they are key players they may have the opportunity to engage with the initiative to the extent that they can influence the effort to be a success or a failure. Table 5 lists the factors related to smart cities and people and communities as found in the literature. It is critical also not to refer to members of the city not only as individuals, but also as communities and groups and their respective wants and needs within cities. People and communities is a component that requires smart cities initiatives to be sensitive in balancing the needs of various communities.

(6) the economy

Giffinger *et al*. [Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanović, N., & Meijers, E. (2007). Smart Cities: Ranking of European Medium-Sized Cities. Vienna, Austria: Centre of Regional Science (SRF), Vienna University of Technology.] suggest a smart city framework consisting of six main components (smart economy, smart people, smart governance, smart mobility, smart environment, and smart living). Their operational definition of a smart economy includes factors all around economic competitiveness .

(7) built infrastructure

ICT infrastructure includes wireless infrastructure (fiber optic channels, Wi-Fi networks, wireless hotspots, kiosks) 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.

(8) the natural environment

Core to the concept of a smart city is the use of technology to increase sustainability and to better manage natural resources]. Of particular interest is the protection of natural resources and the related infrastructure such as waterways and sewers and green spaces such as parks.

3.3. Implementation process in Europe

- How is this related to 'usual' urban planning?
- What Smart City implementation models are used?

Initiative fase:

- Who comes up with a vision for the smart city? (bottom up/ top down/ mix) EC
- How to build momentum? (SIP) Political/citizen support

- Selection procedures: What are the selection procedures for smart city initiatives? two-stage procedure will be adopted for proposals. In the first stage, consortia are invited to submit pre-proposals. After the submission of the pre-proposals, approximately 50 pre-proposals will be selected. Successful consortia will then be invited to elaborate full proposals. The deadline for pre-proposals will be at the end of March (Bron)
- What are selection criteria?
- What were the selection criteria in TRANSFORM?

Planning Project start up (partnerships)

- What happens at project start up?
- How do partners get involved in the project?
- What are criteria for collaborating/participating in a smart city development?
- Cost/Time framework
- What are the Deliverables?
- How are deliverables defined?
- Who defines deliverables? (client/EC)

Execution/Implementation

- How is the final goal defined? Continuing coordination. No final goal?
- How to implement a transformation agenda?
- Which social, institutional, and economic(e.a.?) conditions have to be met to successfully implement new technologies and ensure robustness and reliability?
- Which methods and technologies have to be developed for influencing urban lifestyles and developing motivators for behavioural changes?

Funding programs and phases

European Funding: The Seventh Framework Programme for Research and Technological Development- i.e. the main engine for research funding in EU countries, introduces smart cities in Line 5, Energy Policy. The Framework Programme provides financial support to facilitate the implementation of a Strategic Energy Technology plan (SET-Plan) which provides several funding schemes related to an 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). The case of TRANSFORM is funded through this Programme. Other initiatives are 'the Smart Cities and Communities European Innovation Partnership, launched in 2012 (Vanolo, 2013).

> **Commented [N13]:** http://jpi-urbaneurope.eu/new-joint-call-for-proposals-era-net-cofund-smart-cities-and-communities/
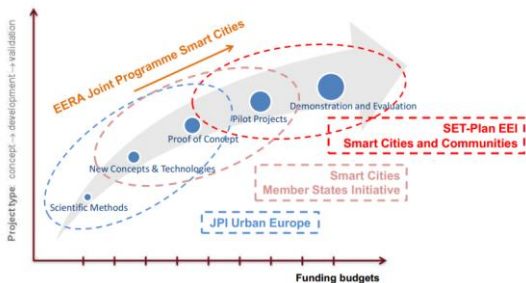
Fig. XX. European RDI Funding in the Urban Field *(Bron Plaatje 2012)* .

The above image shows the current phase of Smart Cities and Communities is focusing on Pilot Projects and Demonstration and Evaluation (in the development and validation phase). More detailed approach to European Smart City development is shown in the figure below. It shows the planning stages of Smart City development from the end of 2012 until the end of 2018.

Fig. Smart City: Most adopted funding mechanisms for smart city projects, 2012 (based on 15 smart city projects) (Vidyasekar, 2013)

3.3.1. Stakeholders

"Smart cities have gained momentum as a conceptual model which embodies a fresh wave of techo-optimism and emphasizes the positive effects of ICT and other innovative technologies in a city, often in combination with multidisciplinary collaborative partnerships." (source).

Partnership for smart city programs

Smart City programs are complex and involve a wide range of partners and stakeholders playing different roles. The nature of partners involved in smart city programs include: academia (university and research centers), state-owned enterprises, real-estate firms (e.g. Gale International), architectural practice firms, investment firms (e.g. TECOM investment), engineering construction firms, technology firms (e.g. CISCO, IBM, Microsoft, Hewlett Packard), international consulting firms (Accenture, Mott MacDonald), government departments and agencies, other governments (e.g. Singapore). While some smart city programs are driven by private sector (e.g. Malta and PlanIT

Bron (Ojo, 2014 #60)

Below in the table stakeholder coordination an overview of different actors and their roles, by the European Innovation Partnership on Smart Cities and Communities:

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

Table: XX Smart City Stakeholders and their roles(Sherpa Group, 2013 #50)

3.3.2. Different approaches

"The Smart City has been operationalized in many diverse ways, which can differ dramatically based on the perspective of the stakeholder describing the concept. Two of those extreme approaches and a final one that aims to meet them in the middle: The top-down Smart City, the bottom-up Smart City, and the Smart City as a local innovation platform" (Walravens, 2015). These relate to policy framework conditions for system innovation, and the three different policy paradigms presented in chapter 3.1.

Various economic, urban, demographic, and geographical variables have a role in influencing the **planning approach** to create a smarter city. Studies show that evolution patterns of a Smart City depend highly on its local context factors. In particular economic development and structural urban variables are likely to influence a city's digital path, the geographical location to affect the SC strategy, and density of population, associated with congestion problems, might be an important component to to determine the routes of SC implementation (Neirotti et al., 2014).

Somewhat more specifically, according to Wolfram the main strategies for implementing the concept of the Smart City is either by shaping 'smart city' alliances (triple-helix model), or by designing service incubators (open innovation ecosystems) (Wolfram, 2012 #53).

"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 #113).-> SC 1.0-3.0:

SMART CITIES 1.0

Smart Cities 1.0 zijn technologiegedreven. Tech-bedrijven moedigen steden aan om hun oplossingen toe te passen. Stadsbesturen laten zich graag verleiden door futuristische visioenen voor de stad, maar zijn niet in staat om de gevolgen te begrijpen van intergratie van technologie en hoe dit het leven in de stad beïnvloeden.

SMART CITIES 2.0

Smart Cities 2.0 worden gestuurd door progressieve bestuurders. Niet technologiebedrijven, maar steden nemen de leiding. Zij zien de technologische ontwikkelingen als mogelijkheden voor het verbeteren van de kwaliteit van leven in de stad. De meest vooruitstrevende smart cities, volgens de ranglijstjes, zijn veelal **Smart City 2.0**-steden, zoals Barcelona en Rio.

SMART CITIES 3.0

Smart Cities 3.0 zijn een relatief nieuw verschijnsel. Hierbij is co-creatie met burgers het model voor de ontwikkeling van een nieuwe generatie steden. In Wenen, een stad die het als **Smart City 2.0** ook goed doet, worden nu burgers betrokken als investeerders in een lokale duurzame energievoorziening, of bij plannen voor betaalbare huisvesting en emancipatie. Deze nieuwe vorm van *smart cities* gaat ook over onderwerpen als gelijkheid en sociale inclusie.
- See more at: http://www.clicknl.nl/design/2015/11/27/smart-cities-3-0-de-transformatie/#sthash.g0k6idOH.dpuf

& https://ruimtevolk.nl/

The top-down Smart City:

- Top down (ex. Songdo & Masdar), and singapore

♣Organic-market oriented (emergence/bottom up) vs. government top down (control) approach in diversifying smart city services

the bottom-up Smart City:

- and the Smart City as a local innovation platform: check with triple/multiple helix VS interactive Network governance (de Bruijn et al 1993)
- Bottom Up (ex. Kippen Amsterdam)

The Triple Helix model:

This model entails "A learning organisation of policy makers, academic leaders and corporate strategist" (Leydesdorff, 2010 #71). The main focus in this model is the relation between universities, industry and government at an urban and regional level, leading to knowledge production, innovation, economic growth, as well as development control in urban regions by exploiting local creativity and social capital. ICT has a crucial role in the different relations by intensifying knowledge generation, mutual learning and creating market institutions. The model can be used as an analytical or an action framework for Smart City implementation (Caragliu, 2011 #2) and can be seen as a "new kind of governance blueprint for steering 'smart' urban development". (Wolfram, 2012 #53)

To obtain funding from the EU, cities are required to form networks of partnerships with industry and research institutes (Wolfram, 2012), thus the EU stimulates the use of this model.

- Multiple Helix (Transform)

"While the triple-helix addresses the creation of an urban-regional governance framework and practices that enable **smart growth"**

Open innovation ecosystems (SULs + triple helix + citizens and civil society stakeholders, end-users, the design process loops; needs analysis; design, evaluation, oriented at overall principles openness, realism, empowerment

Open innovation ecosystems focus on the concrete identification

open innovation ecosystems **focus** on the c**oncrete identification and design of new products, services or infrastructures at the scale of real-life settings**. They draw on a variety of concepts and approaches developed in business and information system studies such as 'open innovation', 'lead-user involvement', 'crowdsourcing' or 'participatory design' (cf. von Hippel 1986; Asaro 2000; Chesbrough 2003). In addition to the interaction environment itself, such ecosystems also **encompass the required technologies and infrastructures, partners providing specific expertises, as well as a supporting organization and methodologies for iterative co-creation and learning.** They build on a partnership among businesses, government and academia, while also involving citizens and civil society stakeholders in as far as they represent certain end-user groups. Typically, the design process then runs through several loops of needs analysis, system design and evaluation, oriented at the overall principles of "openness" (include new users), "realism" (focus on real users in real-life situations) and "empowerment" (motivate and engage users) (Bergvall-Kareborn & Stahlbröst 2009)". (Wolfram, 2012 #53)

- Living Labs; Smart Urban Labs/ Living labs/ lighthouse initiatives
  - Living lab (bottom up) and innovation district (top down)

Living Labs; Smart Urban Labs/ Living labs/ lighthouse initiatives

The Living Labs and other participatory innovation models retain their value to bridge the gap between the technology push of Future Internet testbeds and the application pull of smart cities [10].(Pallot, Trousse, Senach, Schaffers, & Komninos, 2011)

The concept of "Lighthouse Initiatives" is proposed as an important new vehicle to support success in deploying smart city solutions that will enable (over-) achievement of 20/20/20 goals, across the three domains (mobility, built environment and infrastructures). Over the next 7 years the EU envisage a portfolio of at least 20 – 25 lighthouse project each with approximately 6-10 cities (and partners), which have the potential for Europe wide roll out. In the knowledge they can apply tested solutions – that will be better, faster, and cheaper to implement. (bron)

What are "smart cities and communities" or "lighthouse projects"? How do they work in practice?

The idea is that **industry tests technology in a given city/community** to show that the technology it developed works on the ground, can be implemented for **reasonable costs** and **has advantages for citizens** and the whole community. Many technologies have been tested by industry under laboratory conditions and **need to be validated under real conditions of a city.** The projects therefore bring competent industrial consortia (composed of R&D intensive industries from the three sectors) together with one or two cities to demonstrate their advantages – so that other cities may follow to implement the same technologies. (bron)

New versus Existing cities

- New cities that are smart from the start
- Existing cities that address challenges with retrofits and upgrades (TRANSFORM; Vienna, Amsterdam, Lyon, Hamburg, Copenhagen, Genoa)

Innovation

- "EU policy increasingly points towards urban ICT deployment as a key solution to resolve environmental problems and foster competitiveness. It equally underlines that this turn towards the ' smart city' is accompanied by particular approaches for implementation at the local level, contributing conceptually and resource wise to underpin the alleged synergetic coalitions to govern urban change."

The paper (angelidou) reviewed the factors which differentiate policies for the development of smart cities. Four strategic choices with a spatial reference are identified: 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) ->

From Luca: To **manage the complexity of smart city strategies, t**he 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;**

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Commented [N21]: GOEIE PLEK HIER? of naar context?

Commented [N22]: What are these initiatives and should I focus in these lighthouse projects? -> URBAN LABSurban -> YES

Commented [N23]: Verschilt overal

Commented [N24]: European innovation partnership on smart cities and communities SIP

Commented [N25]: Memo EU commission;

http://europa.eu/rapid/press-release_MEMO-12-538_en.htm

Commented [NH26]: Angelidou has made a comprehensive effort to provide a clearer view of the strategic choices with spatial reference. The different paths emerge as dual or multi-faceted, leading to a range of decisions that radically differentiate the outcome of the smart city. Different strategies have been implemented in variations through smart city projects globally. Indeed several proposed or applied smart city strategies lie somewhere in-between the extremes of the available strategic choices. However, Angelidou only addressed strategic choices with a spatial reference. In fact there is a range of strategic choices without spatial reference that need to be tackled in the smart city design process. For example, whether the strategy will be based on an open innovation or closed innovation model. Or one could address the business model and its social implications behind the smart city venture. These strategic choices have been referenced randomly throughout the smart city literature but have never actually been categorize comprehensively and documented as of yet. (Angelidou, 2014) ->

1.1.1.1.**National versus local strategies (below in red (Angelidou, 2014) #63))**
A major differentiating characteristic among smart city strategies is whether they concern an entire country or nation, or they are focused on a more local level, be it a neighborhood, municipality, city, metropolitan area or even a region.
Most applied strategies are built on the local level. **The advantages of local-level smart city strategies, as they have been recently cited in the smart city literature, include that:**
• **Innovation** has a geographical focus and **knowledge** has a geographical 'stickiness' – therefore their advancement on a local level is more effective in making cities smart (Auci and Mundula, 2012, Bria, 2012, Coe et al., 2001, Hodgkinson, 2011, Nam and Pardo, 2011a and Townsend et al., 2009).
• Becoming smart includes fostering a **competitive economy**; competition and competitiveness are clearly a matter of the urban scale, as currently local characteristics are the ones that differentiate cities among each other (Cosgrave and

Commented [N27]: as stated earlier in approach

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Commented [NH29]: Kritiek rob kitchin & van warmerdam quote; 'alleen over technologie praten werkt niet....''

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 described by Carlo Ratti and Anthony Townsend, avoiding the risks of an excessively top-down oriented view.

3.3.3. Defining Goals

The concept of the Smart City arose among others as a possible answer to the challenges of improving urban life and the natural environment. What are the main objectives to realize by a Smart City concept?

The EU, as a stimulating force in adopting the Smart City concept, 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'. (bron XX)

> The European Innovation Partnership on Smart Cities & Communities seeks to significantly accelerate the industrial-scale roll-out of smart city solutions integrating technologies from Energy, Transport and Information and Communication Technologies (ICT). This is where there is most untapped innovation potential and most environment and societal benefits to be gained. The partnership was launched in July 2012[1] and its overarching goal has hence been formulated thus:
>
> *This partnership strives at a triple bottom line gain for Europe: a significant improvement of citizens' quality of life, an increased competitiveness of Europe's industry and innovative SMEs together with a strong contribution to sustainability and the EU's 20/20/20 energy and climate targets[2]. This will be achieved through the wide-reaching roll out of integrated, scalable, sustainable Smart City solutions – specifically in areas where energy production, distribution and use; mobility and transport; and information and communication technologies are intimately linked.*

(Sherpa Group, 2013 #50)

That Smart City initiatives serve a broad spectrum of objectives is shown in the figure below taken from an overview of different Smart City initiatives. From a large (?) number of initiatives the objectives are collected to get an insight in the frequence with which they occur in Smart City projects. This research points out that Green/renewable energies, and People/mobility (transport) cover a large part of smart city initiatives.
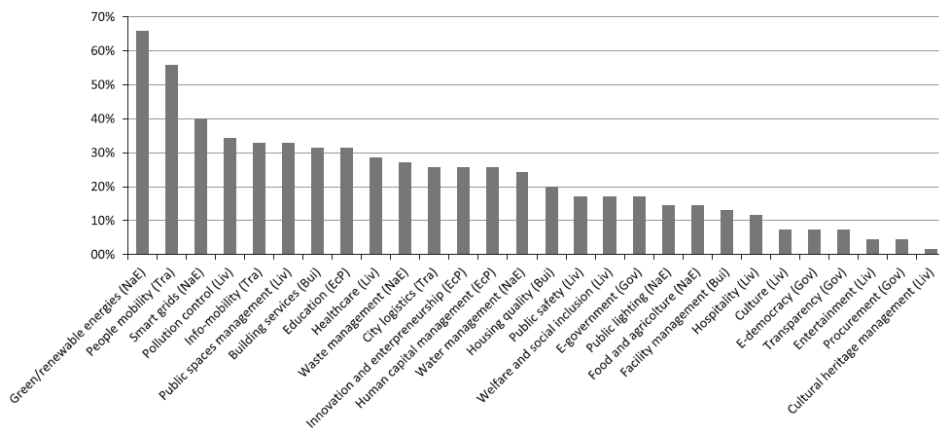
Fig XX Coverage of different Smart City initiatives

> **Commented [N31]:** check source ojo?

According to Ojo (2014), 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. Furthermore it shows energy, environment and mobility are the domains most commonly targeted. Ojo observed, across ten 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; (7) developing sustainable communities; (8) ensuring social harmony among different groups of residents; and (9) evolving city as living laboratory to foster continued improvements. (Ojo et al., 2014). This shows a high focus on soft domains of living economy and people.

> **Commented [N32]:** Source Ojo, 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		X	X		X			X			X				X
MALTA	X														
MASDA CITY			X		X						X				
PLAN IT							X	X			X				
SINGAPORE			X		X			X						X	
CURITIBA		X			X						X		X		
SONGDO				X	X						X			X	
TIANJIN				X	X					X		X			
YOKOHAMA			X												

Table XX Dimensions covered in ten Smart City Programs (Ojo et.al., 2014)

These findings for world wide strived objectives match with the situation in Europe were the EU is a dominant force in Smart City initiatives.

"The need for drastic reduction of greenhouse gas emissions in urban areas - within economically acceptable conditions – comes to the following key challenges for Smart Cities and Communities: to significantly increase the overall energy efficiency of cities, to exploit better the local resource both in terms of energy supply as well as through the demand side measures. This will imply the use of energy efficiency measures optimizing at the level of districts, the use of renewables, the sustainability of urban transport and the better life conditions: lower energy bills, swifter transport, job creation and as a consequence a higher degree of resilience to climate impacts." (European Commission, 2013a).

The scope and style of smart city initiatives vary widely, they all aim to be smarter and greener in order to improve citizen's quality of life and economic opportunities (Paroutis, Bennett, & Heracleous). A recent GSMA report suggests that transportation accounts for most smart city projects. The second sectors are environment/energy (smart metering, electric vehicles and charging infrastructure and renewable projects) and municipal infrastructure services (GSMA, 2013). Some research points out that 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. "Some cities have set out service or application areas specifically to attract entrepreneurs and to stimulate the development of new economic clusters." (J.-H. Lee & M. Hancock, 2012).

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

Furthermore they suggest that "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). Continuing to claim that most initiatives aim to contribute towards smart, sustainable and inclusive growth. Environmental issues and green solutions appear to be the principle concern; nearly 50% of sampled initiatives address environmental problems through improved energy efficiency in buildings or smarter city transportation options.

Neirotti et al. also classified six main domains with slightly different accents with respect to the EU-model (i.e.: natural resources and energy, transport and mobility, buildings, living, government, as well as economy and people)(Neirotti et al., 2014). Ojo et.al. however revealed eight domains: Economy, Environment, Energy, People (intellectual endowment and skills), Lifestyle (Building), Mobility (Transportation), Technology and Governance(Ojo et al., 2014) while the only real difference the technology domain added by Ojo. These domains can be divided in "hard" and "soft" domains, where the 'hard' domains mainly concern tangible 'objects' like buildings and transportation and the 'soft' domains refer to domains as 'quality of life' and 'government'. (Neirotti, De Marco, Cagliano, Mangano, & Scorrano, 2014)

According to Ojo et.al the core strategies on the domains of energy and transportation are the following:

Energy: 1) adoption of energy efficient practices particularly in building designs, 2) use of renewable energy such as biogas and wind energy by households, 3) use of smart grid technologies and deployement of energy management system at the community, 4) education of children through projects on how to save energy and 5) promotion of the use of e-vehicles and hybrids.

Transportation: 1) focusing on accessibility rather than mobility in transportation planning, 2) provision of networks for non-motorized transportation (bicycles an walking), 3) prioritization parking for fuel-efficient and low emitting vehicles in public places, 4) use of e-vehicles for public transport with charging stations provided across the city, 5) integration of land-use and public fare collection and 6) adoption of transit-oriented development in urban planning. (Ojo et al., 2014)

Specific examples of possible measurable objectives within the domains give a good insight in what as the possible results from Smart City initiatives can be expected. Accoring to Ojo (2014) the desired outcomes by stakeholders of Smart City initiatives, in the table below, are recognition as a good practice exemplars. Recognition based on benchmark rankings of smart cities are considered valuable by the ten researched smart city programs (Ojo et al., 2014).

Environment	o Aesthetic value o Recycling take-up by residents and businesses o Green space per residential unit o Recognition - ranking and designation as best practice exemplar o Adoption of organic food	Energy	o E-Vehicle adoption o Level of biogas production o Use of wind energy o Energy usage reduction o Petrol usage reduction
Transportation	o Less congestion o Less CO_2 emission o Self-sustainability o Recognition – ranking and designation as best practice exemplar	Economy	o Standard of living o GDP contribution o Unemployment rate o Investment friendly environment o Recognition – including competitiveness o Employment and job creation o Foreign Direct Investment o Startups

Fig Summary of Desired Outcomes from Smart City Programs (Ojo et al., 2014)

3.3.4. Outcomes and results

According to Dameri et. al (2014), to date, the assumption of all the reviewed smart city studies and implementer reports is that the smart city is a good thing. However, these reports provide no empirical evidence to support the claims that it helps to improve the quality of life of its citizens. These studies and reports assume that a city is smart exclusively thanks to the technology that is its core component, pointing to it as a winning card, but neglect to study the outcome and impact of the technology on the everyday life of the smart city's people, i.e. the relationship forged by the user with the technology (Dameri & Rosenthal-Sabroux, 2014).

On a more positive note; "However, some types of project have produced concrete results consistent with their initial objectives. Most of the testbed micro infrastructures have been implemented and have already begun to reduce service management costs and CO2 emissions, and are regarded as

contributing positively to their cities' economic competitiveness and are producing spillover benefits such as increased real estate value, quality of life and tourism, and the revitalization of local business life." (European Union, 2014)

But how to measure added value, while each citizen has a subjective and nuance view of the quality of life?

How to define success?

Also from 'mapping Smart Cities in the EU' Two definitions of success:

- _Successful 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
    o _Be 'smart' (there should be a significant role for ICT enablers)_
    o _Contribute effectively to achievement of EU 2020 targets_
    o _Be innovative_
    o _Offer sufficient information to assess its success_
- _Successful cities:_ having meaningful objectives (aligned with Europe 2020 and actual outcomes) covering a mix of policy targets and characteristics; having balance portfolio of initiatives; attaining maturity (on our scale); actively joining in Smart City networks.{European Union, 2014 #87}

3.3.5. Different Smart City Roadmaps

Cisco states:" A number of academic studies explore the fundamental issues of realizing Smart City visions. One recent study, "Understanding Smart Cities: Integrative Frameworks,"(Chourabi et al., 2012) states the need and the dynamics to consider in developing Smart City strategies. These reports indicate that the debate is no longer about why a Smart City initiative is good for a city or what to do, but instead about how to implement Smart City infrastructures and services, including the importance of a common language and a structured approach to implementation (Falconer & Mitchell, 2012). However, CISCO has economic interest in implementing Smart City strategies, and therefore would like to see the focus on how to implement, rather than asking the question why this initiatives actually add value.

EU:

First Phase 2013 – 2014
Creating a common basis for future development:
1. Through documentation, pooling and development of existing best practice concepts and methods
2. Supporting the sharing of results among demonstration projects
3. Fostering the standardization of smart urban transformation

Topics: simulation tools and methods, monitoring and KPI's, governance and planning processes

Second Phase 2015 – 2018
Jointly driving the process towards Smart Cities:
1. Setting up and financing RDI on SC partnerships
2. Standards and finance mechanisms for new pilots
3. Blueprint for a Europe wide roll out in transnational partnership among cities and with input from industry and research
4. Methods for excellent real time monitoring and analysis

Potential topics: developing flagship cities, engaging newcomer cities, preparing tools and methods for roll-out

| 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |

Stock-taking:
Finalized before end 2012

First building blocks:
1. Methods of evaluation and monitoring
2. Instruments of planning and governance
3. Technologies of energy production/efficiency
4. Demonstration of best practice cities/project

Development and transfer of knowledge:
1. Actively involving European cities in the development of knowledge
2. Building on the results of existing projects
3. Taking up and actively supporting potential
4. Facilitating the transfer of experience between "lighthouse" cities and ambitious "emerging cities"

Fig. XX (own ill.) European Path to smart cities (from snap shots which source?).

3.3.6. Success factors in Smart City implementation

". The ICF posits that intelligent communities "are those which have [...] come to understand the enormous challenges of the Broadband Economy, and have taken conscious steps to create an economy capable of prospering in it." (ICF 2011). Correspondingly, broadband connectivity, knowledge workforce, innovation, digital inclusion and marketing are identified as the key factors for assessing progress on this path. Emphasis is put on collaboration "among government, businesses, universities and institutions", as well as on leadership and sustainability - although the latter refers essentially to durable service provision and business models (ICF 2011)(Wolfram, 2012 #53)

In particular, the study highlights the key role of urban areas since this is where the above domains converge, as well as the need for closer cooperations between industry and (local) government for implementing measures. (The Climate Group 2012) (Wolfram, 2012 #53)

Smart concepts require in many cases new and innovative technologies and concepts. Research and development is vital but at the same time cost-intensive and risky for private companies. It is therefore necessary to use all available instruments (e.g. innovative procurement, policies, state aid, and competition law) in order to incentivise companies to invest in innovation. Especially, a clear framework for PPPs should be established and bureaucratic hurdles reduced, thus increasing a city's

5.2.1 Potential Action 1: Developing a Smart City Strategy and Implementation plan

Context

Cities often focus on stand-alone smart cities projects. But experience shows that a strategic vision, backed by all stakeholders and supported by long-term policies and respective regulatory frameworks, is the basis for an effective and efficient change process. A detailed city- or even nation-wide implementation plan including intelligent and innovative funding models is key for a coordinated approach. Alignment, both horizontally (between different policy fields) and vertically (between regional, national, EU actors), using a participatory approach, guarantees a holistic view and commitment to the smart-city process. Cities need to involve a broad range of policy fields and stakeholders and formulate an integrated smart city strategy. With clearly defined targets in mind (e.g. establishment of energy- and carbon-neutral districts), cities, regional/national authorities, and EU lawmakers need to work together, asking themselves: what measures are required, what future research is needed, what political, administrative, technological and financial hurdles have to be eliminated, what regulations have to be put in place, or changed, in order to reach the goal? City authorities need to create frameworks for the deployment of integrated technologies, which allow for public-private partnerships between cities and industry, and the creation of innovative and stable business cases.

Success factors	There are no objective criteria that can be used to ensure or measure the success of an urban area development project. Choices have to be made on all these points before judgements can be made about success or failure (Hobma, 2010). Certain success factors can be 'driven' by powerful stakeholders in the urban area development project, while others cannot (Hobma, 2011).
Lessons	Under what circumstances and to what extent can a programme that is effective in one place transfer to another (Rose, 1991). In general, it refers to the fact that planners in different countries generally face the same problems, and one can learn from practices abroad (Heurkens, 2012).
Sustainable developments	Those improvements delivered on a physical (or social or economic) level, which have long-term duration. This includes intended or un-intended developments that are of benefit for the city or its citizens.

Success factors across Smart City cases researched by Ojo et al. shows that: 1) Political leadership and 2) the adoption of an integrated, holistic, and whole of government approach to smart city development stand out as critical factors. Other identified factors include – 3) creation of dedicated research and think-thank institution to support program, 4) non-compromise on core values, 5) ensuring creativity but affordability of solutions, 6) comprehensive master-planning, 7) regulations and standards for stakeholders, and 8) building stakeholder collaboration and industry partnerships (Ojo et al., 2014). These 8 mentioned success factors, vary widely, and are very general.

Commented [NH37]: Reflectie waarop? Bruikbaarheid?

More specific success factors are also mentioned in literature. Rodrigueze Bolivar says "To become smarter, a city needs to transform government in significant ways to engage with the full network of critical actors. ITs can enable these transformations, but only when other elements are considered, and important **organizational and policy changes are made**. IT needs to be implemented jointly with changes in government processes, structures, and regulations for a smart city initiative to be successful and have broad social impacts" (Rodriguez-Bolivar, 2015 #106).

"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 #129).

"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, 2012 #89).

Analysis from Mapping Smart Cities in the EU, shows that: "Successful projects (i.e. which meet their objectives and contribute to the attainment of Europe 2020 goals) are those with:

- Clear objectives, goals, targets, and baseline measurement systems in place from outset;
- Strong governance;
- A sound business case; for an economic assessment of Smart City solutions, it is important to take into account the local context. Comprehensive cost-benefit analyses on the solution level are currently not available. Nevertheless the feasibility of the analysed solutions is possible in the short to middle term and the net value is positive;
- A benefit realization framework>?? (which is???)
- Having a strong local government partner as a key strategic player and co-founder.

Successful projects also tend to:
- Be embedded in a comprehensive city vision;
- Public-private partnerships (PPPs) are highly important, especially where the private partners bring in developer expertise, finance and technology capabilities;
- Involvement of citizens and other end-users (representatives and local businesses)." (European Union, 2014 #87).

- "Smart City needs a fertile environment guided by a clear vision, the participation of relevant actors (people), and the efficient and effective, organisation of its processes."
- "Setting high level principles at city and solution level is important for success because this ensures that measurable targets can be set"
- "Securing the participation of citizens and relevant stakeholders in the Smart City is another success factor".
- "If the initiative is launched by the mayor of the city and leading representatives, as well as by CEOs of local enterprises, this increases the credibility of the initiative".
- "Successful process management requires effective project management with a one-stop-shop for the provision of information, guidance, practical suport and assistance."
- "Evaluation of programmes 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."

- "Another success factor is 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. Following, open standards count towards the success factor" (European Union, 2014 #87).

ZIE EXCEL 'Successfactors Literature' en Essays en gebiedsontwikkeling.nu ADD

Success factors open innovation ecosystems:

A recent report from the IBM Center for the Business of Government highlights how organizations can combine five elements of technology ecosystems to increase value for their innovation processes:

- *Defining clear goals and expectations for open innovation and managing the flow of resources across agencies*
- *Seeking and encouraging diversity among participants*
- *Creating effective positioning within a network and being active team players*
- *Establishing and observing effective governance and leadership while encouraging openness and transparency*
- *Minimizing friction and bureaucracy while continuously monitoring external conditions (bron)*

Commented [NH40]: http://www.modernhealthcare.com/article/20151204/NEWS/151209942/commentary-using-open-innovation-and-cognitive-computing-to-solve?utm_content=bufferad582&utm_content=bufferca2de&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer

It has beenimportant 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 otherinvolvement in developing a smart city. (Lee, 2012 #52)

Table 2. The Framework of Smart City Innovation

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 • Level of interactions		• Consideration of context

3.3.7. Barriers in Smart City implementation

The smart city discourse is opening up new horizons in the problematic relationship between the public and private sectors in the management of cities.

A number of challenges are identified for Smart City initiatives implementation. These challenges include: 1) obtaining buy-in from stakeholders, particularly the privat sector; 2) inclusion of poor areas in the program; 3) sustaining stakeholders' interests and participations; 4) resourcing and funding the program considering high development cost; and 5) obtaining residents participation.(Ojo et al., 2014)

Barrier: Identifying the right stakeholders is challenging because of the breadth of different constituencies that may be interested". (European Union, 2014 #87)

"Technical and procedural limitations have combined to prevent cities from truly harnessing the full power of ICT to collaborate, create and deliver genuinely 'smarter' citizens- and business-centered services. The current economic crisis combined with growing citizen expectations is placing an increasing pressure on cities to overcome existing barriers" (Paskaleva, 2011 #130)

(Lee, 2012 #52) check p. 85 en anderen bvv: me. One important challenge for smart cities (as itis, for instance, in an emerging industry like renewable energy) isto combine the innovativeness of different parties through theformation and management of partnerships and alliances (publicand private partnerships)[10,18]

From the business side, repacking ICT solutions in a "smart city" framework holds the potential of launching a kind of wholesale concept and to direct this to the public sector of city administrators. Most of the ICT included in Smart city concepts already exist. The novelty is thus not so much the individual technologies, products or services but the interconnection and the synchronization of these and the systems they include, so that they work in concerted action (Höjer & Wangel).

3.3.8. Causes of barriers experienced in smart city project implementation

Despite growing interest and sense of urgency, the implementation of smart city initiatives, is hard to realize. Actors still have major difficulties in implementing smart city initiatives due to external factors, the complexity of cities, stakeholder and governance related issues. Knowledge on how to steer on development as to secure an effective process of value creation is needed (J.-H. Lee & M. G. Hancock, 2012).

- Difficulties in governance

Why focus mainly on the governance aspects of Smart City implementation/planning? A conclusion at the Verge City Summit, where sustainability leaders from around the world came together was that "To successfully meet ambitious sustainability and resiliency goals, cities and companies will need to form strategic public-private partnerships, backed by citizen support" (bron). The need for these partnerships is stimulated by EU Smart City funding, since Smart City projects require to form networks and partnerships with industry, research and citizens in order to be able to benefit from the European funding (Wolfram, 2012).

From different industry perspectives it shows "There is a direct need for good partnerships. Only partnerships grounded in collaboration can generate the needed innovations. We need to reevaluate what the term 'partnership' means." (source). Furthermore "It is important to emphasize that stakeholder roles must be established prior to developing any Smart City plan because these players have the most influence on city initiatives and operations."(Bron) And "Smart city stakeholders have different interests and interact with the city in different ways, each stakeholder needs to recognize the existence of standpoints that might differ from their own." (source)

"The smart city is not simply the vision of a future city; **networked urbanism** already exists in practice in a multitude of forms in cities around the world. As such, we are already living with their promise and their perils as smart city technologies and initiatives are deployed. How they are unfolding in different places, **however, varies in line with local politics and social and economic contexts**. In all cases, there is little doubt amongst many key stakeholders that networked urbanism holds much promise for tackling urban issues, improving city services and operational governance, fostering economic development and increasing citizen participation. However, the realities of implementation are messier and more complex than the marketing hype of corporations or city managers portrays and there are a number of social, political, ethical and legal concerns with respect to the kind of society smart city initiatives seek to create. As such, whilst networked urbanism has benefits, it also poses challenges and risks that are often little explored or legislated for ahead of

implementation. Indeed, the pace of development and rollout of smart city technologies is proceeding well ahead of wider reflection, critique and regulation. Consequently, there is an urgent need to interrogate the vision and implementation of smart cities in different locales, and to re-imagine their ethos and ethics to ensure we favor the positives over the negatives."(Kitchin, 2015)

In a Smart City "Technical integration requires organizational integration – and that will require a massive cultural shift for some parts of local government" (bron). Therefore focus mainly on governance?

Commented [NH50]: http://policybytes.org.uk/the-policy-challenges-for-building-smart-cities-in-the-uk/

- The potential benefits of ICT and digital infrastructure are vast. City governments must first understand how and what they are investing in – what exactly, can smart technologies do for their city? Many cities know there is an opportunity around smart but are not sure what it means for them." -> dit is echter tegenstrijdig met innovatieve aspect waar het risico juist is dat uitkomsten nog onduidelijk zijn…..(ARUP et al., 2014) (Arup, 2013)

- Difficulties in coordinating Smart City Projects, dealing with insecurities

Dameri and Rosenthal-Sabroux state "To date, studies that explore how to define and measure smart city performance are few and far between, mostly because not only is it difficult to measure a phenomenon that is still embryonic and, hence fuzzy, but also because of the subjective and nuanced view that each citizen has of the quality of life" (Dameri & Rosenthal-Sabroux, 2014). Dameri & Rosenthal-Sabroux (2014) conclude "the large smart city scope negatively impacts on all the life cycle and governance framework of this urban strategy… with very heterogeneous aims, technologies, stakeholders, it is difficult to support investment decisions, funding of projects, priorities demonstration and expenses justification, outputs measurement and performance evaluation."

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"How to strategize smart cities: Revealing the SMART model", is stated "scholars need to acknowledge further strategies of city transformation beyond top-down and bottom-up models. Nowadays, cities engage in increasingly open and user-driven ecosystems that fall between technology push and application pull" (Schaffers et al., 2012). This observations calls for new governance approaches, which is substantiated by Letaifa saying "analysis regarding decentralization and coordination of Smart Cities requires new Smart City frameworks"(Letaifa, 2015).

Questions about the critical role of networking, innovation and the creativity of partnerships have previously remained unanswered. According to Deakin & Al Waer "Many believe partnerships and networking are resources that can easily be assembled and which can be left to develop as virtuous circles of mutually reinforcing actions. This underestimates the extent of the embedded intelligence, networks, innovation and creativity needed to build partnerships and be successful in meeting their capacity-building and knowledge-transfer requirements" (Deakin & Al Waer, 2011). Dameri and Rosenthal-Sabroux state "To date, the assumption of all the reviewed smart city studies and implementer reports is that the smart city is a good thing, but strangely, these provide no empirical evidence to support the claims that it helps to improve the quality of life of its citizens. These studies neglect to study the outcome and impact of the technology on the everyday life of the smart city's people" (Dameri & Rosenthal-Sabroux, 2014). This shows **the actual added value of smart city implementation is unclear**, which is supported by other researchers: "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).

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Commented [N55]: Most central issue now:
- Unclear benefits/outcome/output
- gap policy-implementation
- complex process
- hard to evolve/up scaling
-
-

people focus in research?

What i

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58

As we have illustrated and argued 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. We argue that rather than trying to find the perfect definition for what the Smart City is or should be, closely looking at who is making claims about the Smart City, with which motivations and consequences, is at least equally important. Approaching the concept using the three characteristics presented above is one way of trying to keep this holistic perspective.(Walravens, 2015)

1. Institutional factors

As **Error! Reference source not found.** shows, institutional factors relate to governance (collaboration, partnership, citizen engagement and participation), policy (vision, strategy and ambition??) and regulations/directives (rules, legislation, zoning plan, etc). According to Nam and Pardo (2011*) "This category comprises a variety of institutional factors like supportive policies, the role of government, the relationship between government agencies and non-government parties, and their governance."* Furthermore, they state this category should also include integrated and transparent governance, strategic and promotional activities, networking and partnerships" (bron). This relates to the Smart City Roundtable session "from strategies to implementation", where P.J. Verbon, Sr. Strategic Advisor Spatial Development stated that *"smart sustainable growth will only flourish if **stakeholders** really want to make it happen and act **flexible with legislation, innovation, funding and priorities**. New dilemma's emerge for spatial development infrastructure planning and legislation. Future EU-policy needs to be ready for these symbioses."* (Verbon, 2013).

So what are issues related to institutional factors in smart city implementation?

The failure in managing high risks leads to total failure in technology-driven public sector projects. 85 percent of IT projects fail because of the challenges by non-technical aspects of innovation in large part—policy, organization, and management-related risks [41,104]. Common reasons include 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 [15,19,25,29,48,55]. bron

Partnerships: The smart city discourse is opening up new horizons in the problematic relationship between the public and private sectors in the management of cities (bron). According to EU, there is a misunderstanding how each sector works within the context of city development and operations. The European Commission states, it is difficult to craft successful public-private partnerships (PPs), which are seen by stakeholders as the answer to implementing smart city solutions, because they do not "speak the same language." (source?)). Furthermore they state, the private sector does not comprehend how its technologies fit into this complex environment of the city, because it tends to view cities as just physical structures upon which to add ICT. Another complexity in smart city partnerships is understanding which city stakeholder, or combination of stakeholders, is responsible for which solution (source?). On top of this, it shows problematic that each organization has different needs and interests, and ownership of city infrastructure is often in the hands of private parties. Finally van Warmerdam (2015) states the reasons for collaboration might be based on a good relationship, rather than high potential of successful results (based on city analysis) (bron).

*Furthermore, the private and public sectors do not understand how each sector works within the context of city development and operations. It is difficult, to say the least, to craft successful public-private partnerships (PPPs)—seen by stakeholders as the answer to implementing Smart City solutions—when both sectors do not "speak the same language." In particular, 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, or combination of stakeholders, is responsible for which solution. Unfortunately, the focus of various groups within the Smart City movement is split: Urban experts and academics think about the **"why"** at great length, while technology companies and consultants focus on the **"what."** Overall, less time is spent discussing the **"how,"** which ironically is where city leaders need the most assistance. (source?)*

"Smart city stakeholders include city administrators, developers, residents, and groups sharing world opinion on the environment. Such groups have different interests and interact with the city in different ways, and stakeholders need to recognize the existence of standpoints that might differ from their own." (source) **added after and :** *Stakeholder roles that define who does what. Unfortunately, this part is missing from many city discussions; its omission creates a lack of understanding in how to implement Smart City solutions.*

Policy: On a policy level, who is responsible for a sustainable planet, and sustainable development? Sustainability is on city agenda's, however according to Judd (2015), politicians as well as researchers see sustainable development secondary to economic development (bron). The current system is even subsidizing carbon emitting sectors, thus holding back on sustainable innovations, like smart city projects. According to the European Comissions, "falling tax revenues and austerity measures from the central government risk delaying the decarbonisation of cities, a core requirement for reducing EU greenhouse gas emissions, an objective of smart city projects" (European Commission, 2013b). Thus the EU is steering on multiple helix cooperation in smart city development, by setting up calls for complex partnerships, with at least a numerous number of government, private parties and knowledge institutes involved.

So how should policy focus on sustainable finance? According to Copeland (2014), part of the issue is that *"Monetary benefits of smart city technologies may be felt only indirectly by the councils that are expected to invest in them."* Thus he states *"if a more direct link between cost and profit centres cannot be found, smart city investment will soon feel like an unaffordable extravagance" (bron).* This accounts for public and definitely private investments. *(add quotes RvW businessmodel)*;

Regulations/directives: The European Union and nations/cities can change legislation, however, this is still a very touchy subject. What will happen when countries do not live up to EU 202002 goals? Adjusting legislation is one thing, living according to legislation another. ADD other notes?

Governance: From a governance point of view, cities and politicians lack power and control over decision-making in smart city development. It is a major barrier to smart city implementation. Since private parties, who are owning the facilities, decide where to invest. In Europe, unlike in China and Singapore (where implementation is top-down, government-led), the smart city implementation process is often a joint effort (public-private-partnership or bottom up/citizen led). Thus, according to Hajer (2014), from a governance point of view, city-level (physical) infrastructures is a deeply problematic field. He states *"Because infrastructure is mostly embedded in all types of systems.*

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Commented [NH72]: Bron tony judd/ Ubikquity Arjan v Timmeren? Human?

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Infrastructures of cities are the result of decades or indeed centuries of cumulative investment. Infrastructures are notoriously difficult to disentangle and change. And infrastructures are essential to daily life within cities; hence, maintaining them is very complex, let alone changing their configuration." (Hajer & Dassen, 2014). In this case, all actors have different needs and drivers, which shows to be a barrier going towards implementation. Especially when Smart City projects lack a clear business case or when corporations are not serving the interest of the people and communities.

One of the advantages of technology is its ability to integrate. Due to the complexity and different city layers and processes, the process of implementation should be integral and holistic (add sources). However, it shows that municipalities don't work accordingly, they have to deal with 'silo 's and slabs' (Bron). Copeland (2014) and van Warmerdam (2015) state that there is no point integrating IT if different departments with local and city councils still work in silos (working in an isolated manner).

2. Human factors

The role of Human infrastructure, human capital and education in urban development are central aspects to smart city definitions (bron). According to Boulton et al (XXX) people and how they interact is recognized as a critical success factor in any city (bron). However the Smart City implementation started as a top-down, technology-push movement, it slowly gained attention to include social capital (..) and human infrastructure (social learning and education). The human factors highlights creativity, social learning and education (bron), representing cognitive/creative capability and human skills. It reflects (lack of) leadership and sustainable ambition. Furthermore human factors includes social inclusion of various urban residents in public services, soft infrastructure (knowledge networks, voluntary organizations, crime-free environments), urban diversity and cultural mix, social/human/relational capital, and knowledge base such as educational institutions and R&D capacity (bron).

So what are issues related to human factors in smart city implementation? Meaningful citizen engagement is still an issue ((interview RvW (2015); Copeland (2014)). Human factors influencing smart city implementation range from involving citizens in the decision making process, to having the right people for the 'job' with the right know-how and skills. Copeland (2014) and Warmerdam (2015) argue that Smart city technologies require advanced and specialist personnel skills, mentioning many local councils don't have the actual in-house expertise (or resources) for smart city projects (bron). On a final note, people in local councils, when applying for EU calls in the process of a smart city 'tender', might use 'optimism bias', or 'strategic misrepresentation' as a way to influence the selection process (bron). Thus creating an environment of uncertainty and unrealistic policy. In line with this, managing smart city projects, means dealing with insecurities, how do you deal with this? (Weening, 2006).

3. Technological factors

According to Hollands (2008) technology is key to being a smart city because of the use of ICT to transform life and work within a city in significant and fundamental ways (bron). Different technology factors include physical infrastructures, smart technologies, mobile technologies, virtual technologies, and digital networks (bron). Thus smart city projects can be influenced in many technological ways during implementation.

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What are main issues related to technological factors in smart city implementation? Van Warmerdam (2015) states "the Smart City concept is 'kidnapped' by ICT, who claim that "using ICT/Big Data for cities will result in better, safer and more beautiful cities." However, he questions if this is the case, mainly because most technologies still have to be developed (bron). In a phd research on managing Smart Cities, Weening (2006) endorses that Smart City projects are known by uncertainty (complexity and dynamics), because most initiatives are not a standard technological product. In contrast, most projects are unique and often experimental, thus outcomes are unsure (bron), not knowing how successful they will be. Smart City projects bare a high risk in achieving technological innovation and improving quality of life. This is subscribed by a vast lack of evidence of smart city projects having actual added value or improvement of life. Dameri and Rosenthal-Sabroux confirm this, stating *"to date, the assumption of all the reviewed smart city studies and implementation reports is that the smart city is a good thing, but strangely, these provide no empirical evidence to support the claims that it helps to improve the quality of life of its citizens [...] These studies neglect to study the outcome and impact of the technology on the everyday life of the smart city's people"* (Dameri & Rosenthal-Sabroux, 2014)

CHECK ESSAY Speelveld Smart Cities (zie issues hierboven!) + document gebiedsontwikkeling.nu

3.3.9. Overcoming barriers in future Smart City implementation
Empirical results suggest that "effective, sustainable smart cities emerge as a result of dynamic processes in which public and private sector actors coordinate their activities and resources on an open innovation platform. The different yet complementary linkages formed by these actors must further be aligned with respect to their development stage and embedded cultural and social capabilities" (J.-H. Lee & M. G. Hancock, 2012).

As seen in case studies from Dameri and Rosenthal-Sabroux, at present 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, 2014).

When these critical partnerships can't be formed "Policy makers of cities that show less technological and economic development should find ways of breaking the path dependency on technology adoption in order to reduce the delay in implementing the Smart City paradigm. For example by "bottom-up" approaches, which are not just based on the deployment of complex technological platforms, but rather on harnessing the collective intelligence and creativity of their citizens" (Neirotti et al., 2014).

Interview Ronald: *zou zo'n call misschien wat kleiner moeten maken en wat meer moeten focussen, in plaats van dat je het breder maakt en ingewikkelder en complexer, wat je niet zo goed kunt bevatten. Dat je zo'n call, dus ook het antwoord van die steden veel smaller moet maken.""*

CHECK MAPPING SMART CITIES IN the EU p 99-. 101

Comments (margin):

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Commented [NH99R98]: Ander punt, dat de uitkomst niet helder is, of dat de oplossing (nog) niet bestaat....

Commented [N100]: Most central issue now:
- Unclear benefits/outcome/output
- gap policy-implementation
- complex process
- hard to evolve/up scaling
-
-

people focus in research?

What i

Commented [N101]: Invovle outcome of smart cities project on every day life?

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Commented [N102]: define/focus on this aspect, or is it open innovation vs triple helix (thus focus on one)

Commented [N103]: further elaborate on
Define Open innovation platform in CH2 see article on partnerships

Commented [NH104]: Moeilijkheid data verzamelen

Commented [N105]: too much detail? -> CH2?

Commented [N106]: Erg PRO Smart City, moeten we niet een stap terug? Naar het belang van SC?

Commented [NH107]: Interview 1; pagina 3

City policy makers are urged **to understand the local context factors** in order to shape appropriate strategies for their SCs. (Neirotti et al., 2014)

CHECK;c(Angelidou, 2014) = smart city policies a spatial approach -> nu in problem statement

Policy-makers and city planners should take vulnerability, resilience, financial sustainability and social inclusion into consideration in their approaches to build cleverer cities. (Neirotti et al., 2014)

ENABLES OJO; GOVERNANCE & PARTNERSHIPS(Ojo, 2014 #60)

Enablers:

Findings from ARUP on Smart City case studies highlighted the following themes in cities adopting smart city approaches to city management:

This study has highlighted common themes in cities adopting smart approaches to city management. • Leadership models. A strong political mandate for action supported by a clear vision of the role of smart in the city supports **strategic alignment and investment in technology across departments**. This should be inclusive of grass-roots activities (such as individual department pilots, or local SME innovation) to ensure the longevity and sustainability of the programme.

• Mechanisms for managing risk and introducing innovation. Cities can manage the risk associated with innovation through both organisational structure and funding models. Organisationally, they can create a function whose role is to act entrepreneurially, collaborate, and pilot new ideas. This function may be supported by capital that is not drawn from the tax payer (e.g. through private grants from foundations etc.), allowing funds to be used more flexibly for innovative projects where the outcomes are less certain.

• 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 organisational 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.

• Procurement policy often makes working with SMEs challenging for local governments, which can act against smart city aspirations. This can be combated by placing a threshold on the size of projects that need to go through formal procurement, or supporting small companies through the procurement process

• Smart cities no longer place city governments as the top-down drivers of development in the city, but instead they act as **one player in an ecosystem**. In response to this, smart city strategies should represent the needs and capabilities of a variety of city stakeholders. In particular, relationships with community groups, the private sector and universities are core to developing well-rounded and sustainable initiatives. • Data analytics can be leveraged to plan and deliver local services better.

• While smart city services and the move to e-government approaches offers significant advantages for citizens, special attention must be paid to ensure that the opportunities are equally accessible by all. Providing vulnerable citizens with access to internet, devices and training around the use of

Commented [N108]: naar intro? waar focus komt te liggen?

Commented [N109]: herkebaar

Commented [NH110]: Artikel gebiedsontwikkeling

digital services as well as ensuring the transparency of and access to government data is essential in ensuring that certain citizen groups are not marginalised by the move to smart city approaches.

ARUP-global-innovators-international-smart-cities Implementing smart city projects case studie examples.pdf -

Table 4
Summary of research findings (8 stylized facts).

Research findings	Description of findings
Movement towards more interactive services engaging citizens	Most domain services are GPS-based. Civic engagement platforms should emerge in time, adding value to services through user driven innovation (crowd-sourcing & open government 2.0)
Open data movement facilitates open innovation	Cities must strike a strategic balance between data transparency (which will stimulate app development) and concern for e.g. privacy
Diversifying service development: exploit or explore?	A centralized-comprehensive approach to service development tends to explore service areas in SMC; an organic-market oriented approach in SFC tends to exploit a limited number of service areas intensively
How to accelerate adoption: top-down public driven vs. bottom-up market driven partnerships	SMC has driven by strong public-initiated funding and partnership while SFC adopted efficient market-oriented partnership
Advanced intelligent technology supports new value-added smart city services	Big data collected through various intelligent sensors creates value and economic opportunity for service innovations
Smart city services combined with robust incentive systems empower engagement	Smart city services needs to be aligned with an effective and robust incentive system to help accelerate users' motivation and participation
Multiple device & network accessibility can create network effects for smart city services	Smart city innovation is driven by diversifying complementary networks between smart services and the city's developing infrastructure
Centralized leadership implementing a comprehensive strategy boosts smart initiatives	Centralized governance reinforces the development of a smart city at an early stage while a decentralized governance setting reinforces integration during the growth stage

(J.-H. Lee & M. Hancock, 2012)

- **Before mapping out a strategy for development of a smart city, it is important to see what is already in place and how it can be improved**. This may sound axiomatic and self-explanatory, but experience has shown that it is surprisingly easy to be allured by grandiose visions about the smart city of the future and to focus on what is missing rather than capitalizing on existing smart city resources first.

  > Commented [NH111]: SWOT of Transform

  > Commented [NH112]: Gebruikt in artikel gebiedsontwikkeling.nu holistic approach?

- **Municipal governments, and authorities operating at the lowest tiers of government, have traditionally had limited autonomy and resources for** themselves, and this has only been exacerbated by an era **of limited public funds and austerity**. Cities should thus begin the journey towards becoming a smart city by selecting a few domains or areas that need to be improved urgently. Amsterdam, for example, chose open data and energy.
- Smart city ventures are also called to **address issues of political coordination among levels of administration**. They also have to address **moral and ethical issues**, such as digital divide, transparency, privacy, and security. National policy and local administration can change during planning phase and implementation **phase**, leading to major delays and long periods of stagnation. **Political and moral balance is thus another important success factor** for the development of smart cities.
- In this sense, it is noteworthy that to **produce morally balanced and socially aware smart city strategies, stakeholder engagement is crucial.** This can increase public acceptance of the smart city venture (New York City, Amsterdam), and elevate the 'smartness of the city to a whole new level, leveraging human capital and collective intelligence (Amsterdam Barcelona). Furthermore stakeholder engagement can provide valuable insights about the assets and the needs of the city. Digital spaces and Web 2.0 tools (Maccani, Donnellan, & Helfert) facilitate this valuable interaction with stakeholders enormously, as they provide collective space where large scale interaction and collaboration can take place.

  > Commented [N113]: irrelevant here? Or use this in research for possibilities to improve?

- It is highly desirable to combine digital changes with targeted physical and institutional ones, achieving **economies of scope through integrated projects**. Physical planning and social

policy can and should underpin the digital or 'smart' dimension of the city. The digitization of citizen services can have splintering effects on the social cohesion of society, as social groups with limited access to digital resources may find themselves completely isolated by losing their access to their physical counterpart.

- There is an emerging trend to approach smart cities and urban development through small-scale integrated projects. These projects create urban-scale innovation ecosystems that are embossed in the physical space of the city and impact positively their surrounding area. These small scale projects act as pilot projects that are more user-friendly, encourage citizen participation and raise awareness and acceptance in the transition towards becoming a smart city (see Amsterdam and Barcelona). However, these projects need to be part of a broader strategic plan and foresee synergies among different projects (Angelidou, 2014).

Check recommendations SIP by EU: Create a number of "Lighthouse Initiatives" that bring together groups of cities with industry and innovative SMEs from the ICT, energy and mobility & transport sector to deliver common Smart City solutions thus creating scale and reducing risk for political decision makers as well as investors, to progressively support wider implementation across the EU as well as showcasing the competitiveness of European industry and innovative SMEs. To unleash the full potential of innovation and make best use of infrastructural and other synergies, these "Lighthouse Initiatives" must focus on the integration of technologies across the ICT, energy and mobility & transport sector so to achieve, e.g., advances in 'zero/plus' energy districts, increased use of alternative energies, public transport and efficient logistics, or green, widely available ICTs and multiple-use infrastructures. **Continuous progress monitoring must be assured. ADD 11 points +** pick

"Daarnaast vereist de Smart City-aanpak een andere invalshoek; een verschuiving van technologiegedreven mogelijkheden naar oplossingen die daadwerkelijk toegevoegde waarde hebben voor belanghebbenden in de stad. Zoals bewoners, gemeenteambtenaren en de gevestigde bedrijven en hun werknemers." (Joost Brinkman?)

Uit 'Smart Cities – Omgaan met onzekerheden' (Weening)

Vanuit NWB (Netwerkbenadering) ligt een aantal strategieën ten aanzien van **het management van smart city projecten** voor de hand: (Blz 38)

- *Formuleer een brede visie;* coördinerende actoren in een smart city project moeten een brede ambitie en globale doelen formuleren. Zij dienen slechts de contouren aan te geven waarbinnen betrokken acotren tot overeenstemming komen over de doelen en samen inhoudelijk invulling geven aan het project. Focus dus niet te vroeg op infrastructuur of (specifieke diensten, maar houdt het project breed, zodat veel verschillende partijen het idee hebben hun belangen te kunnen realiseren in het project en zullen deelnemen aan het interactieproces.
- *Betrek zoveel mogelijk pluriforme partijen;* bij planvorming en later implementatie. Een rijke actorenconstellatie, leidt tot rijke oplossingen. Sluit niemand buiten, actoren die geen gelegenheid krijgen te participeren, kunnen later hun blokkademacht inzetten om het project te hinderen.
- *Bevorder variëteit en interdepentie en faciliteer interactie en samenwerking;* coordinerende actoren doen er goed aan een organisatiestructuur te ontwikkelen waarin

de betrokken actoren veel met elkaar interacteren. Daarbij is het van belang overleg- en samenwerkingsstructuren te creëren en partijen te leren samenwerken.

- *Creëer ruimte, maak enkel procesafspraken;* belang van ruimte voor partijen om te participeren in het proces, maar ook om hun ideeën en percepties in te brengen. Creeër omstandigheden waarin commitment kan ontstaan in de loop van het proces.

BLz. 39: Kenmerken NWB:

1. *Gezamelijkheid*
2. *Productie volgt organisatie*
3. *Ad hoc ontstaan commitment*
4. *Ruime exit en entry*
5. *Soft agreement*

Hands-off management; coordinerende actoren moeten op afstand blijven om ruimte te laten voor interactie en een faciliterende en regisserende managementrol hebben

Omgaan met technisch-inhoudelijke onzekerheid

Smart city projecten worden naast organisatorische onzekerheid gekenmerkt door technisch-inhoudelijke onzekerheid. Hoe kunnen coördinerende actoren hiermee omgaan?

Combinatie van NPM en NWB, en notities vanuit engineering literatuur, kunnen twee dominante manieren van omgaan met onzekerheid in SC projecten worden geconstrueerd:

- Benadering gericht op *beheersing* = gesloten ontwerp/piecemeal engineering = vermijden grote risico's /// stappen voor ontwikkeling worden in kaart gebracht waarbij inhoudelijke convergentie centraal staat om onzekerheid te beheersen.definitionBenadering gericht op *benutting* van technisch-inhoudelijke onzekerheid = open ontwerp, waarbij het eindproduct niet vooraf vaststaat. Het eindproduct is ex ante gegeven, de stappen die nodig zijn om dat te realiseren wroden in kaart gebracht en vervolgens achtereenvolgens gezet waarbij inhoudelijke convergentie centraal staat om onzekerheid te beheersen. ///

1.

4. Modified framework for analysis

Literature analysis and adjustment of the basic checklist for critical success factors and barriers to smart city implementation.

As basic framework for the analysis of success factors and barriers the Integrative Framework of Chourabi is chosen, as described in chapter 3.2.4 (Hafedh Chourabi et.al 2012).
By studying the suggested aspects per factor it becomes clear that the suggested aspects are sometimes of a different order. They are presented in a mixed mode from 'dimensions', ' challenges', 'strategies', and the more neutral 'factors'. It is clear that some of these factors have the focus on

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Rethinking Learning in the Smart City

The smart city is already show noted by Schaffers in relation to ing, and maker spaces (Sharples organizations are addressing. A spaces of learning to places of lea munities as a way to examine and is to connect students, educators, enabling a mutual understanding people live and work together i provide opportunities for contri of eGovernment (Savoldelli et a munity to communicate and coll attention to a range of factors inc associated policy issues (Ferro et

Janssen and Estevez (2013) ic wave of eGovernment which "a tor by simplifying and streamlir "stimulating innovation by mobi 2013), "public organizations int actions with other public organi orchestration role" such that, "E ment based on user requirements

In summary, key elements of in Table 1 as: innovative, transfo right column, why learning matte creative, meaning/satisfaction, co

Mellouli et al. (2014) describe gies in government" generating th (G2C), government and business ernment (G2G). While the intent points to a possible gap requiring a one-way focus from governm may contribute to the loss of inn aligned with agility and leanness interactive and adaptive social m innovation in smart city learning

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Table 1 Summary of smart city and learning city elements and why learning matters	Elements
	Innovative
	Transformat
	Open
	Interactivity
	Awareness

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their appearance as barriers in implementing Smart Cities, because their appearance is often lacking, while being present would make them into an important success factor for the implementation. That's why the formulation of the aspects is changed in a positive way where possible, so 'lack of alignment of organizational goals and project' as a possible barrier, was changed in a possible success factor by eliminating 'lack of'. A limited number of the presented factors will not appear as a barrier or success factor, but can only appear in the form of one of the objectives of a Smart City initiative. The additional labeling of all factors (in 'success factors', 'barriers' and 'objectives', resulted in a first draft version of the checklist. See appendix XXX for the detailed list.

six different criteria for analysing smart city governance: 1)leadership, 2) strategy, 3) the presence of a dedicated organization, 4) processes, 5) principles and 6) performance measurements.(Lee, 2012 #52)

check table 1, p84 (Lee, 2012 #52) below

Table 1
Summary of proposed case framework for smart city analysis.

Dimension	Definition	Sub-dimension	Description
Urban openness	Systems' degree of openness which enables user-driven innovation in existing and new services	• Participatory service design	Assessment of smart city services and infrastructure on whether service design is based on a platform people can interact with and participate in to foster civic engagement
		• Open data platform availability	Measurement of total data provided in open API format and distribution of data among various categories, which reflects a city's willingness to open its data for outside service development
Service innovation	Development of innovative services through exploration of a variety of service areas as well as exploitation of higher interoperability	• Service diversity	Examination of service diversity or focus, driven by either the city itself or outside providers using open data
		• Service integration	The degree of interoperability or connectivity of different services from a business model perspective for innovating within same service domain or cross-functional service domains
Partnerships formation	Determination of types of partnerships formed to promote smart city development. Examination of funding types, whether top-down from government or bottom-up led by private sector	• Private–public partnerships types	Examination of city various types of private–public partnerships for service development
		• Funding resources	Evaluation of government or private funding sources of funding for service and infrastructure development
Urban proactiveness	Extent to which smart city services are moving toward sustainable energy use as well as IT-enabled services, through sensors, internet connectivity or intelligent controls	• Intelligent technology embedded in smart city services	Documentation of services with advanced intelligent technology including sensing and analytic technology
		• Smart green services related to environment and energy	Analysis of services or infrastructure monitoring energy consumption or saving as well as fostering civic engagement in environment. Examination of whether services are direct impact (e.g. Urban eco-map) or indirect impact (e.g. SF Park) on environment
Smart city infra-structure integration	ICT infrastructure for supporting smart city initiatives and creating higher network effects with complementary multiple devices	• Multiple-device/ platform availability	Investigation of how many services are delivered on single vs. multiple device platform as well as % distribution usage of platform(s)
		• City's own network infrastructure	Examination of network capacity by transmission speed and usage rates; Availability of free public wireless zones and sensor network
		• Data center availability and integration	Evaluation of number of data centers their level of interoperability for smart infrastructure; Consolidation plan for data center informs city's efforts to utilize public services
Smart city governance	Effective institutional governance structure impacts sources and uses of resources through dedicated organization support. Innovative institutional approach or governance model to bring together multiple stakeholders to drive growth and foster use of smart services.	• Smart city leadership	Strong smart city leadership by the mayor's office plus different agency's director within the city.
		• Smart city strategy	Formal, comprehensive smart city strategy reviewed and revised regularly to be aligned with city's specific strategic initiatives
		• Dedicated organization	Dedicated smart city team formed with diverse roles and skills to promote smart city development and also

5. Empirical introductions: What is going on in Europe with Smart Cities?

5.1. Introduction

Size: probably focus on larger size cities, since they cities of over 500,000 inhabitants have the most mature Smart City initiatives (implementation beyond the planning and any pilot stages). These largest EU cities tend to have a more even distribution of characteristics than the average, while the smallest cities tend to focus on the two most common characteristics: environment and mobility(bron).

In contrast, we argue that the assemblage of actors, ideologies and technologies associated with smart city interventions bears little resemblance to the marketing rhetoric and planning documents of emblematic, greenfield smart cities, such as Masdar in the United Arab Emirates, Songdo in South Korea and Living PlanIT Valley in Portugal. Therefore, rather than focusing on new cities built from scratch in such peripheral locales, many of which have as-of-yet failed to materialise, we find it more productive to examine how the smart city paradigm is becoming grounded in particular places, especially in the more mature cities and economies of the global north. Rather than constructed on *tabula rasa* according to the centralised plans of multinational technology corporations, smart city interventions are always the outcomes of, and awkwardly integrated into, existing social and spatial constellations of urban governance and the built environment. Far from paradigmatic, greenfield smart cities are the exception rather than the rule, and provide little insight into the ways that an increasing attention to data is affecting the tangible outcomes of urban governance in existing cities.(Shelton et al., 2014)

5.2. Case selection

Ex. Geeft voorbeeldne Case Transform (verwijs naar CH. Case studies for more in depth information)

Steden	Ams	Assen	Delft	Den Haag	Eindhoven	Rotterdam	Utrecht
Criteria:							
size							
Total:							

Cases Europe: Transform
- Overview of insight cases Hamburg, Copenhagen, Genoa, Lyon, and Vienna.

Cases Europe: Triangulum

6. Testing in an In-depth case study: Transform-Amsterdam

- Interview Ronald
- Interview experts aan de hand van literatuur!
- Zie excel: successfactors literature
- Maak barriers

In the case of this research we use the TRANSFORM **definition of a Smart Energy City (SEC***)** *"The Smart Energy City is highly energy and resource efficient, and is increasingly powered by renewable energy sources; it relies on integrated and resilient resource systems, as well as insight-driven and innovative approaches to strategic planning. The application of information, communication and technology are commonly a means to meet these objectives. The Smart Energy City, as a core to the concept of the Smart City, provides its users with a liveable, affordable, climate-friendly and engaging environment that supports the needs and interests of its users and is based on a sustainable economy."* (Nielsen et al., 2013) (source).

Their **vision for the Smart City** is *"A liveable, resilient city, which is inclusive, climate friendly, data insight driven and fosters innovation and a sustainable economy."*
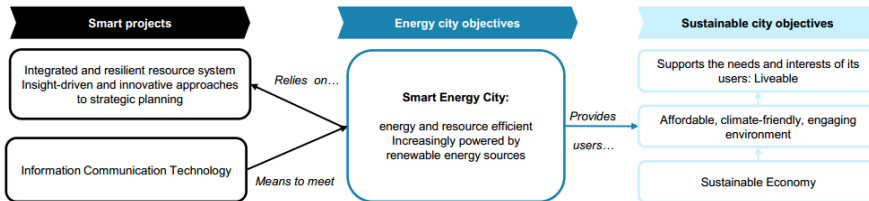
Table XX Visual representation of the Smart Energy City (Source TRANSFORM)(Nielsen, Amer, & Halsnaes, 2013)

Smart Energy City relies on insight-driven and innovative approaches to strategic planning – which? provides: sustainable city objectives: supports the needs and interest of users, is affordable, climate-friendly, and engaging environment, and a sustainable economy. – Where?
The Smart Energy City itself is energy and resource efficient, increasingly powered by RES.

Key elements of the overall SEC definition

❶ Resource system integration ❺ Renewable energy
❷ Access to energy services ❻ Active and engaged users
❸ Resilience ❼ Sustainable economy
❹ Energy efficiency ❽ Smart governance

Table XX Key elements of the SEC definition are incorporated into the structure in which to analyse the impact and ability to implement the different themes (Source TRANSFORM)(Nielsen et al., 2013)

Define key elements! For example active and engaged users are not included...

Scope Transform:

The TRANSFORM consortium itself is a triple helix consortium which also includes universities e.a.?

This research focuses on the scale of urban (re)development areas/projects: especially on the case of TRANSFORM Amsterdam Smart Urban Lab ZuidOost (and possibly other Transform Smart Cities). Amsterdam has chosen Energiek Zuidoost as the smart urban lab in the Transform project. It is part of one of the three areas within the programme of Amsterdam SMART City. The area is a relatively large energy consumer within the city, due to the located high energy using companies in the are. The current phase of the project is that at the moment there are visions for the area, but no big development schemes. The area is strategically located between Amsterdam, Utrecht and Schiphol, well connected with infrastructures. Gradual development of the area will take place in the coming decennia (TRANSFORM, 2014). So why would this area be interesting for research? The way collaboration between partners are formed can be an inspiration to other cities.

TRANSFORM uses Smart Urban Labs (SULs) as an district area to implement smart solutions. In this sense it can be seen as experimental zone. Similar concepts are called 'living labs', or 'lighthouse initiatives' (source).

In the beginning of 2012 local stakeholders of South-East set out together on a journey towards common sustainability projects. Amongst the stakeholders are companies, non-governmental organisations and public parties. Important stakeholders are the Amsterdam Medical Centre, the ArenA Stadium, Evoswithc Datacentre, Stadgenoot housing Corporation, IKEA, gid company Alliander, NUON/Vattenfall,

waterworkscompany Waternet and the Amsterdam Smart City Consortium (TRANSFORM, 2014).

Figure XX : The relationship between City, initiatives, and projects – where to place TRANSFORM? (source)

Interview Ronald : *"Ontzettend veel ICT systemen/projecten mislukken vanwegen de, ik denk, **te grote complexiteit die** wordt nagestreefd." "Bij de uitvraag van subsidieprojecten is de Europese Commissie heel complex in haar eisen. Daar wordt ook gepobeerd om al die dingen aan elkaar te knopen. En omdat het te ingewikkeld is.... "je ziet dat 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."*

EMPIRICAL RESEARCH (hierboven was introductie

In the case of Transform "The involvement of private stakeholders is the most important challenge in many cities from the viewpoint of the process (planning and performing). This challenge divides in a set of different problems: how to convince private actors to involve themselves in the process; to create mutual understanding about the projects objectives; the commitment to contribute (political as well as financially); which should match the overall targets of the envisaged development as a smart urban lab. Especially in case of strong private actors (with a lot of competences and financial power) this can be an enormous challenge. Thus in the course of the process it is necessary to define common objectives and quantitative targets and to deal with (potentially arising) target conflicts. This challenge forms an integral part in the process descriptions of both Amsterdam, Genoa, Lyon and the Vienna SULs." Another aspect to be mentioned is the question of the way of facilitating the dialog among stakeholders despite limited resources, which are mainly personal ones (Copenhagen), and – later on – when and how to step back after having started the process and to appoint ownership (to a further bottom up process, Amsterdam). In addition external factors can play a major role, influencing the process and the development of the SUL, as e.g. national economic and financial issues or changes in the municipal political landscape (bron).

Uitwerking Case Tranform (IP Amsterdam) aan de hand van essay successfactoren:

1. **Effectieve strategie**? Implementatie komt niet van de grond? Oorzaken:

Na twee jaar werken aan Transform in een bestaand gebied (2012 – 2015) is een Implementatie plan document gepubliceerd (bron). Hierin wordt aangegeven dat het Transform team in deze periode wel contacten heeft gelegd, maar dat er nog niet daadwerkelijk samengewerkt wordt aan 'smart energy' gerelateerde zaken. De planning was om een half jaar later (Juni 2015) wel structurele samenwerking tussen energieproducenten, locale bedrijven, kennisinstellingen en de stad plaats zou vinden (met een tijdframe tot 2020). H*oe staat het nu met de samenwerking?*

Doelstelling van het Implementatie Plan (IP) Amsterdam binnen TRANSFORM: onderzoek doen naar verschillende mogelijkheden om energy transitie aan te pakken en het testen van een 'ontwikkelings methode' voor gebiedsgerichte aanpak. Het IP zal gebruikt worden als achtergrond voor de opzet van een gedeeld platform en communicatie materiaal met de focus op de verschillende behoeftes van stakeholders. *Welke behoeftes hadden de verschillende stakeholders?*

Ambitie/goals: als leiddraad worden de EU 202020 goals gebruikt. Maar er zijn nog **geen specifieke gebiedsdoelstellingen** gesteld met de lokale stakeholders. Uit ervaring (welke ervaring?) blijkt dat kwantitatieve klimaat doelstellingen niet nuttig zijn als instrument (Waarom niet?)

Visie: Er is een visie voor het gebied, maar nog geen direct ontwikkelingsschema. De ontwikkeling zal het komende decennia plaatsvinden (lange termijn). De ILS (Intensive Lab Session) hebben bijgedragen aan expertise en nieuwe visies voor het gebied. Daarbij werd een breed beeld geschets van zowel de private als de publieke partijen op de verschillende thema's (ESCO's, and projects like solar gambling, and waste heat of the hospital).

Complexiteit: 'energietransitie in (bestaande)gebiedsontwikkeling, is zo complex dat falen onvermijdelijk is.' (bron).

Uit conclusie: "The main barriers to come to implementation is **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. Also the transition towards a Smart District is **not part of the daily work** yet. It takes time to **innovate**, while times is not addressed to it. The Amsterdam ArenA is very ambitious and does organize extra capacity to innovate. In 2015 the city will support this by dedication of people to this innovation program. The parties who joined the captain's dinner are also more aware of the dedication of time needed for innovation. Foreseen is that in March 2015 parties decided to appoint capacity to a joined innovation program (IS DIT NU ZO??))?? This **capacity building is an important challenge in the field of governance.**

Table 23: Overview on best practice and barriers for implementation – PESTLEGS

Short description	Categorization by PESTLEGS
Best practices	
Business cases for local waste heat	E
Business case for solar for big consumers (low energy price)	E
Business case for local waste to energy	E
Business case for demand supply management	E
Stakeholder engagement	G
Funding by Amsterdam investment fund: solar on ArenA and Orange gas station	E, G
Barriers for implementation	
Local land use plan	L
Possibly: Waste treatment legislation	L

2. Rol overheid in Transform?

"The city is facilitating **organisational power**.". The Amsterdam Energy and Climate Office started as the **accelerator** of the (IP) process, and also took the initiative. This office is part of the urban planning department, to make sure energy and planning are combined. (The people of the Amsterdam TRANSFORM-team work for this organization) – *So this shows a form of integral*

approach. The office of Climate and Energy (Physical Planning Department), 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. The office defined the process interventions that build the network and the knowledge base. "In the making of the sustainability paragraph for the Southeast district development strategy, there was already cooperation between the civil servants of the office of C&E and their colleagues working at the district."

Role SUL team Amsterdam: Setting up of project organization, organizing events in the process that built the network and the knowledge base, and the general project management. Resulting in a new alliance for the implementation plan.

Changes in policy: "During the TRANSFORM period, a complex change in the governance structure is the abolishment of the political democratic structure of city districts and the reorganisation of the municipal administration took place. There is still a chosen political committee per city district, but it is smaller and with less formal powers than in 2013"… "The public administration of the districts and the central city are being merged. (End of 2014/beginning 2015).

Furthermore, for the medium-long term Amsterdam has a strategic plan (the Strategic Plan Amsterdam and Vision Amstel 3). In this the SUL is located in the outside zone. In this zone the investments in the medium long term are mostly directly towards social and economic programs and less to area development. Voor de lange termijn is dit gebied een onderdeel van grootstedelijke herontwikkeling (uirbreiding schiphol... e.a.)

Legal: *Waste*: "At the moment there are no measures needed on legal framework. But if local waste is turned into *energy*, the legal framework for waste treatment might be a barrier for quick implementation. Obtaining the licence is a very complex and costly process. More flexibility within this framework is probably needed to have this business case implemented." *Land use plan*: "The land use plan needs change too in order to enable waste treatment installations and the solar panels above parking places. Within the municipality the same department responsible for sustainability is in charge of changing land use plans"

Decision-making/ *besluitvorming on* City wide quantitative guides: "With the European targets as a starting point, the city of Amsterdam has its own policy with specific targets on reducing carbon emission. The ambitious energy and climate ambitions for the city as a whole are the basis for the objectives of the SUL area. With the newly elected politicians these targets are (can be) changing. The objectives as they were clear in August 2014 are: 2025: 40% CO_2 reduction (by reduction in use and production renewables), 2040: 75% CO_2 reduction"

Environmental goals: **These goals are city wide quantitative goals**. These quantitative goals are guides for the SUL and not seen as hard targets. The Smart Urban Lab will continue to be an area for experimentation, learning and becoming more sustainable." According to the energy atlas, it shows the general quantitative targets from Amsterdam can be reached. (how?!)

3. **Business case**

"Some projects will move to validation and finance stage, before moving to implementation." (Ex. Of Waste heat datacenter; in which user has to be closely located). However, some "Project ideas stop because after research, there is no sound business case. That's part of innovation".

During Transform: "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 the needed investment. Also it creates a feedback loop to parties to set priorities, based on impact and finance. For the AMC all this input leads to the need to make a development strategy." (Hoe komen de feasibility studies tot stand?)

4. **Partnerships/stakeholders**

"Voordat het project begon, bestonden er nog geen samenwerkingsprojecten."

"In general the Amsterdam work on the district level could be summarized as **intensive stakeholder collaboration** and using **data** as an instrument to understand quantitatively goals and to set priorities. *These* are the best practices for governance of the Amsterdam SUL".

Amsterdam: Amsterdam Zuid-Oost is een gemengd gebied met woningen, kantoren, lichte industrie, medische functies, datacenters en voorzieningen. Het huist grote bedrijven/organisaties zoals de Amsterdam Arena, ING bank, ABN Bank, ROC scholing, AMC ziekehnuis, IKEA, Equinix, Evoswitch, Stadgenoot, IKEA, Waternet, Amsterdam Smart City Consortium.

 Mixed interest: Elke stakeholder heeft verschillende (individuele) drivers: financieel, zichtbaarheid/imago, service ontwikkeling, etc. Maar ondanks deze individuele doelstellingen, zijn de stakeholders ervan overtuigd dat **samenwerking de sleutel tot succes** is (Waarom? Waaruit blijkt dit uit?) "From the beginning, companies like ArenA, AMC and IKEA took initiatives from their own agenda's and timelines*". ->>>> Match-making: bringing the relevant actors together on a promising project <<<-*

A **success factor** was that **members of the TRANSFORM team were part of the Amsterdam SMART city** (strategic partnership public/semi/and private partners). "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. Without the enthusiasm of the ArenA/Nuon/AMC, it 'this' (WHAT exactly – implementation projects??) would not be possible.

Sinds het begin van het TRANSFORM project (begin 2012) zijn de actoren gaan **samenwerken** (brainstormen over oplossingen en 'researched project proposals'). "Een van de belangrijkste successfactoren is **commitment van lokale stakeholders**." Hoe kunnen ze betrokken worden? Bijvoorbeeld door het voorleggen van business cases, of door geslaagde projecten aan te dragen. Vanaf 'fall 2014 – Captains Dinner' hebben de (belangrijkste- op basis van???) stakeholders met elkaar afgesproken dat ze 'committed' zijn in dit avontuur van energy transitie. (Wat houdt commitment in?). Uit ervaring in werken met stakeholders bleek het belangrijk om **zowel operationeel als CEO level** vanaf het begin af **aan te betrekken**. Hierdoor worden 'working procedures' geoptimaliseerd.

Changes stakeholders in SUL: Nuon; moved their headquarters into the SUL area beginning of 2014, as a result, they got more involved. This resulted in an improved relation with ArenA, thus formulating an ambition for the area and agreement to invest in new partnerships. Eind 2014 blijkt dat de Amsterdam Arena, NUON, AMC samen met stad Amsterdam een **actieve leiderschapsrol** hebben in Zuidoost (Waaruit Blijkt dit?) "The stakeholders will be together responsible for the final outcome."

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However, "After 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. Therefor it will be the role of the city and the knowledge partners to **stay alert and to foster openness, learning and experiments**". Tijdens de tweede helft van 2013 en over 2014 is het programma gegroeid (nieuwe concepten komen en gaan). "A **public-private partnership** (including Banks) to step by step transform the area into a circular economy is under construction", in which **governance expenses will be paid by the partnership**. "When the EU (TRANSFORM) funding stops, the programme can be continued because the involved local institutions will contribute to project management (Hoe staat het hier nu mee?) "Even commercial companies committed themselves to the spirit of TRANSFORM and signed to contribute to these goals (Which goals exactly?) in the coming years..

*Kennisinstellingen; "*The reason to involve a knowledge institution is to foster learning. Learning from initiatives, techniques, experiences and also communicating this. *Research institutes and (counter-)expertise; Ecofys, Company Fosbury energy?, and two other companies."*(What did the research organisations actually contribute to TRANSFORM?)

Macht/Eigendom: (instruments/techniques): **Omdat het een bestaand gebied is, is het betrekken van lokale stakeholders zo belangrijk**. Zij kunnen het verschil maken. Onderstaand een overzicht:

- Het gasnetwerk is in handen van Alliander en er zijn meerderer leveranciers betrokken bij de levering van gas.
- Het district heating en cooling deel is in handen van Nuon/Vattenfall.
- Heat and cold storage is self-owned by the user,
- Governance soil is done by province of Noord Holland
- Climate & Energy office kan enkel beslissen over input van human resources (no assets, or competency to enforce e.g. environmental act – focus on facilitating in a positive way, without legal enforcement – informing and connecting, cooperation and start up new markets)
    - Kan wel doen aan start up new markets (precompetitive procurement?) ????
- Amsterdam City; (And National Government) – law on the environmental maintenance (concerning spatial and sustainability issues). -> AMS even higher norms in covenant (non-binding legally).

'The **objectives** for the IP is a combination of overall values and objectives and individual targets from the main stakeholders. The main partners in the new cooperation must decide together to what extent will formulate SMART targets, or that the objectives should be stated in more qualitative value based approach. This overall objective will be more specified before December 2014.... (What is the status?)

5. **Citizen involvement**

"In Amsterdam (SUL) werd **niet direct gefocust op het betrekken van burgers**. De aandacht ging uit naar **samenwerking met lokale stakeholder**. Dit was nodig vanwege de beperkte 'legal power to start transformation processes'. -> Link aan stakeholders?

6. **Upscaling**

"The way of working means to start and find out what works and then scale up or try again..." Scaling-up hopelijk vanaf 2016 (zie figuur)

7. Monitoring/evaluatiing (HIER OOK MEETBAARHEID?) -> linken aan kwaliteit leefomgeving?

"By evaluating projects, the decision is - and will be – to continue projects, upscale them or to stop them". What has been done? "A monitor system to benchmark projects against city wide targets on CO_2 is set up. "Amsterdam Southeast is a real transformation area with a lot of local stakeholders and without/with? a large urban development in the near future. Therefore it is **at this moment important to set qualitative goals […]** It is also important to **relate the projects to overall goals and monitor the results.**

"The emphasis has been so far on building a network and starting projects. Although there is a compelling amount of information available, **the projects were** <u>not</u> **deducted from a specific target on for example Co2**. In the next phase <u>this link should be made</u> explicit. It would be strange to steer only on these targets, but by monitoring and learning process on efficacy should start. The challenge is to keep the enthusiasm in the network by working in a bottom-up way, but combining this with a more explicit link to quantitative targets". How to achieve this?

"Less stress is put on the exact contribution to the KPIs of the projects. In this learning process this progress measurement and **realistic goal setting must improve**".

"By regularly evaluating the projects and administrating it will become clear and explicit what projects contribute to the objectives (<u>HOW is not said.. – this is future thinking</u>)

8. Integral holistic approach (strategy)
- Focus op speerpunten (ook uit interview Ronald)..

Aanpak: pragmatisch: "learning by doing". Strategy to define separate projects and test what results they deliver. The strategy was to start with potential projects instead of planning it top down. In a way Amsterdam created a '**projectmachine'** (Bottom-Up). Dus helemaal niet 'integral holistic'. "The development strategy is all about **facilitating**: creating a knowledge base, informing, bringing possible partners together, think along, connect, organise, helping to formulate projects and testing them. The development strategy is bottom up. Measures were about positive stimulation. No large investments in totally new systems were made, no rules formulated. The strategy was helping with: information, connections, finance. The strategy is to institutionalize this process.

9. Innovatie

"Was nodig, omdat de **taak** (opzetten van energie transitie) nog tamelijk **onbekend** is."

"The zone (**Amsterdam Zuidoost) is especially suitable for innovation** and experiments, because of the relative low prices in combination with less restrictions: building groups, renovation, student housing, cultural entrepreneurship and middleclass renting homes"

"Projects will be run by organisations in the area. These are mainly commercial organisations. Projects should therefore have an interesting aspect for the market, directly or indirectly. Therefore **the innovative character of projects will be an important** aspect."

10. Funding

TRANSFORM provided the needed extra financial means to be able to test. Also TRANSFORM brings external expertise, create a sense of urgency, provides knowledge and widen up the scope of

possibilities. TRANSFORM provided a platform of interesting partners (knowledge, urgency, etc.). Deelnemen aan zo'n Europees project (TRANSFORM) legitimeert actie (in SUL). "Transform made it financially possible to organize the necessary human resources. Furthermore Amsterdam Climate and Energy Fund can support (financially) too. There are citywide three funding schemes:

- Amsterdam Investment Fund (loans at 2%, where market is 8%)
- City Amsterdam has subsidy on retrofitting social housing ('building the city')
- Energyloan ???

The *orange gas station* and the *ArenA Solar* are examples in which the Amsterdam Investment Fund is used. This fund is not particularly used for the SUL but is available for the whole city. In the case of the ArenA Solar, the fund did contribute to make the project financially feasible.

- In het SUL gebied worden (fysieke) herontwikkelingsplannen door de stad financieel ondersteund (met sociaal en economische programmas op energie, onderwijs, en ondernemerschap), daarbij zal ze ondersteunen in publiek ruimte
- The SUL-stakeholders, can apply and compete for Climate energy fund; 60 million,.
- Through the Amsterdam Fund, the city is able to support projects throughout the city in the first phase of the development with loans, guarantees and shares.

11. **Europese** calls

??? Geen directe info ??? Opmerking interview Ronald behandelen en toetsen over calls?

12. **Managen van smart city projecten**

Werken aan het district werd gemanaged op **drie levels**: een klein process management team werd voor 2 jar aangesteld (Transform periode). Er werd gewerkt aan een ontwikkelingsprocess met halfjaarlijkse interventie/feedback momenten, waardoor een continue workflow ontstond (hoe?). En een project management is georganiseerd om ideeën te ontwikkelen voor business cases (en mogelijke implementatie).

ILS (intensive lab session) was held on June 2013 on three themes (sustainable heating and cooling, role of private sector in retrofitting, and public action). The ILS helped defining projects, especially around the key challenge of public participation (Heating & Cooling). (UITLEG ILS – stakeholder collaboration – interview Ronald??)

Strategy was to let 'thousends flowers blossom and then with a good process management let this grow into a realistic and coherent programme. It would/could sometimes have been better to test projects at an early stage, and see whether the 'big bosses' of possible partners were enthusiastic or not and try to involve them if they were (problematic in the case of IKEA).

Focus/ two paths (before ILS): **Service design thinking**; creating user-friendly services according to the needs of customers and participants, and about value sharing between stakeholders (i.e. financial, talent, space, marketing, co2 reduction, etc.) – meetings. **Data analysis and energy atlas** –

gathering and analyzing data about energy use and new potential energy sources for the area. Also a 'energy balance' was created (rough calculations on demand an potential sources for renewable energy)

<u>Future management and organization of the SUL:</u> There will be a new programme organization 'Southeast Together/Southeast Circular'; with a steering group consisting of end-users, the municipality, and a knowledge institution. They are together of ongoing strategic planning, implementation and monitoring. However, the projects used in TRANSFORM might be out of scope for the new organistation and the programme lead management role of city of Amsterdam (office of climate & energy), will change. ZO circular partners will be the majority (thus leading management), the city will become one of the partners.

Activities: Setting up of the programme, Build network and knowledge base, energy atlas, workshops, working groups, bilateral contacts:

13. Social vs technical?

Technical;

- Energy savings by insulation and retrofitiing; different challanges per sector: housing (HA long-term responsible stakeholders, tenants own rights), offices (high potential, owners at distance, lack of information about investment moments), light industry (high investment, short term contracts)
- Using Waste heat. For heating there is a variety of options and combinations to reach the targets (co2 reduction). For electricity the case is more complicated."
- Potential for renewable energy (water cooling, solar energy, windmills, termal storage)

Social -> kwaliteit leefomgeving

14. GOALS; Kwaliteit leefomgeving wordt niet verbeterd en Duurzaamheidsdoelstellingen worden niet gehaald (focus?) – IP CHAPTER 4-5

Voordat het project begon, bestonden er nog geen samenwerkingsprojecten. In de loop van de tijd zijn vijf focuspunten gedefinieerd: energy: retrofit and saving, energy: smart balancing, energy: renewables, mobility, waste, knowldegde and innovation, promotion and behaviour. The mission is to come to an optimal use of resources: human, financial, and material. The following themes are agreed upon: energy (decrease in energy use), mobility (transport/parking) and waste (production/re-use/processing). Southeast is a pilot area for a new heating strategy in the whole city.

"The goals are oriented towards the organization of a **cyclical process of continuous learning**. This process must stay open for new partners, new ideas and new projects. The cooperation is all about **plan-do-act**."

ArenA: "The goals set by partners of ZO Circular are still in development. So far, for energy, the city goals are adapted. Main goal is setting up a circular economy, **common goals are driven by a wide range of individual goals**: visability, branding, corporate social responsibility, cost reduction, etc.

Commented [NH143]: verplaatsen naar kopje rol overheid??

Table 12:   Basic KPIs for the SUL

	Status quo 2012	Target 2025 (80%)
Energy use (electricity)	475.000 MWh	380.000 MWh
Energy use (gas)	38.211 m^3	30.500 m^3
Emission of CO_2 and/or CO_2-equivalent		- 40%

15. **Werkgelegenheid**?
    ADD
16. **Data**

Er werd een oppervlakige data analyse gemaakt van de verschillende stakeholders en hun energie verbruik en afval productie in het district.

Amsterdam Smart City partners (Liander,, e.a.) gaven data beschikbaar, waardoor nieuwe inzichten ontstonden en nieuwe uitdagingen gespecificieerd werden.

Daarbij was 'Data' een onderwerp waar verschillende partijen consultancy (Accenture), buitenlandse experts, zakenpartners en studenten actief aan konden werken.

17. **ICT bedrijven?** ADD
18. **Competitie** ADD
19. **External factors** ADD:
20. **Context? (DESTEP + spatial)**

Regulatory -> naar role of government?

- City heating; obliged
- City rolls out heating network
- Price for heating is regulated
- (changing) National tax regulation will make it more difficult to use property of others for renewable energy production. The business case on renewable energy production for small users Is far better, but new tax regulation will hinder new initiatives… (WHICH)?
- Social Housing is restricted to raise the rent – the allowed amount to raise rent is not enough to pay for investment (even though financial benefits for users are high enough to compensate for increased rent.
- Changing goals on climate reduction

Brownfield: In the area there is already a system of city heating and cooling. A part of the buildings are connected to this system. Because the SUL is a brown field development, transformation to more sustainability is a step-by-step process.

21. **Lighthouse project area: Why did South East got chosen?**

Amsterdam heeft het deelgebied Zuidoost aangewezen als Smart Urban Lab (SUL) in Transform vanwege:

- Connections with main stakeholders on the city level

- Amsterdam Smart city -, strong in network building,
- the knowledge base of the physical planning department,
- potential to transfer knowledge in products, focus on sustainability, impartial position in area SO
- Possibility to test plans by city alderman and connections with national ministries
- Know how of funding possibilities
- Innovation possibilities in area?

Post-Transform-period; new public private partnership: (Focus on?)

Actual projects:

12.   Pharma filter business case (AMC-Waternet)

Knowledge, innovation, promotion and behaviour (5.6)

13.   research & education programme (Strategic knowledge alliance)

14.   Solar gambling: student design to promote the use of sustainable energy and behaviour with residents

15.   Using the flat: student action research on living more sustainable in a 60-ties flat.

The projects that are defined/researched/started are:

Energy: retrofit and saving (5.1)

1. Smart Living Gaasperdam
2. BREAAM 4 offices: yearly monitoring of the sustainability of the office buildings
3. Retrofit market transparency: bringing demand and supply in contact

Energy: smart balancing (5.2)

4. AMC-ArenA electricity: local electricity production and exchange. (smart grid)
5. AMC Wasteheat
6. Energy plan Medical Business Park:

Energy: Renewables (5.3)

7. ArenA Solar: production of solar energy
8. ArenA-AMC solar parking

Mobility (5.4)

9. Mobility Portal Southeast
10. SMART charging hubs
11. Orange Gas station

Waste (5.5)

Project failures: "Projects fail because of uncertainty about future developments" (bron). From service design thinking: 7 projects (kitchen grinder, LED public space, targeted at CO2 reduction – and resulted in connections forged between stakeholders in the area) – Verder geen uitleg??

Other project fails:

- AMC solar: a project proposal was to use the roof of AMC for solar panels (interesting business case, however cancelled due to possible 'optopping' of AMC building – after merging with another hospital).
- Lighthouse IKEA: sustainable house showcase in Ikea.
- Waste heat datacentre:

See overview projects last pages IP report.

o How to fit different projects within the Smart City vision
o How to appoint ownership, and step back as municipality in the process of smart city implementation
o How to facilitate stakeholder dialogue, despite limited resources.
o Different responsibilities for different stakeholders, how to align these
o How to convince private actors to involve and apply new energy requirements
o How to create mutual understanding between stakeholders and join partnerships.

- How to define clear and ambitioned, but realizable targets
- How to deal with target conflicts?
- How to secure public and political commitment towards the Smart City project (bron uit IP transform)

7. Testing in an In-depth case study: Triangulum-Eindhoven

8. Conclusions and recommendations

8.1. Introduction

8.1.1. Roadmaps: the making of the IPs

Roadmaps are made. See D 4.1.

8.1.2. Evaluation ex ante

Roadmaps are compared in advance, see 4.1.

Most important conclusion of the evaluation ex ante were:

8.2. Evaluation ex post

8.2.1. Evaluation per city

- Reflection & conclusions per city Roadmap to make an implementation plan
- Comparison Roadmap and real process
- What are the lessons learned in making the implementation plans

8.2.2. Evaluation overall

- Overview of all cities process in making the IP
- Schedule as a summary
- Explanation of differences and similarities on roadmaps
- Most important differences in the process:
- Quantitative approach with clear mandate versus stakeholder approach in fuzzy process

Most important context factors:

- transformation (stakeholder approach) versus new development (quantitative approach).
  Conclusions

8.3. Recommendations

8.3.1. Exemplary roadmap for other cities

8.3.2. Strategies for transformation versus new development

8.3.3. General Roadmap towards making an implementation map

9. Reflection

9.1. Introduction

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Appendix A The basic checklist based on the Integrative Framework of Chourabi