Improving Smart Mobility implementation in the Netherlands through institutional design

A case study to the Dutch Smart Mobility-programme SmartwayZ.NL

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Abstract

For the Netherlands mobility and infrastructure are important. To ensure accessible infrastructure in the future multiple Smart Mobility-projects are developed in the Netherlands. However, most of them are experimental. In October 2018 the minister of Infrastructure and Water Management from the Netherlands wrote a letter to indicate that a shift in attention has to emerge from testing and experimenting with Smart Mobility towards the application and use of Smart Mobility in existing practice. Institutional transformation is required to apply these changes. To identify the current way of implementing Smart Mobility within the contemporary institutional framework, a case study to a Smart Mobility-programme was done. The case under research was the SmartwayZ.NL-programme in southern part of the Netherlands. The case is characterized by a regional focus with the involvement of multiple public actors, private actors and knowledge institutions. To gain insight in the institutional structure, Ostrom's Institutional Analysis and Development (IAD) framework was used. The analysis of the case study showed that for every IAD-rule multiple rules-in-use were identified. Based on these rules-in-use multiple catalysts (benefits for society, the comprehensiveness of Smart Mobility-solutions and the mutual dependence of governmental and non-governmental actors) and barriers (political and social considerations have to be dealt with, defining boundaries and the influence of laws and regulations) were identified. Based on these catalysts and barriers, recommendations for improving the implementation of Smart Mobility in the Netherlands are given. These are about creating specific Smart Mobility laws and regulations, implementing (inter)national guidelines for standardization of the Smart Mobility-process and emphasizing the use and sharing of information within governance structures of Smart Mobility-programmes.

Key words: Smart Mobility, IAD-Framework, rules, institutional design, implementation, case study

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1. Introduction

This chapter explains why this research was conducted. It highlights the relevance of the study and the problem this study addresses. This is followed by the research objectives. The outline provides the layout of this report.

1.1. Relevance

Global developments such as climate change and digitization create a changing society. Urbanization has also a major effect on the current way of living, especially in cities. According to the United Nations (2017) the world's population will increase from 7,6 billion people in 2017 to 9.8 billion people in 2050. The current level of urbanization varies globally[1]: North America has the biggest urban population (82%), followed by Latin America and the Caribbean (80%). In Europe urban population is 72% but will increase to an urbanization level of 82% in 2050 (Tomanek, 2017). Because of the increasing possibilities with ICT and the occurring urban sprawl, significant changes in daily life such as the increase of travel demand are witnessed. Characteristics of urban systems like individualization and increased mobility are the result of those changes (Chai & Chen, 2018). As a result, there is an increasing pressure for cities to find solutions for these developments (Smart City Strategie, 2017).

the Netherlands is also urbanizing. And according to a forecast by the Dutch Environmental Assessment Agency and the Central Bureau for Statistics this urbanization will increase even more in the future. Especially the four largest cities and medium-sized municipalities are expected to continue grow strongly[2] (PBL & CBS, 2016). Due to this growth and due to increasing suburbanization, travel distances increase which results in more dependence on motorised transport. Hence, urban sprawl can be seen as the cause of traffic growth (Tira et al., 2018) and the increasing use of contemporary infrastructure (Flügge, 2017).

1.1.1. Consequences

According to Banister (2011), traveling creates enormous benefits for societies. However there are also negative side-effects because of increasing mobility such as pollution and congestion (Banister, 2008, 2011; Steg et al., 2008). Transport systems are the biggest contributor to air pollution in large cities (Riva Sanseverino et al., 2017a). Most of the vehicles are fuelled by carbon, and its emissions have a negative impact on the global climate (Banister, 2011) and are affecting people's health because of air and noise pollution (UN-Habitat, 2014). Also, accidents caused by road traffic are one of the main causes of premature deaths in multiple cities and countries (UN-Habitat, 2014).

Another consequence of increasing mobility is congestion. In the Netherlands, because of the economic development, the number of vehicles on roads is increasing which means that the number of traffic jams is also increasing (Rijkswaterstaat, n.d.). And according to a study by the Knowledge Institute for Mobility policy (KIM, 2018) traffic on the main road network in the Netherlands will grow with 2,2% which will lead to an increasing congestion of 7%. For the years to come (until 2023) the

[1] Numbers from 2014 (Tomanek, 2017).

[2] The four cities are Amsterdam, Rotterdam, The Hague and Utrecht. Medium-sized municipalities are for example Almere, Haarlem, Amersfoort, Tilburg, Eindhoven, Breda, Arnhem, Zwolle, Nijmegen, Leeuwarden and Groningen (PBL & CBS, 2016).

KIM expects a annually mean of 1,5% growth in traffic in the Netherlands. Therefore, the travel time loss can increase up to 35% compared to 2017 (KIM, 2018).

1.1.2. Increasing use of infrastructure

However, traffic congestion can be seen as a phenomenon that is difficult to predict according to Triantis et al. (2011) and KIM (2018). For a long time, Triantis et al. (2011) argue, congestion was viewed as a 'supply side' problem: in order to solve or lower the congestion in cities, the increasing rate of supply (building additional infrastructure) should match the increasing rate of demand.

However, as argued by Morphet (2016), the traditional 'predict and provide' method of infrastructure planning is no longer useful. This is because it is done in isolation from other aspects and based on projected population increase within an area only. It has no options to adjust to demographic changes and existing capacities. Therefore the increase in supply of new infrastructure will never match the growing demand for new infrastructure (Banister, 2011). Also, expanding infrastructural network capacities by constructing additional roads is costly and environmentally damaging (Triantis et al., 2011). In addition, creating more road capacity can lead to opposite effects than those aimed for. An example is the 'Iron Law of Congestion' which means that road use will expand to meet the space available on roads.

And because urban development accelerates and due to the expansion of cities and thereby its increasing use of infrastructure, infrastructure depreciation is rising (Flügge, 2017). And in our increasingly connected society many problems occur within our existing and still growing mobility. As a result greater capacity is needed to manage the ongoing changes in global trade and the movement of individuals. However the expected growth of traffic, mainly due to the growing economy, can only partially be tackled by expansion of road capacity (KIM, 2018). Therefore our 'basic' transport infrastructure has to be transformed (Jones, 2017a).

1.1.3. Towards a smart solution?

An approach that responds to the insufficient supply of new infrastructure is to use the existing infrastructure more efficiently by focusing on its users and their travel behaviour (Triantis et al, 2011). According to Zanon (2018) there is a consensus that action is needed to reorganise mobility systems. To achieve this, a local or regional dimension is needed. However, a connection between different scales and the change of behaviour of people and companies makes it complex (Zanon, 2018). To address these problems and keep urban regions effective and functioning, it is important to implement solutions which can produce complementary effects (Tomanek, 2017). To reach this, 'smart' solutions are nowadays a promising trend (Tomanek, 2017). According to Schatzinger & Lim (2017) cities need these smart solutions to achieve a sustainable future. Because with smart and sustainable planning cities can be made more liveable (Bisello et al., 2017).

In relation to this research, especially the concept of 'Smart Mobility', a component of the Smart City, is interesting. To make this applicable in practice more collaboration within all levels of decision-making is needed, especially related to transportation (Schatzinger & Lim, 2017). This is also argued by Razaghi & Finger (2018) who wrote that urban problems have increased in being complex and therefore multiple actors are needed to face these problems (see also section 2.1.3.). Nevertheless, because of the increasing attention from scholars and governments for the Smart City concept, and therefore also for the Smart Mobility-concept, multiple definitions have been created for both terms since they can affect multiple aspects of urban regions.

1.1.4. Smart Mobility in the Netherlands

In the Netherlands the urban task within Smart City-developments is to improve the quality of the already existing city by deploying new technologies while keeping in mind the sustainability, safety and liveability (Ministerie van I&M, 2015). Examples of Dutch cities that already commit in becoming a Smart City are Amsterdam, Rotterdam and Eindhoven.

When focusing on mobility and infrastructure, both are important for the Netherlands. According to the World Economic Forum's (2019) Global Competitiveness Report from 2014-2015, the Netherlands is the highest ranking country in Europe based on its transportation infrastructure. Its excellent infrastructure is also acknowledged by Document C and a research conducted by KPMG (2018). According to KPMG (2018) this excellent infrastructure is the result of the heavily-used and well-maintained road network in the Netherlands. And because Smart Mobility-techniques benefit from the presence of advanced road infrastructure, it is interesting for this research to focus on the implementation of Smart Mobility in the Netherlands. Also because for the Netherlands *"… radically different solutions are needed to keep passenger and freight transport reliable and efficient in the future and thereby becoming fully sustainable"* (Dr.Ir J.M. Moonen, 2018, assistant professor at the University of Twente).

To ensure accessible infrastructure in the future multiple Smart Mobility-projects are developed in the Netherlands. However, most of them are experimental. In October 2018 the Minister of Infrastructure and Water Management from the Netherlands, drs. C. van Nieuwenhuizen, wrote a letter to the chairman of the House of Representatives to indicate that a shift in attention has to emerge from testing and experimenting with Smart Mobility towards the application and use of Smart Mobility in existing practice. This should be accompanied by embedding Smart Mobility as an integral part of policy and implementation processes (Document K, 2018). To achieve this, changes are required at governmental agencies such as the Dutch Vehicle Registration Authority, the Central Bureau for Statistics, the Directorate-General for Public Works and Water Management and other governmental authorities (Document K). And as Nieuwenhuizen (Document K, 2018, p.1) wrote: *"Smart Mobility has an important international dimension, [however] at the same time these developments have an impact on the local context"*. To achieve an all-encompassing approach and influence the international, national and regional level to connect more firmly, the minister wants to bundle forces with governmental agencies, the business community, knowledge institutions and social organizations. With this public funds will be dealt with more efficiently and more impact will be generated within Smart Mobility-policy and implementation processes (Document K, 2018).

However, in order to change towards a society in the Netherlands that includes Smart Mobility nationwide, institutional transformation is required. Because, according to Alexander (2005), institutional transformation is a critical aspect when translating ideas into action. Also Razaghi & Finger (2018) conclude that, in the process to address the urban complexity, there is a need for so called 'smart governance': decision-making based on data and involvement of local citizens. To reach this, more research is needed to help shape governance and define governance processes of Smart Cities (and thus Smart Mobility) (Razaghi & Finger, 2018). Hence, Dutch governmental agencies are required to append changes in order to embed Smart Mobility as an integral part of policy and implementation processes. However, as Ostrom (2005, p. 189) states: *"…to think about changing [the social dilemma], one needs to know a lot about the underlying structure leading to the social dilemma"*.

1.2. Problem description

As mentioned by the minister of Infrastructure and Water Management, a lack of implementation processes and a lack of impact from current laws and regulations are the main problem for Smart

Mobility-projects in the Netherlands. This is also argued by Wesselink (2017) who states that a general problem for the development of the Smart City, and therefore also Smart Mobility, is a lack of laws and regulations by governmental agencies. This is endorsed by Riva Sanseverino et al. (2017b) who state that, besides financial cooperation between public and private parties, guidelines are necessary for (local) authorities and other involved stakeholders to shift towards a Smart City and therefore also Smart Mobility.

With this in mind, rules for the implementation of Smart Mobility should be created. The majority of these rules should be composed at a national level or even at an European/international level (Nijboer, 2018). This is supported by UN-Habitat (2014) with the claim that institutional fragmentation has a negative influence on urban transportation possibilities. Thus, by separating urban functions between different (governmental) organization, opportunities to increase urban transportation possibilities are missed (UN-Habitat, 2014). Worth mentioning here is that UN-Habitat (2014) also argues that decision-making should be more decentralized to be more inclusive, democratic and transparent. This will enhance the legitimacy to civil society and other non-governmental stakeholders (UN-Habitat, 2014).

Because of this contradiction between centralized and decentralized decision-making, a balance has to be found between on the one hand allowing national government to create an institutional framework for implementing Smart Mobility within the Netherlands, and on the other hand aiming at a more regional/local and inclusive approach by including local citizens and stakeholders when aiming for implementation of Smart Mobility. In addition, due to the multiple definitions for Smart City and Smart Mobility in practice, it has become difficult to find agreement about a general understanding in Smart Mobility-projects with multiple stakeholders. Therefore this poor conceptualization needs to be concretized

1.3. Research objectives

To improve the implementation of Smart Mobility within the contemporary institutional framework, changes have to be made. To clarify these changes, the positive and negative influences on Smart Mobility implementation have to be clear. Therefore the aim of this study is to indicate what the catalysts and barriers for implementing Smart Mobility within the contemporary institutional framework are. It will then become clear which measures have to be taken to support the catalysts and overcome the barriers. Thereby, a more concrete understanding of the term Smart Mobility would be helpful.

To identify the catalysts and barriers for implementing Smart Mobility, the IAD-framework of Ostrom (2005; 2011) is used. With this framework an institutional analysis is conducted on a case study, the Dutch SmartwayZ.NL-programme. Eventually, the results are described as recommendations for improving the way of implementing Smart Mobility within the contemporary institutional framework.

In order to achieve these objectives, the following research question will be answered:

“How can the implementation of Smart Mobility in the Netherlands be improved through institutional design?”

To answer the main research question the following secondary research questions are formulated:

- How can Smart Mobility be conceptualized?
- What are possibilities for Smart Mobility based on the contemporary institutional framework within the Netherlands?

- Which institutional barriers and catalysts to Smart Mobility implementation can be identified in ‘SmartwayZ.NL’?

1.4. Outline

This report is structured by the following chapters: chapter two contains the theoretical framework which elaborates on the definition of Smart Mobility and how institutional design could be interpreted. Chapter three describes how this research was conducted by explaining the research design, the selected case study, the applied research methods and how the data analysis was conducted. Chapter four describes the results from the case study. In chapter five the results are discussed and the research questions are answered. In this last chapter the relevance of this study is also explained, together with a critical reflection and suggestions for further research.

2. Theoretical Framework

In this chapter the term Smart Mobility, of which a start is made with its definition in chapter 1, is conceptualized further as a means to clarify its meaning and components. Thereafter the meaning of institutions and institutional design are being discussed, followed by its connection to Smart Mobility.

2.1. The definition of Smart Mobility

As described in the introduction, Smart City techniques are able to offer solutions for problems which occur within urban development. Also, Smart Mobility is seen as part of the Smart City concept. Therefore, in order to understand what Smart Mobility actually is, the concept of Smart City is explained first.

2.1.1. Conceptualizing Smart City

The concept of Smart City was developed by combining ideas about how communication technologies and information technologies could improve the efficiency of cities and tackle problems such as social deprivation, poverty and poor environments. In academic literature there are multiple definitions of what a Smart City exactly is or pursues (Caragliu et al., 2011; Dameri, 2017; Giffinger et al., 2007; ISO/TMB, 2015; Iyengar, 2017; Riva Sanseverino et al., 2017b). However, the most used definition of Smart City comes down to *"…a city in which ICT is merged with traditional infrastructures, coordinated and integrated using new digital technologies"* (Batty et al., 2012 p.481). This is because the application of data is one of the most important features of a Smart City (WileyRein, 2017). With this, a Smart City can focus on the use of multiple possibilities like digital information and communication, technological applications and Internet of Things (IoT) to better manage the city (WileyRein, 2017).

The concept of Smart City should not be confused with building a completely new, Smart City (Iyengar, 2017). A city evolves into a Smart City by creating changes in the way of dealing with the current and future needs of that city. This is possible through implementing smart applications and new technologies in combination with cultural changes (Iyengar, 2017). In addition to this, Riva Sanseverino (2017c) argue that a broader definition of the Smart City should also include the socio-economic aspects were participation of citizens is used to improve the social environment. This is included in the following quotation, stating a comprehensive view of the Smart City concept: *"… a Smart City develops around the use of technology (in particular the function of ICT is central) to improve competitiveness and to ensure a more sustainable future through networks, that interconnect people, … companies, consumers (prosumers), energy carriers, spaces etc.. A Smart City is also a city that tries to address public issues through joint solutions, based on a multi-stakeholder municipal partnership"* (Riva Sanseverino, 2017c, p.27).

To continue on the social aspect, the Smart City concept could also be seen as an 'urban strategy' where technology is used to improve the delivery of better services to citizens and to improve the environmental quality which should lead to an increasing quality of life in cities (Benevolo et al., 2016). For example, the Smart City concept can be used for many different topics related to the urban environment, such as waste treatment, air quality, green energy production, construction of energetic efficiency buildings, open data and e-government (Benevolo et al., 2016). Based on these multiple possibilities, the concept Smart City could be seen as an encompassing term for six dimensions: Smart Economy, Smart People, Smart Governance, Smart Living, Smart Environment and Smart Mobility (Giffinger et al.,2007).

When taking into account the multiple definitions of Smart City and its extensive possibilities, the Smart City concept could be divided into three pillars according to Benevolo et al. (2016):

- The green city: which is about an ecological point of view on the urbans space that is based on the concept of sustainable development. As a result green policies within cities are focusing on reducing the ecological footprint and reducing pollution, waste and energy consumption
- The knowledge city: is about policies focusing at increasing the information and knowledge that should be available and produced in cities. Knowledge that should be produced and used by companies, science parks and innovative businesses
- The digital city: regards the use of ICT to create an interconnected network of organizations and citizens. The most important issue is the sharing of data and information, which should be supported by public policies.

For the Netherlands the 'Smart City Strategy' (2017) has been developed. This Strategy mentions seven characteristics of a Smart City. Especially the characteristic *"application of data and integrated technologies"* (p.28) matches with the studied literature. The other six characteristics are also recognizable in other spatial developments: (1) quality of life, (2) sustainability, (3) resilience, (4) involving residents, (5) involving cross-sectoral cooperation and (6) new leadership.

Now it is clear what the concept of Smart City is and how Smart Mobility relates to it, the concept of Smart Mobility itself is more elaborated upon since it is important for this research to understand this concept.

2.1.2. Conceptualizing Smart Mobility

According to Benevolo et al. (2016) and Chai & Chen (2018), Smart Mobility can be considered the most important topic within the Smart City, because mobility is an important facility for an urban area to function properly. Because of this, and because mobility produces several negative impacts on cities (pollution, noise, congestion), Smart Mobility is regarded as one of the most promising topics within the Smart City since measures against the negative impacts could affect almost all citizens (Benevolo et al., 2016). The most important Smart Mobility-objectives could be divided into six categories according to Benevolo et al. (2016): (1) reducing traffic congestion, (2) reducing pollution, (3) increasing people safety, (4) improving transfer speed, (5) reducing transfer costs and (6) reducing noise pollution. And following the three main pillars of Smart City mentioned above, Smart Mobility could be related to the same three pillars according to Benevolo et al. (2016):

- The green city: because transportation in cities is one of the main causes of pollution in cities, the environmental impact of transport could be reduced by applying Smart Mobility-techniques.
- The knowledge city: applying Smart Mobility within a city also depends on the degree of citizens' knowledge, behaviour and sharing cities civic values.
- The digital city: the use of software applications and ICT could optimize multiple issues regarding traffic systems such as more effective public transport, giving suggestions to citizens about urban mobility and routes, decreasing traffic hindrance etc.

Nevertheless, and maybe because of its important function, in comparison to the concept of Smart City also for Smart Mobility there are multiple definitions of what it entails. Jones (2017b, p.5) for example argues that Smart Mobility can be seen *"… as the overall encompassing concept for a more connected and efficient ecosystem [which] is both timely and relevant for many"*. This definition focuses on the overall efficiency of the system without mentioning the need for technological innovations. However, compared to the Smart City definitions, also Smart Mobility is often characterized by the use and implementation of ICT-applications to optimize transportation fluxes, the quality of public transportation services and the liveability in cities (Benevolo et al., 2016).

Benevolo et al. (2016) even argue that a positive correlation is present between the use of ICT and the Smart Mobility-maturity. As a follow-up on this correlation, Staricco (2013, in Benevolo et al., 2016) argues that Smart Mobility can be seen in two different ways in relation to the use of ICT:

- A mobility system that is characterized by the systematic use of ICT, which therefore plays an important role
- Appropriate technologies play an important role in an efficient and effective mobility system rather than ICT, which plays an independent role within the mobility system.

Explicitly focusing on traffic management are Chai & Chen (2018) and Riva Sanseverino et al. (2017a). Chai & Chen (2018) refer to Smart Mobility as aiming for more efficient urban transportation and its management by using innovative technologies, which could lead to an innovative and effective way of addressing traffic problems. Riva Sanseverino et al. (2017a) continue on this by stating that Smart Mobility is about using mobility information (e.g. real-time information on traffic) to manage public and private urban traffic. With this, traffic problems can be dealt with. On a more personal level, mobility information can also support decision-making for the choice of transport mode and which route to follow. As a result, the use of remote traffic management is increasing (Riva Sanseverino et al, 2017a).

Besides the concept of Smart Mobility also other concepts are used by academics. This is made clear by multiple authors such as Banister (2008), Conticelli et al. (2018) and Soriano et al. (2018) who are referring to what they call 'Sustainable (Urban) Mobility'. This concept is focusing on the worldwide response to the environmental, social and economic issues, for example emissions and traffic congestion and the increasing use of private cars. This focus is however on more effective use of resources (Soriano et al., 2018) and the change towards more active travel (e.g. cycling and walking) (Conticelli et al., 2018) instead of using technologies. In addition to this deviation from Smart Mobility, combining technological innovations and mobility is nothing new. However, the way of applying these technological innovations has changed. Previously, the combination of technology and transportation was mainly focused on vehicle improvements instead of infrastructure improvements, as is stated by Banister (2008). He argued that the role of technology was important because of its impact on the efficiency of transport. However, he substantiated this in relation to technological innovations for modes of transport (e.g. engine design and alternative fuels) instead of technological innovations implemented on transportation infrastructure.

Based on the insights from the literature, the following definition of Smart Mobility is used in this research: Smart Mobility addresses mobility-related urban complexities in a comprehensive way with the use of innovative technologies as an important condition.

2.1.3. How to implement Smart Mobility?

As elucidated above there are many definitions of Smart Mobility and what it entails. And as already mentioned in chapter 1, a change towards Smart Mobility is seen as a promising solution. Therefore the transition to Smart Cities, with Smart Mobility as a part of it, has already started. But this transition process comes with changes at the local, regional and national level. Thereby bringing up technological, social, economic and political challenges, adding 'unknowns' to the traditionally stable institutional system (Razaghi & Finger, 2018). And because urban problems have increased in being complex, a single actor does not have the necessary resources, power, expertise or knowledge anymore to face these problems alone. Therefore multiple actors are needed, which results in a large set of relationships among the actors that have to collaborate on solving these urban problems. This complicates the coordination of problem solving (Razaghi & Finger, 2018). A way must be found to coordinate this problem solving. Therefore, as argued by Razaghi & Finger (2018), in many cases governance is seen as *a*, if not *the* critical factor for implementation of Smart Mobility measures.

Because of this complicated coordination of problem solving, the implementation of Smart Mobility is very much dependent on the institutional capacities to hinder or promote the implementation of technological possibilities in practice (Razaghi & Finger, 2018). In order to find barriers and catalysts for implementing Smart Mobility within the contemporary institutional framework, first it should be clear what is meant by institutions and institutional design. Thereafter the institutional relevance for implementing Smart Mobility is explained.

2.2. Institutions and institutional design

In this section it becomes clear what is meant by institutions and institutional design.

2.2.1. Conceptualizing institutions

Institutions are often referred to as 'the rules of the game' which should guide and coordinate actors and their behaviour (Koppenjan & Groenewegen, 2005). According to Helmke & Levitksy (2004, p.727) Institutions are *"…the rules and procedures that structure social interaction by constraining and enabling actors' behaviour"*. In addition to this, Helmke & Levitksy (2004), but also Koppenjan & Groenewegen (2005) make a distinction between so called 'formal institutions' and 'informal institutions':

- Formal institutions are defined as rules and procedures that are created, communicated and enforced by official channels
- Informal institutions are defined as socially shared rules which are usually unwritten and created, communicated and enforced without officially sanctioned channels.

These formal and informal institutions are necessary for the system to function (Koppenjan & Groenewegen, 2005).

With institutions strategic uncertainty in multi-actor settings is reduced, along with the risks of strategic or opportunistic behaviour of actors and the reductions of costs of interaction between involved actors. This allows institutions to provide stability and predictability (Koppenjan & Groenewegen, 2005). Therefore, institutions can be seen as quite robust, however this does not exclude possible changes to these institutions. According to Kickert et al. (1997, in Klijn & Koppenjan, 2006) these changes could be divided in two types: the first type of change is about improving strategic behaviour of actors within policy networks and the quality of interaction between actors. This focuses on the strategy that policy networks should be considered as a fact of life. The second type of change focuses on adjusting existing policy networks or even abolishing them or creating (a) new policy network(s). This could for example be effects of dissatisfaction with contemporary policy networks (Kickert et al., 1997, in Klijn & Koppenjan, 2006).

According to Koppenjan & Groenewegen (2005) institutions are continuously changing due to changes in relation to other institutions at other levels and due to ongoing environmental processes. However, these changes can go unnoticed because of their very slow development (Koppenjan & Groenewegen, 2005). Nevertheless, since institutions are an important aspect related to these changes, it is relevant to elaborate more on the 'the rules of the game'.

2.2.2. What are rules?

Institutions or institutional arrangements can thus be regarded as a set of rules that steer the interaction between involved parties within a (technological) system in order to make it functioning (Koppenjan & Groenewegen, 2005). In addition, Ostrom (2011, p.17) argues that rules are *"… shared understandings among those involved that refer to enforced prescriptions about what actions (or states of the world) are required, prohibited, or permitted"*. Therefore, rules can be regarded as multiple instructions with the aim of creating an action situation within a particular environment

(Ostrom, 2005). With rules individuals order their relationships with other individuals and with the community in which a changing situation occurs (Ostrom, 2011). Thus, with rules stability can be created during actions. However, this stability depends on the shared meaning of a certain rule or set of rules. When there is no shared meaning about a rule or a set of rules, there will be confusion about what actions are needed, permitted or forbidden (Ostrom, 2011). And even if there is a shared meaning at the time a rule is created and accepted, the event on which the rules apply can change due to e.g. transformations in shared norms or in technology (Ostrom, 2011).

In order to analyze institutions, it is important to understand the working rules and norms that individuals use when making decisions. In this, working rules refer to actions taken by participants (Ostrom, 2005; 2011). This need for understanding the rules is also mentioned by Helmke & Levitsky (2004, p.726): *"Good institutional analysis requires rigorous attention to both formal and informal rules"*. Therefore, besides the formal rules within institutions also the informal rules are important to consider. This is because these shape political behaviour and outcomes strongly. Also, many of the 'rules of the game' that structure political life are created, communicated and enforced in an informal way (Helmke & Levitsky, 2004).

With this research there is a focus on a diversity of rules (variables), their interactions and created opportunities and constraints (Ostrom, 2011). To analyze these rules the IAD-framework from Ostrom is used. The use and further elaboration of this IAD-framework and its seven rules, together with more information about the formal and informal rules can be found in section 3.4.1.

2.2.3. Conceptualizing institutional design

According to Alexander (2005, p.210) *"…planning often demands institutional design"*. Because in order to implement Smart Mobility within the contemporary institutional framework, it is likely that changes have to be made. And as Alexander (2005) argues, a major part of planning is associated with institutional transformation. And when institutional transformation is about an intentional intervention, this could be seen as institutional design. Or as Klijn & Koppenjan (2006) argue, the process of changing the rules is called institutional design. There are four reasons for doing institutional design (Alexander, 2005): (1) there is institutional design of the planning process itself, where the existing planning system and involved institutions are inadequate for the goals that are set, (2) if a new programme or project becomes part of a policy or plan, the question of how this will be implemented and organized can be answered with help of institutional design. (3) Institutional design is also needed when new organizations or a reorganization of existing ones is demanded for plan or policy implementation, where new interorganizational linkages are needed or where existing networks are transformed to enable the involved organizations to make the necessary decisions. Finally (4), institutional design is needed when new or amended legislation or regulations are needed by a policy or plan.

It can be argued that institutional design is often complex. Klijn & Koppenjan (2006) distinguish three institutional design strategies: strategies aimed at the network composition, strategies aimed at the network outcomes and strategies aimed at network interactions. Often a combination of reframing strategies is used, accompanied by direct interventions in rules (Klijn & Koppenjan, 2006). However, reframing strategies and direct interventions in rules does not always result in explicit outcomes because, as already mentioned, institutional design is often complex. Also, the interaction processes in which institutional design is realized are often characterized by unforeseen and unexpected consequences (Klijn & Koppenjan, 2006). Also, according to Klijn & Koppenjan (2006), the development of an institutional design by (a mix of) strategies depends likely on three main factors: (1) the networks' institutional characteristics, (2) dominant discourses and imitation behaviour within or outside the network and (3) strategic choices and options.

To continue with the rules from Ostrom (2005; 2011), according to Alexander (2005, p.213) institutional design can be formulated as *"… the devising and realization of rules, procedures, and organizational structures that will enable and constrain behaviour and action so as to accord with held values, achieve desired objectives, or execute given tasks".* Institutional design as formulated by this definition includes action, legislation, planning and programme design, policymaking and implementation. And just as policy making is a bargaining game, the same holds for institutional design. However, the game of institutional design is even harder because new formulated decisions have to be applied, with the focus of this research, in already existing mobility practices (Klijn & Koppenjan, 2006).

2.3. Institutions and Smart Mobility

As mentioned in section 2.1.3. the transition process towards Smart Mobility comes with changes at the governance level that include technological, social, economic and political challenges. Therefore it is difficult to apply the Smart Mobility-concept. This is because there are no agreements about the boundaries of a city in relation to the administrative, functional and social context (Garau et al., 2017). As a result these urban dynamics are irreducible to the traditional parts of administration, politics and hierarchy (Garau et al., 2017). Therefore it can be argued that technological development should be supported by institutions, and where needed institutional changes.

2.3.1. Applying technical intervention

However, in order to apply the Smart Mobility-concept in the urban environment, a socio-technical approach must be used because of the city's governmental state within society (Zanon, 2018). The approach should focus on coordinating and developing technology factors such as ICT and its infrastructure, human factors such as social capital, and institutional factors such as governance, policy and regulations. Therefore, a 'smart model' cannot only focus upon the technological systems but should also address the social and institutional systems (Zanon, 2018). Künneke (2009) subsequently wrote that it is important that changes within institutions correspond with supporting changes in technology and the other way around. These two aspects, combined with economics, are called infrastructures by Künneke (2009). To make this interconnection more concrete: there are four 'system relevant functions' which are essential for the performance of infrastructures. These four functions need to be technically and institutionally supported in order to function. The degree of coherence between these technical and institutional systems is important for the infrastructure performance. An overview of this is given in figure 1.

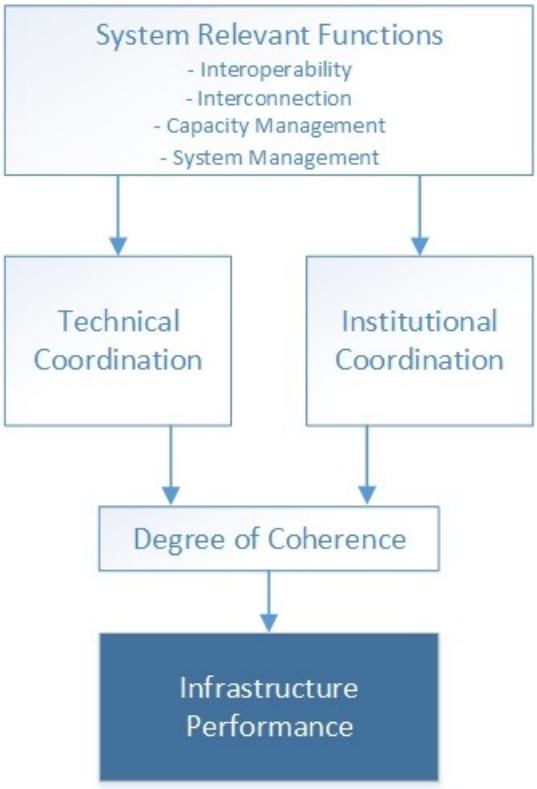

Figure 1. The relationship between institutions and technology and the impact of both on infrastructure performance (Source: author, based on Künneke, 2009).

2.3.2. The need for changing institutions

This institutional aspect is also endorsed by Koppenjan & Groenewegen (2005) who state that complex technological systems such as energy networks, transport systems and information systems are not just a challenge from a technological point of view. Complex technological systems also require an institutional structure which coordinates involved parties. Therefore, an institutional design is needed they argue.

The lack of innovative governance and management approaches for using smart technologies in solving today's urban challenges is also highlighted by Razaghi & Finger (2018). They argue that technological capacities for facing urban challenges, such as autonomous driving, are often more developed than the institutional capacity to implement such technological solutions. Therefore it is arguable that the bottleneck to make use of these technological innovations and its benefits is on the governance side (Razaghi & Finger, 2018). It can therefore be argued that technological advancements do not necessarily mean that they are accompanied by institutional innovations. As a result there is an inconsistency between the technologies and responsible institutions within urban infrastructure systems. Therefore, according to Razaghi & Finger (2018), more steps need to be taken on the governance side.

Therefore, changing institutions in regard to mobility and infrastructure is an essential part. Within this change, its management is the most important and complex issue. This is because of the already mentioned plurality of actors and its variety of demands. Also, there are interactions on different scales: from European, to the national, regional and local scale. Hence, in order to handle the mobility turn and use Smart Mobility as a solution for this, a change in the current institutional framework is needed, according to Alexander (2005, p210): *"If planning is the translation of ideas into action, and the planner's goal is the transformation of society, then institutional transformation must be a critical aspect of planning"*. And also there are only two ways of changing people according to Alexander (2005): by changing individuals and by changing institutions. Because of this difference

between changing individuals and changing institutions, infrastructure management must be flexible and based on cooperation (Zanon, 2018). Therefore, Zanon (2018) argues that besides an information basis, appropriate control mechanisms are important. Both 'hard' (e.g. new infrastructures) and 'soft' interventions (e.g. innovation of management systems and coordination of actors) are needed.

This study focuses on applying 'soft' interventions which will focus on changing the 'rules of the game' to implement Smart Mobility. Because, according to Klijn & Koppenjan (2006), without the attendance of institutions every form of collective action and collective behaviour would be impossible. Institutions provide a source of stability with its fixed rules, norms and agreements. And because at the moment there is no proper institutional framework for implementing Smart Mobility, changing contemporary rules in order to do so, is obvious. And as described above, we could describe the process which is aimed at changing the rules as institutional design (Klijn & Koppenjan, 2006).

2.4. Conceptual model

When combining the insights and theories as described in this chapter, the conceptual model can be made (see figure 2). Current institutions for implementing Smart Mobility have originated from institutional design. And as already mentioned in section 2.2.2. institutions consist of the seven rules as identified by Ostrom. For this study catalysts and barriers of the contemporary institutional framework regarding the implementation of Smart Mobility will be identified. Together with technical Smart Mobility developments the catalysts and barriers will influence the implementation of Smart Mobility-techniques.

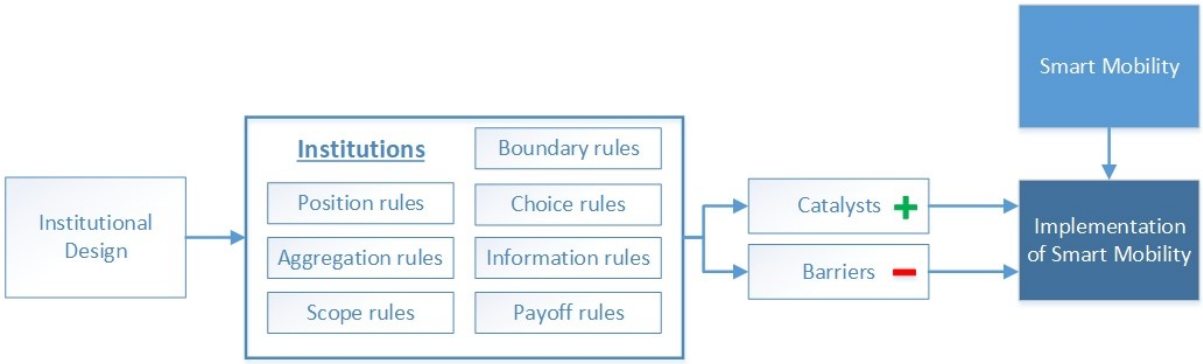

Figure 2. Conceptual model (Source: author).

3. Methodology

In this chapter the methodology used for this qualitative research is explained. It consists of three phases: literature research, institutional analysis and semi-structured interviews. For each of these phases is explained why a certain methodology was used. For a clear overview, table 3 shows the basic outline of the methods used for answering the secondary research questions of this qualitative research.

3.1. Research design

For this research a case study was conducted. The case study method is regarded as a method especially relevant when trying to evaluate broad and complex initiatives, e.g. systems reforms and community development projects (Yin, 2013). Therefore this qualitative method will help to understand the complex dynamics that are part of Smart Mobility implementation.

3.1.1. Generalization

The concerns with case study evaluations are often about making generalizations. The preferred way of making generalizations from case studies is making an analytical generalization (Yin, 2013). This is instead of reaching for a numeric generalization, which is not applied in this research (due to a lack of time and because Smart Mobility is rather 'new' and therefore not many cases could be compared to each other). Analytic generalizations are not focused at contributing to abstract theory building but aim for applying its derived knowledge to other concrete situations (Yin, 2013). This statement also applies to this research.

According to Yin (2013, p.325), generalizations *"…form the basis for 'scaling-up' a desirable intervention within the same country"*. This is also one of the reasons why was chosen for a regional Smart Mobility-programme instead of a local Smart Mobility-project. Because with a local project, less stakeholders are involved and less impact is made by applying Smart Mobility technologies on a local scale. With the regional focus of the selected case, a thorough understanding is created of how Smart Mobility is implemented on a regional scale and how multiple stakeholders are involved within this case. According to Yin (2013), doing a close-up, in-depth study of a specific case in its real-world context will lead to a very strong empirical foundation for the generalizations that are made. Based on this, national implementation of Smart Mobility can be more generalized from a regional perspective in comparison to a local project or programme.

In order to improve making generalizations about the results from the case study, data triangulation was applied (see section 3.3). Ultimately, findings of the case study will be linked to the weaknesses and gaps which are already mentioned before in chapter 1 and 2. This connection, according to Yin (2013), will lead to making generalizations from a single case study that are of greater meaning and could lead to cumulative knowledge (in this research: knowledge about barriers for implementing Smart Mobility in the Netherlands).

3.2. Case study

3.2.1. Case selection

Because Smart Mobility could be regarded as rather 'new', finding a suitable case for this research within the Netherlands was not difficult as there where not many cases to explore. Because the focus of this case study-research is on finding institutional catalysts and barriers for Smart Mobility implementation within the contemporary institutional framework, the focus for selecting a particular

case was on the Smart Mobility-programmes. The reason for this was because Smart Mobility-programmes within the Netherlands have a more regional focuses than Smart Mobility-projects which have often a more local focus. This regional focus makes it more interesting for this research because programmes are often more extensive which has effect on the number of actors that are involved. Also the application of Smart Mobility-techniques within programmes are often done on a larger scale compared to Smart Mobility-projects. This could lead to more extensive list of catalysts and/or barriers with effects in multiple directions.

The focus of the case study will be on the Smart Mobility-programme 'SmartwayZ.NL'. This case focuses on the southern region in the Netherlands, in the provinces of Noord-Brabant and Limburg. This case was chosen because of its regional focus, the multiple stakeholders that are involved (national/regional/local governments, learning institutions and market parties) and because of its focus on implementing Smart Mobility-techniques and applications within the eight challenges the SmartwayZ.NL-programme consists of.

3.2.2. Unit of analysis

To be able to place the results in chapter four in perspective, the unit of analysis within the case study will be discussed first.

The unit of analysis contains multiple actors (public, semi-public and private). Because the programme consists of a programme committee and a programme team, together with all the involved parties within each of the eight challenges, it goes beyond this research to mention and discuss them all. Therefore, the specific actors involved within the programme committee and programme team are mentioned, whereas actors involved within the different challenges are mentioned based on their origin.

The programme council consists of governmental organizations (Provinces of Limburg and Noord-Brabant, Directorate-General for Public Works and Water Management, the minister of Infrastructure and Water Management), knowledge institutions (TU Eindhoven, TU Delft and the Planning Agency for the Living Environment) and businesses. Every organization that is involved within the council is also represented within the programme team. These are representatives are employees of the (semi)-public and private actors and initiators of the programme. Further, the programme has eight challenges of which seven challenges are focused on infrastructure development and the eighth challenge focuses on the implementation of Smart Mobility. Because every challenge merely consists of the same sort of actors, only one challenge is highlighted in relation to the actors involved (see figure 3).

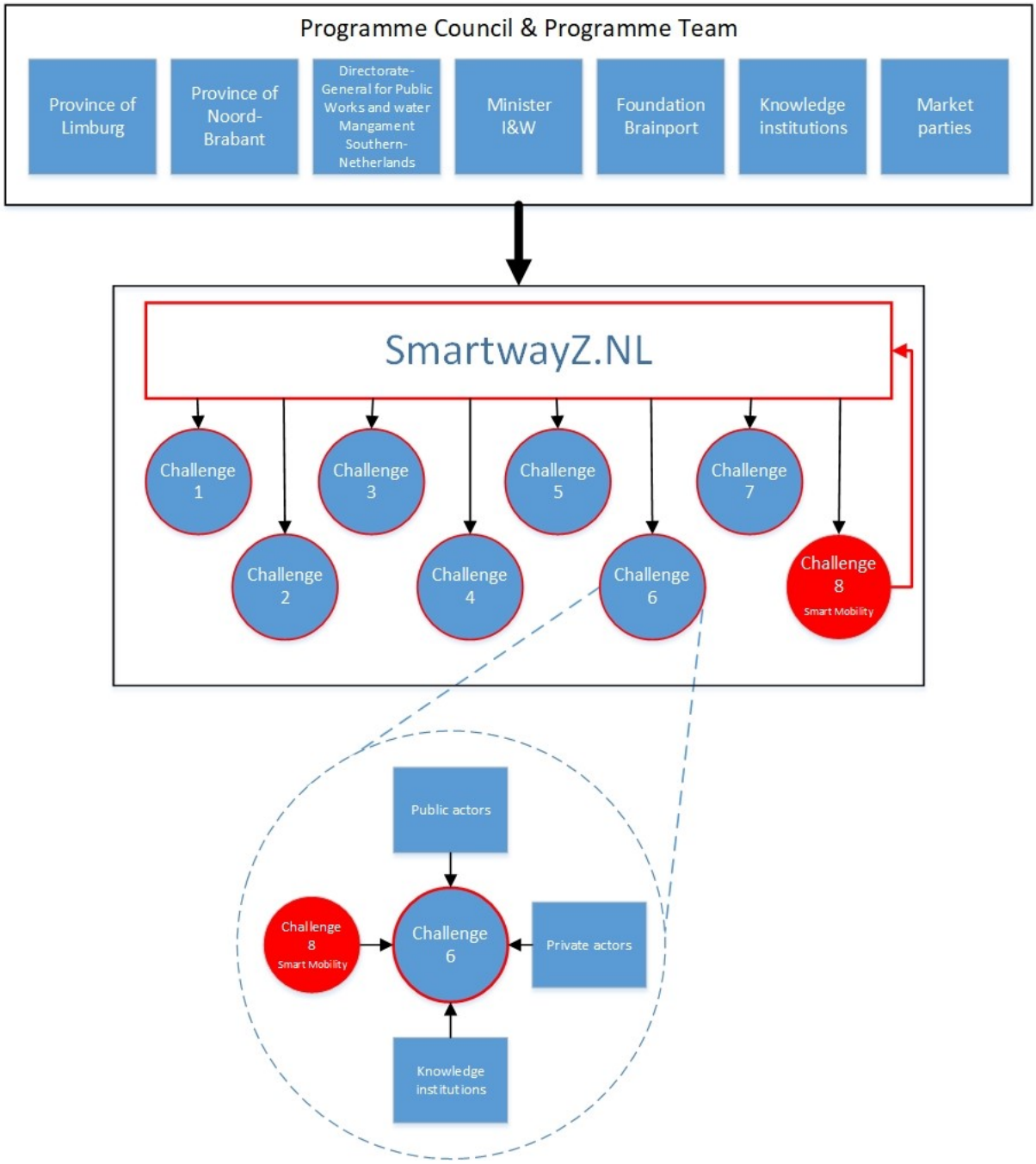

Figure 3. Unit of analysis (Source: author).

3.3. Research methods

In order to answer the three secondary research questions, which will lead to answering the main research question, data is collected from multiple data resources with different research methods. Because a quantitative approach is not sufficient for answering the main and secondary research questions, a qualitative approach with corresponding research methods is used. These research methods include (grey) literature research, institutional analysis and semi-structured interviews. By using three research methods the possibility of data-overlapping is present (see figure 4). This is called data triangulation which, according to Yin (2013) and Baarda et al. (2018), can result in greater confidence on the overall findings of a study and the validity of the evaluation of a case study.

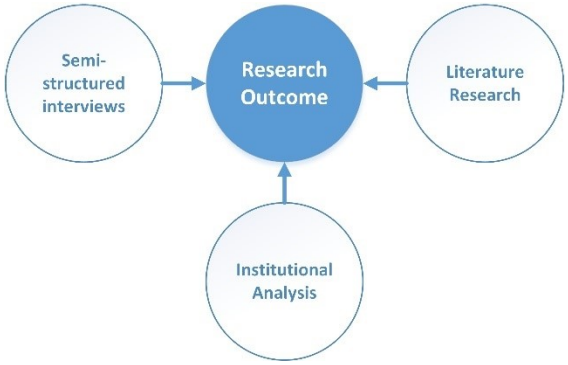

Figure 4. Data triangulation: with these research methods the research question is answered (Source: author).

The following section explains why and how each research method is used.

3.3.1. Literature research

Literature research is used to construct the theoretical framework which is about getting a thorough understanding of the concepts of Smart Mobility, institutions and institutional design. The literature is obtained by books from the library of the University of Groningen and by online sources, found via SmartCat and Google Scholar. Also, suggestions for literature by the supervisor and by courses followed in the authors master programme were used in obtaining relevant literature. Furthermore, the reference lists of the obtained literature where also a source for additional relevant literature. And in addition, for obtaining information about the case sometimes grey literature was used when official documents or literature were not available.

In order to understand the concept of Smart Mobility, first the concept of Smart City was further elaborated on as Smart Mobility is part of this concept (see chapter 2.1.). For understanding the Smart City concept, research papers and (online) books of (among others) Caragliu et al. (2011), Dameri (2017), Giffinger et al. (2007) and Iyengar (2017) are consulted. For conceptualizing Smart Mobility, work of e.g. Banister (2008), Riva Sanseverino et al. (2017a) and Chai & Chen (2018) is used. Explaining institutions and institutional design was another important element of the theoretical framework because of the focus of this research on improving the implementation of Smart Mobility within institutions. Scholars as Koppenjan & Groenewegen (2005), Helmke & Levitsky (2004) and Ostrom (2005; 2011) are used to get a thorough understanding of institutions, institutional design and institutional analysis.

Whereas literature about Smart Mobility can be considered rather ‘new’, literature about institutions and institutional design is available for a longer time. Therefore, the selection of relevant literature for the institutional part is based on the date of publication. More recent publications were expected to be more relevant due to changing circumstances, The literature for the Smart Mobility part of this research is primarily based on the availability and correspondence with the aim of this research.

3.3.2. Institutional analysis

An institutional analysis is conducted to obtain an overview about the possibilities for Smart Mobility implementation. Institutional analysis is done by consulting policy documents (policy analysis) that were focused on implementing new technologies or Smart Mobility within the contemporary institutional framework and SmartwayZ.NL (see table 1). During analysis of the policy documents the focus was on the goals set by authorities and on the formulated strategies that are/were used in order to achieve these goals. In relation to the case study, the interviews were also contributing to

the institutional analysis. This is because the interviewees spoke about how the SmartwayZ.NL-programme was set up and how responsibilities were divided among involved actors.

In addition, grey literature sources have been useful for acquiring knowledge about the context of policy documents and certain decisions that are made and about current practices in Smart Mobility in the Netherlands, e.g. news articles about Smart City and/or Smart Mobility developments in the Netherlands or publications by interest groups. These grey sources were considered valuable for interpreting the institutional framework and the possibilities for Smart Mobility. Because these documents can be considered as reflections on the contemporary institutional framework.

Table 1. Consulted policy documents.

Document	Title/subject policy document	Institution	Year
Document A	Aanvalsplan Smart Mobility Zuid Nederland *"Plan of attack Smart Mobility Southern Netherlands"*	SmartwayZ.NL	2016
Document B	Governance Bereikbaarheid Zuid-Nederland *"Governance Accessibility Southern Netherlands"*	SmartwayZ.NL	2016
Document C	Smart Mobility: Bouwen aan een nieuw tijdperk op onze wegen *"Smart Mobility: Building a new era on our roads"*	Ministry of Infrastructure and the Environment	2016
Document D	Experimenteerwet *"Experimental Law"*	National government	2018
Document E	Experimenteerwet in werking *"Experimental Law in force"*	National government	2019
Document F	Uitvoeringswet Algemene Verordening Gegevensbescherming *"Implementing law General Data Protection Regulation"*	National government	2019
Document G	Verdrag van Wenen *"Vienna Convention on Diplomatic Relations"*	United Nations	1961
Document H	Brief Minister van Infrastructuur & Milieu, Schultz van Haegen: Bereikbaarheid Zuid-Nederland "Letter Minister of Infrastructure and the Environment, Schult van Haegen: Accessibility Southern Netherlands	Ministry of Infrastructure and the Environment	2015
Document I	Strategische langetermijnagenda SmartwayZ.NL *"Strategic long-term agenda SmartwayZ.NL"*	SmartwayZ.NL	2018
Document J	Schets Mobiliteit naar 2040: veilig, robuust, duurzaam *"Preview Mobility to 2040: safe, robust, sustainable*	Ministry of Infrastructure and Water Management	2019
Document K	Smart Mobility Dutch reality	Ministry of Infrastructure and Water Management	2018

3.3.3. Semi-structured interviews

Different actors with different backgrounds were interviewed to gain insights about the SmartwayZ.NL-programme from multiple perspectives. Semi-structured interviews were conducted to get insight in the way of performing the SmartwayZ.NL-programme. Semi-structured interviews were held because this way of interviewing offers the interviewees the opportunity to talk about subjects they think are important besides the list of predetermined questions that was composed. It also offered the interviewees the possibility to answer with an open response in their own words rather than a simple 'yes' or 'no' answer (Longhurst, 2010). The authors preference was to conduct face-to-face interviews, because the conversation is easier to follow and it provides more information then interviewing by telephone. To increase the chance of arranging a face-to-face interview, date, time and location was agreed upon that suited the interviewee best.

In advance, an interview guide with questions was composed based on the seven rules of the IAD-framework from Ostrom (see section 3.4.1. and Appendix 1) in relation to the implementation of Smart Mobility within the programme. The interview guide was also created to structure each interview around the same topics in order to focus on the subject of this research. However, each question asked was an open-ended question. This allowed the interviewer to bring up interesting, unanticipated topics which weren't part of the interview in the first place but could provide valuable information for this research.

The interviews were structured along a few suggestion made by Longhurst (2010). She suggested to held the interview prepared. Therefore the author acquired knowledge about Smart Mobility developments and the programme under study. The interview guide that was composed was first submitted to the author's supervisor. This interview guide was the backbone of each interview and could be helpful in the case a conversation 'dries up'. Another suggestion by Longhurst (2010) was to include a combination of different types of questions in the interviews, starting with a more comfortable question for the interviewees ('How do you conceptualize Smart Mobility?'). Eventually, the more in-depth and difficult or sensitive questions where discussed in the second half of the interviews. Also, the author tried to allow the discussion to unfold, where the order of the listed questions was not a predefined 'path' to follow during the interviews. Nevertheless, some interviews were held according to the order of the questions in the interview guide. Besides, information gathered from earlier interviews within this study was used in the following interviews. Furthermore, according to Longhurst (2010), semi-structured interviews are not only about asking questions and talking but also about listening, paying attention and being open to hear what the other person has to say. Therefore during the interviews, the interviewer tried to interrupt as little as possible and let the interviewee tell his/her story and experiences. An additional benefit was that this was also useful when transcribing the interviews.

Table 2. List of the interviewees and their role within the SmartwayZ.NL-programme or Smart Mobility in the Netherlands.

Function	Role	Date	Conducted
Interviewee A	Programme coordinator SmartwayZ.NL	20-05-2019	Face-to-face
Interviewee B	Programme manager SmartwayZ.NL	21-05-2019	Face-to-face
Interviewee C	Project manager SmartwayZ.NL	21-05-2019	Face-to-face
Interviewee D	Cluster manager SmartwayZ.NL	29-05-2019	Face-to-face
Interviewee E	Project manager SmartwayZ.NL	29-05-2019	Face-to-face
Interviewee F	Director Smart Mobility-initiative	20-06-2019	Telephone
Interviewee G	Consultancy advisor SmartwayZ.NL	03-07-2019	Face-to-face
Interviewee H	Consultancy advisor Smart Mobility	05-07-2019	Face-to-face
Interviewee J	Consultancy advisor SmartwayZ.NL	05-07-2019	Face-to-face
Interviewee K	Senior researcher focused on mobility	16-07-2019	Face-to-face

Table 3. Overview of the methods used in this research.

Secondary research question	Methods	Source(s) of information	Results	Used techniques
How can Smart Mobility be conceptualized?	Literature research	Literature about Smart Mobility and Smart Cities	Insights from existing literature on the meaning of Smart Mobility and what it entails	No specific technique is used here
What are possibilities for Smart Mobility based on the contemporary institutional framework within the Netherlands?	Literature research and institutional analysis	Literature on Dutch institutional framework and the possibilities for transitions or adapting on new techniques. National/regional/local governmental documents	Insights from existing literature and insights from governmental documents	No specific technique is used here
Which institutional barriers and catalysts to Smart Mobility implementation can be identified in 'SmartwayZ.NL'?	Case study with semi-structured interviews and institutional analysis	Case study, documents and interviews with actors involved in the case study	Information about the programme, how actors are involved and what the barriers and catalysts within the programme are	Coding and is done by using Atlas.ti 8 coding software. Results are distributed and analyzed based on the seven rules from the IAD-framework

3.4. Data analysis

The questions for each interview where based on the seven rules from Ostrom. The analysis of the gathered data is therefore also based on the rules of this Institutional Analysis and Development Framework.

3.4.1. Institutional Analysis and Development Framework (IAD-Framework)

According to Ostrom (2011) markets and institutional hierarchies are often presented as different types of organizations of which both require their own explanatory theory. This affects cross-institutional comparisons and evaluations of these organizations in a negative way. Therefore Ostrom (2011) argues that a framework is needed that questions the reform and transition of institutions. This framework should identify the structural variables that are present in institutional arrangements (these variables can differ between institutional arrangements). For this the Institutional Analysis and Development Framework (IAD-framework) is useful.

By making an institutional analysis, two steps could be made to better understand the structure of an action situation within particularly institutions: (1) deepening into the specific aspects that affect the situation's structure or (2) focusing on its path-dependency by exploring how the action situation may change over time when focusing on perceptions and strategies that are affected by earlier outcomes (Ostrom, 2011). For both steps of institutional analysis, rules are important (Hodgson, 2004, in Ostrom, 2005).

For the IAD-framework seven types of rules are used (see table 4). These rules are based on the work of Ostrom (2005, 2011) and have impact on the elements within an action situation. These rules should not be seen as independent, but as a cumulative set of rules that affect the seven variables of an action situation: positions, participants, potential outcomes, action-outcome linkages, control that participants exercise, types of information generated, and the costs and benefits related to actions and outcomes. Hence, a change in one rule can affect the other six working rules (Ostrom, 2011).

Table 4. Seven rules of the IAD-framework (Ostrom, 2005, 2011).

Rule	Explanation
Position rule	Identifies positions that may be taken by actors
Aggregation rule	Determine 'who is to decide' which action or set of activities is to be undertaken
Scope rule	Determine which outcomes may, must, or must not be affected within a situation
Boundary rule	Define who may enter or exit a position and how
Choice rule	Specify what an actor occupying a position must, must not, or may do at a particular point in the decision process
Information rule	Affect the level of available information to actors about actions and the link between actions and outcomes
Payoff rule	Affect benefits and costs assigned to actors related to the actions and outcomes achieved

In figure 5 the position of the rules is clarified in relation to the action situation, its interactions and the potential outcomes.

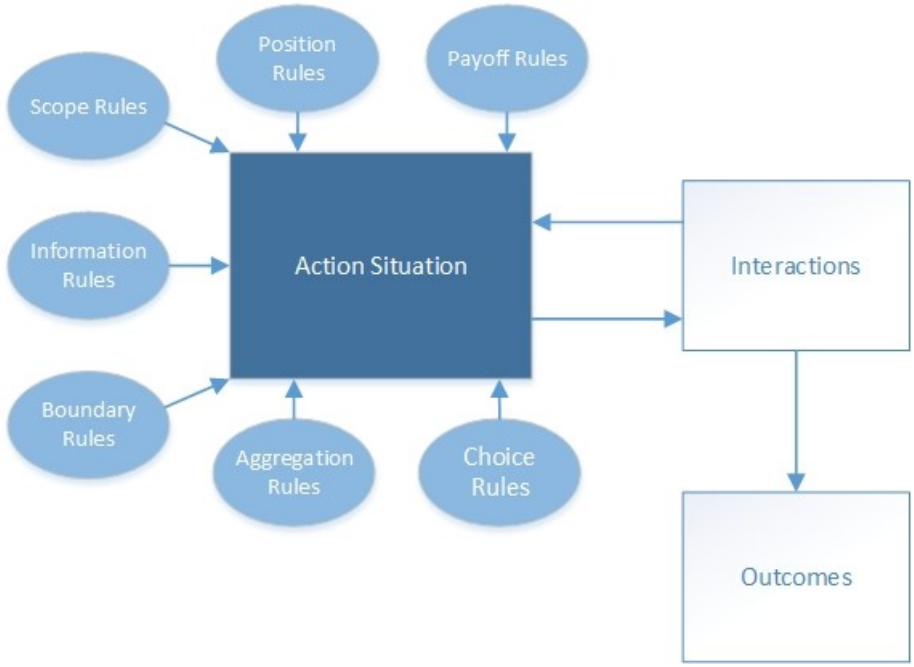

Figure 5. The position of the rules in relation to the action situation, its interactions and outcomes (Source: author, based on Ostrom, 2011).

3.4.2. From data to rules

The qualitative data from the interviews was structured based on the operationalisation of the IAD-framework. After transcription of the interviews, the data was coded and analyzed with Atlas.ti 8. The seven rules from the IAD-framework were used as a coding scheme. Patterns within these seven rules were searched for which resulted in multiple topics per rule. This made it possible to use information from different interviews, which was coded with the same rule, to be combined based on a specific topic. This eventually led to the rules-in-use as described in the following chapter. Based on these rules-in-use and their topics, multiple catalysts and barriers were identified.

3.5. Ethics

According to Longhurst (2010), two important ethical issues are anonymity and confidentiality. In this research these two issues were important when conducting the semi-structured interviews.

At the start of every interview was questioned if the interviewee was comfortable with recording the conversation. All of the interviewees where. Because both the author and the interviewees where Dutch, the interviews were held in this native language. After the questions were answered, agreements were made about using possible quotations and anonymizing their possible quotations in this research. The Interviewees are only mentioned by their function within the SmartwayZ.NL-programme. Eventually multiple quotations from the interviewees were used. Therefore each interviewee was sent his/her quotes, including the transcription of the conversation that took place. The interviewees were asked if they agreed with mentioning their quote in this research and if they agreed with the translation by the author.

Because the author is aware that interviewees might have mentioned aspects that were confidential and because of the agreements about anonymity, the transcribed interviews will not be included in this report.

4. Results

In this chapter the results of the analysis will be presented. With this research, multiple rules-in-use are identified within the SmartwayZ.NL-programme. The rules-in-use are based on the IAD-framework (see chapter 3) and will highlight the current focus of collaborations between involved parties and the governance structure of the programme. This chapter is based on the following two secondary research questions:

- What are possibilities for Smart Mobility based on the contemporary institutional framework within the Netherlands?
- Which institutional barriers and catalysts to Smart Mobility implementation can be identified in 'SmartwayZ.NL'?

The rules will be further discussed below, starting with the Position rules and the explanation of the governance structure of the SmartwayZ.NL-programme.

4.1. Position rules

The position rules are about creating positions within an action situation that may be taken by actors. These are the connecting link between involved participants and authorized actions. Specific action sets for specific positions are assigned to these participants. A position rule may define whether there is a limit on the number of participants holding a specific position (Ostrom, 2005). Ten position rules are identified in the SmartwayZ.NL-programme (see table 5).

Table 5. Identified Position rules in the SmartwayZ.NL programme that influence Smart Mobility implementation.

No.	Position rule – identifies positions that may be taken by actors
P1	Both public and private actors are needed within a Smart Mobility-programme
P2	Knowledge institutions are part of the organization of the SmartwayZ.NL-programme
P3	Governmental actors are obliged to represent the public interests
P4	The programme council direct the objectives of the SmartwayZ.NL-programme
P5	The programme team executes the daily control of the SmartwayZ.NL-programme
P6	The programme manager direct a team of specialists and representatives of the challenges to provide an effective and efficient SmartwayZ.NL-programme
P7	The project managers give direction to the challenges and monitor their progress within the SmartwayZ.NL-programme
P8	The Advisory group and International feedback group contribute to the SmartwayZ.NL-programme by delivering opinions and knowledge based on the demand from the programme
P9	Researchers have to determine whether Smart Mobility-innovations are effective and whether adjustment have to be made to the SmartwayZ.NL-programme
P10	The communication consultants guarantee the progress of and coherence in communication between and about the challenges of the SmartwayZ.NL-programme, as stated in the programme communication strategy

4.1.1. Involved actors

The first position rule is about the involvement of public and private actors within the Smart Mobility-programme (P1). According to multiple interviewees (A, D, H & J) this is needed because of the public interests and the use and development of technological knowledge (see also section 4.7.1. PAYOFF RULES). This is underlined by Document C: *"The ever-increasing developments and applications in ITS[3] and Smart Mobility require new forms of collaboration. Both on the public side*

[3] ITS: Intelligent Transport Systems

and in the public-private role distribution". But private actors should not only be involved because of their technical know-how, but also because they have their own interests: *"… the business community wants to ensure that it remains regionally economically accessible. Because of this it is necessary that this problem is not only situated at the government, but that it is solved together"* (Interviewee D). This is an important aspect according to Interviewee G, who sees it as an 'ecosystem' that is being built. The actual time (short term, long term) of involvement of actors depends on the possibilities actors have to contribute to Smart Mobility implementation. Because also this innovative domain is a market of supply and demand (Interviewee C). Nevertheless, with the innovative character in mind, it always remains a question if the market is able to deal with it themselves or that collaborations with authorities have to alter in order to make changes possible (Interviewee J).

Despite these public and private actors, the knowledge institutions are also a group of actors within this programme. Together, these three groups are summarized as the 'Triple Helix' (Documents A & B; Interviewees A, D, E, F & G). The position of knowledge institutions is complementary to that of public and private actors, and are part of the organizational structure within the programme (P2). This is highlighted by Interviewee G: *"… at that highest level we look at that entire program, which is a triple helix construction"* and Document A by *"… specifically in the Smart Mobility and ITS challenge innovation is taking place, and we are seeking to stimulate knowledge development through combinations of market parties, governments and knowledge institutions"* (p.5) and by: *"Organization and management: in a Triple Helix context, so that knowledge from different perspectives is maximized"* (p.19). In addition, Smart Mobility-issues that cannot be solved by the market are offered to the knowledge institutions to find a solution for these (Interviewee E). The most results are achieved with this interplay according to Interviewee A.

The most important aspect of Smart Mobility implementation, as seen by the interviewees, are the benefits for commuters (see also section 4.7.1). Because of this and because of the involvement of private actors (see section 4.1.2.), the governmental actors have the obligation to represent the public interests during Smart Mobility development and implementation (P3). This is underlined by Interviewee G: *"… if you see the difference between government and market parties … [with market parties] there is always an interest of their own"*. Therefore the governmental actors have to safeguard the public interests. However, this has to be in line with the governmental interest of e.g. providing the necessary infrastructure for transportation and the focus of particular governmental parties: *"… governments themselves can also have different focuses. There are different problems per city, different tasks"* (Interviewee G). Market developments for example are not (financially) supported when it does not directly contribute to governmental interests (Interviewee D).

4.1.2. Governance structure

The SmartwayZ.NL-programme has a governance structure that elaborates on the overall structure of decision-making and which challenges are involved in the programme (see figure 6). In table 6 an overview is given of the roles of actors based on the RACI-model (Responsibility, Accountability, Consultation, Inform), as provided by Document I. The specific action situation cannot be derived from it, which has already been discussed (section 3.2.2).

The governance structure is based around two main pillars: the first pillar is about the overview of the programme, which is done by the overall programme council and the programme team, focusing on respectively the accessibility of the Southern Netherlands and on the process and content of the programme. The other main pillar is about the programme itself: it consists of eight challenges of which one is about Smart Mobility implementation. These challenges are further discussed in section 4.3.1..

Programme Council

The programme council is responsible for implementing the agreements that have been made between the southern region of the Netherlands and the House of Representatives. Therefore the programme council directs the objectives of the SmartwayZ.NL-programme (P4) (Interviewee D). To fulfil this task, the council issues a go or no go based on the action plans that have been submitted by the challenges (Document B). The council consists of multiple actors (governments, businesses, knowledge institutions) (Document B; Interviewees A & G). Important to mention here is that there is a distinction between actors that contribute financially to the programme and actors that do not. Financial contributing actors (House of Representatives, Provincial states, local councils) make decisions about financial allocations within the programme, non-financing actors focus on the desired direction for the programme (Document B, Interviewee D). Also, the programme council manages the programme team (Document B).

Programme Team

The programme team consists of actors which represent the parties involved in the programme council. The programme team 'organizes, coordinates, supports and advises' on programme level (Document B). The team is charged with the daily control of the SmartwayZ.NL-programme (P5). It supports and gives advice to the programme council. The team also implements choices made in the programme council. Further, the team is responsible for the communication about the overall programme and also monitors and evaluates the implementation of the programme. The team is steering the programme and its underlying processes with help of people with particular experiences and knowledge who are involved in the eight challenges (Document B; Interviewee D). When focusing on Smart Mobility particularly, the programme team deals with the effects of ITS/Smart Mobility on the overall programme. Therefore there is a representation of the ITS/Smart Mobility challenge at the core of the programme (Document B). However, the programme team is not involved within the processes of the particular challenges (Document B).

Programme Manager

The programme team is controlled by two programme managers (of which one is Interviewee B) (Document B). As stated in Document B (p.22): *"An effective and efficient programme must be 'in control' of content and method, and at the same time recognize and implement opportunities and innovations. The programme manager deals with it and determines what happens and how it happens. This is also necessary to ensure that everything runs smoothly and to guarantee quality and efficiency"*. To do this, the managers direct a team of specialists and representatives of the multiple challenges (P6) (Interviewee D). In consultation with the actors involved the managers set the course of the challenges (Interviewee G).

Project Managers

Every challenge is steered by a project manager and executes it with a team he/she has composed. The project manager has to monitor the progress of the challenge (P7). This is because every challenge has its own focus (see section 4.3.1.). In accordance with the overall programme it is important for project managers to coordinate and communicate with each other about the course of their challenges (Document B). The programme manager has to be kept informed about this coordination and communication. When changes or deviations from the overall programme are noted and could have impact on other challenges in the programme, intervention from the programme council is needed (Document B).

Advisory Group & International Feedback Group

Both the programme council and the programme team are influenced by actors from outside these institutional environments. The advisory group and international feedback group deliver opinions

and knowledge about the programme (P8). The nature of the contribution of these actors varies due to the overall focus (programme) or regional/local focus (challenges) (Document B).
This 'external' group consists of:

- An advisory groups with lawyers, data experts and scientists which varies in composition based on the demand for information. The advisory groups provides solicited and unsolicited advice.
- An international feedback group consisting of directors and policy employees from foreign countries and scientists focused on knowledge exchange. It provides advice on request from the programme council and team.
- The non-organized groups which are the organizations and individuals that have not yet been involved in the programme, but can contribute by giving their (un)solicited advice. This is seen as enriching for the process (Document B).

Researchers

Researchers connected to the SmartwayZ.NL-programme have to evaluate which factors affect the efficiency and influence he effectiveness of the programme. This includes a risk analysis focusing on the programme council, programme team and other including actors. Monitoring and evaluation is important to determine whether Smart Mobility-innovations are effective and to determine whether adjustments of the programme are needed. It also helps in making choices about which measures have to be done and which choices have to be made, due to the innovative character of the programme (P9). What is important here is the independent role of the researchers (Document B).

Communication consultants

Communication is located in multiple places and on different levels in the programme, based on multiple responsibilities and roles of involved actors. The communication is focused on exploiting opportunities in the programme. The communication consultants, which are part of the programme team, are the responsibility of the programme council (Document B). Their focus is on the programme communication strategy. Also, the consultants advise the programme team about the communication between actors. The communication consultants also focus on the progress of and coherence in communication between and about the challenges of the SmartwayZ.NL-programme (P10). However, every challenge has its own plan of communication, established in the action plan of that particular challenge (Document B).

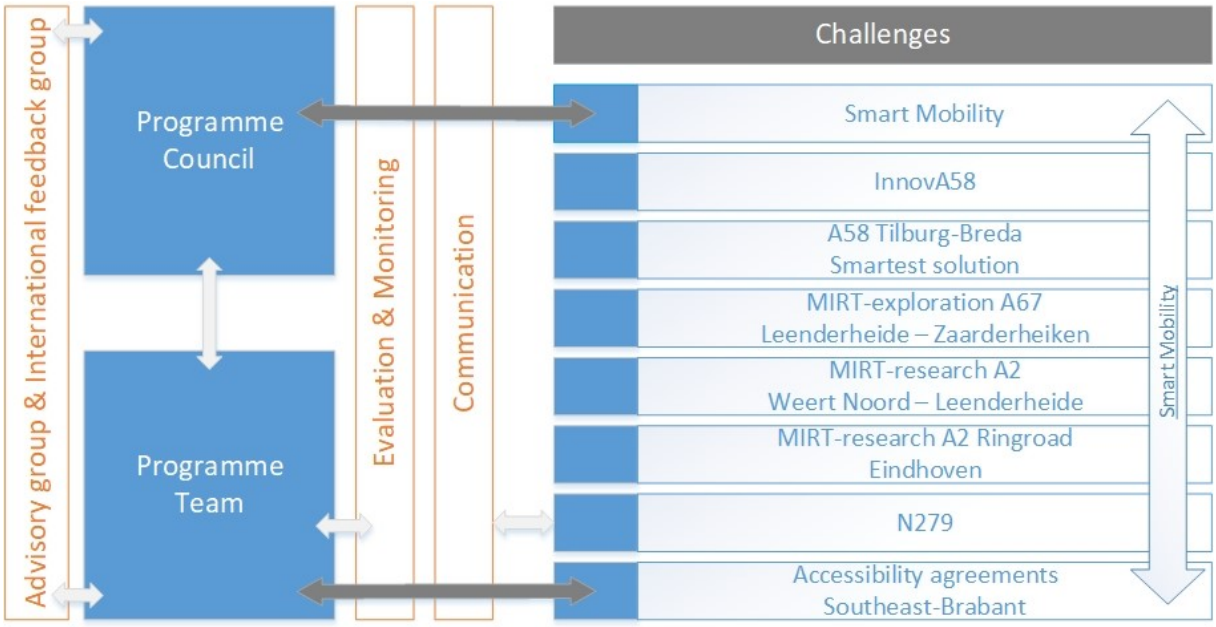

Figure 6. The governance structure of the SmartwayZ.NL-programme, based on two pillars: the overview of the programme and the eight challenges the programme consists of (Source: Documents A & B, modified by author).

Table 6. Overview of the roles of actors (Responsibility, Accountability, Consultation, Inform) in the governance model (Source: Document I, modified by author).

	House of Representatives Provincial States	Programme Council	Programme team Programme manager	Project manager
Making spatial decisions	R	A	C	I
Making additional resources available	R	A	C	I
Changing objectives programme		R	A	
Changing allocation of funds within programme		R	A	
Implementation decisions within programme			R	C
Implementation decisions within challenge			I	R

4.2. Aggregation rules

Aggregation rules are about whether a decision can be made by a single participant or that multiple participants are needed to execute an action at a particular point in the decision process (Ostrom, 2005). In total nine aggregation rules for the purpose of Smart Mobility are playing a role in the processes of the SmartwayZ.NL-programme (see table 7). Within the rules-in-use two levels of decision-making could be identified: decision-making at the programme level and at the project level. Both levels show different rules for implementing Smart Mobility within the programme.

Table 7. Identified Aggregation rules in the SmartwayZ.NL programme that influence Smart Mobility implementation.

No.	Aggregation rule – determine 'who is to decide' which action or set of activities is to be undertaken
A1	Actors have to decide if they want to be part of the Smart Mobility-programme where the future is somewhat 'unknown' due to its innovative character
A2	The more actors are involved within the Smart Mobility-programme, the more complex it becomes to make considered decisions with all these actors about the implementation of Smart Mobility
A3	Political actors have more mandate than non-political actors when decisions have to be made within the SmartwayZ.NL-programme
A4	The programme council is able to make decisions within the SmartwayZ.NL-programme without having reached a consensus with the actors involved
A5	Decisions about the strategic lines for Smart Mobility within the SmartwayZ.NL-programme are made by the programme council
A6	The programme council has to approve financial applications for Smart Mobility-interventions which are submitted by the project managers
A7	Decisions about the execution of the seven infrastructure challenges and their coherency with Smart Mobility are made by the programme team and the programme manager
A8	Decisions about how new projects are being executed within the Smart Mobility-challenge are made by the Smart Mobility team
A9	Decisions about the allocation of resources within a Smart Mobility-project are made by the projectmanager of the challenge the project is located in

4.2.1. Programme level

At the programme level the aggregation rules are focused on the decision of actors to join the programme and on the governmental actors and their (political) influence in the programme. The governmental influence is generally based on the general public interests. But goals related to these interests might differ from other actors' purposes.

Therefore, an important aggregation rule is the decision of actors to join the programme. Because while considering their choice actors have to bear in mind that, due to getting involved with a rather 'innovative' programme, the future is unknown, uncertainties are common and *"…tasks, rolls and responsibilities change due to its innovative character"* (A1) (Interviewee J). This uncertainty is underlined by Document A: *"The next two to three years are manageable in terms of new technologies and services. The period after that is diffuse. That is exciting and at the same time difficult…"* and Document B: *"…for many stakeholders it is not clear what the consequences of the implementation of the various challenges (including Smart Mobility-services) will be … and which variables will influence these effects"*. Due to these uncertainties the involved actors might manoeuvre themselves in a weak position within the decision-making arena.

This uncertainty is underlined by the programmes top-down steering. And because many actors are involved *"… the playing field is now much wider"* (Interviewee G). As a result it is harder to reach a consensus (A2) about Smart Mobility implementation and it becomes more complicated about who in the end is making the decisions, because *"…it becomes very diffuse if you allow more people to take part, because then more people can say something about it"* (Interviewees H & J). Another important aspect is the financial contribution of governmental institutions (Document B). Because of this the political actors have often more mandate within the decision-making than non-political actors (Interviewees A & G) (A3). Therefore political actors have more mandate in the programme council of which they are part (see section 4.1.2.). Agreements can therefore be made by the programme council without actors having direct influence on these decisions. This means that these

decisions are not consensus-based (A4). Non-governmental actors should be aware of this. These findings are elucidated by Interviewee A: *"…there are also decisions that were not worked out with 21 people in advance [of the decision-making]. So you can ask questions about its democratic legitimacy …[and for businesses] the representation is limited"* and by Interviewee B: *"As civil servants, possibly together with companies, you prepare a proposal with arguments etc.. But in the end it is up to the politicians to make a choice and that includes a political consideration"*.

4.2.2. Project level

At the project level of decision-making, the aggregation rules are focused on which projects are being executed, the allocation of resources within projects and who makes these decisions. These rules are complementary to the governance structure mentioned in section 4.1.2. Overall, decisions about the strategic lines for Smart Mobility within the programme are made by the programme council (A5). The programme team, and in particular the programme manager, decides about how existing projects will be executed within the seven infrastructural challenges. They also decide how these challenges strive for coherency with each other, but especially with the Smart Mobility-challenge (A7) (Document B). However, the decisions on how new projects within the Smart Mobility-challenge are executed are made by the Smart Mobility team itself (A8): *"[With] some decisions you have authorization as project manager to make decisions about. And then you actually vote with your project team, you discuss it and then you make a decision because you are the projectmanager"* (Interviewee G). The same holds for the allocation of resources within each challenge: financial funds are being distributed by the programme council after a financial application is submitted and approved (A6) (Interviewees D & E). After that, the specific decisions on how to spend these funds are made by the project manager of each challenge (A9). Depending on the progress of each challenge, a shift of financial resources could be limited. However: *"…components that come from ITS-Smart Mobility can still be influenced by the programme council"* (Document B, p.5). Nevertheless, for both (A8) and (A9) holds: as long as the scope fits within the preconceived framework (Interviewee D). This is underlined by Document B (p.20): *"The challenges themselves bear the responsibility for the scope of the alternatives, the planning and the spending of the project budget, as long as these are within the agreements laid down in the relevant plan of action"*. This is because the decisions that are made have to be justified towards the higher levels in the governance structure (Interviewee E).

4.3. Scope rules

With these rules, a known outcome variable must, must not or may be affected due to the result of actions taken within a situation. Therefore the rules do not directly appoint for specific action sets but affect the action by their effect on the outcome variables (Ostrom, 2005). Eleven scope rules are identified in the SmartwayZ.NL-programme (see table 8).

Table 8. Identified Scope rules in the SmartwayZ.NL programme that influence Smart Mobility implementation.

No.	Scope rule – determine which outcomes may, must, or must not be affected within a situation
S1	Seven challenges within the SmartwayZ.NL-programme are focused on infrastructural problems and the eighth challenge is focused on implementation of Smart Mobility within those seven challenges
S2	Expansion of the asphalt road is only considered after the possibilities of Smart Mobility have been explored
S3	Political colour and the formation of leading political parties can influence the focus of Smart Mobility implementation

S4	Due to the increasing role of market parties, the implementation of Smart Mobility-applications becomes a market of supply and demand based on business models
S5	There is a need for a comprehensive approach between national, regional and local programmes and projects in order to make Smart Mobility-solutions more future resistant
S6	Involved actors have common interests that also provide conflicts due to the innovative character of Smart Mobility
S7	The 2018 *General Data Protection Regulation* hinders the development of Smart Mobility-applications for which commuter support is needed
S8	The 1968 *Vienna Convention on Road Traffic* hinders the development of Smart Mobility-applications by its outdated regulations
S9	The 2015 *Decree granting exceptional transport exemption* made large-scale testing of Smart Mobility-applications possible on public roads in the Netherlands
S10	The 2019 *Experimental Law* allows for testing of Smart Mobility-vehicles on public roads in the Netherlands
S11	The 2016 *Declaration of Amsterdam* focuses on international partnerships to implement Smart Mobility-initiatives in practice.

4.3.1. Smart Mobility within the programme

The first scope rule is also the most extensive because it considers the content of the SmartwayZ.NL-programme. The programme is divided in eight challenges. Seven are focused upon infrastructure problems. The eighth challenge focuses on the implementation of Smart Mobility besides and within these infrastructural problems (S1) (Documents A & B; Interviewees B, D, E & G). The eight challenges all consist of an own governance structure and action situation (see section 3.2.2.). This is because every challenge is in a different phase within the process.

As mentioned, the eighth challenge focuses on Smart Mobility. However, the Smart Mobility-focus is recurring within every challenge and is concentrated upon the implementation of an adaptive strategy: expansion of the asphalt road is only considered after the possibilities of ITS/Smart Mobility have been explored (S2) (Interviewees D & J; Documents B, C & I). Therefore the eighth challenge is involved within every other challenge as could also be seen in figure ?. Therefore the direction of the other seven challenges depend on the application of Smart Mobility-measures. This could be seen in two ways: on the one hand by offering possibilities and standards for implementing Smart Mobility, on the other hand by translating lessons learned from Smart Mobility-applications from one challenge into possibilities for other challenges (Document A).

4.3.2. Playing field

Within the contemporary institutional framework, political shifts might affect the focus of Smart Mobility-projects due to e.g. the appointment of political parties with a deviant view (S3). Due to provincial elections in 2019 and the resulting coalition agreements, this scope rule has come forward during the interviews, because: *"That is the moment that everyone has the need to take another look at: 'are we still doing well? Maybe we should adjust a little somewhere*" (Interviewee B). Although the overall programme has been set until 2026, 'political colouring' might still influence this programme, and therefore also Smart Mobility-measures, on a rather small level: *"You do see nuance shifts, if we were given a very 'green' cabinet or a 'green' coalition … [then] sustainability is probably coming forward"* (Interviewee D). This is because certain decisions are still made by governmental actors (see section 4.2.) and because Smart Mobility as a solution is not that popular among politicians in contradiction to constructing roads, which is more tangible (Interviewee K). However, because of its approval for ten years the dependence on this colouring has become less.

Besides politics, the overall mobility market is also changing and having its influence on Smart Mobility-integration. As already mentioned, the playing field of involved actors is much wider nowadays (see section 4.2.1.). This is also the case for the mobility market itself. Private actors are developing new technologies faster than ever. Thereby, the role of the government within this market is degrading: *"…as a government you will no longer play a leading role in this. Because the entire mobility market is changing, with all kinds of roles for companies … And whether they are start-ups, existing companies or existing car companies … as a government you become much more a director than an instructing authority"* (Interviewee B). As a result, private actors exert more influence within this domain resulting in the increasing use of techniques within mobility. Nevertheless, this trend is also characterized by the fact that *"…many market parties continue to think in terms of their own business model, their traditional role, their 'compartmentalized' role: the provider of mobility services remains a provider of mobility services and the transporter remains a transporter"* (Interviewee J). The most important reason for this could be that new business models and market opportunities have to be derived from it (S4) (Interviewee F) which could be rather difficult due to the innovation and uncertainties that it is accompanied by. However, despite this increasing market involvement, the government will always keep a significant role in this (Interviewee A).

4.3.3. Comprehensive approach

The following two scope rules can be considered as affecting each other. Because of the need for an comprehensive approach between programmes and projects in order to make Smart Mobility-solutions future resistant (S5), actors that have common interests could also be in conflict with each other about these interests (S6). This need for a comprehensive approach is highlighted by multiple interviewees (A, B, D, H & J). Because of the range of traffic problems and the resulting infrastructure developments, Smart Mobility-measures should not only address the specific problem itself but should also include other domains to make the solution more future resistant , as comes forward by this statement: *"There is a lot of work, many large companies that are growing very fast and there will be a major housing challenge. This also generates traffic. And this traffic must be controlled in one way or another. And Smart Mobility is one of the factors there"* (Interviewee A). However, the focus within these programmes can be wider than only traffic and mobility. They can also include e.g. sustainability, accessibility and/or liveability, which is also stated by Document J. Also a more regional or national scope is important because *"… the users who ultimately benefit from these [Smart Mobility-]investments are not limited to a city or region"* (Document C, p.22; Document J). As a result, new projects and programmes can be integrated more easily (Interviewee J). Therefore, within SmartwayZ.NL, there is attention on how to make this comprehensiveness happen between multiple projects (Interviewee H).

However, with this comprehensive focus many actors will be involved. And due to their origin as public or private party, despite their common interests in implementing Smart Mobility (Interviewee A), this can also cause conflicts due to its innovative character. Because the process is one of: *"…'trial-and-error' every time again. And sometimes problems arise within Smart Mobility because it is new"* (Interviewee H). Resulting problems might be about the fact that e.g. MaaS[4]-services are only possible when other actors admit to optimize timetables of public transport, which might not be profitable in the beginning and it is not sure if it ever will be. According to Interviewee A: *"This kind of problems you encounter all the time. Because of this, [Smart Mobility] starts with a disability and reduces the chance of success"*.

[4] MaaS: Mobility-as-a-Service

4.3.4. Laws and regulations

Multiple scope rules are about the development and implementation of Smart Mobility-techniques and the effect of laws and regulations on it. Contemporary legislation and regulations do not support the development of Smart Mobility in the Netherlands according to many interviewees (A, B, C, D, E, F, G & J):

- *"Legislation and regulations are always behind on new developments. So in fact, you will be hindered by it rather than helped by it"* (D)
- *"As far as I am concerned, legislation and regulations are not contributing at the moment, there is no positive effect on the development of Smart Mobility ... legislation and regulations are very difficult within the current constellation"* (E)
- *"But if you really look at existing legislation and regulations, then [legislation and regulations] certainly do not encourage that, rather obstruct it"* (F).

Often mentioned as an unsupportive regulation is the *General Data Protection Regulation* (Interviewees A & B) introduced in May 2018 (In Dutch: *Algemene Verordening Gegevensbescherming*) (Document F). It focuses on the processing of personal data and the use of it (S7). Due to this regulation it becomes e.g. more difficult to track and contact commuters on a certain road to encourage them to change their travel pattern using Smart Mobility-applications (e.g. MaaS-services). Also mentioned is the *Vienna Convention on Road Traffic* (1968) which is about international road traffic and the increase of road safety (Document G). It hinders the development of Smart Mobility-applications (S8), especially self-driving vehicles, by stating that *"Every moving vehicle or combination of vehicles shall have a driver"*, *"Every driver shall at all times be able to control his vehicle or to guide his animals"* and *"Every driver of a vehicle shall in all circumstances have his vehicle under control so as to be able to exercise due and proper care and to be at all times in a position to perform all manoeuvres required of him…"* (Document G, Article 8.1, 8.5 & 13.1).

Some interviewees also saw the possibilities the current laws and regulations can offer:

- *"[We] are going to look for the limits of the law, but [we] are not going to break them. [We] are going to look for the limits in a controlled manner. That is actually the way to use legislation and regulations"* (F)
- *"If you have even more flexible legislation and regulations, certain developments might develop sooner and quicker"* (G)
- *"What also is underestimated is that within existing legislation and regulations, a lot is possible"* (J)

Therefore it can also be argued that possibilities within laws and regulations are present, for example the *Experimental Law* (Interviewees B, D, F, G & J; Document D). Since 1994 the *Road Traffic Act* has regulated road traffic in the Netherlands. It was this Act that was obstructing the testing and implementation of new techniques within traffic on Dutch roads. In order to make testing on Dutch roads possible, in 2015 the *Decree granting exceptional transport exemption* was entered into force (Document C). This decree created the possibility to exempt vehicles from certain technical requirements and made large-scale testing of Smart Mobility-applications possible (S9). However, this exemption did not apply to the rules that relate to the driver and its traffic behaviour (as stated in the 1994 Road Traffic Act) (Document C). Therefore the *Experimental Law* has become applicable since July 2019 (Document D & E). This law made it possible to do experiments with self-driving vehicles, without the driver being present in that vehicle (S10). However, the Minister of Justice and Security still has to approve every experiment before execution (Documents C & D). In order to stimulate Smart Mobility-initiatives across Europe the *Declaration of Amsterdam* has been embraced by European Ministers of Transportation (S11). This declaration aims at removing obstacles for self-driving vehicles across borders and making clear how multiple countries can align their regulations (Document C).

4.4. Boundary rules

According to Ostrom (2005) boundary rules are about defining which participants are eligible and may or must enter a position and how participants may or must leave a position, or in short: the entry and exit rules. For the SmartwayZ.NL-programme ten boundary rules are identified (see table 9).

Table 9. Identified Boundary rules in the SmartwayZ.NL programme that influence Smart Mobility implementation.

No.	Boundary rule – define who may enter or exit a position and how
B1	Due to the adaptive focus of the SmartwayZ.NL-programme, actors are free to enter or exit the Smart Mobility-arena until their contribution is contractually determined
B2	Actors need to have resources available to start with / join a particular Smart Mobility-project of the SmartwayZ.NL-programme
B3	In the SmartwayZ.NL-programme it is expected that actors are open to knowledge sharing in order to make Smart Mobility-projects a success
B4	Smaller governmental actors find it more difficult to join the SmartwayZ.NL-programme due to a lack of resources
B5	Due to their public interests (safety, sustainability) governmental actors have to be involved within Smart Mobility-projects
B6	Governmental actors that want to participate in the programme are allowed to enter if they are within the geographical boundaries of the SmartwayZ.NL-programme
B7	Market parties that want to participate in the programme are not bounded by the geographical boundaries of the SmartwayZ.NL-programme
B8	Knowledge institutions that want to participate in the programme are not bounded by the geographical boundaries of the SmartwayZ.NL-programme
B9	Commuters are not bounded by the geographical boundaries of the SmartwayZ.NL-programme, however they have to travel within the geographical area if they want to participate in the programme
B10	The *General Data Protection Regulation* hinders the involvement of commuters within Smart Mobility-projects

4.4.1. Interests and resources

As mentioned earlier, the SmartwayZ.NL-programme and especially the Smart Mobility challenge has an adaptive focus. Therefore, in order to make the involvement of parties as easy as possible, actors are free to enter or exit the Smart Mobility-arena in the beginning. This is done because as Interviewee B suggests: *"In the initial phase you mainly try to get a level playing field, so if new parties join or want to participate, that is fine"*. As a result actors can get involved in an innovative project to explore their opportunities and they can withdraw from the adaptive process when (possible) results are disappointing. However, it should be clear that this possibility to get involved and/or withdraw from a project depends on the design and scope of a particular project. Also, there are differences between e.g. involving citizens and involving market parties based on a tender. Nevertheless, this possibility to get involved or withdraw from the process *"… takes place before the phase of signing contracts … When contracts are signed you are bound to each other"* (B1) (Interviewee H).

Three boundary rules are related to the use of resources within the process. In order to join or start with a particular Smart Mobility-project, actors need to have resources available (B2) and have to share knowledge related to the Smart Mobility-project to make it a success (B3). With resources is not only meant capital but also the use of people, time, the ability to take risks (Interviewee B) and especially for private actors: *"… the government needs market parties because of their way of working but also because of their technological insights, knowledge and techniques"* (Interviewee G)

(see also P1). Sharing knowledge is also seen as a key to success according to Interviewee A: *"A good exchange of knowledge between the parties is very important for the success of Smart Mobility, I am convinced of that"*. Also highlighted during the interviews is that smaller governmental actors (smaller municipalities) find it more difficult to join a large programme like SmartwayZ.NL, despite being interested in it. This is because they do not have the problems larger municipalities are dealing with and also because of a lack of resources (e.g. employees) (B4) (Interviewee G).

4.4.2. Participation of actors

Because the implementation of Smart Mobility is seen as 'new' and uncertain, the role of the government within this implementation is seen as essential due to their public interests focused on e.g. safety and sustainability (B5): *"Eventually it is the government (central government, province and municipality) who are the road manager and the owner of the roads … therefore the government will always keep a large role in this…"* (Interviewee A) (see also section 4.1.). This could be seen as both a positive and a negative aspect. Due to its public focus, Smart Mobility-initiatives have always to be developed and implemented in accordance with requirements of the (local) government. And because of its innovative character, the government often has to be involved. However, due to its participation, governmental parties are often looked at to solve problems or start and direct transitions: *"We do that very often in the Netherlands. We look at the government whether it can solve [the problems] for us"* (Interviewee G).

To participate in the SmartwayZ.NL-programme it is for governmental actors required to be located within the geographical boundaries[5] (B6), which are the provinces of Noord-Brabant and Limburg (Documents A & B; Interviewee E). For Smart Mobility-initiatives these geographical boundaries are essential, because when crossing these boundaries other governmental institutions must be involved due to the use of public environments. This could result in an ever increasing growth of participating (governmental) actors. However, despite these provincial borders the focus is also on the bigger picture: *"…we actually want to offer benefits … across the entire corridor. It makes no sense just to talk about a piece of Brabant. Therefore we are already looking at the southern part of the Netherlands"* (Interviewee D). Contrasting with rule B6 are the following rules, stating that market parties (B7) and knowledge institutions (B8) that want to participate in the SmartwayZ.NL-programme are not bounded by these geographical boundaries. The same applies to commuters (B9), they can live outside the SmartwayZ.NL-area however they have to travel within the region if they want to participate in the programme.

However, due to the introduction of the *General Data Protection Regulation* in 2018 it became more difficult to involve commuters and/or citizens within Smart Mobility-projects (B10) (Document F). Due to this legislation information about daily commuters, e.g. on a particular road, is more difficult to obtain (see also section 4.3.4.). This impediment is also recognized by one of the interviewees (A), in general on the level of the SmartwayZ.NL-programme: "*If you really want, from within the programme, to approach the commuter to travel differently, you do need information that is more difficult to obtain due to privacy legislation"*, and on the level of the Smart Mobility-challenge: *"…for Smart Mobility to be successful and to have a major effect, you need a lot of information, including that from road users and commuters. That grinds with the privacy on data"*.

[5] Obviously this does not apply to the actors that are on the programme council and programme team.

4.5. Choice rules

Choice rules describe what a participant in a certain position must, must not or may do at a specific point in the decision process. Also, actions which do not fit within information rules, payoff rules, boundary rules or aggregation rules within an action situation may be considered as part of choice rules (Ostrom, 2005). Six choice rules related to Smart Mobility are identified (see table 10).

Table 10. Identified Choice rules in the SmartwayZ.NL programme that influence Smart Mobility implementation.

No.	Choice rule - specify what an actor occupying a position must, must not, or may do at a particular point in the decision process
C1	Non-governmental actors may choose themselves whether they get engaged in Smart Mobility implementation or not
C2	Actors need to make balanced choices if they want to get involved in the Smart Mobility-programme based on their own and the SmartwayZ.NL-programme's ambitions
C3	Market parties are not likely to take the initiative in Smart Mobility-projects when governmental actors are involved
C4	Governmental actors need to take the initiative in public-private Smart Mobility-projects
C5	To apply Smart Mobility-projects in practice social considerations must be made by the (governmental) actors involved
C6	Due to the new techniques that are applied, choices have to be made in the process of Smart Mobility implementation that are different from more regular projects

4.5.1. Public and private actors

As mentioned earlier, actors participating in Smart Mobility-projects have to deal with uncertainties due to its 'innovative' character and the public focus of the programme. And because implementing Smart Mobility-applications is often a project for the longer term (Document I) and within the public environment, private actors are free to decide if they want to get involved or not (C1). As a result, private actors are easier in taking a reserved attitude in general and especially towards governmental actors because: *"When it comes to a longer period, people are more reluctant to make commitments"* (Interviewee E). Another important aspect is that the ambitions of the programme might be divergent and not in line with those of (private) actors: *"There are so many parties, some choose to go along with it and others don't. And that also depends very much on the roadmap that these companies have. …So that of course depends a lot on the design of the project and the goal and whether you as a public and private party can keep each other informed"* (Interviewee G). Therefore balanced choices have to be made by every (private) actor before getting involved in the programme (C2).

Eventually, in order to make concrete steps, the initiative in public-private Smart Mobility-projects need to be taken by governmental actors (C3 & C4)), for example by composing a well-substantiated Smart Mobility vision what can serve as a starting point for private actors. This view is supported by Interviewee D: *"What we find out more and more is that the market is not taking the lead … and that means that we, as the government, have an initiating role in many cases"* and Interviewee E: *"…we [as a governmental actor] need to take the initiative"*. However, this does not mean that governmental actors also bear the responsibilities (Interviewee E). Nevertheless it should be clear that both public and private actors have their interests to participate together which means that interaction between the two is necessary (Interviewee C). And to keep the process going Interviewee F suggests that *"…you must reach consensus otherwise you cannot proceed"*.

4.5.2. Social aspect

Because of the application of Smart Mobility-initiatives within the social environment and the poor presence of regulation about applying Smart Mobility-techniques within it (see section HD 1/2),

social considerations (e.g. the use of social data) must be made by the governmental actors involved because of their public task. Therefore, when actors want to apply new Smart Mobility-techniques within projects these social considerations are important to take into account (C5). Not only because of safety issues but also related to finance, for example: should society cover the costs related to Smart Mobility-services (Interviewee A)? Such services might affect in any way more 'smart' movement of people, resulting in e.g. savings on the environment and road infrastructure investments. According to Interviewee A this is a difficult question. This will be determined during the process, as explained by Interviewee F: *"…in consultation with each other you will determine: 'what are the possibilities within [these social considerations]?'"*.

Related to this social rule is that, during the process of Smart Mobility implementation, choices have to be made that are different with regular (non-Smart Mobility) projects, due to its new and innovative character (C6), for example about the use of data or how to stimulate commuters to us MaaS-services. This choice rule could also be related to the position, aggregation, scope and boundary rules already mentioned in this chapter. However, and also as a follow-up to the suggestion of Interviewee F to determine together what the possibilities are, due to the fast changing circumstances within Smart Mobility development it is advisable to *"…include the opportunity in contracts to recalibrate several times during the process together: 'are we still doing the right things?'"* (Interviewee J).

4.6. Information rules

Within an action situation available information, about e.g. the structure of the particular situation and moves of other participants within certain positions, is important. Information rules affect the level of knowledge about these aspects towards other participants and the link between actions and outcomes (Ostrom, 2005). Related to the implementation of Smart Mobility within SmartwayZ.NL, six information rules are identified (see table 11).

Table 11. Identified Information rules in the SmartwayZ.NL programme that influence Smart Mobility implementation.

No.	Information rule – affect the level of available information to actors about actions and the link between actions and outcomes
I1	It is important that knowledge is shared between actors to make Smart Mobility-projects a success
I2	Despite the uncertainties and changing circumstances within Smart Mobility developments involved actors should be on the same level of knowledge to successfully implement Smart Mobility-techniques
I3	Since the SmartwayZ.NL-programme has an adaptive focus, differences in knowledge-levels, due to actors joining and leaving the programme, should be absorbed
I4	Involved actors within the SmartwayZ.NL-programme should be informed about the state of affairs within Smart Mobility-projects to make it succeed
I5	Despite the extensive structure of the SmartwayZ.NL-programme involved actors should be on the same level of knowledge to successfully implement Smart Mobility-techniques
I6	Communication between involved actors on multiple levels is key to success in Smart Mobility-projects

4.6.1. Knowledge sharing

Because the programme is rather 'innovative' this is reflected in the collaboration between actors. Within the programme an interactive collaboration between actors is facilitated (see section 4.1.) which results in an arena where knowledge-sharing is encouraged. This sharing of knowledge is seen as a key to success in Smart Mobility-projects (I1). With interactive collaboration is meant the use of

multi-level actors in regulatory compositions within multiple adaptive projects. As a result (knowledge) resources can be used optimally because: *"…someone knows something different than someone else. And if you put that together you have much more knowledge and experience…"* (Interviewee G). In this way involved actors are learning from each other, which is also an important aspect of the SmartwayZ.NL-programme according to Interviewee C. This was confirmed by Interviewee F*: "…the objective is to learn from what we will experience. …That applies to the government, that applies to the other parties: gaining learning experience. And that is [possible]"* (see also Y7).

However, as mentioned before, Smart Mobility development in general is characterized by changing circumstances and uncertainties. Therefore it is difficult for collaborating actors to reach a certain level of knowledge and sustain on the same level of knowledge together (I2):*"It all changes very quickly. That is really a challenge. It is also expanding. Try to get everyone back on the same information level. That is a major challenge, especially because it is a transition within which Smart Mobility is positioned"* (Interviewee G). This is because e.g. new techniques are introduced or particular actors have more access to certain knowledge. However, this is also because new actors are joining the programme and others are leaving. This results in differences in knowledge-levels among the actors involved during the process of Smart Mobility implementation (I3). This keeps going throughout the programme due to its adaptive focus, which affects the implementation of Smart Mobility-techniques.

The fourth information rule could be regarded as a follow-up on the first three. Where the first three rules are mainly about general knowledge about Smart Mobility-techniques and possibilities, the fourth rule is about the progress of the Smart Mobility-projects within the SmartwayZ.nl-programme and the actors who should be informed about this progress (I4). Because, *"…a lot is happening in terms of projects and programs, [but] there is often insufficient knowledge of each other who does what exactly"* (Interviewee J). And according to Interviewee E: *"…that flow of information is really vital to properly do your work"*. An important obstacle in keeping actors informed is the increasing number of involved actors (I5) and the different levels on which these actors operate (see section 4.1.2). As a result: *"Creating a physical moment to meet, talk, catch up on content … has become a bigger challenge"* (Interviewee G). However, as suggested by Interviewee A the governmental actors (which are at the top in the governance structure) are often more up to date about the state of affairs than other actors. Improvements can be achieved by focusing more on implementing and informing knowledge institutions, private parties and other actors, as suggested by Interviewee A: *"I think that if they are more involved than at the administrative level, that does increase the chances and the speed of implementation of the programme"*.

4.6.2. Communication

Building on rule I5, the last information rule is about the communication between actors on multiple levels which is an important aspect for success in Smart Mobility-projects (I6). A distinction could be made between e.g. actors on the decision-making level, the advising level and the executive level. Within these levels different sorts of actors are spread across (e.g. governmental organizations, public-private companies, private companies and citizens). Because of the use of interactive processes within the programme (see above) communication is essential to keep the process going. However for governmental actors it is difficult, especially in the case of a Smart Mobility-project, to explain non-governmental actors the progress of a project because: *"… you are dealing with certain things in a rather abstract way, and how do you translate that into the citizen for whom you eventually do it? … That remains a major challenge at all levels, for SmartwayZ.NL but also for Smart Mobility…"* (Interviewee A). This is supported by interviewee D who suggests that, overall, communication is something that is extremely difficult to do it right, which actually depends a lot on the needs of the recipient and the ways they differ from each other. Therefore it is necessary to find

a balanced range of communication styles. Another negative aspect for implementing Smart Mobility related to communication are the side-effects due to the implementation of the *General Data Protection Regulation* (see section 4.4.2.).

4.7. Payoff rules

Payoff rules are about assigning external rewards (positive) or sanctions (negative) to actors, related to particular actions that have emerged (Ostrom, 2005). Nine payoff rules related to Smart Mobility are identified in the programme under research (see table 12).

Table 12. Identified Payoff rules in the SmartwayZ.NL programme that influence Smart Mobility implementation.

No.	Payoff rule – affect benefits and costs assigned to actors related to the actions and outcomes achieved
Y1	Public problems related to traffic and mobility are being addressed
Y2	Both public and private actors benefit from the improvements related to safety, accessibility, sustainability and economy that Smart Mobility implementation generates
Y3	With the implementation of Smart Mobility-applications, social considerations in relation to e.g. privacy have become more important
Y4	Involved actors may test Smart Mobility-techniques in the social environment
Y5	Due to financial subsidies it is interesting for non-governmental actors to get involved in a Smart Mobility-programme
Y6	With the involvement of market parties within the SmartwayZ.NL-programme, solutions are more likely to be found due to their technical capacities
Y7	Involved actors acquire knowledge about the process of Smart Mobility implementation for future Smart Mobility-projects and -programmes
Y8	During the process of Smart Mobility implementation, actors have to be able to deal with unknown risks related to innovations, finance, collaborations, opportunities, externalities etc.
Y9	The current development and application of Smart Mobility-techniques influences the willingness of citizens to accept Smart City-techniques in the future

4.7.1. Related interests

The first payoff rule is also regarded the most important: Smart Mobility is being implemented to address problems related to traffic and mobility with its main focus on the public/commuters (Y1), especially to improve traffic flow, liveability and safety. This public focus is underlined by multiple Documents (A, C, I & J) and mentioned during multiple interviews (C, D, E & G): *"SmartwayZ.NL focuses on improving the accessibility in the southern Netherlands on roads and in parts of the region where bottlenecks exist …"* (Document I, p.5). Both public and private actors are helped with the improvements Smart Mobility implementation will give. Because a trip without problems or delays is the common interest. This relates to e.g. increasing safety, better accessibility, developing sustainability and especially improving economic factors such as growth and development (Y2) (Interviewees E & G). However, an aspect that has to be considered is: 'Smart Mobility at what costs?'. Due to the increasing use of data to support 'smarter' techniques, social considerations (safety, privacy) have become an important aspect within these processes (Y3) (see section 4.5.2.). The solution that Smart Mobility is should not regenerate new (social) problems.

4.7.2. Mutual gains

An important payoff rule to get (private) actors involved in Smart Mobility-programmes is the possibility to test their Smart Mobility-techniques in the social environment (Y4). This is

acknowledged by Document C (p.15): *"We are developing an extensive test environment [in the Netherlands], which allows large-scale testing in practice … Added value for market parties is that they can test their own service in a real-life traffic situation"*. Yet, another advantage for non-governmental actors is at the financial level: due to subsidies it is interesting for actors to get involved in the programme (Y5) since it may increase the chance of success of a Smart Mobility-concept. Thereby, it is interesting for both public and private actors because *"For market parties, the incentive is to get a business case … For governments, goals are about accessibility, traffic flow and quality of life"* (Interviewee C). Also, for researchers the SmartwayZ.NL-programme is the ideal case for monitoring and evaluating Smart Mobility-techniques, acquiring knowledge and sharing this knowledge (Document C).

Because of the involvement of market parties, the chance of finding a solution for or improvement of a social problem increases due to the innovative/technical capacities of the market (Y6). From this perspective, payoff rules Y4, Y5 and Y6 in relation to Y2 show a win-win for both public and private actors: *"…if we develop our technologies … [and] we can improve and guarantee the accessibility of the region, that's what we do it for. And that this will eventually result in innovations that will make money from it, so be it. But then we have also solved our problem"* (Interviewee E; Document H). Therefore, due to governmental involvement, the possibility for market parties to test their Smart Mobility-techniques is seen as more facilitated in comparison to a situation where public authorities are not involved. And in addition, in the end private actors might have developed new technologies in collaboration with public authorities. In the most ideal case they could have the intellectual property of these technologies (Interviewees C, D & J). However, it shows the dependence of the market on the government and its financial aid, thereby raising the question: from who is what? (Interviewees D & J).

Another positive aspect for involved actors is that they learn how to deal with the process of Smart Mobility implementation (Y7). The process is now seen as a 'learning' one according to interviewees C & J: *"… it is a learning experience. We learn in projects, and we immediately see that things could be done smarter and better. And that is positive from SmartwayZ.NL … we do it step by step: the things we encounter, the learning experience, we use that in following projects"* (Interviewee J). As a result involved actors acquire knowledge for future Smart Mobility-projects and -programmes.

4.7.3. Risks

The last payoff rules for actors are rather negative. One is about dealing with unknown risks (Y8). As mentioned before the implementation of Smart Mobility has to deal with many uncertainties due to its innovative character. This gives actors the possibility to 'learn' (see above). However, this also means that actors do not know how the future might be in relation to innovations, finance, collaborations, opportunities, externalities etc.. These uncertainties are context dependent and could be regarded more uncertain than in normal processes because: *"…it really depends on the type of measure/intervention you implement and how big the risk is"* (Interviewee B). This appeals to both public and private actors. And due to the rather 'new' character of Smart Mobility and it still being in development, also the 'informal' side plays a major role in these uncertainties (Interviewee B). Because as Interviewee J suggests: *"…you have society and citizens that does or does not want certain things"*. Also: *"The distrust [among citizens] is largely fuelled by unfamiliarity with and ignorance of the available solutions. The current possibilities/applications are still unknown to many people"* (Document A, p.46). Due to e.g. accidents where Smart Mobility-techniques are involved (e.g. self-driving car accidents), the willingness of citizens to commit to these measures decreases (Y9). This could affect the future of Smart Mobility implementation.

5. Discussion & Conclusion

In this chapter the results will be discussed and concluded. In the first section the results are reviewed and linked with the theory. In section 5.2 the main research question is answered. In sections 5.3. and 5.4. the relevance of this study is explained. This is followed by a critical reflection of this research (5.5) and suggestions for further research (5.6.).

5.1. Main findings and relation with the theory

As the Minister of Infrastructure and Water Management stated, a shift has to emerge from testing and experimenting with Smart Mobility towards the use of it in existing practice, accompanied by embedding Smart Mobility as an integral part of policy and implementation processes. This requires institutional transformation (Alexander, 2005) in order to make such a shift possible. And to obtain a comprehensive approach for implementing Smart Mobility-techniques, the focus is on combining governmental authorities, market parties, knowledge institutions and social organizations (see section 1.1.4.). However, there is a lack of implementation processes and Smart Mobility-policies. Since the SmartwayZ.NL-programme is one of the most extensive ones in the Netherlands, this research focused on this programme to analyze the institutional aspect with Ostrom's IAD-framework. This turned out to be an extensive aspect within Smart Mobility implementation, as the analysis of the case study shows that for every IAD-rule multiple rules-in-use are identified. In relation to the theoretical framework mentioned before, some of these rules could be seen as catalysts or as barriers for the implementation of Smart Mobility.

5.1.1. Application of Smart Mobility

As reviewed in the theoretical framework, many definitions are available for the concept Smart Mobility. When interpreting the results, the given definitions about Smart Mobility show many similarities with the concept as used within the SmartwayZ.NL-programme.

From the results it became clear that Smart Mobility turned out to be an important aspect within the region. As a result, Smart Mobility is applied in a comprehensive way. This comprehensiveness could be related to the three main pillars of Smart Mobility as discussed by Benevolo et al. (2016): the green city, the knowledge city and the digital city.

The view of Jones (2017a) about Smart Mobility being a comprehensive concept where many people profit due to a more efficient and connected system also applies to the programme under research. Smart Mobility is used in a comprehensive way since it addresses multiple problems (social, economic, technological, etc.) in multiple ways (multiple challenges, multiple approaches), as is acknowledged by the results. It especially fits the definition of Jones (2017b) since it is not mentioning the need for technological innovations per se but focuses more on the overall efficiency of the system. This is because the Smart Mobility-programme aims on improving the overall accessibility of the southern Netherlands as was highlighted by several interviewees and consulted documents. Smart Mobility is a means in this, since it is considered first when dealing with a problem, but it is not considered as the only solution for existing problems. When Smart Mobility is used as a specific solution, it remains closest to the definition given by Chai & Chen (2018). They elaborated on Smart Mobility as a concept that aims for increasing the efficiency of urban transport and its management by using innovative technologies. These eventually should lead to an innovative and effective way of addressing traffic problems. As the results suggest, these innovative focus is applied within the programme by including market parties with their expertise.

5.1.2. Institutions and rules

As stated by Koppenjan & Groenewegen (2005) in section 2.2.2., institutions are referred to as 'rules of the game' that guide and coordinate actors and their behaviour. These rules have to be understood in order to analyze the involved institutions according to Ostrom (2005; 2011). As mentioned before, the SmartwayZ.NL-programme was used to study the implementation of Smart Mobility by examining the formal rules-in-use. When looking at the results, a comprehensive framework of rules-in-use is identified within the Smart Mobility-programme. When examining the results, it can be argued that certain rules have proven to be very important.

One of these are the position rules that determine relevant positions for actors within the programme. In the case study these rules resulted in an extensive governance structure with rules focusing on which actors (public and private) are needed and which roles have to be filled by these actors. Together with rules focusing on what decisions have to be made and by who (aggregation rules) it becomes clear which actions and decisions regarding the implementation of Smart Mobility have to be taken and by which actors. It turned out that the applied governance structure created a transparent distribution of roles between involved actors that supports the implementation of Smart Mobility-techniques. Therefore the argument of Razaghi & Finger (2018) about governance being *the* critical factor within Smart Mobility implementation, is agreed upon in this research. Because of this it could be argued that the degree of Smart Mobility implementation is indeed dependent on the institutional capacities as was also mentioned by Razaghi & Finger (2018). This is also acknowledged by the results from the case study. However, what must be taken into account is that the role of the mobility market in the process of Smart Mobility implementation has become bigger. This has resulted in more involvement of non-governmental actors within Smart Mobility-programmes such as SmartwayZ.NL. Therefore knowledge institutions and private actors should be more involved than only at the administrative level. This might positively influence the implementation of Smart Mobility-techniques.

Other important rules, as identified in the case study, are scope rules. The scope rules within the programme are focused on the development of Smart Mobility-techniques and the implementation of these techniques within multiple challenges. Thereby, when addressing (urban) problems, Smart Mobility is used as starting point. This resulted in a scope that Smart Mobility is seen as a serious solution for problems. It is therefore paving the way for future implementations of Smart Mobility-techniques. The results also show that, besides the scope rules in general, laws and regulations are important to consider. This is because Smart Mobility implementation is usually accompanied by changes in the social environment. The scope rules related to these laws and regulation can be both resistant or supportive as noticed in the case study. Therefore, also since Smart Mobility is applied as a serious solution, these aspects could be the first steps that might lead to a change of the 'rules of the game' as was discussed by Klijn & Koppenjan (2006), since changes are possible within these 'robust' systems according to Koppenjan & Groenewegen (2005).

As was theorized, the focus of Smart Mobility implementation is mainly on managing traffic problems according to Riva Sanseverino et al. (2017a). This public focus of Smart Mobility was also highlighted within the case study. Because of this public focus, public actors are involved. However, besides these public actors also private actors are involved within the SmartwayZ.NL-programme. As discussed in the results, this is because of the mutual dependence of public and private actors. Therefore, in order to involve private actors within a Smart Mobility-programme such as SmartwayZ.NL, it is important that these actors know what is in it for them. Therefore it can be argued that payoff rules also play an essential role within Smart Mobility implementation, since private actors have proved to be indispensable.

As Razaghi & Finger (2018) argued in the theoretical framework, a single actor does not have the necessary resources anymore to face complex urban problems alone. Therefore multiple actors are needed and they have to collaborate on solving these problems as was argued. This multiple actor involvement is underlined by the results, stating that both public and private actors are needed, together with knowledge institutions. In relation to the mutual dependence of these actors and the extensive governance framework it entails, information rules proved to be important. This was acknowledged by multiple sources, also stating that this aspect is taken into account, especially by focusing on knowledge sharing and learning within the programme. Nevertheless, the use of information rules in practice is considered as insufficient within the case study, since it is not obvious for involved actors to do that exchange. The reason for this could be the adaptive focus of the programme because, as a result, multiple actors enter and exit the Smart Mobility-arena during the programme. This is considered as having a negative effect on the use of information rules in practice.

Since Smart Mobility is an innovative concept, many actors are involved and uncertainties have to be dealt with on a regularly base according to the case study. Therefore rules might change along the way. This is in line with Koppenjan & Groenewegen (2005) who argued that institutions are continuously changing because of environmental processes and because of changes in relation to other institutions. This is also acknowledged by Ostrom (2011). She suggested that a shared meaning about a rule can change due to e.g. transformations in shared norms or in technology. Therefore, since collaborations and agreements within a Smart Mobility-programme can alter, rules-in-use could be subject to change.

5.2. Research questions

It was made clear in chapter 1 and 2 that institutional design is needed to implement Smart Mobility-techniques in the Netherlands. The purpose of this research was therefore to find institutional catalysts and barriers for Smart Mobility implementation. To determine what the catalysts and barriers for implementation were, a case study to a Dutch Smart Mobility-programme was done. In this section recommendations are given for improving the way of implementing Smart Mobility within the contemporary institutional framework by answering the main research question. To do this, first the secondary research questions will be answered shortly.

5.2.1. How can Smart Mobility be conceptualized?

In this research it became clear that there are multiple definitions for the concept Smart Mobility. Overall it can be argued that Smart Mobility contributes to a more sustainable future for transportation systems. Smart Mobility is considered as a solution for complex urban problems related to urbanization, increasing population and the growth of motorization. In addition to this, considering the case study of this research, it can be argued that Smart Mobility can be seen as a comprehensive concept for attaining these urban (traffic) problems. Often argued is that (innovative) technologies have an important role in this concept. This is because these technologies could have impact on the transport-efficiency such as modes of transportation, infrastructure and a more effective mobility system addressing traffic problems, the quality of public transport services and the overall liveability in cities. Overall it can be argued that it is impossible to give an exact definition of Smart Mobility since it depends on the specific urban problem that is being addressed, the way this problem is addressed and the actors that are involved.

5.2.2. What are possibilities for Smart Mobility based on the contemporary institutional framework within the Netherlands?

The attention given to Smart Mobility by the Dutch Minister of Infrastructure and Water Management to change towards an environment where Smart Mobility is an integral part of policy

and implementation processes contributes to its development in the Netherlands. As a result there are possibilities for Smart Mobility-programmes such as SmartwayZ.NL to test and implement Smart Mobility-techniques in practice.

Considering the implementation and its (im)possibilities, besides the internal governance of a project/programme itself, contemporary (inter)national laws and regulations have the most influence on Smart Mobility implementation in the Netherlands. Laws and regulations that cause hindrance are the *Vienna Convention on Road Traffic* and the *General Data Protection Regulation*. However, there are also laws and regulations that support Smart Mobility. These are the *Decree granting exceptional transport exemption*, the *Experimental Law* and the *Declaration of Amsterdam*. These allow Smart Mobility-techniques to be tested and implemented in practice to a certain extent. However, these laws and regulations do not contribute to the full potential of Smart Mobility development since these are adjustments to existing laws and regulations.

5.2.3. Which institutional barriers and catalysts to Smart Mobility implementation can be identified in 'SmartwayZ.NL'?

The SmartwayZ.NL-programme turned out to be a comprehensive Smart Mobility-programme with a corresponding governance structure with multiple rules-in-use. As was discussed in section 5.1.2. multiple rules turned out to be of great importance for the functioning of a Smart Mobility-programme. Out of these rules multiple catalysts and barriers could be identified.

A first catalyst are the benefits for society that can be achieved. From the case study it became clear that improved accessibility of the southern Netherlands and the corresponding benefits for commuters are the most important aspect related to Smart Mobility implementation. A second institutional catalyst is the mutual dependence of governmental and non-governmental actors during the process of Smart Mobility implementation. This is because governmental actors have the possibility to allow Smart Mobility-techniques to develop in the social environment, and non-governmental actors (especially market parties and knowledge institutions) have the technical expertise to create these Smart Mobility-techniques in the first place. This dependence encourages the development and implementation of Smart Mobility by bringing together both worlds of institutional and technical capacities. A third institutional catalyst is the comprehensiveness Smart Mobility-solutions might entail. Complex urban problems comprehend technological, social, economic and political challenges. By including multiple governmental layers and multiple domains, Smart Mobility-solutions create an all-inclusive, more future resistant result. Especially when Smart Mobility as solution is considered first when dealing with a problem.

Three barriers are identified for Smart Mobility implementation. First, political and social considerations have to be dealt with. Since Smart Mobility-techniques are implemented in the social environment, the effects of these implementations (e.g. safety, privacy, etc.) are important to consider, thereby complicating Smart Mobility implementation. In addition, due to political shifts the focus on applying Smart Mobility as a solution for urban problems might be influenced since its techniques and results could be disputed and are often not tangible. A second barrier is the difficulty of defining the area for Smart Mobility implementation, because mobility itself does not end at geographical boundaries. However, the more extensive an area becomes the more actors have to be involved and the more complicated the governance structure will be. Defining institutional boundaries is therefore essential. A third barrier are the contemporary laws and regulations. These are not particularly contributing to the implementation of Smart Mobility-techniques as was concluded in the second secondary research question.

With insights from answering these secondary research questions, the main research question will now be answered.

5.2.4. How can the implementation of Smart Mobility in the Netherlands be improved through institutional design?

This study has shown that governance is *the* critical factor for implementation of Smart Mobility-techniques in practice. Nevertheless, recommendations are given to improve this implementation.

First, as discussed, laws and regulations are an important barrier for Smart Mobility implementation. Overall, laws and regulations have to transform from lagging behind on technological developments to guiding Smart Mobility-innovations. They have to transform from obstructing to encouraging the implementation of Smart Mobility-techniques. And because the current laws and regulations that provide possibilities for Smart Mobility are merely adjustments to existing laws and regulations, these do not contribute to the full potential of Smart Mobility developments. Hence it is argued that laws and regulations specifically aimed at implementing Smart Mobility-techniques are needed. These specific laws and regulations have to focus on the needs of implementation. This focus has to be on two aspects: one aspect is about the developing and testing of Smart Mobility-techniques. This has to be more stimulated in order to shift the focus of implementation from public actors more towards private actors, thereby creating more independency for private actors. The other aspect is about the process of implementing Smart Mobility-techniques in the social environment. The process to do so has to be more open and transparent for actors, thereby focusing on e.g. easier involvement of citizens. However, it is important that a balance is found between implementation and social aspects as safety and privacy.

Second, due to the 'innovative' character of Smart Mobility, projects and programmes are focused on testing new techniques in the social environment (as is mentioned above). And as suggested by the minister, applying these techniques in existing practice has to be accompanied by integral implementation processes. Defining these processes turned out to be difficult due to the aspect that geographical boundaries are difficult to establish for Smart Mobility-projects and -programmes (because commuters also come from outside these areas). To address this problem the focus should be on cross-regional implementation. To establish this, the national government should take the lead in Smart Mobility implementation in the Netherlands. Therefore a national (or even international) system with general guidelines for Smart Mobility implementation is required. These guidelines should focus on standardizing the process of involvement of actors (public, private, knowledge institutions) and on standardizing the process of applying techniques in public (where specific laws and regulations are useful, see above). A first step to take in this, as is successfully done in the case study, is to apply the standard of 'Smart Mobility where possible, asphalt when necessary'. This eventually could improve the tangibility of Smart Mobility-solutions and results.

Third, in this research it turned out that information rules within the governance structure of an extensive Smart Mobility-programme proved to be important. However, within this research these are not considered as such. This can be caused by the adaptive focus of a programme, the multiple involved actors and/or the extensive geographical focus of a Smart Mobility-programme. Therefore it can be concluded that the exchange of information has to be arranged in a more formal way. To achieve this, attention must be paid to the importance of applying and executing these information rules within the governance structure of a Smart Mobility-programme. Therefore additional attention has to be given to these rules when (inter)national guidelines (as recommended above) are going to be formulated and implemented. This aspect should be part of the guidelines that focus on standardizing the process of involvement of actors.

5.3. Theoretical implications

This study adds to the growing body of research indicating that Smart Mobility is the way to go in dealing with growing urban complexities. Overall, the theoretical relevance of this study is on

confirming statements made by authors mentioned in the theoretical framework. This study has tested the theories to see whether they were recognizable in practice. However, there were also results which were not endorsed by these authors. The main relevance being the connection between Smart Mobility, its implementation in practice and the role for institutional design within this. Especially the social context turned out to be relevant. Another relevance for theory is the use of Ostrom's IAD-framework on a Smart Mobility-programme which, to the authors knowledge, was not done before. Lessons can be learned from this.

5.4. Practical implications

This study highlighted how institutional Smart Mobility implementation could contribute to address urban problems. Because of its highly developed infrastructure, the Netherlands have the possibility to implement Smart Mobility-techniques to an extensive level. As explained in the theoretical framework there are multiple definitions for both the concepts Smart City and Smart Mobility. With this study it is highlighted what is meant by these concepts and that Smart Mobility is part of the Smart City, together with multiple other concepts. With the overview of rules-in-use within the case study, the influence of different aspects from within the process of Smart Mobility implementation has become more explicit. Due to this, future Smart Mobility-programmes could be established with this as background knowledge, focusing on better coordination with and between public and private actors. Overall, the findings of this research provide insights for the development of measures to implement Smart Mobility more thoroughly within the Dutch institutional framework. And although this study focuses on Smart Mobility implementation, the findings may well have a bearing on the implementation of Smart City-techniques in general because of its interconnection.

5.5. Critical reflection

This section elaborates on the process and outcomes of this study. First, it should be clear that the use of the concept 'Smart Mobility', in whatever form, will always be subject to questions. Both in (academic) literature and in practice. Therefore this research did not focus on the question if Smart Mobility could be a solution, but on the question what should be done when it is regarded as such. Therefore this research does not state that Smart Mobility solves the problem, it argues that it could make a contribution to the solution.

Second, this research used a qualitative method of data gathering which resulted in an in-depth analysis of the case study. This resulted in in-depth knowledge about the programme under study and the rules-in-use. However, due to this single case generalizations are more difficult to make. In order to make generalizations more valuable, multiple cases should be analyzed and compared to each other. However, due to its novelty there are yet not many programmes that are as extensive as the programme under study. This (again) makes it difficult to make generalizations (for now).

Third, the IAD-framework used divided the institutional situation in seven rules. Due to these rules the institutional elements of the case study were highlighted. Also, the information was structured using these rules which made analysing the information easier. Despite this, the IAD-framework uses the rules in separation from each other. However, as experienced with the case study, sometimes there are strong links between multiple rules that affect the action situation. As a result choices had to be made to relate certain information to a certain rule. Therefore some rules-in-use could be somewhat overlapping. Nevertheless they still have their own particular focus.

Fourth, as mentioned earlier and what is also acknowledged by the theory, both formal and informal rules are important within institutional analysis. This aspect was also mentioned multiple times by

interviewees. However, due to time constraints it was not possible to focus on both. And since there is demand for formal institutional design this clarifies the focus of this research.

Finally, during the interviews some interviewees contradicted certain statements of other interviewees. To maintain the focus of this research, a considered decision between contradicting statements was made based on multiple interviewees and the document analysis.

5.6. Suggestions for further research

Since this study is based on a single case, further research could focus on multiple Smart Mobility-cases and its similarities and differences between them. Complementary to this is to use quantitative data gathering, e.g. the use of questionnaires among involved actors, to highlight the differences between cases. As a result generalizations about the acquired data could be done easier. Another suggestion for further research is to include the informal aspects of the institutional framework. This is because of its importance on the ‘rules of the game' as mentioned in the theory and because of its probably importance on Smart Mobility implementation.

And since this study came up with three concluding aspects in order to improve institutional design, further research should focus on these aspects and the concrete steps that are necessary to improve Smart Mobility implementation. And to create suitable and adequate steps that fit within the current institutional framework, national policymakers could be interviewed to provide input.

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Appendices

Appendix I – Institutional Analysis and Development Rules

In this appendix the rules from the IAD-framework are more elaborated upon. The explanations of the rules are based on the work of Ostrom (2005, 2011).

Position rules

Positions within an action situation are the connecting link between involved participants and authorized actions. The position rules are about creating positions within an action situation. Positions are filled by participants of this action situation. Specific actions sets for specific positions are assigned to these participants. A position rule may define whether there is a limit on the number of participants holding a specific position.

Boundary rules

Boundary rules are about defining which participants are eligible and may or must enter a position and how participants may or must leave a position. And because boundary rules can also influence the number of positions participants can hold within an action situation, boundary rules are related to the above mentioned position rules. However, boundary rules are also about exit rules in which the conditions are defined under which a participant must (not) leave or may leave a position within the action situation. Besides the participant him/herself, other participants may also have influence over the exit of another participant.

Choice rules

Choice rules describe what a participant in a certain position must, must not or may do at a specific point in the decision process. These choices may relate to conditions that have (not) been met within that particular process. The resulting actions depend on the prior actions taken by other participants or themselves, the position they hold and other relevant variables within the action situation. Therefore, choice rules affect the power created and the distribution of power within action situations. Also, actions which do not fit within information rules, payoff rules, boundary rules or aggregation rules within an action situation may be considered as part of choice rules.

Aggregation rules

With these rules is determined if a decision is needed from a single participant or from multiple participants before an action within the decision process can be executed. No single participant does fully control the outcome of a process. In situations where multiple participants are involved, they jointly decide which actions will be taken. However individual participants can control certain decisions made at individual nodes within the process. Eventually, the aggregation rules are there to make clear for a group who makes the final decisions about which action(s) or set of activities should be executed and how much weight each decision from a participant will have in the decision field with other participants.

Information rules

Within an action situation available information, about e.g. the structure of the particular situation and moves of other participants within certain positions, is important. Information rules affect the level of knowledge about these aspects towards other participants, to what extent this information is accurate and its frequency of exchange of information. With information about (past) actions of participants, others can create an image about who is (not) e.g. trustworthy.

Payoff rules

Payoff rules are about assigning external rewards (positive) or sanctions (negative) to particular actions that have emerged. Most of the time it will be about money involved. However, money is not the only payoff possibility there is: payoff consequences may also emerge from information rules,

choice rules and scope rules. Even boundary rules, which are tied to assignment of actions to certain positions may be used as a payoff consequence within an action situation. Therefore payoff rules are not the only rules that outline the costs and benefits of action situations.

Scope rules

With these rules a known outcome variable may be affected due to actions taken within the action situation, however these rules affect the action by their effect on the outcome variables and therefore they do not directly appoint for specific action sets. Scope rules define the outcome and specify each outcome variable's range and the rules link actions to specific outcomes.

Appendix II – Interview guide case study SmartwayZ.NL

- Heeft u er bezwaar tegen als ik het interview opneem?

In een kamerbrief (2018) over de aanpak van Smart Mobility gaf minister van Nieuwenhuizen aan dat er een verschuiving moet komen van het testen en experimenten, naar het toepassen en het gebruik van Smart Mobility in de praktijk en het inbedden ervan in beleids- en uitvoeringsprocessen.

Met dit onderzoek focus ik mij daarom op de casus SmartwayZ.NL op de implementatie van Smart Mobility binnen dit programma. Ik hoop inzicht te krijgen in hoe het proces tot nu toe is verlopen en hoe formele regels de implementatie van Smart Mobility beïnvloeden. Hiervoor maak ik gebruik van het IAD-framework en haar 7 regels (Ostrom, 2005, 2011). Deze regels focussen zich op de verhoudingen tussen partijen binnen een samenwerking.

Met dit onderzoek hoop ik tot aanbevelingen te komen waardoor Smart Mobility beter geïntegreerd kan worden in toekomstige infrastructurele en/of mobiliteitsprojecten.

- Omdat ieder interview zich concentreert op 7 regels zoals hierboven benoemd en tijd een factor is, vraag ik u om uw antwoorden kort en bondig te houden.

Inleiding

1. Bij welke organisatie bent u werkzaam, wat is uw functie en welke rol vervult u binnen het Smart Mobility-programma SmartwayZ.NL?

Algemeen

2. Wat verstaat u onder het begrip ‘Smart Mobility’?’

Wat ik versta onder het begrip SM: Het gebruik van technische ontwikkelingen in het verbeteren van mobiliteit en het data-gestuurd verbinden van mensen en locaties.

IAD-framework

3. Hoe stimuleert de huidige wet- en regelgeving de realisatie van Smart Mobility oplossingen? *(scope rules)*
    a. Zou u een voorbeeld hiervan kunnen noemen?
    b. Waar doen zich problemen voor?

4. Kunt u kort uitleggen hoe in het SmartwayZ.NL programma invulling is gegeven aan Smart Mobility? *(scope rules)*
    a. Hoe is de focus op Smart Mobility ontstaan en om welke reden?
    b. Welke wensen/doelen zijn er van te voren opgesteld binnen het programma SmartwayZ.NL om tot implementatie van Smart Mobility te komen?

5. Het SmartwayZ.NL programma bestaat uit meerdere deelopgaven. Hoe wordt, met de focus op de implementatie van Smart Mobility, bepaald welke projecten deel uitmaken van het programma? *(scope rules)*
    a. Zijn hier eisen aan verbonden?

6. Welke partijen zijn betrokken bij het realiseren van Smart Mobility maatregelen en wat zijn hun rollen? *(position rules)*
    a. In hoeverre ondersteunt deze rolverdeling efficiënte en effectieve implementatie van Smart Mobility maatregelen?

b. Zijn er partijen die de implementatie van Smart Mobility hebben gehinderd? Zo ja, welke?

7. Wat zijn stimulansen ('incentives') voor betrokken partijen om mee te werken aan de implementatie van Smart Mobility, en wie profiteren van (aanstaande) Smart Mobility maatregelen? En heeft dit effect op de daadwerkelijke implementatie van Smart Mobility? *(payoff rules)*
    a. Geld? Kennis? Macht?
    b. Wie zijn eigenaar van (nieuwe) innovaties die worden gedaan/gebruikt?
    c. Welke betrokken partijen dragen de kosten en financiële risico's?

8. Hoe worden in samenwerkingen m.b.t. de implementatie van Smart Mobility keuzes gemaakt als: wie neemt het voortouw en wie is eindverantwoordelijk? *(choice rules)*
    a. Wat is de rol van uw organisatie hierin?

9. Hoe gaan de betrokken partijen om met hun verantwoordelijkheden m.b.t. de implementatie van Smart Mobility binnen SmartwayZ.NL? *(choice rules)*
    a. Komen partijen hun afspraken na?
    b. Wat voor een effect heeft dit op de relaties tussen betrokken partijen binnen SmartwayZ.NL?

10. In hoeverre is het mogelijk om gedurende het implementatieproces nieuwe actoren te betrekken of betrokken actoren uit te sluiten om de realisatie van Smart Mobility te stimuleren? *(boundary rule)*
    a. Hoe is dit gebeurd?

11. Hoe is de besluitvorming tussen partijen geregeld binnen het programma SmartwayZ.NL? *(aggregation rules)*
    a. Wie heeft het de laatste stem in keuzes die gemaakt moeten worden? Of heeft iedere partij een gelijke stem?
    b. Hoe kijkt u, vanuit het perspectief van uw organisatie, hier tegen aan?

12. Zou er volgens u betere uitkomsten gerealiseerd kunnen worden m.b.t. de implementatie van Smart Mobility wanneer het proces van besluitvorming anders zou worden uitgevoerd? *(aggregation rules)*
    a. Bijvoorbeeld wanneer (andere) partijen meer invloed zouden hebben op de besluitvorming.
    b. En/of gezien vanuit een meer nationaal / lokaal standpunt

13. Hoe wordt informatieoverdracht tussen betrokken partijen geregeld binnen het programma SmartwayZ.NL? *(information rules)*
    a. Bijvoorbeeld: in hoeverre worden betrokken partijen op de hoogte gebracht van de voortgang / stand van zaken binnen het programma SmartwayZ.NL?

14. Heeft de aanwezigheid van kennis en de uitwisseling van kennis tussen betrokken partijen m.b.t. Smart Mobility invloed gehad op de implementatie ervan? *(information rules)*

Afsluitend

15. Waar liggen volgens u de grootste knelpunten/barrières voor de ontwikkeling van Smart Mobility in Nederland?
    a. Zijn er belangrijke punten die nog niet zijn besproken, die wel van belang kunnen zijn voor mijn onderzoek?

b. Heeft u nog tips voor mij?

- Wilt u dat ik het interview anonimiseer?
- Mag ik quotes van u in mijn onderzoek opnemen?
    - Ik zal de geïnterviewde op de hoogte stellen wanneer ik in mijn onderzoek refereer naar de geïnterviewde.
- Heeft u nog mogelijke contacten die mij verder kunnen helpen in dit onderzoek?

Bedankt voor uw tijd!