Universiteit Utrecht

Master's Thesis – master Innovation Sciences

Road Safety Strategic Plan:
A mission-oriented innovation systems approach in the Netherlands

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Abstract

Interrelated pressures, stresses and tensions stemming from overpopulation, urbanization and consumerism are causing grand societal problems, such as climate change and poverty. These grand societal problems are not easily solved with second generation policies, as they are characterized by their wicked nature. Emerging literature discusses two types of perspectives that are fit to tackle these challenges: transformative innovation policy (TIP) and mission-oriented innovation policy (MIP). This paper combines the best of both worlds and looks at MIP through a transition's perspective, allowing for transformative changes, with a central role for directionality through the formulation of missions, allowing for the development of concrete strategies.

Wesseling & Meijerhof (2021) are the first to develop an approach to studying missions using this perspective, which they called a Mission-oriented Innovation Systems approach (MIS). The MIS approach is adapted from the structural-functional approach of a Technological Innovation Systems framework. It involves a problem-solutions diagnosis, a structural analysis, a system function analysis, a systemic barrier analysis and a systemic instrument analysis. Central to the MIS approach is the mission arena, which constantly monitors and evaluates the mission, and redirects it when necessary, through the use of mission governance actions.

This research analyzes the mission Road Safety Strategic Plan (RSSP) 2020 and its consecutive mission RSSP2030 via a case study research design. An event history analysis is performed on RSSP2020. Furthermore, both missions are analysed via a literature analysis and through interviews with 20 experts. The research question: *"How have systemic instruments affected the barriers to the achievement of the RSSP2020 mission and what did the mission arena for RSSP2030 learn from this for overcoming the MIS barriers of today?"* guided the research.

It was found that there was a significant lack of mobilization, regarding finances and actors, for the RSSP2020 mission. This meant that no systemic instruments effectively helped overcome any of the systemic barriers. One of the core barriers, the lack of structural embeddedness of traffic safety within the Netherlands, was identified to be strongly present in RSSP2020 and in RSSP2030. Even though significant advances have been made for the RSSP2030, which show an increase in structural embeddedness of traffic safety within the Netherlands, these advancements are insufficient for the achievement of the RSSP2030 goals within the constrained time.

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1. Introduction

The capacity to collectively organize its affairs through joint institutions has distinguished humans from any other species on the planet. This has resulted in a global change where human societies experience extreme economic developments and are becoming increasingly interrelated (Biermann, 2014). At first sight this seems beneficial, however interrelated pressures, stresses, and tensions stemming from overpopulation, urbanization and consumerism are causing problems (McMichael, 2013). These problems such as climate change, poverty and inequality have a significant impact on our society and are called “grand societal challenges” (Voegtlin et al., 2019)

The concept of grand societal challenges has gained popularity in policy making over the last years (Kuhlmann & Rip, 2014). They are characterized by their “wickedness” meaning that they are complex, systemic, interconnected, and urgent, requiring insights from many perspectives (Mazzucato, 2018a). Second generation innovation policies mainly focus on stimulating economic growth and the general ability of nations and sectors to generate innovations (Alkemade et al., 2011). These policies are unable to deal with wicked challenges, therefore a new generation of innovation policy is needed (Schot & Steinmüller, 2018; Fagerberg, 2018).

Emerging literature discusses two types of perspectives that are fit to tackle these challenges: transformative innovation policy (TIP) and mission-oriented innovation policy (MIP). The former originates primarily from the literature stream of transitions, while the latter finds its roots in economics literature and governmental projects (Haddad et al., 2019). Even though both literature streams argue for a new generation of innovation policy to tackle grand societal challenges, there are some differences. TIP authors focus on open-ended transformations in our model of production and consumption, through bottom-up initiatives (Schot & Steinmüller, 2018; Steffen et al., 2015, Weber & Rohracher, 2012). MIP authors, on the other hand, take a top-down approach using predetermined goals, which help steer into a specific direction (Foray et al., 2012; Mazzucato, 2018a; Kattel & Mazzucato, 2018).

This paper combines the best of both worlds and looks at MIP through a transition’s perspective, allowing for transformative changes (Schot & Steinmuller, 2018), with a central role for directionality through the formulation of missions, allowing for the development of concrete strategies (Mazzucato, 2018a). MIP has substantive potential to tackle societal problems, however it remains understudied. In order to design more effective MIP, a deeper understanding of the innovation dynamics is needed (Janssen et al., 2020).

Innovation dynamics can be analysed using innovation system theory. Here, a system is defined as ‘a set of interrelated components working towards a common objective’ (Carlsson et al., 2002). There are several innovation system theories developed, each using a different point of delineation as departure. However, none of the existing innovation system frameworks are fit to deal with the characteristics of a MIP, because *“they miss a clear operational approach, or they lack a sufficiently detailed, ‘embedded system’s’ perspective” (*Wesseling & Meijerhof, 2021).

Therefore, to successfully analyse the innovation dynamics of MIPs, a new innovation systems framework is needed. Hekkert et al. (2020) argue for a 'Mission-oriented Innovation System' (MIS). Wesseling & Meijerhof (2021) developed a first approach to studying MIS. They use the structural-functional approach from the Technological Innovation System (TIS) framework as a starting point and build on it to make it suitable for studying MIS (Bergek et al., 2008; Hekkert et al., 2007). This is done by adapting and reinterpreting the seven key innovation activities into functions that are applicable to the delineations of a mission. These *'system functions'* systematically measure all the activities which take place in an innovation system (Hekkert et al., 2007). When a function is weak or absent it is considered a *'systemic barrier'*. This can be tackled by altering the elements of the innovation system through the implementation of *'systemic instruments'*, which are policy interventions (Wieczorek & Hekkert, 2012).

The first approach developed by Wesseling & Meijerhof (2021) is a step in the right direction, however more case studies are needed to fully understand how MIS dynamics work. Each mission is unique; hence it is important to systematically compare them and their dynamics. Therefore, this research explores the innovation dynamics of a case with different elements compared to the sustainable maritime transportation (SMT) case by Wesseling & Meijerhof (2021). The case selected is the 'Road Safety Strategic Plan (RSSP)', which is a mission by the Dutch government to increase road safety (V&W, 2008). The RSSP started in 2008 with RSSP2020, currently the consecutive mission RSSP2030 is in operation and there are plans for a mission for 2050.

The RSSP is a great example of a MIP as it includes all the elements described by Mazzucato (2018a). Firstly, the goal, *to reduce traffic deaths per year to 500 by 2020 and to 0 by 2050*, is well defined, due to the RSSP document extensively explaining the mission, the problem-areas and the related solutions (V&W, 2008; IenW 2019). Secondly, the RSSP mission consists of a portfolio of innovative projects. For the RSSP2020 every two years a dynamic action plan is composed and for RSSP2020 a national action plan, both of these plans include a list of innovative projects that should help reach the mission goal (Nationaal Mobiliteitsberaad, 2008; IenW, 2018). Thirdly, the RSSP enables investments across sectors involving different types of actors. This can also be seen in the dynamic action plan, as it provides a list of actors who are contributing to the individual projects. These actors range from traffic and tourism actors (e.g. ANWB) to research institutes (e.g. TNO) to aerospace actors (e.g. NLR). Lastly, the RSSP-mission translates its priorities into concrete policy instruments. One of the policy instruments used is a subsidy in order to get projects off the ground (Nationaal Mobiliteitsberaad, 2008; IenW, 2018).

The differences between the RSSP case and the SMT case, which are interesting from a MIS analysis perspective, are (1) an emphasis on social innovations, (2) the status of operations and (3) the inclusion of two groups of actors mobilizing structural components. The SMT-case has a strong technological focus, while the RSSP includes both technological and social innovations (Nationaal Mobiliteitsberaad, 2008; IenW 2018). The inclusion of social innovations and understanding its innovation dynamics is of vital importance, because solely technological solutions are unable to tackle grand societal challenges (Levin et al., 2012). In order to compare the maturity of technological and social innovations, a single evaluation measure is needed.

Currently the literature does not describe such an evaluation measure. Therefore, this paper introduces a Solution Readiness Level (SRL) metric, which allows evaluating and comparing both technological and social innovations contributing to the mission's goal. The definitions and corresponding examples can be found in section 2.2.1.

The SMT-case was analysed while the mission was still in operation. While this is a viable way to analyse a MIS and determine whether the policy is targeting the right barriers, it is not possible to see the full picture of causal effects and determine if the policies in place help to overcome these barriers. Since the operations of RSSP2020 ended in 2020, a longitudinal analysis can be performed in the form of an event history analysis. This analysis allows for a clear assessment of the impact of policies on the systemic barriers, resulting in an in-depth analysis of the MIS dynamics between the policies and the systemic barriers. Furthermore, since this analysis maps out events over time, it allows for an assessment of the evolution of the learning processes of the policy makers, meaning that it can be analysed how reflexive and evaluative these policy makers are. This was difficult to analyse in the SMT-case due to it being in operation for a short period of time when it was analysed.

The RSSP2030 includes two central groups of actors that mobilize structural components to meet the defined goals within the constrained time. These central groups of actors are called a *mission arena* in the MIS literature. Four main tasks are distinguished related to governing the mission: setting up the mission arena, mission formulation, mobilization of MIS components via mission governance actions, and continued reflexive mission governance. An analysis on a case with two mission arenas has not been done. Therefore, this paper aims to contribute to the MIS's theoretical development by exploring the dynamics between these mission arenas.

In summary, the analysis of the RSSP2020 increases the theoretical knowledge of the MIS. More specifically, knowledge related to the dynamics of social innovation and to the dynamics between the systemic barriers and systemic instruments. Additionally, lessons can be drawn from the analysis, which can be used as recommendations for overcoming the systemic barriers in the RSSP2030-mission. RSSP2030 is in operation from 2020 until 2030 and is used as a waypoint to reach the ambition of zero traffic casualties in 2050 (IenW, 2019). The analysis of the RSSP2030 contributed to the theoretical development through the exploration of the dynamic between two mission arenas. The implementation of the recommendation will enhance the functionality of the RSSP2030 MIS which will increase the chance of completing the mission within the constrained time.

The following research question is formulated:
"How have systemic instruments affected the barriers to the achievement of the RSSP2020 mission and what did the mission arena for RSSP2030 learn from this for overcoming the MIS barriers of today?

In order to answer this research question, it is split into multiple sub-questions, which follow the analytical steps of a MIS and are built on the proposed diagnostic questions of Wesseling & Meijerhof (2021). These sub-questions will be answered for both the RSSP2020 and RSSP2030.

Problem solution diagnosis

- *How do different societal problems and 'wants' relate to the mission?*
- *What technological and social innovations are relevant to the mission?*
    - *How mature are these innovative solutions?*

Structural innovation system analysis

- *What actors, institutions and infrastructures have contributed to the mission?*
    - *How and by whom are they mobilized?*

System functions analysis

- *What system functions are not developed sufficiently rapidly to complete the mission?*

Systemic barriers analysis

- *What are the underlying causes of the systemic barriers?*

Identification of systematic instruments

- *What systemic instruments can be considered effective or ineffective in tackling the identified systemic instruments and why?*

Answering the research questions increases the knowledge about MIS and will accelerate its development, allowing policy makers to better understand how MIPs should be created. This also has societal implications, because effective MIPs enable societies to overcome grand challenges, which have the potential to drastically decrease the quality of life of humanity. For example, the increased understanding of the innovation dynamics and the introduced Solution Readiness Level metric could help the selection process of solutions, which could help reach the goals of missions faster. Additionally, since this paper gives recommendations for a better Road Safety Strategic Plan, the overall infrastructure in the Netherlands can also become safer. This can result in fewer traffic deaths, thus a better life for the citizens in the Netherlands.

2. Theory

The following sections explain the theory used in this research. The first subsection explains Innovation Systems in general and talks about the different existing delineations. In the second subsection, the Mission-oriented Innovation System is explained. This subsection also includes the different analytical steps, which consist of a problem-solution diagnosis, structural analysis, system functions analysis, systemic barriers analysis and the identification of systemic instruments.

2.1 Innovation systems

Innovation systems (IS) theory finds its roots in institutional and evolutionary theories (Nelson & Nelson, 2002). The concept of IS was first introduced by Lundvall (1985) and is defined by Freeman (1987) as *"the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies"*. However, due to the emergence of multiple innovation systems, the definition can vary in level of analysis (Carlsson et al., 2002). The level of analysis can differ in the physical (e.g. technology, product or firm), geographical (e.g. country or city) and/or time dimension. Even though IS can differ in level of analysis they all include components, relationships between the components and have certain attributes (Carlsson et al., 2002).

Components can be physical or legislative artifacts operating in a system such as transformers in an electricity system or institutions in a political system. They can also be the actors or organizations working together towards a common objective. These components are interdependent, having relationships between them, meaning that the system as a whole is larger than the sum of the individual independent parts (Blanchard et al., 1990). Interactions, due to these relationships, cause technology transfer and procurement to take place inside the innovation system. This, in turn, develops the capabilities of the actors, which cause the system to evolve (Fagerberg & Srholec, 2008). Attributes are features of components that characterize the system, for instance if a component is present and if the quality of that component is sufficient to perform its function in the system (Wieczorek & Hekkert, 2012).

There are several innovation system theories developed, each using a different point of delineation as departure. Some innovation system frameworks take geographical delineations, such as the National Innovation System (NIS) and the Regional Innovation System (RIS) (Nelson, 1993; Cooke et al., 1997). Others use sectors as a delineation, such as the Sectoral System of Innovation (SSI) (Malerba, 2002). The Technological Innovation System (TIS) by Hekkert et al. (2007) is unique in its characteristics due to its delineations being a technology, meaning that it can cross geographical areas and sectors. However, none of these innovation system frameworks are fit to deal with the characteristics of a MIP, because they are unable to deal with the wickedness, temporality and embeddedness, and directionality of a mission (Wesseling & Meijerhof, 2021).

2.2 Mission-oriented Innovation System

The innovation system relevant for this paper is a MIS, which is defined by Hekkert et al. (2020) as "*the network of agents and set of institutions that contribute to the development and diffusion of innovative solutions with the aim to define, pursue and complete a societal mission*". The analytical focus of a MIS is a mission that has a certain time-span and can cross technologies, sectors and geographical areas. Unlike other IS, which focus on economic growth and technological development, MIS focuses on achieving a mission formulated around a societal problem (Hekkert et al., 2020). The MIS' structural components consist of actors, institutions and infrastructures, which have relationships between them, called interactions (Wieczorek & Hekkert, 2012).

For an innovation system analysis, the MIS utilizes an adapted version of the structural-functional approach as described in the technological innovation systems (TIS) framework (Bergek et al., 2008; Hekkert et al., 2007). The adaptations are made to deal with a difference in the following analytical dimensions: wickedness, temporality & embeddedness and directionality (Wesseling & Meijerhof, 2021). The structural-functional approach uses diagnostic questions to analyse the structural components, functions and barriers of the system. The results of this analysis are used to develop systemic policy instruments, which should help overcome the systemic barriers. However, before the structural-functional analysis, the full scope and complexity of the mission should be mapped out in a problem-solution diagnosis (Wesseling & Meijerhof, 2021).

2.2.1 Problem-solution diagnosis

The first step in analysing a MIS is the problem-solution diagnosis. Here the sub-problems which cause the overarching societal problem and the related technological and social innovations to solve them are cataloged. In this paper, technological innovation is seen as *'a new or improved product or process whose technological characteristics are significantly different from before'* (Tilastokeskus, n.d.). This is different from social innovations, which looks at a "*change in social relations, involving new ways of doing, organising, knowing and framing"* (Avelino et al., 2019). Social innovation focuses on behavioral change in humans, while technological innovations focus on technical change in products or processes. Both innovation types help tackle societal problems through the accumulation of new ideas. However, they can also contribute by phasing out old bad practices. This is called '*exnovation'* and is a key process for enabling sustainable transitions (Heyen, 2017)

During the problem-solution diagnosis, the maturity of the innovations is assessed. The maturity of an innovation describes its effectiveness and development stage (Enkel et al., 2011). A more mature innovation can play a larger role in reaching the mission's defined goals. Stakeholders are also more inclined to invest in a mature innovation compared to a less mature one (Czarnitzki & Toole, 2011). The further an innovation is in the development process the more mature the innovation is. There are many theories surrounding the process of innovation. Some examples are the stage-gate model (Cooper, 1990), technology readiness level (TRL) (Mankins, 1995) and the innovation capability maturity model (Essman & Du Preez, 2009). These theories can all be used to assess how far into development a technology is. However, none of these theories can

be used for social innovations, because they are either specifically for physical products and/or are focused on market deployment.

Therefore, this paper creates a new metric called the *'Solution Readiness Level'* (SRL), which allows for evaluating and comparing both technological and social innovations. The TRL is taken as a starting point, since this metric is specifically used for assessing maturity and it has clearly defined levels. In order to take into account the social dimensions of innovations, the definitions of the SRLs include how relevant stakeholders view the innovation. The solution readiness level metric consists of four levels. An overview of the different levels with corresponding definitions and examples can be found in table 1.

Table 1: overview of the SRLs, including the definitions and examples of technological and social innovations

SRL	Definitions	Technological Innovations	Social Innovations
1	Application and principle concept of innovation is being formulated and/or relevant stakeholders are being identified	Smart wireless digital traffic signs send a signal to the cars to give them the information needed. The specific functions of this innovation are still in development. (Toh et al., 2019)	The current approach to educate novice drivers about safety is deemed unsuccessful. Therefore, the SWOV are researching a better approach focused on voluntary courses. (IenW, 2018)
2	First experimental testing of innovation in laboratory environment and/or relevant stakeholders see the solution as valid	Sensor fusion, which integrates sensory data from multiple sources to produce more accurate information, is now being tested in virtual environments. (Fayyad et al., 2020)	In 1997, a paper was published which discusses the usefulness of 'distance based vehicle insurance'. This was seen by policy makers as a new way to increase road safety (Rejikumar, 2013).
3	Innovation is being piloted in relevant environment and/or has received practical feedback from relevant stakeholders	Ford is testing its data-driven road safety tool in London. This tool should help identify potential incident hotspots. (Ford, 2020)	'Opwegnaarschool' tracks the routes kids take to school. It also tracks the behavior towards traffic. This data is used to give feedback and help kids think about their experience with traffic. (VerkeersNet, 2012)
4	Innovation is proven in demonstration or actual operation and/or relevant stakeholders view this innovation as a good solution for the problem	Electronic Stability Control (ESC) has proven to be effective in providing control over cars. (Ferguson, 2007)	Parent-focused interventions have proven to be effective in reducing the teens' risky driving behavior and is seen as a good intervention to increase safety by stakeholders. (Curry et al., 2015)

2.2.2 Structural analysis

After the problem-solution diagnosis the following analytical step of a MIS is to perform a structural analysis. As explained earlier, the structural components of an innovation system consist of actors, institutions and infrastructures (Wieczorek & Hekkert, 2012). In a structural analysis structural dimensions are analysed, including the structural components and the interactions between them. An overview of the structural dimensions and subcategories as described by Wieczorek & Hekkert (2012) is shown in table 2. To delineate between the relevant structural components this paper uses the concepts *mission arena* and *overall MIS* introduced by Wesseling & Meijerhof (2021).

Table 2: Overview of the structural dimensions and subcategories (Wieczorek & Hekkert, 2012)

Structural dimensions	Subcategories
Actors:	• Civil society • Companies: start-ups, SMEs, large firms, multinational companies • Knowledge institutes: universities, technology institutes, research centres, schools • Government • NGOs • Other parties: legal organisations, financial organisations/banks, intermediaries, knowledge brokers, consultants
Institutions:	• Hard: rules, laws, regulations, instructions • Soft: customs, common habits, routines, established practices, traditions, ways of conduct, norms, expectations
Interactions:	• At level of networks • At level of individual contacts
Infrastructure:	• Physical: artefacts, instruments, machines, roads, buildings, networks, bridges, harbours • Knowledge: knowledge, expertise, know-how, strategic information • Financial: subsidies, fin programs, grants etc.

Wesseling & Meijerhof (2021) have defined the mission arena as *'those actors that are engaged in the highly political, and often heavily contested process of directing the MIS and building up its structural components'*. They have distinguished four main tasks to mission governance. (1) setting up the mission arena, (2) mission formulation, (3) mobilization of MIS components via mission governance actions and (4) continued reflexive mission governance. Specific actors are not bound to these actions, as actors and their active contributions can vary over time.

Setting up the arena refers to the process of forming the structure of the mission governance. During this task, it is decided who is in the mission arena, how to mobilize existing innovation systems structures, how decisions are made and how to deal with power imbalances. There has not been sufficient research done on how to do this effectively, however Wesseling & Meijerhof (2021) argue that the mission arena should be placed at the heart of the MIS analysis to develop a better understanding of the mission arena's governance strategies and its dynamics with the overall MIS.

The mission arena formulates the mission through the construction of concrete ambitious missions from abstract societal problems. This will provide direction to the larger overall MIS and can enable them to prioritize one societal problem over another. Mission goals usually oppose the vision of vested regime actors, as societal-challenge-led missions require transformative changes of socio-technical systems (Wanzenbock et al., 2020). This, in turn, will lead to conflict between the actors with opposing views (Loorbach, 2010**)**. Therefore, the mission arena should have selective participation, focusing on actors which support transformative change. Willing regime actors are crucial as they have considerable power in the regime, which can prevent capture and delay from opposing regime actors (Loorbach, 2010).

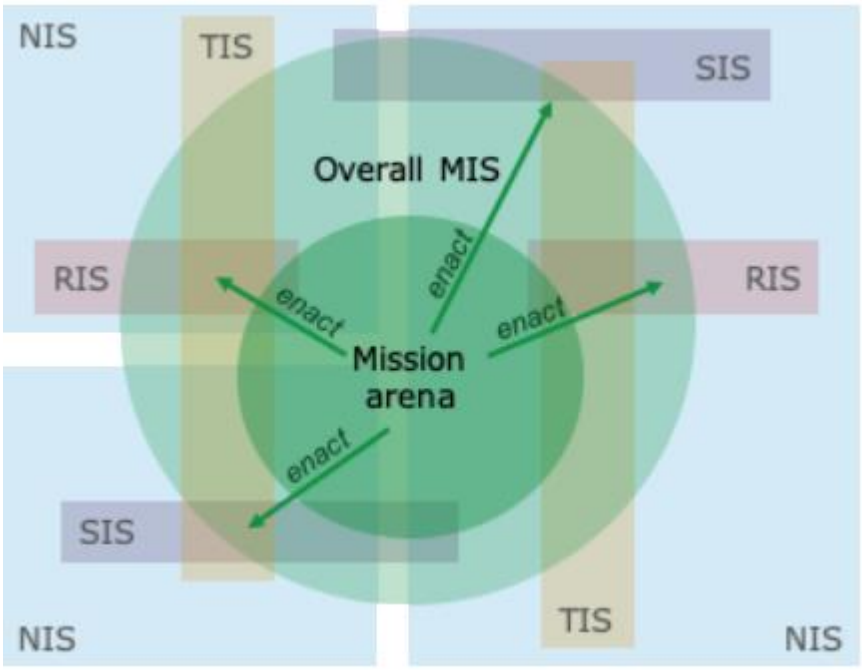
Mission governance actions should be complemented with an overarching action plan or agenda in order to effectively mobilize MIS components (Wesseling & Meijerhof, 2021). Besides the concrete activities which existing innovation system structures need to pursue, this overarching action plan or agenda should also include governance actions focused on incentivizing these existing innovation system structures to engage in these activities. Mission governance actions can either be taken by governmental organization through MIP instruments or by other arena

stakeholders through the mobilization of system components. The arena actors that execute the mission governance actions should be well-connected, embedded, and empowered to construct an effective mission arena.

To redirect the MIS when it does not capture the most relevant societal problem any more, a continued reflexive mission governance is required throughout the entirety of the mission. This includes the constant monitoring and evaluation of the mission's progress, which ensures that the solution pathways are coordinated and/or adapted in such a way that the mission goal is completed within the constrained time. Besides the changes to the solution trajectories over time - within and outside of the mission arena (Jørgensen, 2012), it is also important to monitor how the societal problem changes over time (Smith & Sterling, 2007**)**.

Besides the mission arena and its four main activities, it is also important to define what comprises the overall MIS. The overall MIS includes all structural components, both human and non-human, which affect the rate and direction of technological and social solutions, both stimulating and hindering the progression of the mission. The mission arena can mobilize these structural components in order to stimulate the development and diffusion of technological and social solutions, which, in turn, should help reach the mission's goal within the constrained time. A visual representation of how the Mission Arena enacts the overall MIS, which crosses other innovation systems can be seen in figure 1.

Figure 1: Visualization of how the Mission Arena enacts the overall MIS



2.2.3 System functions analysis

The third analytical step for analysing a MIS is the system functions analysis. This analysis was first developed by Hekkert et al. (2007) to analyse technological innovation systems but was later also applied and adapted to innovation systems delineated by a societal problem (Ghazinoory et al., 2020), transformative innovation policy (Haddad & Bergek, 2020) and missions (Wesseling & Meijerhof, 2021). The general idea of the system functions analysis is to analyse the system's performance using seven all-encompassing system functions.

However, this is not the case when applying it to a mission. As seen in the visualization of the MIS (figure 1), it can cross multiple innovation systems. This increases the scope of the IS, compared to a TIS, but it also increases the complexity due to the inclusion of multiple technological and social solutions, which can be innovations or exnovations. To deal with this complexity, this paper will not assess the system functions for each solution but will assess them for the mission as a whole. It can be argued that a new system function is needed for the analysis of exnovations, this allows for an in-depth analysis of the destabilization of the regime. However, this paper chooses to analyse exnovations through the already existing system functions, by adding diagnostic questions related to exnovations.

Haddad & Bergek (2020) argue that the current directionality function 'guidance of the search' does not fully capture all aspects of directionality which are needed to deal with the coordination of MIP. For instance, they argue that it is unable to assess whether "*the outcomes and impacts match the expected and desired ones"*. The adaptation made by Wesseling & Meijerhof (2021) to deal with this shortcoming, is the translation of 'guidance of the search' into '*problem directionality*' and '*solution directionality*'. Problem-directionality refers to *"the way different societal problems are included and prioritized in the mission formulation" (*Wesseling & Meijerhof, 2021). When a societal problem is included and prioritized over other problems, policy makers create more favourable conditions to tackle these problems. This is called '*solution-directionality'*. This can be done by using regulative institutions, such as subsidies, -normative institutions and cultural cognitive institutions (Scott, 2014).

Related to the issue of directionality is the issue of reflexivity. Since the mission is directional, it is key that procedures are in place to monitor and evaluate the impact of the implemented MIPs, to ensure the direction is desirable (Mazzucato, 2018b). Weber & Rohracher (2012) argue that reflexivity is vital to ensure the functionality of a transformative system. The need to include reflexivity is also recognized by Wesseling & Meijerhof (2021), who add '*reflexivity'* as a sub-function into the directionality system function. This function ensures the inclusion of impact assessment procedures and feedback to adapt MIP accordingly into the analysis.

Besides the issue of directionality and evaluation, there is also an issue of temporality. Since missions are defined by a certain timespan, this temporality should also be included in the system functions. This can be accounted for by applying a *'temporality filter'* to each system function. This is also done by Wesseling & Meijerhof (2021), who incorporate diagnostic questions referring to the extent to which system functions are developed *'sufficiently rapidly to complete the mission'.* An overview of the system functions used for a MIS analysis can be found in table 3. These

functions can either be positive or negative (Suurs & Hekkert, 2009), meaning that they can either help or be a barrier to the achievement of the mission within the defined time frame.

Table 3: Overview of the system functions for a MIS analysis by Wesseling & Meijerhof (2021)

System function	**MIS interpretation**
SF1: Entrepreneurial activities	Experiments with (clusters of) solutions to enable learning; entering markets for new solutions; engaging in business model innovations to the diffusion of solutions
SF2: Knowledge development	Learning by searching and by 'doing', resulting in development, and better understanding of new technical and social knowledge on problems and solutions, through R&D, social and behavioral science research.
SF3: Knowledge diffusion	Stakeholder meetings, conferences, governance structures, public consultations, mission progress reports and other forms of disseminating technical and social knowledge for the mission's solutions and societal problems.
SF4a: Problem directionality	The direction provided to stakeholders' societal problem conceptions and the level of priority they give it.
SF4b: Solution directionality	The direction provided to the search for technological and social solutions, as well as the coordination efforts needed to identify, select, and exploit synergetic sets of solutions to the mission.
SF4c: Reflexive governance	Reflexive monitoring, anticipation, evaluation, and impact assessment procedures, which provides the analytical and forward-looking basis for redirecting the system's problem framing and search for solutions based on lessons learned and changing context. It can be seen as second order directionality.
SF5: Market formation and destabilization	Creating niche markets and upscaling support for technical and social solutions; phasing out or destabilizing markets for practices and technologies harmful to the mission.
SF6: Resources (re)allocation	Mobilization of human, financial and material resources to enable all other system functions.
SF7: Creation and withdrawal of legitimacy	Creating legitimacy for prioritizing the problem and the development and diffusion of its solutions.

2.2.4 Systemic barriers analysis

As mentioned above, when a system function negatively contributes to the MIS, it is a barrier. This *'systemic barrier'* is related to a specific structural element (described in 2.2.2) in the system function. The systemic barriers analysis tries to assess the underlying cause of the problem. The coupled functional-structural analysis by Wieczorek & Hekkert (2012) is used to identify this. An example for *'SF1 entrepreneurial activity'* can be found in table 4.

Table 4: overview of the systemic problems and their related systemic problem types

System function	Structural element	Systemic problem	(Type of) systemic problem
F1: entrepreneurial activities	Actors	Actors problem	Presence? Capabilities?
	Institutions	Institutional problem	Presence? Capacity/quality?
	Interactions	Interaction problems	Presence? Intensity/quality?
	Infrastructure	Infrastructural problems	Presence? Capacity/quality?

2.2.5 Identification of systemic instruments

The final analytical step is the identification of systemic instruments. These systemic instruments are policies that are implemented to overcome the systemic barriers. For this research, the systemic instruments are evaluated both ex-post and ex-ante. Meaning, it is analysed whether the policy interventions have sufficiently reduced the systemic barriers for the 2020 mission, and it is analysed whether the policy intervention will overcome the identified barriers for the 2030 mission. The ex-post analysis allows for a full assessment of the causal effects of the systemic instruments on the systemic barriers. The development and implementation of systemic instruments in order to achieve the mission goals are seen as mission governance actions committed by the mission arena.

3. Methods

The following sections explain the methods used to perform this research. The first subsection explains the research design and how each of the analytical steps were performed. In the second subsection the data collection is explained, which includes a literature analysis and interviews. The last subsection explains how this data is analysed.

3.1 Research design

This thesis uses a case study design that includes longitudinal elements to analyse the case of the Road Safety Strategic Plan 2020 and the 2030 plan. This research has analysed the effects of the systemic instruments on the systemic barriers at multiple moments in time. Therefore, it includes longitudinal elements (Bryman, 2016). This is done using an event history analysis, collecting data each year from 2008-2020 for all the analytical steps through a literature analysis and expert interviews. Additionally, the interviews with experts provide data for RSSP2030. The

analytical steps taken in this thesis follow the above-described steps of a MIS. The operationalization of the concepts can be found in appendix 2. How these analytical steps were applied for this case is described in the following subsections.

3.1.1 Problem-solutions diagnosis

The problem-solutions diagnosis is the first analytical step. Here, two key concepts were analysed using the diagnostic questions found in appendix 3. First, the societal problems and wants related to the RSSP. These problems and wants were already identified and documented in the RSSP documents. Second, the technological and social solutions that contribute to the mission's achievement were assessed using governmental documents, LexisNexis, and expert interviews. After the identification of the different solutions, their Solution Readiness Levels (SRL) were assessed using the diagnostic questions in appendix 1. Data about these solutions was found on the producers' websites or online news articles.

3.1.2 Structural analysis

After the problem-solutions diagnosis, the structural analysis was the next analytical step. First, an overview was made of all the relevant structural components, using the literature analysis guide (appendix 3). This information was found in the RSSP documents and related documents such as the "Dynamic Action Plan", "Monitor Policy Stimulus Road Safety" and "Road Safety Exploration 2020". Next, the overview was used to determine what structural components are inside the Mission Arena and what structural components are in the overall MIS. The four main tasks to mission governance guided the in-depth analysis of the mission arena. The interview guide (appendix 4) helped assess how and by whom the structural components are mobilized and how reflexive mission governance is done in the RSSP missions.

3.1.3 System functions and barriers analysis

The third analytical step is the system functions analysis. In this analysis the seven system functions as described in the theory section were analysed. The data for a system function analysis is commonly collected by performing interviews. However, because this paper carries out an event history analysis, differences between each time period from 2008-2020 are essential. Trusting the interviewees on their recollection of events that happened a long time ago could result in unreliable data. Therefore, before the interviews, events were mapped out for each time period through a literature analysis. These events were used to assess the system's performance over time and allowed the researcher to understand the context of the mission. An overview of the measurement scheme for mapping empirical events to system functions can be found in table 5. The measurement scheme by Suurs & Hekkert (2009) for a TIS analysis was used as a starting point and was adapted to fit the MIS framework.

Furthermore, when events, which negatively affect the system functions, occur several times and have the same underlying reason, they are seen as systemic barriers. The identification of these barriers and their evolution over time was the next analytical step. The identified systemic barriers related to RSSP2020 were used as a guideline for the interviews (appendix 4). Using a specific event or sequence of events helped the interviewee recollect their memories, resulting in more

reliable data. The interviewees were asked to rate the performance of the system functions on a scale of 1-5, followed by questions about underlying reasons for this performance and the relating systemic components. This helped understand the context and nuances which were unable to be included through a literature analysis exclusively.

The performance of the system functions and the systemic barriers of RSSP2030 were not analysed over a time period, but for how they are as of right now. For this mission, expert interviews were used as the primary source of data. Here, again, the interviewees were asked to rate the performance of the system functions on a scale of 1-5, followed by questions about the underlying reasons. When an underlying reason causes problems within the system, it is identified as a systemic barrier.

Table 5: overview of measurement scheme for event history analysis

System function	Event type	Description	N	Sign
F1	Project entry	Experiment or project is started within a societal context or with a commercial goal	83	+
	Project exit	Experiment or project within the societal context and/or with a commercial goal is stopped	22	-
F2	Learning by searching	Assessment research which stimulates the understanding of new technical and social knowledge on problems and solutions	129	+
F3	Networks, coalitions	Cooperation between actors	42	+
	Meetings	Workshops, conferences, etc	64	+
F4a	Direction for problem	Attention for the societal problem is increased through publications, campagnes & agenda setting	51	+
	Problem prioritization	Signing of covenant or treaty by stakeholders	20	+
F4b	Direction for solutions	Roadmaps, factsheets and agenda setting for solutions	189	+
F4c	Evaluation activities	Monitoring, evaluation and impact assessment procedures	27	+
	Uncertainty about data	Expressed uncertainty about data for evaluative purposes	63	-
F5	Tax exemption starts	-	N/A	N/A
	Tax exemption stops	-	N/A	N/A
	Market failure	Innovation is unable to enter the market	2	
	Mandatory	Laws are implemented which make technological or social solutions mandatory	1	+
F6	Investments, subsidies	Dedicated subsidy programmes	20	+
	Human resources	Increase in man-hours	3	+
	Resource refusal	Rejection of financial support and cutbacks related to financial and human resources	11	-
F7	Dissent	Conflicting interests around the mission	4	-
	Lobby or advice pro	pressure on actors in power to change institutions, aiding the completion of the mission	N/A	N/A
	Lobby or advice contra	pressure on actors in power to change institutions, hindering the completion of the mission	N/A	N/A

3.1.4 Systemic instruments analysis

The last analytical step was the analysis of the systemic instruments. As mentioned in the theory section, the goal here is to analyse if the implemented policies helped overcome the systemic barriers in the RSSP2020. This was done by first analysing the annual “Monitor Policy Stimulus Road Safety” document, where implemented policies in the different time periods were identified. After that, it was checked whether any of these policies help overcome the identified barriers in the previous analytical step. This could be easily assessed by examining the changes of the systemic barriers over time. When barriers are resolved or are less prominent in the system, it means that the implemented policies were considered effective. Complementing this with interview data gained by asking questions about the interviewees' opinions and experiences related to the implemented policies offered data sources from different actors, which allows for triangulation and thus increased the reliability of the data (Bryman, 2016).

In order to assess what lessons can be learned from RSSP2020 the unsolved systemic barriers and the ineffective systemic instruments have been reexamined. This reexamination consists of looking for underlying reasons for the existence of these discrepancies and discussing these underlying reasons with expert interviewees. Furthermore, interviewees were asked whether any evaluation of the RSSP2020 was done by the mission arena of RSSP2030 in order to draw lessons from this plan themselves.

The systemic instruments analysis for the RSSP2030 was done by analysing the national action plan (Landelijk actie plan) and the traffic safety manifesto 2.0 by the traffic safety coalition. These documents include policies that can or are used to overcome systemic barriers related to the RSSP2030. During this step, it was assessed whether these documents help overcome the identified systemic barriers from the previous section. If any barriers are not overcome, additional systemic instruments are needed for an optimal performance of the MIS.

3.2 Data collection

As described above, this research performed an event history MIS-analysis on RSSP2020. For this analysis it was crucial to base interview questions on specific events to enable interviewers to recollect their memories. Therefore, this research used a literature analysis to create interview questions and used the interview data to complement and validate the data from the literature analysis. Additionally, an analysis was performed on RSSP2030 using expert interviews.

3.2.1 Literature analysis

The documents used for the analysis are government documents and additional data related to the innovative solutions. There are many different types of documents published, ranging from the overarching RSSP2020 to the specific dynamic actions plans. Some documents are only published once (e.g. RSSP2020 & RSSP2030), but others are published annually (e.g. Monitor Policy Stimulus Road Safety) or biannually (e.g. Dynamic Actions Plans). The general overarching documents can be used for collecting data about the different societal problems and ‘wants’ related to the mission. The more frequently published documents were effective for collecting data

about specific solutions and events, which, in turn, were used to create interview questions. Appendix 3 provides an overview of the diagnostic questions used to collect the data for each analytical step.

The governmental documents are published by actors in the mission arena and therefore are focused on events which are seen by the mission arena. In order to include the events occurring in the outer MIS, which are potentially not seen by the mission arena, articles were included from the search engines LexisNexis and Google (scholar). This was primarily focused on system functions that have considerably more activity outside of the mission arena, such as entrepreneurial activity and market formation, as events related to these system functions do not occur frequently in the governmental documents. The articles from LexisNexis and Google (scholar) complemented and triangulated the data derived from the governmental documents. The triangulation helped prevent outcome reporting bias stemming from the government's interests in the mission (Vaganay, 2016). An overview of the keywords used in the search engines can be found in table 6, and an overview of the data sources used for the literature analysis can be found in table 7.

Table 6: keywords used in search engines

Language	**Keywords**
Dutch	Strategisch plan verkeersveiligheid, SPV, actieprogramma verkeersveiligheid, monitor verkeersveiligheid, verkeersveiligheidsverkenning, verkeersveiligheid, factsheet, roadmap, subsidie, pilot, experiment, convenant, verdrag, vrijstelling, campagne, *names of innovative solutions*, *names of identified organizations*, *names of policy interventions*, *names of events identified during the analysis*

Table 7: overview of the data sources used for the literature analysis and the amount per source type

Source type	**Source**	
Governmental documents (16)	Monitor verkeersveiligheid 2009-2019 (11)	Landelijk Actieplan Verkeersveiligheid 2019-2021
	Strategisch Plan Verkeersveiligheid 2020	Actieprogramma Verkeersveiligheid (2)
	Strategisch Plan Verkeersveiligheid 2030	
Multi stakeholder position paper (1)	Traffic safety manifesto 2.0	
Newspaper articles (289)	De Stentor	Brabants dagblad
	Dagblad de Limburger	Dagblad van het Noorden
	De Gelderlander	Het AD
Websites	SWOV.nl	verkeerveiligheidscoalitie.nl
	website of solution producer	

3.2.2 Expert interviews

The interviews were conducted with key actors related to the RSSP. These interviews were anonymous and semi-structured. The structure of the interviews followed from the results of the literature analysis and each interview provided information for the following interviews. An overview of the interview guide can be found in appendix 4. Who was interviewed followed from the literature analysis, but also resulted from snowball sampling during the interview phase. A total of 20 interviews were conducted, an exact list of what actors are interviewed, and their abbreviations can be found below (table 8). The type of actors was evenly spread to ensure a comprehensive dataset. Due to Covid-19, the interviews were done via phone or other online meeting services.

Table 8: overview of interviewees, including actor category, # of interviewees and abbreviations

Actor category (# of interviewees)	Abbreviation
Consultancy firm (2)	CO
Civil society organization (1)	CSO
Governmental association (2)	GA
Independent administrative body (3)	IAB
Knowledge institute (3)	KI
Market party (2)	MP
Municipalities (2)	MUN
Policy maker (5)	PM

3.3 Data analysis

The data analysis followed a semi-open coding process because the categories, which gave direction to the coding process, were already identified in the operationalization (appendix 2). In semi-open coding pieces of text in the documents are labeled into ‘concepts’ (Bryman, 2016). After all the concepts were created, they were grouped into categories. These categories included, but were not limited to, the core concepts of the MIS, as explained in the theory section. The results of the coding process were used to answer the research questions and to identify specific events and problems which were used to create interview questions. The results of the interviews were coded according to the process described above and were used to complement and triangulate the results from the literature analysis.

The sub-questions related to the problem-solution diagnosis and the structural innovation system analysis were used to assess the context of traffic safety and identify interviewees for the system function analysis. During the system function analysis, the performance of the system was assessed through the use of systemic functions described in the theory section. This, in turn, allowed for an identification of the systemic barriers. Thereafter, it was assessed if the implemented systemic instruments were effective in tackling the systemic barriers. Answering these questions for both the RSSP2020 and 2030 allowed for answering the research question:

"How have systemic instruments affected the barriers to the achievement of the RSSP2020 mission and what did the mission arena for RSSP2030 learn from this for overcoming the MIS barriers of today?

4. Results

In the next sections, the results of the analysis will be discussed. In the first subsection RSSP2020 is discussed. Due to an unexpected lack of mobilization, both financially and regarding actors, not enough happened during the RSSP2020 for an in-depth analysis of the effect of the systemic instruments on the systemic barriers. Therefore, this plan is only discussed briefly, and the more significant focus is on RSSP2030. In the second subsection, the results related to the RSSP2030 are presented. These results are discussed more in-depth and follow the analytical steps as described in the theory section.

4.1 Road safety strategic plan 2020

Traffic safety in the Netherlands has been declining progressively over the last decade. From the year 1997 until 2003, the Netherlands implemented a significant amount of effective measures, which resulted in an increase in traffic safety over the coming years. Making the Netherlands one of the safest countries in the world related to traffic safety. However, this trend stagnated around 2009, and to this day, this trend has only gotten worse. One policymaker mentioned that due to this great period before 2009, the urgency and the priority of traffic safety declined, causing little to no effective measures to be taken (PM3). Another interviewee mentioned the 'bizarre' statistics in the corona lockdown period, referring to the fact that there was only a 10% decrease in traffic deaths and accidents (MUN2; Bremmer, 2021).

The RSSP2020 started its operations in 2008 with the main goal to reduce traffic deaths and accidents to 500 and 10.600, respectively. During the creation, several actors (*mission arena*) gave feedback on the content, which can be seen in figure 2. A distinction is made between the more active actors, which were mentioned frequently in the monitors and took action to increase the traffic safety in the Netherlands (inner circle) and the actors who only helped during the creation of the plan but did not show any additional efforts to increase traffic safety in the Netherlands (outer circle). The plan did not include any binding commitments for the actors involved.

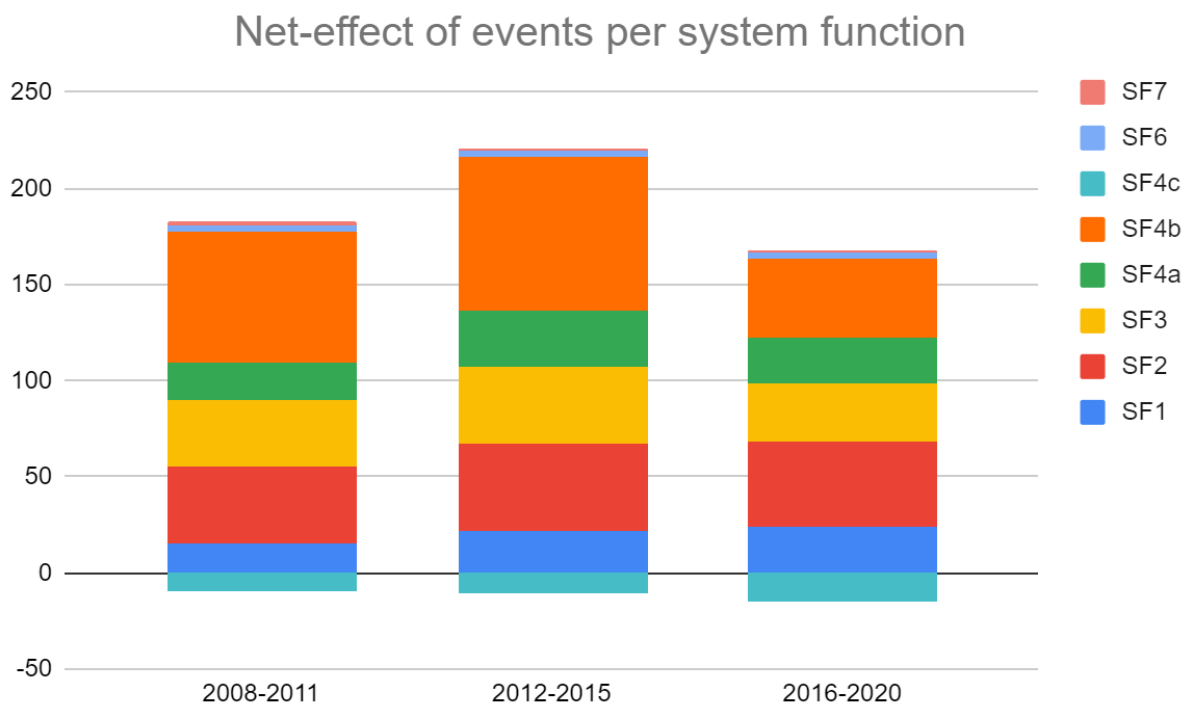
The event history analysis has identified that the RSSP2020 can be split up into three time periods. The first time period started in 2008 and lasted until 2011. In this phase, RSSP2020 was created, goals were set, and monitors were made to evaluate the plan. The second phase lasted from 2012-2015 and is characterized by a policy impulse. This policy impulse consists of 23 measures, which include policy supporting-, tool-kits- and concrete measures. The final phase started in 2016 and ended in 2020, when the RSSP2020 came to an end. The lack of actions taken characterizes this phase. The monitors stopped looking at most of the measures taken in the second phase, because they were not in operation anymore. Additionally, no new measures were implemented in this phase.

By using the measurement scheme as described in the methods section, a bar chart is made which includes the net-effect of the events on the system functions for each time period (graph 1). From the bar chart, several interesting observations can be made. Firstly, the negative reflexivity [SF4c] indicates that a barrier must be present hindering this function to have an optimal performance. Secondly, there is a significant difference in solution directionality [SF4b] between the first two phases and phase three. This difference is due to a stagnation in the publications of fact sheets by the SWOV. Fact sheets are published for new social and technological solutions and due to the stagnation of new solutions, the number of fact sheets published also stagnates over time. However, this does not mean the solution directionality decreases, as fact sheets from previous years can still be used. Thirdly, market formation [SF5] is not included in the chart due to a low number of events. Lastly, there is a general increase in activity in phase 2 and a decrease in phase 3, this seems to be caused by the implementation of the policy impulse, which stopped at the end of phase 2.

It should be noted that, even though the quantity of events does not indicate a significant difference, it could be that through further examination and expert interviews a small event has had a significant impact. Therefore, the results from event history analysis are discussed with experts through interviews. This discussion has led to the identification of several underlying reasons why a system function performs in a certain way. Additionally, as the RSSP2020 was monitored each year with a publication, several barriers were already identified by the mission arena. An overview of the identified barriers and stimulants per time period can be found in table 9.

From the overview of underlying reasons, several systemic barriers are identified in phase one. Firstly, a lack of data about the causes and details of accidents [SB1], caused by the weak collection of data about the effects, hinders evaluations [SF4c] (SWOV, 2009; 2010; 2011). Secondly, a systemic registration of the actions taken to increase traffic safety prior to RSSP2020 is missing [SB2], making it hard to evaluate the existing and newly implemented policies [SF4c] (SWOV, 2011). Lastly, a weak resource (re)allocation [SF6], caused by the fact that the plan did not include any financial resources [SB3], was a significant bottleneck for the implementation of effective policies (PM3).

Graph 1: Bar chart of the net-effect of events per system function



At the start of the second phase, it was already assessed that the goal max. 10.600 serious traffic injuries per year in 2020 probably will not be met (SWOV, 2012). The policy impulse consisted of 23 measures, but only 7 of these are considered to be 'concrete measures'. The other measures are either 'policy supporting' or 'tool-kit' measures. Besides the lack of concrete measures, the weak solution directionality [SF4b] was also caused by the lack of focus on the actual implementation of these measures [SB4] (PM5). In the monitors it is stated that a complete overview of which measures are taken by whom and where, is still missing [SB2] (SWOV, 2012; 2013; 2014). Additionally, systemic barriers one and three from phase 1 are still present. Two systemic instruments were implemented in phase 2. Toolkits were developed for a better accident registration and for a more structural implementation, and evaluation of measures [SI1] and Safety Performance Indicators (SPI's) were developed to link measures to accidents more accurately [SI2] (SWOV, 2013; 2014; 2015). However, none of these systemic instruments have yet to overcome systemic barriers one, two and four.

In the third phase, the monitors stopped looking at most of the measures taken in the second phase because they were not in operation anymore. Additionally, no new measures were implemented in this phase (SWOV, 2016; 2017; 2018; 2019). A complete overview of the measures is still missing (SB2), which withholds an analysis of the effectiveness of these measures (SWOV, 2016). The other systemic barriers which were present in phase 2 are also still in place. The development of new toolkits [SI1] and SPI's [SI2] are still in progress and have yet to overcome any of the systemic barriers.

In short, the RSSP2020 has experienced four main systemic barriers, [SB1] a lack of data about the causes and details of accidents, [SB2] a systemic registration of the actions taken to increase traffic safety is missing, [SB3] a lack of financial resources supporting RSSP2020 and [SB4] a lack of focus on the implementation of the measures. None of the implemented systemic instruments, the development of new toolkits [SI1] and SPI's [SI2], have overcome the systemic barriers.

From the analysis of the RSSP2020, it can be noted that no systemic instruments were implemented to increase the resource (re)allocation [SB6], even though systemic barriers three and four are related to a lack of resources. The inability to resolve these barriers could also mean that the two implemented systemic instruments did not result in any significant changes. One interviewee, who has been in this sector for a long time, even stated that he/she sees the RSSP2030 as 'the first road safety strategic plan' (KI3). This, in combination with the lack of a systemic registration of the actions taken and the lack of focus on the implementation of the measures, suggests that there was insufficient attention for RSSP2020 and traffic safety in general. Several interviewees related this insufficient attention to the fact that traffic safety was not structurally embedded within the Dutch government during the RSSP2020 and that this is still a barrier present for the RSSP2030 (CSO1, CO2, MP2). This barrier and other barriers related to the RSSP2030 are discussed in-depth in the following subsections.

Figure 2: Overview of the RSSP2020's mission arena, split into two showing their involvement. The mission arena includes governmental actors (red), consultancy firms (black), independent administrative bodies (brown), knowledge institutes (blue), trade associations (purple), CSO's (light blue), market parties (green) and governmental associations (purple)

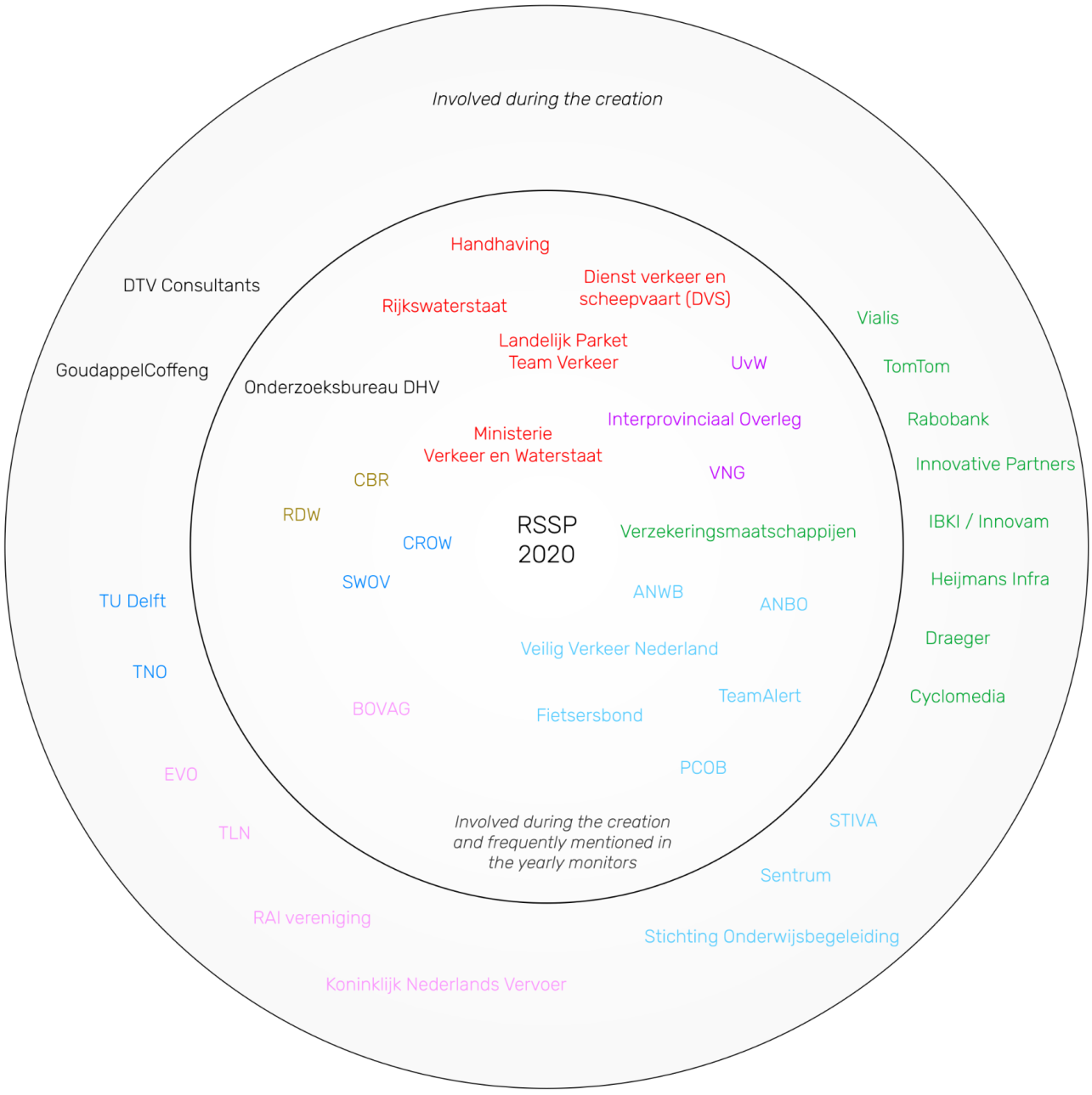


Table 9: Overview of results RSSP2020

	Phase 1 (2008-2011)	Phase 2 (2012-2015)	Phase 3 (2016-2020)
System functions			
Entrepreneurial activity	Some developments around models which describe risk per mode of transport. [+]	More activity around the development of new products and evaluation tools. [+]	Lots of development around 'smart' functions in cars. This is not directed by the RSSP. [+]
Knowledge development	Not enough data is collected to analyse unexplainable trends. [-] New trends and the effects of solutions are researched. [+]	Not enough data is collected to analyse unexplainable trends. [-] However, SPI's are being developed and collaborations are made with data firms to counter this. [+]	Data about the SPI's is collected. However, these cannot be used yet [-/+] Knowledge development is centered around smartphone use. [+]
Knowledge diffusion	Knowledge about new trends is shared with enforcement officers. [+] There are occasional meetings, but a structured way / central organisation for sharing knowledge is missing. [-]	Knowledge is diffused through various communication channels (e.g. websites, meetings, collaborative publications). This is mostly centered around bikes and behavior. [+]	Little to no face-to-face knowledge diffusion. Main communication channel is publications. [+/-]
Problem directionality	Too few activities to direct stakeholders into prioritizing traffic safety. [-]	Actors included in the policy impulse have traffic safety as their main priority, but little to no efforts are done to include more actors. [+/-]	No efforts were made to include more actors in the actualisation of the RSSP. [-]
Solutions directionality	No additional policies to provide direction, however the creation of RSSP and its risk-based approach provides some direction. [+/-]	The policy impulse focuses on high-risk groups, but direction for specific solutions remains vague [+/-]	Policy impulse has ended, and no additional efforts are taken to direct actors towards solutions. [-]
Reflexivity	The importance of evaluating measures is stressed, however the lack of data hinders this process significantly. [-]	The importance of evaluation is stressed, but an overview of where and by whom the measures are taken is missing. Showing this ambition is not put into practice [-]	The importance of evaluation is stressed, but an overview of where and by whom the measures are taken is missing. Showing this ambition is not put into practice [-]
Market formation	EuroNCAP-tests, which shows the safety of cars through a star system, helps create a market for safer cars. [+]	Focused on stimulating BVM-products, resulting from the policy impulse. No efforts done to create a market for traffic safety innovations [+/-]	No efforts were made to stimulate market formation, besides the law making eCall-systems mandatory in all commercial cars. [-]
Resource (re)allocation	105€ million to increase the safety of N-wegen from 2006-2010. But no extra funds specifically for the RSSP. [+/-]	Budget cuts at municipalities. No extra funds specifically for the RSSP [-]	Due to the lobby of the VVC, the government will commit resources to increase the traffic safety for RSSP2030 [+]
Creation of legitimacy	No efforts were made to create legitimacy for the problem or its corresponding solutions [-]	Efforts are done to increase the attention of traffic safety in publications of CSO's [+]	TSC lobbied for the integration of the TSM into the coalition agreement [+]

4.2 Road safety strategic plan 2030

Following the RSSP2020 came the RSSP2030, whose creation started in 2017 and will be in operation until 2030. Multiple interviewees, including one who contributed to the development of the plan, expressed that the core of the RSSP2030 is relatively the same as the RSSP2020 (CO1, CSO1, PM3, KI1). It is still initiated by policy makers and oriented around a risk-based approach, which has the same high-risk groups. However, municipalities and provinces have become central actors in the RSSP2030, as the plan is made by 'governments for governments'. Roads which are located in municipalities and provinces are managed by the local road authority and thus should be mobilized and included in the RSSP2030. These actors will follow the idea of a risk-based approach through a risk-analysis, which assesses where measures should be taken to increase traffic safety. Besides the measures taken locally, the RSSP2030 also includes measures that should be taken nation-wide, which are focused on supporting the risk-analysis and measures taken on a larger scale.

4.2.1 Problem-solution diagnosis

The road safety strategic plan 2030 was initiated as a response to an increase in traffic accidents and deaths, and to increase traffic safety related to new developments such as social media and electric vehicles. These problems were already identified in the monitors of RSSP2020 but were not tackled sufficiently and therefore remain a problem. Additionally, a problem related to the trade-off between safety and freedom is identified. Several interviewees mentioned that it is sometimes hard to implement safety measures due to their restrictive nature. For example, making a bicycle helmet mandatory when riding a bike would increase traffic safety. However, this measure would not quickly be seen as legitimate because it restricts citizens' freedom of choice. Implicating a legitimacy problem regarding some traffic safety solutions.

During the solution diagnosis, several social and technological solutions were identified. These solutions include all categories of traffic safety, which are infrastructure, vehicle, behavior, and enforcement. Due to the fact that traffic safety includes an enormous amount of social and technological solutions, this paper will use the solution trajectories identified by the traffic safety coalition (more on this in the next section). The traffic safety coalition has constructed concrete solution trajectories centered around five themes. These solutions trajectories are created independently of the RSSP2030 but are created specifically to help reach the RSSP2030 goals. The themes include the four themes of traffic safety and an extra theme called 'registration, monitoring and policy'. The solution diagnosis focuses on the core solution of these solution trajectories and adds specific examples to them. Additionally, the solution readiness level of these examples will be given as described in the theory section. Table 10 gives an overview of the solutions diagnosis.

Even though most of these solutions are ready for implementation, it could be hard to implement them in the system. This is due to the interactions in the system and the fact that many actors have to be mobilized. For example, just the implementation of advanced driver-assistance systems will not increase traffic safety, as citizens have to be educated about the use of these systems. Another example is about the behavioral campaigns. These campaigns have to reach

and mobilize an enormous amount of citizens in order to be effective. The development of a roadmap for the implementation of these solutions lies beyond the scope of this research.

Table 10: Overview of solution diagnosis

Solution trajectory	Core solution or examples	SRL
Safe infrastructure through infrastructural changes	Risk-analysis by MUN's and assessment of other high-risk areas through the use of EuroRAP, PROmev and CROW guidelines	4[1]
Maintenance of roads	Increase time and money spent on maintenance of roads	4
Stimulate use and development of innovative infrastructural measures	Dynamic road paint, which absorbs solar energy during the day and emits light at night. This allows the road to be clearly visible without the use of addition infrastructural measures.	3[2]
	Intelligent roads can help increase traffic safety through surface safety monitoring. Surface safety monitoring allows for a real time warning to drivers about low friction surfaces, caused by local weather conditions	3[3]
Include safety at the start of road designs	Education for road designers, use more assessment tools (EuroRAP, CycleRAP & PROmev) and take into account behavior of the drivers	4[1]
Optimal use of new systems	Advanced driver-assistance systems, such as Anti-lock Braking Systems (ABS), Collision avoidance systems, Electronic stability control (ESC) and many others. In order to use these systems for optimal traffic safety they should be complemented with standardisation and education.	1-4
Behavior and empowerment	Through the use of behavioral campaigns, initiated by the private and public sector, empower and encourage citizens to have an active contribution to traffic safety. These campaigns should be focused around the two largest distractions in traffic: smartphone use (MONO campaign) and alcohol/drug use (BOB campaign).	4[4]
Increase enforcement in traffic safety through deployment of innovative techniques	The creation of special investigating officers (BOA's) with traffic enforcement powers, helps take the load of police enforcement and increases the catch chance (pakkans) of traffic offenders.	3[5]
	Further decrease the load of policy enforcement through the use of automated systems, such as route control (traject controle) and speed cameras	4[6]
	Increase the catch chance of multi-offenders through - ANPR (automatic numberplate recognition) - progressive speed fines Tracking violators through the use of citizen's dashcams	 3[7] 2[8]

[1] SWOV. (2017a). ProMeV. https://www.swov.nl/publicatie/promev-light

[2] StudioRoosegaarde. (2013, October 19). Smart Highway. https://www.studioroosegaarde.net/project/smart-highway

[3] European Union. (2019, October 10). Intelligent Roads. TRIMIS. https://trimis.ec.europa.eu/project/intelligent-roads

[4] Ministerie van IenW (2021, April 28). Kom veilig thuis. komveiligthuis. https://www.komveiligthuis.nl/

[5] Moen, N. (2021, February 8). Boa's in Utrecht mogen tijdelijk fietsers bekeuren. Gemeente.nu. https://www.gemeente.nu/veiligheid/boas-in-utrecht-mogen-tijdelijk-fietsers-bekeuren/

[6] Ministerie van JenV. (2020, December 3). Trajectcontrole. Openbaar Ministerie. https://www.om.nl/onderwerpen/verkeer/handhaving/snelheid-en-te-hard-rijden/trajectcontroles

[7] de Wit, L. (2021). Proef met automatische kentekenplaatherkenning in Krimpenerwaard. AD. https://www.ad.nl/gouda/proef-met-automatische-kentekenplaatherkenning-in-krimpenerwaard~a03869f7/

[8] SWOV. (2017b). Progressief boetestelsel en verkeersveiligheid. https://www.swov.nl/publicatie/progressief-boetestelsel-en-verkeersveiligheid

		4[9]
Better and more complete registration of traffic accidents	The diffusion of the traffic accident protocol so that it becomes a nationwide protocol, which can be used when serious traffic accidents occur	4[10]
	Combine police data with ambulance data and SEH-data (emergency aid data), in order to get a more complete picture of accidents. This can also be complemented with data collected by private organizations. This would require a strong coordination by the government.	4[11]
	Additionally, a better and more complete registration can be realized through the use of an Event Data Recorder (EDR), which records data related to traffic collisions.	4[12]

4.2.2 Structural analysis

The mission arena of RSSP2030 is composed of 47 parties, which is divided into a 'core team' and 'workgroups'. Both of these groups are committed to the achievement of the goals of RSSP2030, however, no legal actions are described, which ensures the commitment of these parties. The core team, also called 'policy employees' government', consists almost exclusively of governmental related actors (figure 3). The only non-governmental actor is AEF, which is the consultancy firm hired to help with the creation of RSSP2030. These actors initiated RSSP2030 at the start of 2017 with an orientation phase. This orientation phase used a systems-approach to include all elements of traffic safety and had a broad and intensive involvement of CSO's, scientists and governmental actors. This resulted in an overview of the causes of unsafe situations and behaviors in traffic, which stands at the basis of the nine themes included in the RSSP2030. Some of these themes were also part of RSSP2020 and some themes are new developments in traffic safety, such as smartphones and e-bikes.

The workgroups helped identify the most important risks for each of the nine themes. These groups looked at (1) the current state of affairs, (2) the most relevant trends, (3) which policies are in place and (4) what risks are currently in play. This was then used to create potential solution-trajectories and measures. As seen in figure 3, the workgroups are also heavily dominated by governmental actors. Although only three knowledge institutes are included in the workgroups, their involvement was very intensive as they provided most of the information needed to construct RSSP2030. Additionally, only one market actor is involved. This actor is also only related to the use of data, meaning that no automotive market actors are included in the workgroups. However, some trade associations are included in the workgroups, which have connections to the individual market parties. Although there are some connections to individual

[9] Pieper, F. (2021, May 31). Dashcams: hulpmiddel tegen asogedrag. AdremLimburg. https://adremlimburg.nl/dashcams-hulpmiddel-tegen-asogedrag/#:%7E:text=Een%20dashcam%20%E2%80%93%20een%20samentrekking%20van,te%20sporen%20en%20te%20vervolgen.

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[11] VeiligheidNL. (2020). SEH- en ambulancedata openen een wereld aan ongevalsinformatie. Verkeerskunde. https://www.verkeerskunde.nl/42020ongevalregistratie

[12] de Laat, R. (2020, October 26). Zwarte doos in auto. GoedkopeAutoverzekering. https://www.goedkopeautoverzekering.nl/blog/zwarte-doos-auto-ongevalsdatarecorder#:%7E:text=Vooralsnog%20is%20EDR%2Dtechnologie%20in,motormanagementsysteem%20en%2Fof%20de%20airbagregeleenheid.

market parties, their commitment and involvement to the RSSP2030 has not been shown yet. Multiple interviewees expressed their excitement about the workgroups and being able to have input into the plan. However, their input was only asked before creating the plan, meaning that they were unable to give feedback on the written pieces of the plan. This resulted in less excitement and involvement of these workgroup actors for the RSSP2030, which meant that they were not as eager to contribute to the execution of the plan as they originally were (IAB2, IAB3, KI3, KI2).

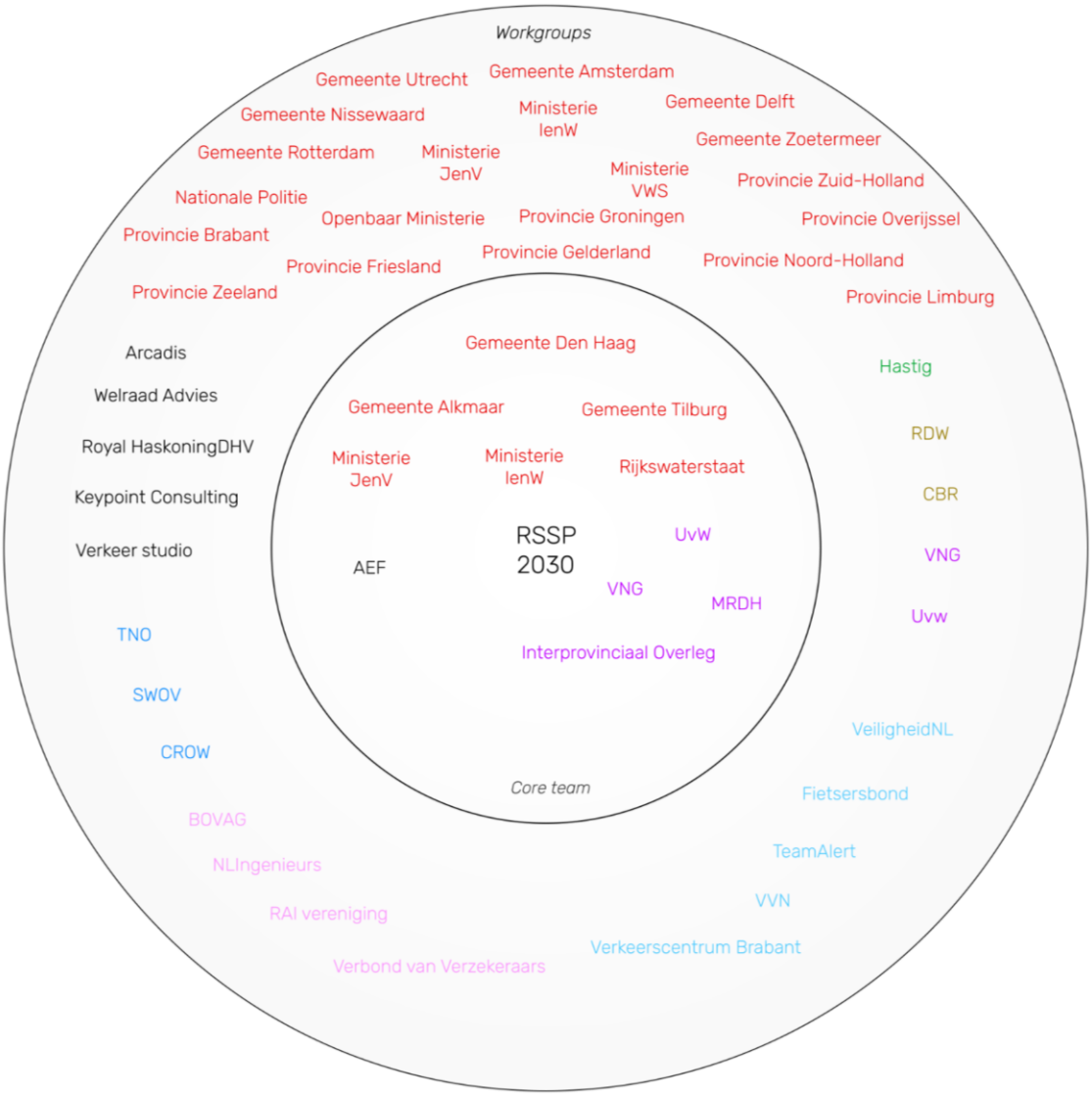
Besides the government-dominated mission arena described above, the traffic safety coalition can be considered a parallel mission arena that is governance dominated. The traffic safety coalition has the same goal as the RSSP2030: reducing the amount of traffic accidents and deaths. The governance of this parallel mission arena includes CSO's, municipalities, knowledge institutes, industry associations and companies (See appendix 5 for a full overview). The traffic safety coalition was created in 2017, however most of the included organisations already had annual meetings since 2015 in the form of a traffic safety diner. In 2017, they pleaded to make traffic safety a national priority, which resulted in the creation of RSSP2030 (verkeersveiligheidscoalitie, n.d.; KI3). This was before the government-dominated mission arena was created and initiated the RSSP2030. Therefore, even though the traffic safety coalition is considered a parallel mission arena in this paper, they were actually the first mission arena regarding this mission.

The creation of the traffic safety coalition was completely voluntary, which has led to high ambitions. The traffic safety coalition has several projects running independently of the RSSP2030. One project is related to the lack of traffic accident data, which has been identified as a systemic barrier to the achievement of RSSP2020 in the previous section. Another project focuses on creating a new norm for using smart functions in traffic. This is realised through the use of a covenant in combination with a campaign. The website (verkeersveiligheidscoalitie.nl) provides more information about different projects.

Besides the projects, the traffic safety coalition performs another important activity, they monitor the ambitions and activities of the RSSP2030 mission arena, which is one of the main tasks of a mission arena. This first started through the publication of their traffic safety manifesto, which was published in 2017. The idea of this manifesto was for it to be implemented in the Dutch coalition agreement, which would result in making traffic safety a national priority again. Recently, the traffic safety coalition has published their manifesto 2.0 in combination with an appeal to the Dutch House of Representatives. The manifesto 2.0 includes several solutions trajectories that have been summarized in the solution-diagnosis. The appeal focuses on three themes: (1) the formulation of more concrete goals and targets, (2) increase the priority of safety in residential areas by increasing the safety related to roads, vehicles, elderly and countering distraction, and (3) ensure proper funding and utilise cost savings. This appeal displays the monitoring role the traffic safety coalition takes towards the mission arena of the RSSP2030 and therefore is seen as a parallel mission arena.

The outer MIS includes many actors, as the stakeholders for traffic safety in the Netherlands are everyone who is participating in traffic and everyone who is contributing to the mission by developing and diffusing solutions. Nonetheless, some outer MIS actors are more active and are mentioned more frequently by the interviewees. Firstly, the automotive industry is seen as the largest actor, which contributes to the development of solutions within cars. Secondly, driving schools and CSOs are contributing the most to the development and diffusion of traffic safety education. Lastly, state actors, which are also included in the mission arena, are the largest actors contributing to the development of safe infrastructure and sufficient enforcement.

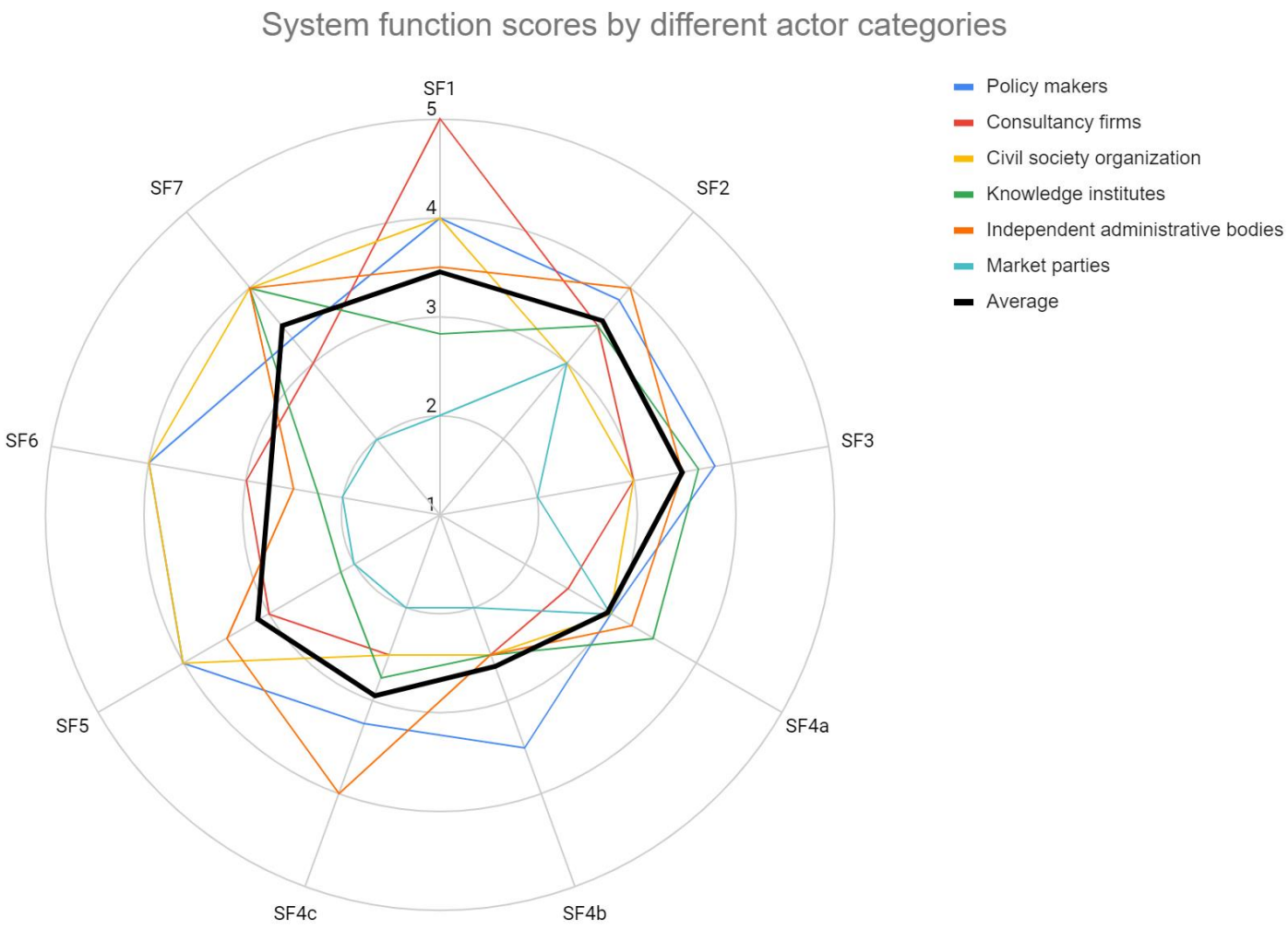
Figure 3: Overview of the RSSP2030's mission arena, split into two showing the core team and the workgroups. The mission arena includes governmental actors (red), consultancy firms (black), independent administrative bodies (brown), knowledge institutes (blue), trade associations (pink), CSO's (light blue), market parties (green) and governmental associations (purple)



4.2.3 System functions and barriers analysis

To measure the performance of the system interviewees were asked to rate each system function on a scale of 1-5, where 1 indicates very bad and 5 indicates very good. An overview of the system function scores per actor category can be found in graph 2. This graph does not include governmental associations and municipalities due to a lack of data. However, their insights are included in the in-depth analysis of each system function. The average of graph 2 shows that all system functions score around the median of 3. In the analysis below, all system functions are discussed in depth.

Graph 2: Overview of system function scores by different actor categories



Entrepreneurial activity

The system function entrepreneurial activity averaged a score of 3.46 (N=12, σ=0.89). Since traffic safety covers many different sectors and includes a lot of different innovations, the interviewees' topics are differentiated from each other. The interviewees which were most positive about this system function talked about entrepreneurial activity around data and the automotive industry. The activity around data stems from the need for data to analyse traffic safety trends and evaluate the effects of the taken measures. As mentioned in section 4.1, one of the main barriers of RSSP2020, therefore RSSP2030 has increased its focus on data. This can be seen as the only individual market actor in the mission arena is a data company. Two interviewees mentioned that market actors are experimenting with new techniques to collect and analyse data (KI2, PM2). Additionally, one interviewee mentioned that market actors approached municipalities to help them with their risk analysis (CO2).

Since the automotive industry is centered in Germany, technically, this falls outside of the scope of this research. However, due to its significant impact on traffic safety in the Netherlands this will be discussed shortly. The automotive industry is experimenting extensively with advanced driver assistance systems (ADAS), which in theory can help increase traffic safety. However, according to the Onderzoeksraad voor Veiligheid (2019) this is not the case most of the time. A lack of knowledge about the systems by the driver in combination with a lack of alertness and the still immature versions of ADAS, results in unsafe situations.

When focusing more on the entrepreneurial activity around infrastructure and education, the interviewees were more negative. Several interviewees mentioned the word ‘traditional’ in relation to infrastructure and education (CO2, PM5, KI2, MP2). With traditional they meant the fact that everything has to be done according to the books and that when something new is initiated, it is usually a small adaptation or addition to what is already happening.

Additionally, market actors are not involved in traffic safety. The mission arena has no connections with market actors and the RSSP2030 only mentions a connection to market actors in relation to the EU and in relation to the traffic safety coalition. This lack of connection has resulted in no subsidies or other financial benefits for market actors. This in combination with the dispersed costs and benefits related to traffic safety results in a lack of market actors experimenting with traffic safety innovations to enter the market.

Knowledge development

The system function knowledge development averaged a score of 3.57 (N=14, σ=0.55). As seen by the scores, most interviewees were relatively positive about the knowledge development around traffic safety. No interviewee scored knowledge development below a 3. Knowledge is developed by all kinds of actors ranging from CSO’s to IAB’s to market actors but is mainly done by knowledge institutes. In general, the interviewees were content with the quality, quantity and broadness of the knowledge development in the sector. A theme of developing knowledge through collaborations is also present. Several interviewees mentioned collaborations between SWOV, TNO, RDW, CBR, TUe, TUd (PM1, IAB1). Additionally, the interviewees seemed to talk

about knowledge development and knowledge diffusion as if they were one thing, implicating a collaborative knowledge development and diffusion culture.

Even though the knowledge development in the whole sector is positive, this knowledge does not diffuse to the municipalities properly. Due to a lack of resources (SF6), resulting in too little man-hours, most municipalities are unable to grasp the core of the risk-based approach. In order to overcome this barrier, the mission arena gave out an assignment to the consultancy firms AnteaGroup and Royal HaskoningDHV to support the municipalities with their risk-analysis. This is an effective short-term solution, however two interviewees mentioned that the municipalities are at risk of not incorporating the knowledge (CO2, GA2). This would result in the municipalities not being able to use the results of the risk-analysis, thus still being unable to increase their traffic safety.

Knowledge diffusion

The system function knowledge diffusion averaged a score of 3.50 (N=13, σ=0.82). As mentioned in the previous section, knowledge development and knowledge diffusion go hand in hand within the sector. In order to facilitate knowledge diffusion, two of the largest knowledge institutes, CROW and SWOV, collaborated through an initiative by the mission arena of the RSSP2030. This collaboration created the knowledge network RSSP (kennisnetwerkSPV), which operates as the central organization to help diffuse knowledge towards municipalities to help them with their risk-analysis. The website of knowledge network RSSP is a great central point for everyone who wants to get involved with the RSSP2030, as it provides information about the risk-based approach, effectiveness of traffic measures and new developments around traffic safety. Additionally, CROW initiated other collaborative organizations, such as ‘Ruimte voor Lopen’ and ‘Fietsberaad’, centered around pedestrians and cyclists.

Even though there are many different communication channels diffusing knowledge towards municipalities, they struggle to make use of them. This originates from the same problem as described in the previous section, municipalities have a lack of resources (SF6). Due to this lack of man-hours, most municipalities simply do not have the time to go to webinars and regularly check out the knowledge network RSSP website. This results in the municipalities not being able to use the available knowledge effectively.

Problem directionality

The system function problem directionality averaged a score of 2.96 (N=14, σ=0.63). Interviewees expressed their excitement about the fact that traffic safety finally got more attention compared to the previous years. Several interviewees associated this with the change of Minister of Infrastructure in 2017 (KI1, PM4, KI3, CO1). Suggesting that the previous minister did not have traffic safety as a priority. Other interviewees also stressed the importance of personal bias related to municipal officials and councilors (KI2, CO2, IAB3, CO1). The process of the creation of RSSP2030, which included many actors, helped increase the priority of traffic safety within these actors. In turn, these actors mobilize other actors, such as smaller municipalities and data market actors, which increase their priority of traffic safety. Additionally, the creation and activity of the

traffic safety coalition, which have traffic safety as their top priority, mobilized more actors to increase their priority of traffic safety.

Even though many actors are mobilized by these initiatives, most of these actors already have traffic safety as one of their top priorities. The actors who stand at the core of RSSP2030, the municipalities, do recognize the RSSP2030 and agree with its ambitions. However, they do not see traffic safety as a big enough problem to spend the limited amount of resources they have on it (SF6). For them, the more visible problems, such as youth care, have a higher priority. Many municipalities have too few traffic accidents that they see as a problem. When accidents do happen, they see it as one incident and not as a structural problem. This links back to the lack of understanding about the risk-based approach (SF3).

One interviewee also said that the ministry sees these accidents each as one tragic accident (KI3). Other interviewees mentioned something similar, saying that traffic safety does not 'live' within the government or that it is not structurally embedded (CSO1, CO2, MP2). This is all related to the fact that traffic safety is seen as a prerequisite instead of a top priority. A municipality mentioned that city planners do not look at traffic safety, but rather want the city to be visually pleasing (MUN2). This is a systemic barrier for deploying the risk-based approach of RSSP2030, as this approach requires constant attention on traffic safety even during periods where no accidents occur.

Besides a lack of urgency of traffic safety in the ministry and municipalities, there is also a lack of urgency in firms. This is due to two different causes. First, firms lack involvement in the RSSP2030 and are rarely mobilized by the RSSP2030. As assessed by the structural analysis, only one firm is included in the mission arena. The RSSP2030 only includes the mobilization of firms in relation to creating a new norm through campaigns such as MONO. A concrete roadmap on how firms can help increase traffic safety through their operations is missing. Second, automotive firms are focusing more on how to increase sustainability in their cars due to more strict CO2 limits in Europe (Abnett & Carey, 2020). One interviewee expressed that this causes a switch from safety to sustainability within the automotive industry (IAB2).

Solution directionality

The system function solution directionality averaged a score of 2.63 (N=12, σ=0.64). As mentioned before, traffic safety is centered around the themes of infrastructure, education, vehicle and enforcement. This multidisciplinary translates to the solutions needed to increase traffic safety. Solutions need to interact with each other accordingly, for instance, ADAS with the correct infrastructure and well-educated drivers. This makes a central coordinating organization or several collaborative organizations essential for the process of directing the solutions. In the period of RSSP2020 (2008-2020) there was a large focus on decentralisation, which meant that municipalities were responsible for the coordination of traffic safety. Now, for the RSSP2030, the ministry is trying to be more central and take a role as a coordinator.

Through the risk-based approach, the ministry has created a roadmap for actors to identify their problems and, in turn, use and invent new solutions to overcome these problems. Additionally, the ministry has created a national action plan (Landelijk ActiePlan), which consists of 55 concrete measures that the government will take in collaboration with societal partners. The risk-based approach and the national action plan do provide some directionality for solutions. However, several interviewees expressed their critique on this plan for still being too abstract and questioning if the actors involved were actually the ones who could implement the measures. An interviewee stated "*how do we get there"* (referring to the goals of the RSSP2030) (GA1).

Even though the criticism coming from these actors is legit and a concrete plan for the next phase is essential to facilitate solution directionality, the ministry has stated that currently they are still in an orientation phase and are focused on finishing the risk-analysis for all the municipalities. The ministry is now working on a new national action plan for the coming four years (2022-2026). Additionally, the traffic safety coalition recently released their traffic safety manifest 2.0, which includes 21 concrete safety trajectories. If this is coordinated properly, this should help facilitate solution directionality. However, due to its recent development, no conclusion can be made.

Reflexivity

The system function reflexivity averaged a score of 2.95 (N=10, σ=0.86). The creation of RSSP2030 has shown a reflexive nature. As described in the structural analysis, the feedback sessions with workgroups stimulate evaluation of potential risks and their corresponding measures. However, these feedback sessions 'pre-creation' of RSSP2030 is where the involvement of these workgroups came to an end. After the core team started writing RSSP2030, there was no feedback on the individual pieces included in the plan. Some interviewees stated that this has led to them being less involved and excited about the plan (IAB2, KI2, KI3).

The RSSP2030 states that evaluation is one of its core features. The development of Safety Performance Indicators (SPI's) should help facilitate the evaluation by making traffic safety more concrete. This way concrete measures can be linked to SPI's and by monitoring the development of the SPI's it can be concluded if the measure was effective or not. However, several interviewees expressed their scepticism about the SPI's (PM2, IAB3, PM3), due to the fact that SPI's have been in development since 2013. The results of the municipalities' risk-analysis should facilitate the development of the SPI's. Since the risk analyses have not been finished yet, a conclusion if the SPI's do actually facilitate reflexivity cannot be drawn.

Additionally, even though the RSSP2030 states that evaluation is one of its core features, several interviewees stated that evaluation is not a tradition, especially within education, and that it is sometimes forgotten (KI1, PM3, MUN2, IAB1, CSO1). Another interviewee stated that even when a project is evaluated, the learning points are often not used for the next project (IAB2). Scientific evaluation of measures is also considered to be expensive, resulting in a lot of evaluation to be done by 'expert judgement' (KI2). Since municipalities lack the resources for scientific evaluation and do not have the capacity for 'expert judgement' (*SF6*), measures taken on a municipal level are often not evaluated.

Market formation

The system function market formation averaged a score of 3.13 (N=12, σ=1.05), which shows a neutral view of the market formation. However, the standard deviation is quite significant, implicating that interviewees have different opinions about this system function. The interviewees who were positive about market formation related it to developments around data. The risk-based approach of the RSSP2030 requires a lot of data, which the state and municipalities do not have. Therefore, the governmental actors reach out to data firms, or vice versa, to obtain / sell the required data.

Some interviewees who were positive about market formation talked about the automotive industry in Europe (KI1, PM5), expressing that many new developments around ADAS are happening. However, these developments only get integrated into high-end cars and focus on increasing driving comfort instead of traffic safety (OVV, 2017). Additionally, the designs of ADAS differ from car to car and brand to brand, resulting in unsafe situations due to a lack of knowledge of the driver. In 2018 a proposal was passed regarding the standardisation and obligation of several non-intervening ADAS. This obligation is an important driver for the market formation of ADAS. Two interviewees expressed criticism of the proposal for being watered-down as it only includes non-intervening ADAS, which can be turned off (IAB2, KI). They both relate this to a lobby of the German automotive sector (*SF7*), but no concrete evidence of this can be found.

As described, there is some market formation around vehicle safety, however market formation for the other traffic safety themes is missing. Several interviewees mentioned that this is because of the dispersed costs and returns (IAB2, KI3, KI2, MP2). The costs are for the entire society and do not show up on the balance sheet of the ministry or other actors. Even though the RAI (2019) has shown that the ratio of costs and return is around 1:3, there is no incentive for a single actor to invest in traffic safety. This has significant effects on the system around traffic safety. For instance, insurance companies charge customers more for safe cars with ADAS (CCS, 2020). However, these systems should decrease the possibility of accidents, which saves the insurance company money. These dispersed costs and returns, resulting in ‘mismatches’ within the system are systemic problems for market formation (*SF5*). The lack of incentive for a single actor to invest in traffic safety is also considered a systemic problem for entrepreneurial activity (*SF1).*

Resource (re)allocation

The system function resource (re)allocation averaged a score of 2.75 (N=10, σ=1.03). The standard deviation of this system function is also quite big. This stems from the fact that the interviewees who are positive about the resource (re)allocation are happy that the RSSP2030 includes financial support (500 million until 2030), in contrast to RSSP2020. This financial support, mostly used as subsidies, has mobilized municipalities to take action regarding traffic safety. The subsidy is meant for proven effective measures, which were selected by the mission arena, or for measures taken as a result of the risk-analysis. The subsidy provides municipalities with 50% of the money needed for the measures.

However, this subsidy does not provide the municipalities with enough resources to sufficiently focus on traffic safety. Two interviewees mentioned that only the four largest municipalities have enough financial and human resources to follow the RSSP2030 as it was intended (CO2, MUN2). Through the use of consultancy firms, the mission arena tries to overcome this lack of human resources. However, according to a consultancy firm, this is not sufficient, especially for the smaller municipalities. It also brings up the previously mentioned problem of not incorporating the knowledge in municipalities (*SF3).* For the municipalities to operate, as the RSSP2030 has intended, it needs a structural increase of human and financial capacity.

The lack of resource (re)allocation is also related to the systemic problem of 'dispersed costs and returns' identified in the market formation section. As mentioned before, dispersed costs and returns cause a lack of investments of single actors. This, in combination with low urgency for traffic safety, makes it hard for the mission arena to legitimize large investments in traffic safety. For the RSSP2030 this means that the policy impulse of 50 million per year (from 2020 until 2030) is too small. The traffic safety coalition has calculated the societal costs of traffic safety to be around 17 billion per year. In relation to the costs the policy impulse seems insignificant.

Creation and withdrawal of legitimacy

The system function creation and withdrawal of legitimacy averaged a score of 3.50 (N=10, σ=0.85). Many actors expressed that their organisation or other organisations actively lobby to increase the priority given to traffic safety (IAB2, CSO1, IAB1, KI1). One interviewee said that "*traffic safety is a political game"* (KI2), implying that lobbying is necessary in order to get attention for specific problems. ANWB is perceived as the actors being the most active in this lobby. They are also considered the leader of the traffic safety coalition, which is probably why the ANWB is perceived as the most active lobbyist. The traffic safety coalition initiated a big lobby in 2017 through the creation of their traffic safety manifesto, which they lobbied for to be implemented into the coalition agreement of the Dutch government. They succeeded and due to this lobby the RSSP2030 included a budget of 500 million for 2030. The traffic safety coalition recently created their manifesto 2.0, which they also want to be included in the coalition agreement. However, because these developments happened very recently, their effects cannot be seen yet. No interviewees expressed disappointing feelings concerning two documents for the same cause. One interviewee even stated that the traffic safety coalition and the RSSP2030 create legitimacy on two fronts, the RSSP2030 on the policy-side and the traffic safety coalition on the implementation side (IAB2). This excludes the possibility of an internal battle for legitimacy between the two documents.

No-one is against traffic safety, however there is an important tradeoff between traffic safety and freedom. For example, the elderly is a high-risk group causing a considerable amount of traffic accidents. Taking away their rights to stay mobile would solve a big part of the traffic safety problem, however, this would be considered inhumane and would not receive the needed legitimacy. A less extreme example is the problem with ADAS. The more intervening and restricting functions ADAS has, the safer it will be. However, the more intervening/restricting these changes are the more the user will feel like it is restricting his or her freedom. Several interviewees have expressed that sometimes the government should make unpopular decisions for the benefit

of the whole society (PM1, MUN2, MP2). The tradeoff between freedom and safety is not seen as a systemic barrier but is something to keep in mind when creating and implementing new measures.

Systemic barriers regarding the mission arena

Several systemic barriers have been identified from the system function analysis, which are divided into systemic barriers occurring in the overall MIS and systemic barriers occurring within the mission arena. In the mission arena two systemic barriers have been identified. These barriers, (1) firms are not mobilized by RSSP2030 and (2) traffic safety is not structurally embedded, are affecting problem directionality [SF4a] negatively, resulting in a low urgency for traffic safety. A low urgency within the mission arena has resulted in the policy impuls being too small [SF6] to reach the goals set of the RSSP2030 mission, because it is hard to legitimize investments for a societal mission which does not have priority. The traffic safety coalition has calculated that for infrastructural measures only, an investment of 5 billion is needed and that to reach the goal of zero deaths in 2050 an extra investment of 12 billion is necessary (Vos, 2021). These investments are considerably larger than the current total investments of 500 million for 2030.

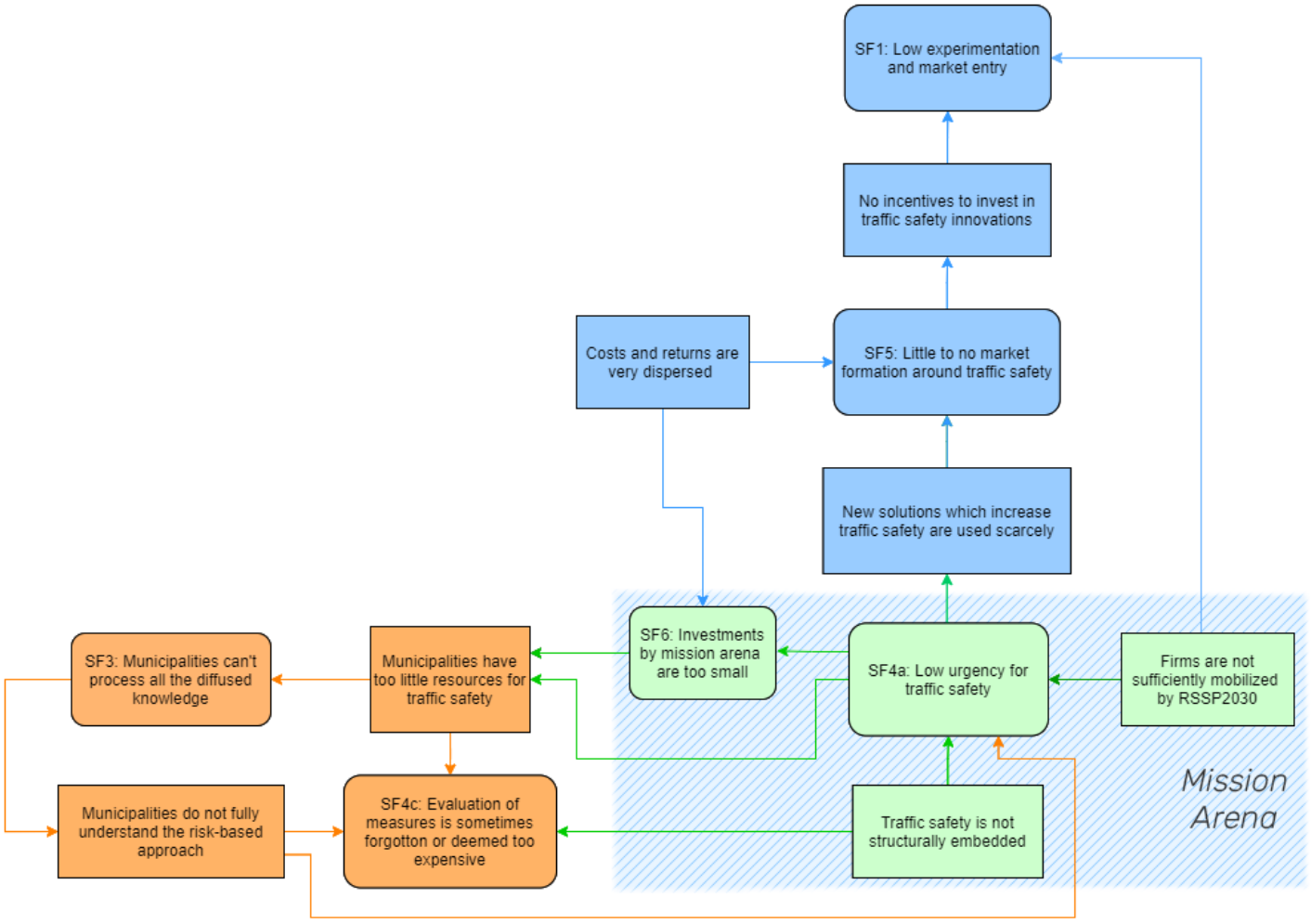
Additionally, resources (re)allocation [SF6] is negatively affected by a systemic barrier in the overall MIS. This systemic barrier, costs and returns are very dispersed, causes an under investment of actors, due to it being hard to allocate where and who will reap the benefits of the investments. Furthermore, this makes it even harder for the mission arena to legitimize investments in traffic safety. Therefore, the ministry has under invested in traffic safety, even though the RAI (2019) has shown that the ratio of costs and return is around 1:3. This implies that it is beneficial for the mission arena to invest in traffic safety when relating it to the Dutch society. The systemic barriers and their effects on the system function within the mission arena can be seen in figure 4 and are depicted by the color green.

Systemic barriers regarding the overall MIS

The negatively affected system functions in the mission arena [SF4a & SF6] create systemic barriers in the overall MIS. Both the system functions cause a systemic barrier within municipalities. The low urgency, combined with too little funds from the policy impulse, cause the municipalities to have too little resources for traffic safety. This, in turn, due to a lack in man-hours, causes the municipalities to not fully receive, process and understand all the knowledge which has been actively and passively diffused to them [SF3]. Besides the negative effect on knowledge diffusion [SF3], the lack of resources also sometimes causes the scientific evaluation of implemented measures to be deemed too expensive [SF4c]. Additionally, the negative effects on SF3 create a new systemic barrier because municipalities do not fully understand the risk-based approach. Sequentially, this barrier also negatively affects SF4c, because due to this barrier, the evaluation of measures is sometimes forgotten. Furthermore, this barrier reinforces the low urgency within municipalities [SF4a]. The barriers related to the municipalities can be seen in figure 4 and are depicted through the color orange.

Additionally, the low urgency for traffic safety [SF4a] is also happening outside of the mission arena. The low urgency to increase traffic safety in citizens results in that new products which increase traffic safety are used scarcely. This, in combination with the dispersed costs and returns, cause little to no market formation around traffic safety solutions [SF5]. Sequentially, this causes no incentives for individual actors to invest in traffic safety, even though investments have a cost/return ratio of around 1:3. This underinvestment leads to low experimentation and market entry of new traffic safety innovations [SF1]. However, this is not only caused by the lack of incentive to invest in traffic safety. The mission arena of RSSP2030 also insufficiently mobilizes firms related to traffic safety, causing low experimentation and market entry [SF1]. The mobilization of firms and incentivizing actors to invest are both the responsibility of the mission arena as they fall under the main task: *mobilization of MIS components via mission governance actions*. Therefore, the low performance of market functions, depicted by the color blue in figure 4, are partly caused by the inability of the mission arena to perform their main tasks successfully and partly caused by the dispersed costs and returns.

Figure 4: Overview of the systemic problems (rectangles) that are interdependent through their effects on system functions (rounded rectangles). Orange relates to the municipalities, blue to market formation and green to the mission arena



Systemic instruments analysis

The systemic barrier analysis has shown several systemic barriers hindering the performance of the system. Both mission arenas have created a plan, which include several policy interventions, called national action plan traffic safety (IenW, 2018) and traffic safety manifesto 2.0 (verkeersveiligheidscoalitie, 2021), respectively. An analysis is done on both documents to check whether the systemic instruments help overcome the identified systemic barriers. An overview of the results can be seen in table 11.

According to the analysis, the national action plan has taken measures to overcome five out of the seven systemic barriers. The systemic instruments to overcome systemic barriers one and five include concrete measures specifically tackling the problem and thus have a high chance to be overcome. While the systemic instruments relating to barrier two, three and four need additional measures to fully overcome them. The national action plan does mention that it wants to stimulate innovation regarding traffic safety, however, no systemic instruments are mentioned on how to achieve this. In addition, no systemic instruments are mentioned on how to overcome the barrier of dispersed costs and return. Currently, the ministry is working on a new action plan, however no information about this is public and therefore cannot be used for this research.

The measures included in the manifesto 2.0 by the traffic safety coalition are meant to be initiated by the mission arena of the RSSP2030. Because the measures are either related to (1) public roads, which the government is responsible for, (2) enforcement, which is also the domain of the government, (3) laws and regulations, which can only be initiated by the government, or to (4) educational campaigns, where the government should play a coordinating role. The manifesto 2.0 includes a systemic instrument related to each of the seven identified systemic barriers. Systemic barriers one, three, four, five and six should have a high chance of being resolved, due to the concrete measures specifically tackling the underlying problem of the barriers. However, the systemic instruments tackling barriers two and seven are not concrete and thus would be unable to overcome the barriers.

Complementing the national action plan with the systemic instruments included in the manifesto 2.0 would result in overcoming five out of the seven systemic barriers. Meaning that systemic barriers two and seven are still hindering the optimal performance of the system. Both plans try to mobilize firms differently, where the national action plan fails to have firms actively contribute to traffic safety, the manifesto 2.0 fails to include concrete measures on how to achieve this. Following Wieczorek & Hekkert (2012), this barrier can be resolved through stimulating and organising the participation of these firms. This, for example, can be achieved through the inclusion of more individual firms in the mission arena.

Besides systemic barrier two, the systemic instruments of both plans are also unable to tackle systemic barrier seven. Making costs and returns less dispersed is not possible through the implementation of measures. However, as the traffic safety coalition has shown, there is a cost/return ratio of 1:3 on infrastructural measures. This means that it would be beneficial for the government to keep investing in traffic safety, as the returns will be visible in our society.

Table 11: Overview of systemic barriers solved by RSSP2030 and traffic safety coalition

Systemic barriers	Solved through national action plan (LAP)	Solved through manifesto 2.0
SB1: Traffic safety is not structurally embedded	Yes, through the implementation of traffic safety in the new National Environmental Vision (Nationale omgevingsvisie (NOVI)). This inclusion on a national level provides direction for choices, inspires, sets frameworks and ensures an integrated approach to strategic tasks in the physical living environment.	Yes, through the creation of concrete targets and a roadmap for the corresponding finances. Additionally, they want to enable citizens to actively participate and contribute to traffic safety through the use of behavioral campaigns
SB2: Firms are not mobilized by the RSSP2030	Educating employers and lease companies in order to increase traffic safety within these firms is mentioned. Additionally, mobilizing firms through signing a covenant is stated. However, having firms actively contribute to traffic safety is not mentioned.	Mobilizing firms in order to increase the traffic safety within their operations through the use of corporate social responsibility is mentioned in the manifesto. However, how exactly this will be realised is missing.
SB3: Municipalities have too little resources for traffic safety	Municipalities and local road operators get support from a team of experts and through the knowledge centrum SPV in order to complete the risk analysis. However, this is not enough and additional funding for the municipalities is necessary in order to increase their focus on traffic safety.	Yes, through an increase in budgets for municipalities and through new enforcement innovations to take workload off of local enforcement, the municipalities should have enough resources for traffic safety
SB4: Municipalities do not fully understand the risk-based approach	The support from the expert teams to help complete the risk-analysis does not help the municipalities to incorporate knowledge related to the risk-based approach. The implementation of the new NOVI on a local scale could help municipalities to understand the risk-based approach, however this has not been done yet.	A systemic instrument for this barrier is not specifically mentioned. However, through an improved roadmap for financing, this barrier should also be overcome
SB5: New solutions which increase traffic safety are used scarcely	It is mentioned that the use of ADAS in cars should be stimulated, but how this should be realised is not stated. More research will be done on ADAS in motorbikes, safety innovation in e-bikes and bicycle helmets, which could increase the use of these systems. Additionally, the use of protective clothing for motorcyclists is stimulated and through education other safe traffic solutions can also be stimulated.	Yes, the use of safer cars is stimulated through tax exemptions. Additionally, by using these safer cars during driving lessons, the use is also stimulated. The use of innovations related to safer infrastructure is stimulated through subsidies and funds.
SB6: No incentives to invest in traffic safety innovation	No measures are mentioned to increase the incentives for investing in traffic safety solutions, even though it is mentioned that they want to stimulate innovation.	The above-mentioned systemic instruments increase the demand for safe traffic innovation, which also increases the incentive to invest in these innovations.
SB7: Costs and returns are very dispersed	No measures are mentioned which can resolve this barrier	This seems to be a problem which cannot be solved. However, through the calculations made, showing that the costs/returns ratio is 1:3, it shows that it is beneficial for a society as a whole to invest in traffic safety.

5. Conclusion & discussion

In this section the research question is answered, followed by a discussion about the theoretical contributions, a reflection on the research method and recommendations for further research. However, before answering the research questions, a short summary of this research is given.

This paper builds upon the first approach of a MIS by Wesseling & Meijerhof (2021) and explores the dynamics of a MIS through the analysis of the Road Safety Strategic Plan 2020 and its consecutive mission the Road Safety Strategic Plan 2030. In addition to checking the identified dynamics of the MIS approach by Wesseling & Meijerhof (2021), new dynamics are explored, such as how social innovations play a part within a MIS, how systemic barriers evolve over time in relation to systemic instruments, and how the dynamics work between two mission arenas within the same MIS. This is all done through a literature analysis in the form of an event history analysis, combined with 20 expert interviews. The overarching research question which has guided this research will now be answered.

"How have systemic instruments affected the barriers to the achievement of the RSSP2020 mission and what did the mission arena for RSSP2030 learn from this for overcoming the MIS barriers of today?

The first part of the research question relates to the systemic instruments of the RSSP2020 mission. The two systemic instruments, the development of new toolkits and safety performance indicators, did not significantly change the systemic barriers identified in RSSP2020. Therefore, it is unfortunately not possible to identify positive elements related to the deployment of the systemic instruments which help overcome systemic barriers. However, due to the fact that the core barrier to the achievement of the RSSP2020, the lack of structural embeddedness of traffic safety within the Dutch society, is still present for the RSSP2030, it is interesting to analyse what the mission arena for the RSSP2030 learned from this for overcoming the MIS barriers of today.

The government-dominated mission arena has significantly increased the priority of traffic safety by increasing the amount of financial resources, mobilizing and helping municipalities, and through the implementation of traffic safety in the National Environmental Vision. This indicates that the government-dominated mission arena has learned from bottlenecks encountered in RSSP2020. However, the parallel, governance dominated, mission arena still pleads for more policies and measures to increase traffic safety. One of them is a 30 year-investment of at least 12 billion euros, which is necessary to increase the safety of the infrastructure (NU.nl, 2021). This makes the current policy impulse of 500 million for the next 10 years seem like an insignificant amount. Therefore, it can be concluded that the government-dominated mission arena did not sufficiently learn from the RSSP2020 to achieve the goals of the RSSP2030 by themselves. Fortunately, the governance dominated parallel mission arena provided concrete complementary measures which should help achieve the goals of the RSSP2030 within the constrained time.

Theoretical contributions

This thesis has made several contributions to the theoretical development of the innovation systems theory, specifically the mission-oriented innovation systems framework. Firstly, the larger focus on social solutions, compared to the SMT case, has explored the relation between social and technological solutions in the context of a mission. There are social solutions, like progressive speed fines, and technological solutions, like automatic numberplate recognition, which can be implemented standalone. However, there are also technological solutions that need to be complemented with social solutions to be effective, or vice versa. For example, citizens' use of ADAS (a technological innovation) has to be complemented with education for these citizens for the technology to actually increase traffic safety. Therefore, this paper has proposed a solution readiness level, which allows for assessing solutions with both social and technological aspects. Additionally, using the diagnostic questions (Appendix 1) it can be assessed where the solution is lacking behind. The solution readiness level can be a helpful tool for assessing the readiness for the implementation of social and technological innovations. This, in turn, can be used to advise policy makers to help them select a solution trajectory, which decreases the uncertainty around the solution directionality [SF4b], aiding the completion of the mission.

Secondly, the identification of two mission arenas within the same mission is a novel insight in the MIS literature. This paper has identified one *government-dominated mission arena* and a parallel *governance-dominated mission arena*. For the case presented in this paper, the government-dominated mission arena is seen as the one responsible for executing the mission governance actions, while the governance-dominated mission arena focuses more on continued monitoring and evaluation of the mission's progress. An interesting observation was that the ambitions of the governance-dominated mission arena was significantly higher than the government-dominated mission arena, which enabled them to critically monitor and evaluate the actions of the government-dominated mission arena. Until now, there have not been any collaborations between the two mission arenas. It would be an interesting topic for further research to analyse how the dynamics of these mission arenas would evolve over time. Furthermore, the analyses of two mission arenas in a different context would be an interesting research topic.

Thirdly, the performance of an event history analysis on a MIP is a novel method while using a MIS approach. As explained in the introduction, the application of an event history analysis allows for a full picture of causal effects between the systemic barriers and the systemic instruments. However, none of the systemic instruments implemented by the mission arena during RSSP2020 resulted in overcoming any of the systemic barriers. This resulted from a lack of mobilization, both financially and regarding actors, during the RSSP2020. Therefore, the original idea of an in-depth analysis of the MIS dynamics between systemic barriers and the systemic instruments could not be performed.

Reflection

The quality of the research has been ensured by assessing the external and internal reliability and validity as described in Bryman (2016). Firstly, the external reliability is hard to ensure due to the nature of this study being qualitative. As the majority of the data is derived from interviews, which can give different answers on different moments with different researchers, it is possible that repeating this study will result in a different outcome. Therefore, this paper maximizes the external reliability by writing down the steps taken as detailed as possible. The replicability of the literature analysis can be ensured because these will remain the same over the years.

Secondly, the internal reliability is assessed through the use of Krippendorff's Alpha (Krippendorff, 2011). Two researchers who are also writing a master's thesis using the mission-oriented innovation system were asked to code 30 statements (Appendix 6). This resulted in an Alpha of 0,8475. If the Krippendorff's Alpha is larger than 0.8 it is considered reliable (De Swert, 2012). This means the quality of this research has been ensured.

Thirdly, the internal validity is ensured through the use of multiple data sources, such as governmental documents, news articles and grey literature, and performing multiple anonymous interviews. Data is collected until theoretical saturation is reached using the available time and resources. Internal validity is further ensured through the triangulation of the various data sources.

Lastly, external validity is hard to ensure due to the nature of this study being a qualitative case study, meaning it is hard to apply the findings in other social contexts. However, it should be noted that the theory and the contributions of this paper can be applied by researchers in different social settings.

Besides a reflection on the quality indicators by Bryman (2016), this paper also reflects on the barriers which were encountered during the process of this research. One barrier which was encountered by the researcher was the lack of knowledge about the context. This, in combination with the lack of an internship, caused the first step of the research, a literature analysis, to be highly time-consuming. This could have been prevented by first doing some exploratory interviews with knowledgeable stakeholders.

In relation to the lack of knowledge about the context of traffic safety, the proposed idea of an in-depth analysis of the RSSP2020 was deemed insufficient for a master thesis, as too little mobilization was occurring for an analysis. Therefore, the researcher expanded its focus on the RSSP2030 mid-research, which caused some inefficiencies related to time. This could have been prevented by some exploratory interviews with knowledgeable stakeholders.

Furthermore, as the mission includes many municipalities that have active participation, it was challenging to include all the local dynamics in the data. For instance, the development of local solutions, like educational programs, which are not widely spread, are not included in that data. Additionally, each municipality performs their own risk-analysis and therefore will have unique focus areas and unique solutions. To maintain sufficient problem and solution directionality [SF4a/b], it is crucial for the mission arena to connect all the local needs and initiatives to an

overarching national initiative. For further research of missions with complex local differences, it is advised to perform a comparative case study analysis. This research type allows for an in-depth analysis and comparison of local differences.

Suggestions for further research

This paper proposes a number of suggestions and interesting topics for further research. As described in the limitations above, since this research has a case study design the findings are not generalizable. Therefore, in order to improve the evaluation of MIP using a MIS approach there is a need for more case studies with different characteristics. These characteristics include, but are not limited to, different sectors or countries, different composition of mission arenas and mission's which cross borders. Related to the difference in mission arenas, it would also be interesting to further research the dynamics between a government-dominated mission arena, with a strong focus on mission governance actions, and its parallel governance-dominated mission arena, which focuses more on evaluating and monitoring the mission's progress. As this is the only paper that has analysed such a dynamic using the MIS approach, there could be more instances where such an interaction could occur. For instance, a reversed interaction, where a government-dominated mission arena monitors and stimulates a governance-dominated mission arena. Additionally, this paper has also identified an internal battle between the legitimacy of sustainability and safety within the automotive industry. This internal battle for legitimacy could be an interesting research topic using the institutional logics perspective by Thornton, Ocasia & Lounsbury (2015).

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Appendix 1: Solution Readiness Level guide

Solutions readiness level	Diagnostic questions
SRL 1	Is the concept of the innovation still being formulated? Is the application of the innovation not clear yet? Has the identification of stakeholders started recently? Are there no regulations regarding the innovation?
SRL 2	Is the innovation being tested in a laboratory/virtual environment? Do stakeholders see the solutions as a valid way to solve their problem? Are the regulations regarding the innovation unclear?
SRL 3	Is the innovation being piloted in a relevant environment? Has the innovation received practical feedback from stakeholders? Are stakeholders involved in the development of the innovation? Are the regulations regarding the innovation relatively clear? Do the users lack sufficient knowledge to use the innovation effectively?
SRL 4	Has the innovation been proven in demonstration or actual operation? Do stakeholders view the innovation as the best solution to their problem? Are there specific regulations regarding the innovation? Is the innovation part of mandatory regulations? Is the innovation economically viable? Is the innovation considered a dominant design? Do the users of the innovation have sufficient knowledge to use it effectively?

Appendix 2: Operationalization

Analytical steps of MIS	Concept	Indicator article analysis	Indicator interviews
Problem-solution diagnosis	Problems	Different societal problems and 'wants' related to the RSSP2020 mission	Different societal problems and 'wants' related to the RSSP2020 mission
	Solutions	Technical and social solutions which are considered/included in the RSSP2020 - Their SRL	Technical and social solutions which are considered/included in the RSSP2020 - Their SRL
Structural analysis[13]	Actors	Companies, knowledge institutes, governments, NGOs, other parties	Companies, knowledge institutes, governments, NGOs, other parties
	Institutions	Rules, laws, regulations, norms, values and habits	Rules, laws, regulations, norms, values and habits
	Interactions	Collaborations between actors	Collaborations between actors
	Infrastructure	Physical, knowledge and financial infrastructure	Physical, knowledge and financial infrastructure
System functions analysis	SF1	Diagnostic questions (appendix 3)	Diagnostic questions (appendix 4)
	SF2	Diagnostic questions (appendix 3)	Diagnostic questions (appendix 4)
	SF3	Diagnostic questions (appendix 3)	Diagnostic questions (appendix 4)
	SF4a	Diagnostic questions (appendix 3)	Diagnostic questions (appendix 4)
	SF4b	Diagnostic questions (appendix 3)	Diagnostic questions (appendix 4)
	SF4c	Diagnostic questions (appendix 3)	Diagnostic questions (appendix 4)
	SF5	Diagnostic questions	Diagnostic questions (appendix 4)

[13] See Wieczorek & Hekker (2012) for further details

		(appendix 3)	
	SF6	Diagnostic questions (appendix 3)	Diagnostic questions (appendix 4)
	SF7	Diagnostic questions (appendix 3)	Diagnostic questions (appendix 4)
Systemic barriers analysis	Systemic barriers in the Mission Arena	Identified problem areas	Identified problem areas
	Systemic barriers in the overall MIS	Identified problem areas	Identified problem areas
Systemic instruments analysis		Systemic instruments considered/implemented to tackle the systemic barriers	Systemic instruments considered/implemented to tackle the systemic barriers

Appendix 3: Literature analysis guide

Sub-questions	Diagnostic questions
How do different societal problems and 'wants' relate to the mission?	What societal problems are tackled in the RSSP2020? How are societal problems prioritized?
What technological and social innovations are relevant to the mission?	What technological innovations are used to reach the RSSP2020 goals? What social innovations are used to reach the RSSP2020 goals?
How mature are these innovative solutions?	*See appendix 1: diagnostic questions SRL*
What actors, institutions and infrastructures have contributed to the mission?	What organizations have helped develop the RSSP2020 mission? What organizations are developing/employing solutions to reach the RSSP2020 goals? What hard and soft institutions are relevant for the RSSP2020 mission? What physical, knowledge and financial infrastructures are important for reaching the RSSP2020 goals?
What system functions are not developed sufficiently rapidly to complete the mission?	SF1: Are experiments to develop existing and new solutions, conducted sufficiently rapidly to complete the mission?
	SF2: Is knowledge to develop existing and new solutions, created sufficiently rapidly to complete the mission? Are harmful practices unlearned sufficiently rapidly to complete the mission?
	SF3: Is knowledge about the societal problem diffused sufficiently to formulate a broadly supported, clear, time-bound and ambitious mission? Is knowledge to develop and use solutions diffused sufficiently rapidly amongst all stakeholders, to complete the mission?
	SF4a: How do stakeholders prioritize the mission's problem in relation to other societal problems? SF4b: How do stakeholder prioritize the mission's solutions in related to

	other solutions? SF4c: Is the mission's progress monitored and is the MIS on track to meet the mission? If not, are sufficient measures taken to catch-up? Is the impact and relevance of MIP instruments regularly evaluated and, when needed, are they adequately redesigned?
	SF5: Are formal or informal policies supporting the diffusion of solutions sufficiently rapidly to complete the mission? Are formal or informal policies phasing-out harmful technologies and practices sufficiently rapidly to complete the mission? Are stakeholders sufficiently rapidly adopting the solutions? Are stakeholders sufficiently rapidly abandoning harmful practices and technologies?
	SF6: Are sufficient human, financial and material resources mobilized to fulfil the other system functions?
	SF7: Are stakeholder advocating or lobbying for more problem and/or solution support?
What are the underlying causes of the systemic barriers?	What causes the identified weak system functions to perform this way? Is this related to actors, institutions or infrastructure? Where is the systemic barrier located? (Mission arena or overall MIS)
What systemic instruments can be considered effective or ineffective and why?	What systemic instruments are considered and/or implemented to solve the systemic barriers? What systemic instruments have successfully resolved the systemic barrier? What systemic instruments have not resolved the systemic barrier?

Appendix 4: Interview guide

Sub-questions	Potential interview questions
How do different societal problems and 'wants' relate to the mission?	Why is problem X included in the RSSP mission? Why is problem X prioritized over problem Y? How come problem X was excluded from the mission in year Y? How come problem X was included in year Y?
What technological and social innovations are relevant to the mission?	Why is solution X included in the RSSP mission? Why is solution X prioritized over solution Y? How come solution X was excluded from the mission in year Y? How come solution X was included in year Y?
How mature are these innovative solutions?	Has solution X proven itself in real life environments? Has solution X received feedback from relevant stakeholders? How far into the development is solution X currently?
What actors, institutions and infrastructures have contributed to the mission?	*This should be fully assessed in the literature analysis*
How and by whom are they mobilized?	How has organization X mobilized your organization to help contribute to the achievement of the RSSP goals? How has your organization mobilized organization X to help contribute to the achievement of the RSSP goals?
What system functions are not developed sufficiently rapidly to complete the mission?	SF1: Are experiments to develop existing and new solutions, conducted sufficiently rapidly to complete the mission?
	SF2: Is knowledge to develop existing and new solutions, created sufficiently rapidly to complete the mission? Are harmful practices unlearned sufficiently rapidly to complete the mission?
	SF3: Is knowledge about the societal problem diffused sufficiently to formulate a broadly supported, clear, time-bound and ambitious mission?

	Is knowledge to develop and use solutions diffused sufficiently rapidly amongst all stakeholders, to complete the mission?
	SF4a: How do stakeholders prioritize the mission's problem in relation to other societal problems? SF4b: How do stakeholder prioritize the mission's solutions in related to other solutions? SF4c: Is the mission's progress monitored and is the MIS on track to meet the mission? If not, are sufficient measures taken to catch-up? Is the impact and relevance of MIP instruments regularly evaluated and, when needed, are they adequately redesigned?
	SF5: Are formal or informal policies supporting the diffusion of solutions sufficiently rapidly to complete the mission? Are formal or informal policies phasing-out harmful technologies and practices sufficiently rapidly to complete the mission? Are stakeholders sufficiently rapidly adopting the solutions? Are stakeholders sufficiently rapidly abandoning harmful practices and technologies?
	SF6: Are sufficient human, financial and material resources mobilized to fulfil the other system functions?
	SF7: Are stakeholder advocating or lobbying for more problem and/or solution support?
What are the underlying causes of the systemic barriers?	In year X event Y caused a systemic barrier, can you tell me something about how this happened? Did event X cause other problems, besides problem Y? What do you think is the root of the problem of event X which happened in year Y?
What systemic instruments can be considered effective and ineffective and why?	Why was systemic instrument X considered but not implemented? Why was systemic instrument X implemented? How come systemic instrument X was changed in year Y? Do you think a different systemic instrument would have been more effective?

Appendix 5: Actors in the traffic safety coalition

Appendix 6: Inter-coder reliability check with Krippendorff's Alpha

Statement	Thesis researcher	Researcher 2	Researcher 3
Het schetst vooral een richting en een aantal thema's. Het geeft geen set aan maatregelen, maar vooral aandachtspunten, een doel en een soort van gezamenlijke aanpak.	SF4b +	SF4a +	SF4b +
Ik vind dat bij sommige gemeenteambtenaren een stukje passie ontbreekt om iets aan verkeersveiligheid te doen. Dan vind ik ook dat je. Dan zou ik als ik op zo'n plek zou zitten, dan zou ik een passie hebben om zo goed mogelijk alles te voorkomen.	SF4A -	SF4A -	SF4A -
Ja, alcohol in het verkeer is weer toegenomen. Ik had het even met het ministerie er over. Die zijn ook een nieuw onderzoek aan het aanbesteden om dat inzichtelijker te krijgen van 'waarom stijgt dat nou'?	SF2 +	SF4c +	SF2 +
Het is gewoon dat gemeenten onder anderen hebben gewoon onvoldoende geld en iedere stuivertje die ze kunnen krijgen gaat automatisch werken blijkt ook nu weer.	SF6 -	SF6 -	SF6 -
Maar dat soort beperkende dingen die ingrijpen in hoe mensen rijden. Dat wil de auto industrie niet. Euh, we kunnen bijvoorbeeld heel makkelijk in auto's inbouwen dat ze simpelweg niet harder kunnen dan de limiet. Er zijn voldoende proeven mee gedaan. En natuurlijk zit er snelheidsaanpassing aan. Dat wil de auto industrie niet.	SF7 -	SF7 -	SF1 -
De inzet op nul verkeersdoden en dat het jarenlang daalde, dat waren we heel blij mee. Maar nu stijgt het weer. Nou, dat is echt heel vervelend. En dan wordt er echt op ingezet. Ook vanuit zo'n ministerie van hoe kunnen we dat omlaag brengen.	SF4a +	SF4a +	SF4A +
Wij maken kennis producten die kunnen helpen bij het opstellen en uitvoeren. Dus zeg maar generieke factsheets, stappenplannen en overzichten van methodieken. Dus we geven wel allerlei handreiking, maar die zijn gewoon allemaal generiek, toepasbaar en generiek.	SF3 +	SF3 +	SF3 +
Ik weet dat de Fietsersbond bijvoorbeeld en de ANWB volgens mij ook. Die zorgen dat de verkeersveiligheid ook echt op de agenda blijft, want als dat niet gebeurt. Dan heb je gewoon weer een maatschappelijk probleem.	SF7 +	SF7 +	SF7 +

Eigenlijk was dit de eerste minister die zei ik vind verkeersveiligheid vind ik echt een speerpunt.	SF4a +	SF4a +	SF4A +
middelen vanuit de Europese Commissie die ook tenders uitschrijven voor bepaalde onderzoeken waar wij dan ook aan meedoen. Zo sprockel je gewoon geld bij elkaar	SF6 +	SF6 +	SF6 +
Ja, en bijvoorbeeld ook het zorgen voor een goede kaart met alle maximumsnelheden in Nederland. Klopt, dat hebben we ook nog steeds niet voor elkaar en daar is ISA (Intelligente snelheidsaanpassing) natuurlijk wel op gebaseerd.	SF5 -	SF5 -	SF1 -
Maar of het echt wordt gezien als probleem en dit is wel echt een ding waar we echt mee aan de slag moeten. Nee, dat denk ik niet. Ik denk dat er momenteel ook andere problemen zijn, zoals dat hele Corona gebeuren, maar dat veel meer prioriteit oppakt dan het SPV of verkeersveiligheid	SF4a -	SF4a -	SF4A -
Maar ja, de echte concrete vertaalslag [naar maatregelen] is ook onduidelijk. En daarom ook misschien dat mensen het een beetje links laten liggen van joh. Wat moeten we er precies mee?	SF4b -	SF4b -	SF4B -
Rond om data bijvoorbeeld is er op dit moment best wel veel in beweging nieuwe technieken. Floating car data bijvoorbeeld. Nieuwe voorspelt model ontwikkeling.	SF1 +	SF1 +	SF1 +
Vaak weet ik en dat is niet bewust, maar dat dat wel eens vergeten wordt. Ja, wat is nou uberhaupt het effect? Hebben we van tevoren al nagedacht over dat effect meten? Hoe we die gaan doen wanneer we die doen?	SF4C -	SF4C -	SF4C -
We krijgen subsidie van IenW, dus die gelden zijn er wel gewoon elk jaar weer. Mits je met een goed plan komt natuurlijk, want anders krijg je ook niet. Maar goed, dat helpt ons al weg	SF6 +	SF6 +	SF6 +
Fijn als een minister zelf denkt laat ik eens gaan scoren met verkeersveiligheid. Dan heb je opeens een gemeente waarbij veiligheid opeens hoog op de agenda staat.	SF4A +	SF4A +	SF4A +
En dat hebben we ook met het ministerie besproken omdat we ook zeiden van ja, we steunen helemaal het doel. Maar we merken gewoon heel erg, knelpunten vooral bij de capaciteit in de gemeentes ligt.	SF6 -	SF6 -	SF6 -
Dus ik investeer in het collectief en dan krijg ik een heleboel free riders. Die gaan op mijn investering mee profiteren.	SF5 -	SF5 -	SF5 -

Omdat ik zie dat ze best wel wat organisaties daar door het Strategisch plan verkeersveiligheid (SPV) bezig zijn met hun data. Euh uhm. Data analyse modellen. Euh ja, door het SPV hebben wij ook een hele nieuwe tool ontwikkeld.	SF1 +	SF1 +	SF5 +
Allemaal partijen die hebben meegedaan om dat plan te maken. Ja, dan zou je op z'n minst natuurlijke relevante onderzoeken mee kunnen delen. En dan kun je zelf bepalen wil dat wel of niet meenemen. Ik vind dat dat niet gebeurt, niet actief en het is wel een gemiste kans.	SF3 -	SF3 -	SF3 -
Een voorbeeldje daarvan is dat we samen met het ministerie allerlei proeftuinen hebben voor een vernieuwd rijexamen voor de toekomst.	SF1 +	SF1 +	SF1 +
En nu is het zo dat eigenlijk, je krijgt een nieuwsbrief, maar eigenlijk is de communicatie over hoe het nu verder gaat met het SPV. Ik vind dat echt te weinig.	SF3 -	SF3 -	SF3 -
De laatste stap in de cirkel: het evalueren en verbeteren. Die wordt echt vaak overgeslagen. heb ik het idee	SF4c -	SF4c -	SF4C -
En daarnaast zijn we ook namens de gemeente met andere partijen aan het bespreken hoe zo'n subsidie er uitkomt te zien, wat de voorwaarden zijn en wat de eisen zijn.	SF6 +	SF6 +	SF6 +
Aandacht voor verkeersveiligheid, dat erkent iedereen. uhm. Maar hoe dat dan om te zetten in één actie dan? Dan is er een hoop nog mogelijk.	SF4a -	SF4a -	SF4a -
Ja ja, sowieso. Het hele verkeer en vervoer is best wel traditioneel en vernieuwen dat moet toch allemaal volgens de boekjes gaan. Zeg maar als het om infra maatregelen gaat.	SF5 -	SF5 -	SF5 -
We zouden een fietshelm kunnen verplichten, maar dat doen we niet omdat ook het aantal mensen zegt van joh dan gaan er minder mensen fietsen en dat nodigt niet uit om te gaan fietsen. En dat is niet comfortable. Dat soort zaken dus je merkt vindt om heel belangrijk maar hele lastige maatregelen, die worden soms niet genomen	SF7 -	SF7 -	SF7 -
Het beleid wat je voert beter te onderbouwen en dat is eigenlijk wat je doet met die risicogestuurde aanpak. Dat je gaat kijken van nou doe ik wel de goede dingen op de goede plekken.	SF4c +	SF4b +	SF4c +
En de pest aan dit verhaal is dat. De businesscase zit hem in dat het kosten zijn voor voor de overheid van ons allemaal, terwijl de opbrengsten heel diffuus zijn op allerlei op allerlei plekken. Dus niet goed, niet goed.	SF5 -	SF5 -	SF5 -

```
Run MATRIX procedure:

Krippendorff's Alpha Reliability Estimate


             Alpha     LL95%CI     UL95%CI       Units    Observrs       Pairs
Nominal      ,8475       ,7586       ,9238    30,0000      3,0000    90,0000

Probability (q) of failure to achieve an alpha of at least alphamin:
   alphamin          q
      ,9000      ,9278
      ,8000      ,1342
      ,7000      ,0006
      ,6700      ,0001
      ,6000      ,0000
      ,5000      ,0000

Number of bootstrap samples:
  10000

Judges used in these computations:
 Rs1      Rs2      Rs3
```