

**Reducing lifestyle and living environment related burden of disease  
in the Netherlands:  
a Mission-Oriented Innovation Systems Approach**

Master Thesis Innovation Sciences

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## **Abstract**

This thesis presents the second case study using Mission-oriented Innovation Systems (MIS) theory. A mission in the health domain was chosen to add to the knowledge about dimensions that can influence mission dynamics, with a specific focus on differences in dynamics between social and technological solutions. The studied mission is called Mission I, and a part of the mission programme of the Dutch government: *"In 2040, the burden of disease as a result of an unhealthy lifestyle and unhealthy living environment is decreased by 30%."* (Health Holland, 2019a).

By following the five analytical steps of the MIS framework (problem-solution diagnosis, structural analysis, system functions (or key innovation activities) analysis, systemic barriers analysis, and analysis of governance actions), the following research question was answered: *to what extent are the systemic barriers present in the Mission-oriented Innovation System around Health Mission I adequately targeted by governance actions?* For this purpose, a qualitative single case study approach was chosen, including 25 interviews with a broad variety of expert stakeholders and a desktop study of policy documents, scientific publications and websites.

Based on the data analysis, three main barriers were identified to have a relatively large influence on the strengths and weaknesses of the system functions: the lack of a short term business case for the individual organisation for most prevention solutions, the bias within the MIS to mainly support research, (technological) development and innovation, and the fragmentation of domains and regions of the MIS. When reflecting on the extent to which the governance actions were targeting these barriers it was concluded that some governance actions were addressing the barriers, but these attempts were mostly restricted because they were bounded by a narrow definition of innovation focused on technological entrepreneurship. To better support societal embeddedness of innovations and thus mission I with governance actions, it is crucial to better support (regional) initiatives from all stakeholders of the quadruple helix that are involved in demand driven innovation.

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## 1. Introduction

Human societies are dealing with grand challenges like promoting global health and dealing with the consequences of climate change. These grand challenges have arisen in a globalising world in which science and technology have improved many aspects of human life, but have also made its facets more intertwined and complicated. With the realisation of this increased complexity, a shift is happening from seeing the future as controllable through planning practises to a rediscovery of its open-endedness (Wenzel et al., 2020). This has its consequences for thinking about innovation policy as well.

Two separate branches of scholars are arguing that in order to deal with grand challenges a third frame or generation of innovation policy is necessary. Transformative innovation policy (TIP) (Schot & Steinmueller, 2018; Steward, 2012) departs from the sustainable transitions literature, whereas mission-oriented innovation policy (MIP) (Mazzucato, 2018) departs from mainstream economic literature. Although historically separate, according to Haddad and colleagues (2019), TIP and MIP have found common ground in a) their notion of the wickedness of societal problems, b) the need for departure from old innovation paradigms, c) the importance of directional governance, d) and the need for social change in addition to technological change. In comparison however, MIP is clearer in its emphasises of directionality. Here, it can emerge through measurable goals, whereas in TIP it is unclear which mechanisms stimulate its emergence (Haddad et al., 2019).

As the need to tackle grand challenges through policy has become more pressing, MIP and its emphasis on directionality have been gaining an increasing amount of attention from policy makers. However, so far its implementation is limited (Janssen et al., 2020). One early example on a supranational scale is the European Union's 'Horizon Europe', which launches in 2021 and contains five missions focused on grand challenges with an end date in 2030 (European Commission, 2019a). On a national scale, the Netherlands have launched 'Missies voor de Toekomst' in 2019, containing twenty-five such missions with an end date somewhere between 2030 and 2050 (Ministry of Economic Affairs and Climate Policy, 2019a). Because implementation of MIP is limited, many important empirical questions about the approach remain unanswered (Janssen et al., 2020). For example, it is yet unclear how policy makers can avoid simply presenting old policy practises under this new mission-oriented label (Goetheer et al., 2018). In addition, there is little consensus on how mission implementation can lead to mission impacts (Janssen et al., 2020).

One recently developed method to study the implementation of MIP is Mission-oriented Innovation Systems (MIS) (Hekkert et al., 2020; Wesseling & Meijerhof, 2021). Interestingly, this approach is based on Innovation Systems literature which is a part of transformative policy literature instead of the MIP literature (Haddad et al., 2019). MIS, which has so far been applied to one case study, was based on the structural-functional Technological Innovation Systems (TIS) analysis. Hekkert et al. (2020, p. 77) have defined MIS 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."* It is a method with concrete steps to study the system dynamics of a mission (Wesseling & Meijerhof, 2021), that contains a problem-solution diagnosis, a structural analysis, a system functions (or key innovation activities) analysis, a systemic barriers analysis, and an analysis of governance actions. According to Wesseling and Meijerhof (2021), MIS can be applied ex-ante, ex-

durante and ex-post, making it a useful framework to study the implementation and/or impact of missions at different stages, which consequently allows for a longitudinal approach. In addition, the framework can in the future be used to compare case studies along their different mission dimensions (Wittmann et al., 2020). Missions can for example have underlying problems and/or solutions that differ in terms of complexity, uncertainty and contestation (Wanzenböck et al., 2020), or the proportions and relationships between technological and social solutions can be different (Mazzucato, 2018; Janssen et al., 2020). Researching such cases can shed light on the effect of mission dimensions on system dynamics.

To add to the knowledge about dimensions that can influence mission dynamics, and specifically the differences in dynamics between social and technological solutions, this study has analysed a case study in the health domain. There are two important factors that make health missions relatively complex, uncertain and contested (wicked) (Wanzenböck et al., 2020). Firstly, the health sector involves a broad array of actors and sectors (Sachs et al., 2019) that are often scattered in nature (Sagner et al., 2016). It includes many other groups than just medical professionals, like social scientists, ethicists and financial institutions (Walt & Gilson, 1994). Secondly and not unrelated, human health is at its core heavily influenced by individual behaviour, culture and local context (Walt & Gilson, 1994). This latter point leads to the expectation that health missions might have a relatively large social and behavioural component besides a technological one. Within the previously mentioned Dutch mission programme 'Missies voor de Toekomst', five out of twenty-five missions are focused on health and care. In this study the following mission (called Mission I) is central: *"In 2040, the burden of disease as a result of an unhealthy lifestyle and unhealthy living environment is decreased by 30%."* (Health Holland, 2019a). As this mission was launched in 2019 (Ministry of Economic Affairs and Climate Policy, 2019a), this research can be considered early-phase ex-durante. This means that for this case, MIS can be used in order to evaluate policy in an early phase of its execution. Specifically, it can be evaluated whether the systemic barriers are being adequately targeted by the current governance actions. In order to learn new empirical lessons about applying MIS ex-durante, as well as capture the dynamics of both the technological and the social solutions associated with this mission, the following research question is formulated:

*To what extent are the systemic barriers present in the Mission-oriented Innovation System around Health Mission I adequately targeted by governance actions?*

According to MIS' analytical steps, several sub-questions are formulated based on Wesseling and Meijerhof (2021):

Problems and solutions diagnosis:

1. How do different societal problems and 'wants' relate to the mission?
2. What technological and social solutions can potentially contribute to the mission?

Structural analysis:

3. What actors, networks, institutions and materiality are involved in the mission formulation and the mission implementation and how are they configured?
4. How does the MIS align with existing (formal and informal) institutional structures?
5. How has the structure of the system changed since the beginning of its mission formulation?
6. What are the rationales behind governance actions?

System functions analysis:

7. What are the weak and strong system functions of the overall system and of social and technological solutions respectively?

Systemic problems analysis:

8. What are the barriers to the development and diffusion of the mission?
9. What are the differences in barriers to the development and diffusion of technological and social solutions?

Governance action analysis

10. How are the systemic barriers currently being targeted by the governance actions?

With the above mentioned research question, this research adds to the existing literature of both MIP and MIS, as it is one of the first case studies, and the first focused on the health sector, applying the MIS framework. Additionally, it takes the first steps towards comparing the system dynamics involved in social and technological solutions, and the dynamics of mission implementation, both aspects that are currently overlooked in the MIS literature (Hekkert et al., 2020; Janssen et al., 2020; Wesseling & Meijerhof, 2021). As will be explained in the theory section of this thesis, some additions to the MIS framework are made to capture these dynamics. For policy makers, MIS offers a method to analyse and improve their mission formulation and implementation, making the improvements to this framework suggested in this research relevant for them. For policy makers in the health sector, and for those involved in Mission I especially, the systemic barriers and the suggestions to solve them that are identified in the case study, will be particularly useful.

This thesis will contain the following sections: a theory section elaborating on the MIS framework and its theoretical context, a methodology section to describe how the research questions will be researched and answered, and a planning section to give an overview of planned research activities during the time frame of the thesis.

## **2. Theoretical Framework**

In section 2.1 the origins of innovation systems (IS) theory will be described, after which it will be explained in section 2.2 how MIS differs from other IS approaches. Then some attention will be given to the differences between social and technological innovation in section 2.3. Finally, the structural-functional MIS framework will be explained in detail in section 2.4-2.8.

### **2.1 Innovation Systems**

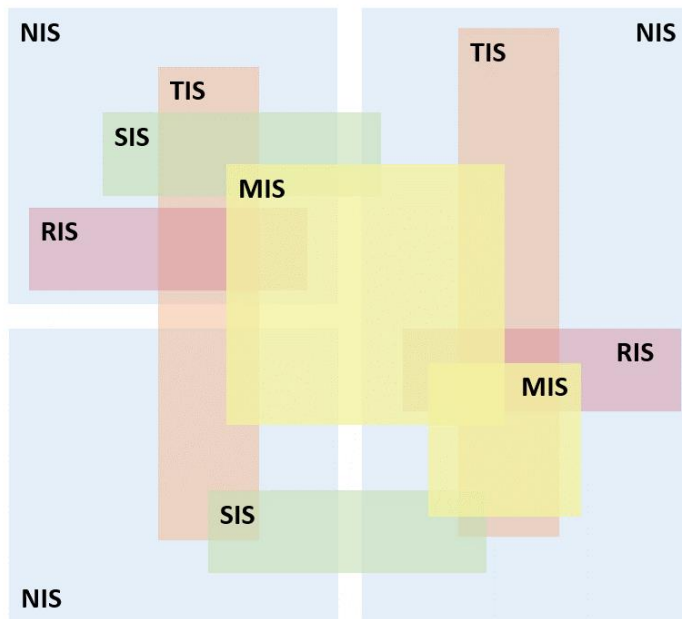
The MIS approach finds its origins in a wider theoretical school called the Innovation Systems (IS) approach (Hekkert et al., 2020), an approach often used to support innovation policies (Suurs, 2009). Central to this approach is the idea that social structures (institutions) in which firms, knowledge institutes, and public institutions (actors) are embedded, influence technological change and consequently economic growth (Freeman, 1995; Lundvall, 1992). A good system performance is dependent on the dynamics of both enabling institutions and multiple actors within the system exchanging knowledge and engaging in learning. (Suurs, 2009).

Within the IS school of thought, multiple approaches have been suggested, differing in scope (for example geographically or sectorally) but often in part overlapping (see figure 1). Lundvall (1992) was the first to write about National Innovation Systems (NIS), which can be considered the oldest approach (Suurs, 2009). It has the clear geographical scope of the nation. Other approaches are Regional Innovation Systems (RIS) (Cooke et al., 1997), Sectoral Innovation Systems (SIS) (Breschi & Malberba, 1997), and Technological Innovation Systems (TIS) (Carlsson & Stankiewicz, 1991; Hekkert et al., 2007). It is this latter approach that has played a large role in the formulation of the Mission-oriented Innovation Systems (MIS) approach (Wesseling & Meijerhof, 2021).

The TIS approach focuses on the processes and social structures that determine the developmental course of an emerging technology (Hekkert et al., 2007). This makes its scope one that is focused on a technology that can theoretically develop across nations, regions and sectors. One common way of studying TIS is the structural-functional approach as described by Hekkert et al. (2007). Here, 'key innovation activities' called 'system functions' identify which aspects in the performance of the TIS are weak, and what systemic barriers are causing the weakness. Another important feature of this approach is that system functions are expected to reinforce each other over time, either in a vicious or in a virtuous cycle. These cycles have been called motors of innovation (Suurs, 2009). Because the structural-functional approach helps with understanding system weaknesses and motors of innovation, it is insightful not just for scientists but also for policy makers. In MIS, the structural-functional approach of TIS is adapted to fit with the differences in scope between the two approaches (Wesseling & Meijerhof, 2021). In the next section it will be explained what makes MIS different from other IS approaches, after which the specifics of the structural-functional approach as applying to MIS will be explained.

**Figure 1**

*How MIS is related to other innovation systems, adapted from Wesseling and Meijerhof (2021)*



## **2.2 Mission-oriented Innovation Systems**

As described in the introduction of this thesis, Hekkert et al. (2020) have defined MIS 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."* According to Wesseling & Meijerhof (2021) there are several characteristics of missions that make MIS different from other IS approaches. Firstly, the scope of the system depends on the mission in question. Often, missions build on or are embedded in problems and solutions that have been framed within the context of other innovation systems (either regional, sectoral, national and/or technological) (Frenken, 2017). Secondly, instead of only focusing on innovative solutions, MIS also requires a focus on the problems underlying the mission as both the mission's problems and its solutions tend to be wicked: contested, complex and uncertain (Wanzenböck et al., 2020). Consequently, MIS is not just about implementing the 'new', but also about phasing out the 'old'. Thirdly, contrary to other IS approaches, a MIS is temporal in nature because missions have a clear end date (Mazzucato, 2018). A MIS emerges when a mission is formulated, and ends when the mission is reached. Lastly, MIS has the directionality of the mission statement to guide innovation (Mazzucato, 2018), whereas the direction of innovation is less clear in other IS approaches.

The structural-functional approach to MIS as described by Wesseling and Meijerhof (2021) has several steps (a problem-solution diagnosis, structural analysis, system functions analysis, systemic barriers analysis and an analysis of governance actions), which will be explained in detail in the sections below. Some additions to the approach will be made to ensure a better focus on possible differences in dynamics between social and technological solutions. For this purpose, the definitions of both social and technological innovation have to be specified first.



### **2.3 Social and Technological Innovation**

The OECD (2013) has defined technological innovation as: *“innovation that comprise new products and processes and significant technological changes of products and processes.”* . Hekkert et al. (2007) have made this definition more specific within the context of innovation systems literature: *“innovation that can be defined as the successful combination of hardware, software, and orgware, where orgware refers to the various components of the innovation system.”*.

In comparison to technological innovation, theory behind social innovation has remained underdeveloped and its definition a source of debate (Cajaiba-Santana, 2014; Mulgan et al., 2007; Pel et al., 2020; Terstriep & Rehfeld, 2020). This even though many scholars agree that social innovation can improve societies' capacities to solve their problems and is crucially important for economic growth (Pel et al., 2020; Pol & Ville, 2009). Consequently, different interpretations about the difference between social and technological innovation exist. For example, Terstriep and Rehfeld (2020) describes social innovation as: *“novel combinations of ideas and distinct forms of collaboration that transcend established institutional contexts with the effect of empowering and (re)engaging vulnerable groups either in the process of social innovation or as a result of it.”* (p1). In contrast, Pel et al. (2020) criticise understandings of social innovation that imply that 'social' refers to desirable purposes and that have a pro-innovation bias, for they consequently neglect the normative aspects of striving for social change and the unintended consequences of social change. Pel et al. (2020) define social innovation in a descriptive instead of a normative manner as: *“new ways of doing (practices, technologies, material commitments), framing (meaning, visions, imaginaries, discursive commitments) and knowing (cognitive resources, competence, learning, appraisal).”* (p.3). What both definitions have in common is the process of changing social relations. Based on this, social innovation can have a technological component and still be considered social. The difference between technological innovation and social innovation can thus be found in the emphasis on either technological change or on changing social relations. This means that the two concepts should not be seen as binary categories, but instead as the two extremes of a continuum.

Seeing technological and social innovation as part of a continuum is particularly useful in the context of societal missions, as in the context of such a mission it is desirable that all innovations have a social impact and thus change social relations. Furthermore, given the directionality of missions, the desirability of social impact has a clear normative character.

### **2.4 Problem-solution Diagnosis**

During this first step of MIS's structural-functional approach it is researched how different societal problems and 'wants' are included and prioritised, and what solutions directions are relevant to reaching the mission (Wesseling & Meijerhof, 2021).

#### **2.4.1 Problems and 'Wants'**

According to Wesseling and Meijerhof (2021), the problems and 'wants' of a mission are determined not only by the societal problems or wants that are focused on in the mission statement, but also by other related societal wants that are deemed important by the stakeholders executing the mission. In this

analytical step it is described what problems and wants are a part of the MIS, and how they relate to each other.

#### *2.4.2 Solutions*

According to Wesseling and Meijerhof (2021), the problems and 'wants' of a mission affect what solutions are relevant to deal with these problems and 'wants'.

Wesseling & Meijerhof (2021) offer several examples of diagnostic questions that can be used in this step of the MIS. Interestingly, their suggestions seem mostly focused on analysing technological solutions. For example, to look at the extent to which solutions are ready to be implemented on a large scale, they suggest to use Technology-Readiness Level (TRL), which is used to judge the maturity of technologies (NASA, 2017), even though this measurement system cannot be applied to social innovations. No alternative for social innovations is given. In addition, even for technological solutions, focussing only on technological readiness might not be sufficient in the context of societal missions as there are more dimensions to be considered when trying to embed a new innovation into society. Technological readiness could be considered a precondition for successful large scale implementation, but not a sole condition (TNO, 2019)<sup>1</sup>. There currently is no well developed readiness level tool able to take other dimensions into account as well, therefore none can be used in this thesis. In the future, this could become an important part of further developing MIS theory to truly include social innovation, as using a readiness level tool gives the advantage of being able to compare different solutions. Another technology-focused diagnostic question offered by Wesseling & Meijerhof (2021) is about how identified solutions interact. Here, they suggest using the theory of Sandén and Hillman (2011) covering six modes of interaction that can exist between different technologies. This theory would need to be altered to apply to social innovations too.

In order to be able to incorporate social innovation into this step of the analysis, this thesis will view technological and social solutions on a continuum, in line with the argumentation of section 2.3. In addition, an explorative approach will be taken to identify other dimensions on which solutions can differ based on the data. The goal of this is to be able to inform later steps of the analysis.

### **2.5 Structural Analysis**

According to Wesseling and Meijerhof (2021) the second step of the MIS analysis is focused on the structural components of the system: actors, institutions, networks and materiality. Here, a distinction is made between the mission arena and the overall MIS. The mission arena is a part of the overall MIS, and comprises actors engaged in four tasks: 1) setting up the mission arena, 2) mission formulation, 3) mobilisation of MIS components via mission governance actions, and 4) continued, reflexive mission governance. In table 1, the specifics of these four tasks are explained. This relatively small group has a substantive influence on building and maintaining the overall MIS, but the success of the MIS is

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<sup>1</sup> According to the readiness level (RL) tool analysis by TNO (2019), three other important dimensions are: societal readiness (the extent to which stakeholders have adapted to the innovation) (e.g.: Innovation Fund Denmark, n.d.), regulation readiness (the extent to which an innovation is supported by political regulation) (e.g.: Kobos et al., 2018), and market readiness (the extent to which an innovation is ready to be commercialized) (e.g.: Cloudwatchhub, n.d.).

dependent on the entire system.

As mentioned in the introduction, the overall MIS can be defined 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."* (Hekkert et al., 2020, p. 77). Here, a distinction can be made between agents that are explicitly striving to complete a societal mission because they are influenced by the mission arena to do so, and agents that are implicitly contributing to the societal mission because they have aligning goals but are not (yet) aware of the mission itself. It is this latter group that distinguishes the structure of a MIS from many of the structures studied in other IS approaches. In many other IS approaches, especially in TIS, there is mostly a focus on government, industry and academia (triple helix), whereas the societal focus of MIS often requires the study of civil society (quadruple helix) too because societal challenges impacts the entire breadth of society (Wanzenböck & Frenken, 2020; Wesseling & Meijerhof, 2021). Consequently, the broader the scope of the mission, the bigger and more complicated the system structure, creating a situation where not all contributors to the mission are aware of their contribution, and where the mission arena will most likely have to undertake more action in order to mobilise MIS components to become explicit contributors to the mission that can be influenced by the directionality of the mission.

Overall, within the structural analysis the scope of the system and the relationships between its actors can be described, both in relation to mission formulation and to mission implementation. Furthermore, the institutional context can be described, including both formal institutions and informal ones like the rationales behind governance actions. In later steps of the analysis it can be determined how the structure of the system affects the system dynamics.

**Table 1**

*Description of mission arena tasks, adapted from Wesseling and Meijerhof (2021)*

<b>Mission arena task</b>	<b>Description</b>
Setting up the mission arena	Deciding on the mission governance structure. There are many different strategies to this. Currently, the understanding of the effects that different strategies have on the functioning of the MIS is lacking. For example, the extent to which regime players should be included in the mission arena is still under debate, as they can be either a strong contributor to societal transition or a protector of their own interests within the current regime.
Mission formulation	Translating societal problems and wants into an ambitious and actionable mission that can provide direction to the overall MIS.
Mobilisation of MIS components via mission governance actions	Creating an overall mission agenda that includes both a pathway towards reaching the mission and governance actions that enable and incentivise the overall MIS via the directionality they give.

Continued, reflexive mission governance

Monitoring and evaluating the taken pathways towards reaching the mission and redirecting the MIS when necessary.

## 2.6 System Functions Analysis

In this step, the focus is on system functions or 'key innovation activities' that result from structural system components and are crucial to the successful development of a MIS. Wesseling and Meijerhof (2021) have adapted seven system functions of a MIS based on the system functions that are a part of TIS's structural-functional analysis. In table 2 these functions are laid out. When using the system functions in practice, diagnostic questions can be asked to identify the strength and weaknesses of each system function. In order to better accommodate the differences between social and technological solutions, the system functions could be approached separately for the two. In this step it is also important to focus on the attention that is given within the MIS to phasing out the old. There is no separate system function for this important feature of MIP because it can be considered an essential part of each system function. For example, in SF2: knowledge development, phasing out the old would mean unlearning harmful practises.

**Table 2**

*Description of system functions for MIS analysis, adapted from Wesseling and Meijerhof (2021).*

<b>System function</b>	<b>MIS interpretation</b>
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 behavioural 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.
SF4: Providing directionality A: Problem directionality	The direction provided to stakeholders' societal problem conceptions and the level of priority they give it.
SF4: Providing directionality B: Solution directionality	The direction provided, both by existing system structures and the mission arena, to the search for new and further development of existing technological and social solutions, as well as the coordination efforts needed to identify, select and exploit synergetic sets of solutions to the mission.

SF4: Providing directionality C: Reflexive governance	Reflexive deliberation, 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. Reflexive governance can be initiated by the mission arena or by critical outsiders.
SF5: Market formation and destabilization	Creating niche market 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 a) the problem and b) the development and diffusion of its solutions, at the cost of harmful practices and technologies.

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## 2.7 Systemic Barriers Analysis

Wesseling and Meijerhof (2021) describe that in this fourth step, systemic barriers (i.e. structural components) that are missing or unable to support the system functions are identified, and are analysed by looking for underlying causes that result in system function weaknesses. From this analysis, an abstraction can be made showing interrelated systemic barriers that may result in systemic lock-in.

## 2.8 Analysis of Governance Actions

According to Wesseling and Meijerhof (2021), in an ex-durante context, this last step of MIS's structural functional analysis focuses on the extent to which identified barriers are sufficiently addressed by current governance actions. Policy advice on how to better target the barriers can result from this last analytical step.

### 3. Methodology

#### 3.1 Research Design

To answer the research question, this thesis employs a qualitative single case study approach (Bryman, 2016), focusing on Health Mission I from the Dutch mission programme 'Missies voor de Toekomst'. As mentioned in the introduction, Mission I was formulated as follows:

*"In 2040, the burden of disease as a result of an unhealthy lifestyle and unhealthy living environment is decreased by 30%." (Health Holland, 2019a).*

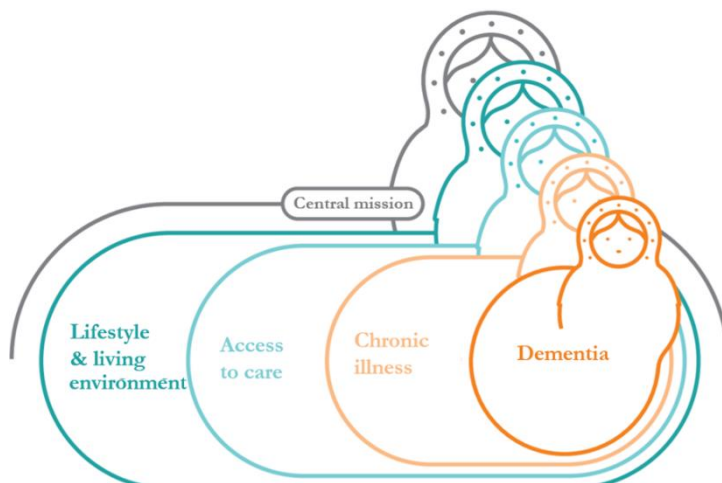
This case was chosen because it is expected to have a relatively large social and behavioural component besides a technological one, allowing a better comparison of the dynamics involved in social and technological solutions.

##### 3.1.1 Case description

The Dutch mission programme 'Missies voor de Toekomst' or 'Mission-oriented Top Sector and Innovation Policy (MTIP) succeeds the national Top Sector based research innovation strategy of 2012. The Dutch government announced that it would use a mission approach in 2018 (Ministry of Economic Affairs and Climate Policy, 2018), and in the fall of 2019 the twenty-five missions focusing on four societal topics were presented (Ministry of Economic Affairs and Climate Policy, 2019b). Five of these missions have a health and care focus, of which the first (not to be confused with Mission I) is an overarching mission. Each of the subsequent four missions, including Mission I, is narrower in focus, and a part of the scope of the previous mission (see figure 2).

**Figure 2**

*How the Dutch Health Mission are related to each other, translated from Health Holland (2019b)*



### 3.1.2 Analytical steps

The case was approached using the research steps explained in the theory section of this thesis. For its operationalisation, see table 3.

**Table 3**

*Operationalisation of analytical steps.*

<b>Analytical step</b>	<b>Concept</b>	<b>Definition</b>
1. Problem-solution diagnosis	Problems	Societal problems and 'wants' relating to the mission.
	Solutions	Solutions with the potential to contribute to the mission.
	Solution dimensions	Dimensions on which solutions can differ.
2. Structural analysis	Mission arena actors	Actors involved in one or more of the four tasks of the mission arena.
	Overall MIS actors, networks and materiality	Actors, networks or materiality contributing explicitly or implicitly to the development and diffusion of innovative solutions that impact the mission.
	Institutional contexts	Institutions that influence the progress and/or direction of the MIS
	Governance action rationales	The rationales behind governance actions planned in pursuit of the mission.
<b>Description</b>		
3. System functions analysis	The system functions as described in the theory section of this thesis (table 2) will be used as operationalisation. A distinction is made between weak and strong aspects of the respective system functions, and underlying causes.	
4. Systemic barriers analysis	Structural components that are missing or unable to support the system functions in relationship to the system functions they influence.	
5. Analysis of governance actions	The relationships between identified systemic barriers and governance actions that may or may not be targeting them.	

### 3.2 Data Collection

Two complementary data sources have been used to ensure triangulation of results: interview transcripts and relevant documents.

#### 3.2.1 Interview data

Using a semi-structured approach to interviewing (see appendix A), 25 interviews were conducted online using Microsoft Teams, with in total 28 expert stakeholders of the studied mission that were approached via a snowball sampling strategy (Bryman, 2016). Each interview lasted between 40-65 minutes, and was transcribed using an audio recording of the interview. Due to the broadness of the studied case, questions sometimes had to be adapted to fit within the context of the interviewee. Reformulation was done in collaboration with the interviewee, to verify mutual understanding. Additionally, due to differences in expertise between interviewees, during each interview some questions were given more emphasis compared to others. Table 4 shows an overview of the type of stakeholders that were interviewed. It should be noted that many stakeholders could fit into multiple categories. The category was chosen based on the main focus during the interview.

**Table 4**

*Type of interviewed stakeholders*

<b>Type of stakeholder</b>	<b>Number of interviewees</b>
National government	4
Local government	2
Top Sector Life Sciences and Health	3
Other Top Sector	1
Knowledge/educational institute	4
Subsidy organisation	3
Civilian cooperation	2
Public-private partnership, subsidised by Top Sector Life Sciences and Health	3
Public-private partnership, not subsidised by a Top Sector	1
Regional development agency	2
Health insurer	2
Architectural firm	1
<b>Total</b>	<b>28</b>

#### 3.2.2 Desktop study data

Relevant documents in the form of policy documents, scientific publications and websites were obtained either via the recommendation of experts or via Google (Scholar). It includes documents from the websites of the Top Sector Life Science and Health, other relevant Top Sectors, the Dutch government and its ministries, the Mission-oriented Innovation Policy Observatory (MIPO) of the Copernicus Institute



for Sustainable Development, knowledge institutes TNO, Rathenau, RIVM and AWTI, and from other stakeholders of the studied mission.

### **3.3 Data Analysis**

Both the transcriptions and the documents from the desktop study have undergone a content analysis (Bryman, 2016). In a first round of coding, the data was broadly categorized according to the operationalisation of the first three analytical steps in table 3, using NVivo 12 pro. In a second round of coding, overarching themes were identified within the coded fragments, as well as connections between categories. This provided some depth to first three analytical steps and formed the base of the latter two analytical steps.

### **3.4 Data Quality**

Several considerations were made in the data collection and data analysis of the study to improve the validity and reliability and of the results. Below, these considerations are described.

During data collection, to improve the internal validity of given answers, interviewees received a document detailing the goal of the interview and the directions of questioning in advance of the interview (see appendix B) and during the interview mutual understanding was often verified. In choosing which interviewees to approach, several measures were taken to improve internal validity too. Firstly, because heterogeneity of point of view was expected due to the broadness of the studied MIS, including a wide variety of stakeholders had priority over having many interviewees of the same type. Secondly, an effort was made to include both stakeholders that are closely related to the mission arena and those that are not, as well as stakeholders that are active on a national scale and those that are active on a regional or local scale (although these are not dichotomous categories).

During data analysis, it was taken into account that a certain amount of personal bias during the coding process was to be expected in this type of qualitative research. A Krippendorff's Alpha (Krippendorff, 2013) was calculated using R to check the reliability of coding. For this purpose, three independent researchers with experience in the field of innovation sciences recoded 30 statements, out of which resulted a Krippendorff's Alpha of .75, which is often interpreted to be an 'acceptable' (>.667) but not 'good' (>.8) reliability (Krippendorff, 2013). A possible explanation for this is that some of the recoded statements had elements of other system functions in them, creating the possibility for an alternative coding depending on personal bias. In appendix C details of the calculation can be found.

## **4. Results**

The results section is structured based on the analytical steps as described in the theory and method sections. Firstly, problems and wants relating to mission I are described, followed by an overview of solution that can contribute to these problems and wants. Secondly, the structural analysis details the actors, networks, institutions and materiality involved in the MIS. Then, the status of the system functions that result from the structural system components are focused upon, followed by an analysis of the structural barriers that influence the system functions. Lastly, the (planned) mission governance actions are contrasted with the identified barriers.

### **4.1 Problem and Solution Diagnosis**

#### *4.1.1 Problems and Wants*

In terms of problems and wants regarding the studied mission, an important distinction can be made between the problems and wants related to the mission-oriented policy in general and those of the health and care missions and mission I specifically. In this section both topics and their interdependencies are described. An overview can be found in figure 3.

Before the creation of the Mission-oriented Top Sector and Innovation Policy, the Dutch Top Sector approach was focused on stimulating public-private collaborations between businesses, government and knowledge institutes (triple helix). Here, the focuses in research, development and innovation themes were decided based on sectoral interests instead of on societal challenges. Important goals were to strengthen the economy through innovation and investments after the economic recess of 2008, and to remain a strong competitor internationally (Top Sectors, n.d.). In a policy document inspired by the work of Mazzucato, published in July 2018, the Ministry of Economic Affairs and Climate Policy explains why this approach would no longer suffice to as a country remain in the top of international rankings of competitiveness and innovation, and introduces its Mission-oriented Top Sector and Innovation Policy. According to this parliamentary document, stimulating future earning capacity is still an important aim of the policy, but now another aim is dealing with societal challenges such as sustainability, health and care, and data security. Here, global challenges are seen as global markets where the Netherlands could become a market leader on certain key technologies that can contribute to dealing with the challenges.

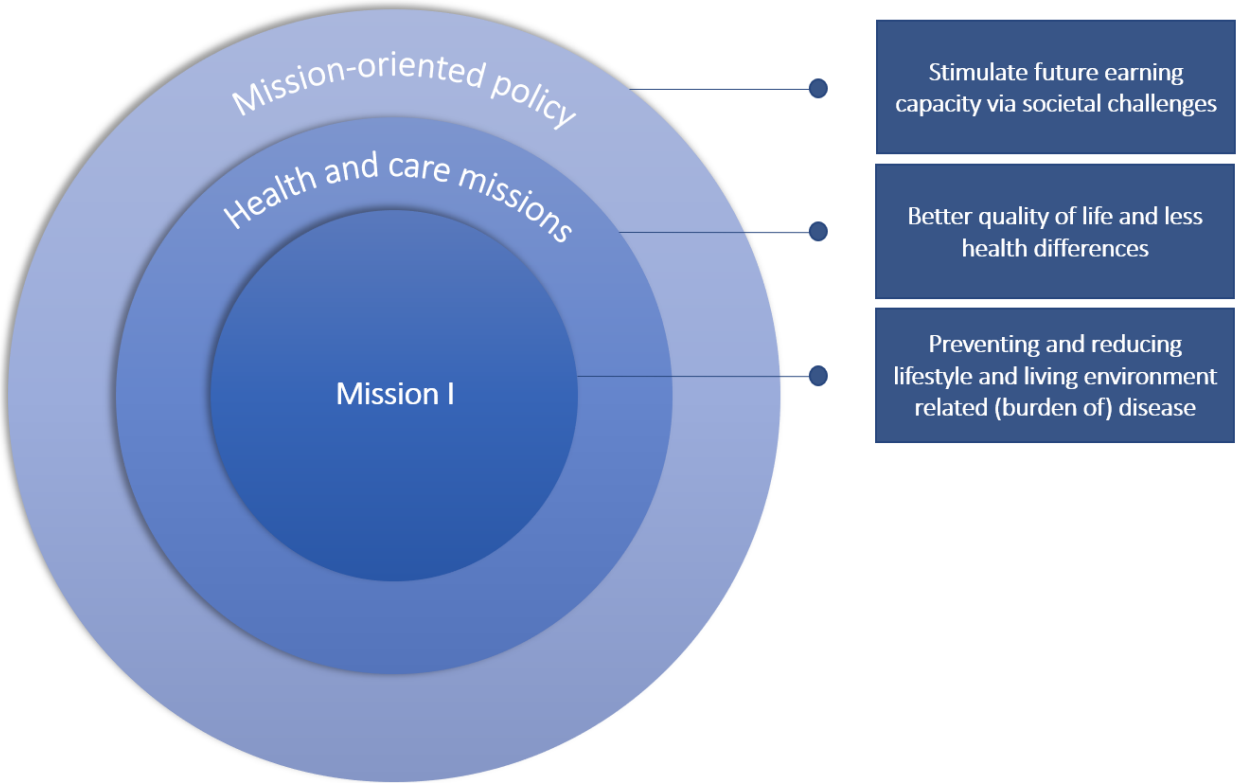
For the theme of health and care, missions, including the one studied in this thesis, were formulated by the Ministry of Health, Welfare and Sport with a focus on health and care challenges that already were a focus of the ministry, and less on innovation and future earning capacity. Several interviewees mention the importance of making the health and care sector more cost-effective and sustainable for future generations. A health and care system that is less inert and more focused on the needs of individuals and communities is needed, but this change should not happen at the expense of the good healthcare of the current system. The problems and wants of the missions were detailed in the Knowledge and Innovation Agenda (Health Holland, 2019b) of the Top Sector Life Sciences and Health, which was created in collaboration with a wide variety of stakeholders of the quadruple helix (now including the civilian as an end user in addition to the triple helix stakeholders). In this document, both the focus of the Ministry of Economic Affairs and Climate Policy on stimulating future earning capacity

by dealing with societal challenges and the focus of the Ministry of Health, Welfare and Sport on good health and care can be found. For all health and care missions improving quality of life of civilians and reducing health differences between socio-economic groups is central. According to the agenda (Health Holland, 2019b) both technological innovation and social innovation are crucial to reach these goals.

Although the previously mentioned problems and wants are also true for the studied mission, for mission I the focus is on prevention of disease and reducing lifestyle and living environment related burden of disease specifically. This can clearly be seen in the formulation of the mission: *"In 2040, the burden of disease as a result of an unhealthy lifestyle and unhealthy living environment is decreased by 30%."* (Health Holland, 2019a). Importantly, in the context of this mission, prevention of disease goes beyond the borders of the health and care sector and is seen by many interviewees as something that can only be achieved largely outside of those borders. According to this view, stimulating good health and preventing disease should be considered in all areas of life, or in other words it should become a part of the very fabric of society.

To summarise, the overall policy of which mission I is a part has an equal focus on stimulating future earning capacity and solving societal challenges, while in the formulation of mission I the societal challenge lifestyle and living environment related burden of disease was the main focus.

**Figure 3**  
*An overview of the problems and wants of mission I*



#### 4.1.2 Solutions

In this section the emphasis is on solutions that can contribute to preventing and reducing lifestyle and living environment (burden of) disease specifically. To understand the scope of solutions, the following terms will be discussed first: burden of disease, prevention, lifestyle, and living environment. Then, examples of solutions will be given to demonstrate the broadness of possible solutions, and finally, differences in focus of solutions that were identified based on interviews are discussed.

##### *Burden of disease*

Firstly, burden of disease is often described in Disability Adjusted Life Years (DALYs): a combination of lost life years due to early mortality and years lived with health issues weighted for severity (RIVM, 2021). In the Netherlands, coronary heart disease, strokes and diabetes mellitus are the top three cause of burden of disease (RIVM, 2018). (However it should not be forgotten that zooming in on differences between age groups or sexes creates a very different picture.<sup>2</sup>) Consequently, solutions that focus on these issues will have a big potential societal impact that can contribute to reaching mission I.

##### *Prevention*

To reduce burden of disease, most researchers distinguish between three types of prevention measures (Jusot & Sirven, 2012):

- primary prevention is focused on reducing the occurrence of disease;
- secondary prevention is about reducing the health consequences of disease;
- tertiary prevention is focused on reducing disabilities linked to chronic diseases.

Although all three types of prevention can play a role in reducing burden of disease, it is primary prevention that is most likely to give the most health at the lowest costs (Kaplan, 2000).

##### *Lifestyle*

In the Netherlands, about 26% of burden of disease is linked to the commonly mentioned lifestyle factors: smoking, poor diet, low physical activity and alcohol use, with smoking and dietary factors being the biggest contributors (European Commission, 2019b). Although not as routinely measured in the context of burden of disease, quantity and quality of sleep, sexual behaviour, substance abuse (besides nicotine and alcohol), application of modern technologies, recreation, and study are also important lifestyle factors that can influence burden of disease either positively or negatively (Farhud, 2015). Although many prevention solutions are focused directly on these predictors of burden of disease, research has shown that it is relevant to additionally focus on the social determinants of health that are often linked to these predictors, including: stress, early life events, social exclusion, social support, work, unemployment, addiction, language skills and health knowledge (Marmot, 2005). Social determinants often correlate with a person's socio-economic status, leading to large health difference between socio-economic groups (RIVM, 2018). Targeting solutions to the needs of specific socio-economic groups is

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<sup>2</sup> For more information about causes of burden of disease in the Netherlands, see: <https://www.volksgezondheidenzorg.info/ranglijst/ranglijst-aandoeningen-op-basis-van-ziektelast-dalys>

thus most likely to significantly reduce the burden of disease in the population average, and includes targeting social determinants of health besides lifestyle factors.

### *Living environment*

The concept of living environment in the context of health includes natural, built (or man-made), and digital elements. The concept cannot be seen as separate from lifestyle, as living environment influences both lifestyle behaviours and social determinants of health (Stål et al., 2001). For example, the living environments of lower socio-economic groups are often less healthy by comparison (Marmot, 2005).

For the natural environment, the RIVM (2005) has determined that 2-5% of Dutch burden of disease can be attributed to exposure to pollution, noise, radon, natural UV and dampness in houses. When taking into account the uncertain long-term effects of particulate matter exposure, this increases to about 13%. In addition, research has shown that exposure to so-called ‘green space’ is an important predictor of health, and one that reduces health inequality (Mitchell & Popham, 2008).

The concept of built environment includes both larger scale city or neighbourhood layouts, and smaller scale building layouts. A healthy community is described as: “one that continuously creates and improves both its physical and social environments, helping people to support one another in aspects of daily life and to develop to their fullest potential.” (Renald, Smith & Hale, 2010). For example, research has found that walkability within cities, neighbourhoods and buildings is an important determinant of both physical, mental and social health (Feenstra, 2020; Renald, Smith & Hale, 2010).

As human life has a growing digital component, influences of digital environment on health have become more important. For example, there is evidence that daily digital technology use is associated with poor mental health symptoms, although there is an ongoing debate about cause and effect here (Odgers & Jensen, 2020). Of course, the digital environment can also be a source of solutions promoting good health and improving care (Murray et al., 2016).

In table 5, examples of solutions fitting with the themes lifestyle and living environment are described. This list of examples is by no means exhaustive but does give an insight into the broadness of possible solutions.

**Table 5**

*Type of interviewed stakeholders*

	<b>Lifestyle factors</b>	<b>Social determinants of health</b>	<b>Natural environment</b>	<b>Built environment</b>	<b>Digital environment</b>
National vaccination programme (RIVM, n.d.)	X				
Combined lifestyle intervention (Gecombineerde Leefstijl Interventie; GLI) (Zorginstituut Nederland, n.d.)	X				

Reactivating hospital (a hospital environment that stimulates movement of patients) (Feenstra, 2021)	X			X	
Gamified depression screening tool (Sardi, Idri & Fernández-Alemán, 2017)	X				X
Sugar tax (Djojosoeparto, et al., 2020).	X	X			
Dementia friendly neighbourhoods (Hung et al., 2021).		X		X	
Seev (app to prevent further payment delays and debt of youths) (Monnie Movement, n.d.)		X			X
ICT system that facilitates worker autonomy (Gerten, Beckmann & Belimann, 2019)		X			X
Air quality practices (Van Rij & Altes, 2014).		X	X		
Green in cities (Mitchell & Popham, 2008)			X		
Social meeting spaces in neighbourhoods (Mohnen et al., 2011)		X		X	
Walker friendly cities (Renald, Smith & Hale, 2010)	X			X	
Less intensive livestock farming (to reduce pathogen spillover) (Smit & Heederik, 2017)				X	
Algorithm to prevent online bullying (Nandhini, Sri & Sheeba, 2015)		X			X
Austerlitz Zorgt (civilian cooperation supporting the elderly to continue living at home) (Austerlitz Zorgt, n.d.)					

Within the abovementioned categories, several differences in focus can be found. Firstly, as expected, a difference in focus on either technological development or on changing social relations. In some cases, such as a national vaccination programme, technological development is a key aspect of innovative action, whereas in solutions like the reactivating hospital concept the use of technology is mostly a means to reach an end. Here, the real innovativeness lies in the use of social design practices to create a new hospital concept (Feenstra, 2021). Other solutions fall more towards the middle of the continuum. For example, Seev (Monnie Movement, n.d.), an app to prevent further payment delays and debts of youths is innovative both in its use of technology to change payment systems and in its attempt to change the negative mentality and treatment that society has towards debtors (which often exacerbates the issue).

Based on interviews, other difference in focus can be identified:

- impact on the collective (structure of society) or on the individual (personalized intervention);
- impact on civilians in general or on specific groups (such as a patient group or a socio-economic group);
- developed by an organisation (or multiple) or developed by a community/citizen;
- selling/spreading to consumers, citizens, businesses or public services, on a national or local scale.

To illustrate, table 6 shows how some of the previously mentioned solution examples fit into these categories.

**Table 6***Differences of focus of solutions, applied to examples*

	Vaccination programme	GLI	Reactivating hospital	Gamified depression screening tool	Sugar tax	Austerlitz Zorgt	Seev	Less intensive livestock farm	Anti-bullying algorithm
Impact on collective	X		X		X			X	X
Impact on individual		X		X		X	X		
Impact on civilian	X				X			X	X
Impact on specific group		X	X	X		X	X		
Developed by citizen/community						X			
Developed by organisation	X	X	X	X	X		X	X	X
Aimed at consumers/citizens					X	X	X		X
Aimed at businesses					X	X	X	X	
Aimed at public services	X	X	X	X		X			
Aimed at national scale	X	X		X	X		X	X	X
Aimed at local scale			X			X			



## 4.2 Structural Analysis

In this section, the respective roles of mission arena members is explained first, followed by the overall MIS and its connections to the mission arena, the most relevant formal institutional contexts of the MIS, and finally the rationales of governance actions of the MIS.

### 4.2.1 Mission Arena

For the studied mission, there are three main organisations involved in setting up the mission arena, formulating the mission, mobilisation of other MIS components via mission governance actions, and the continued, reflexive governance. An overview of mission arena tasks can be found in table 7, and a summary of the relationships between actors in the mission arena in relationship to mission arenas of other mission themes of the Mission-oriented Top Sector and Innovation Policy in figure 4.

#### *Ministry of Economic Affairs and Climate Policy*

Firstly, the Ministry of Economic Affairs and Climate Policy was the initiator of the Mission-oriented Innovation and Top Sector Policy in the Netherlands, of which the studied mission is a component, and has created the foundation of what the policy should entail (Ministry of Economic Affairs and Climate Policy, 2018; 2019b). The ministry and thus its policy has a strong focus on innovation, research and (technological) development. Currently, the ministry is responsible for overseeing the policy, meaning for example that they are hosting a quarterly interdepartmental meeting where different ministries discuss the process involved with the mission policy. In addition, the ministry is also responsible for several instruments that generically stimulate research, (technological) development and innovation, financing the Top Sectors, and the monitoring of the overall policy.

#### *Ministry of Health, Welfare and Sport*

The formulation of the specific missions was performed by different ministries, depending on the topic of the mission. For the health and care missions, including the one studied in this thesis, the Ministry of Health, Welfare and Sport was a key actor. Although the formulation process has not been well documented and not all contributors are traceable, interviews do shed some light on the formulation process. During formulation, the ministry has included a limited amount of actors, mostly from the existing network, for example knowledge institute TNO and the Dutch Federation of University Medical Centra (NFU). These actors were involved in inspiration sessions and in feedback sessions. Including the ‘non-usual suspects’, such as civilians, in the formulation process was an intention but proved to be difficult, as it was unclear whom exactly to involve. The missions resulting from the formulation process are close to the existing goals of the ministry, and are seen by the ministry as one of many policy instruments to improve the future of health and care. In contrast to the Ministry of Economic Affairs and Climate Policy, the Ministry of Health, Welfare and Sport is less focused on (technological) innovation for innovation’s sake, and more on the implementation of solutions that can improve health and care. Currently, the ministry sees itself as a partner

in executing the missions together with the Top Sector Life Sciences and Health. Its specific role in this is still being constructed, as it requires a different role for the ministry compared to previous Top Sector policies. The ministry is also responsible for the monitoring of the health and care goals of the policy.

### *Top Sector Life Sciences and Health*

The Top Sector Life Sciences and Health (often called Health Holland), or factually the Top Team of the Top Sector, was made responsible for creating the Knowledge and Innovation Agenda (Health Holland, 2019b), a document that details how the health and care missions can be reached. Importantly, in the process of creating the KIA the existing triple helix network (business, scientific and government partners) of the Top Sector was used, but an active effort was made to include a wider variety of actors of the quadruple helix (citizen partners). This now includes representatives from several Top Sectors, national and regional government bodies and related institutes, citizen and patient organisations, industry organisations and knowledge institutions. Currently, the Health & Care Governance's Theme Team and Core Team includes a (smaller selection) of stakeholders from the quadruple helix too, so that they can have an influence on the directions taken to reach the mission goals during the periodic meetings of the teams. The Top Sector has also created the Knowledge and Innovation Covenant (Health Holland, 2019c), which shows the contributions that have been pledged by partners, both public and private, for the period 2020-2023. Additionally, agendas for the topics of internationalisation and human capital, topics that are to have a role in reaching the mission goals, were also created together with other Top Sectors (Health Holland, 2019d; Health Holland, 2019e). Another responsibility which is connected to the agenda setting of the Top Sector is to stimulate public-private collaboration within and between Top Sectors, with the goal of pursuing economic opportunities related to the societal challenges of the theme health and care. This can be either in the form of public-private partnership R&D projects, or in strategic longer term partnerships. Furthermore, the Top Sector is involved in monitoring the mission specific activities and impact, and in signalling and addressing the bottlenecks of the policy (Ministry of Economic Affairs and Climate Policy, 2019).

### **Table 7**

#### *Tasks of the mission arena*

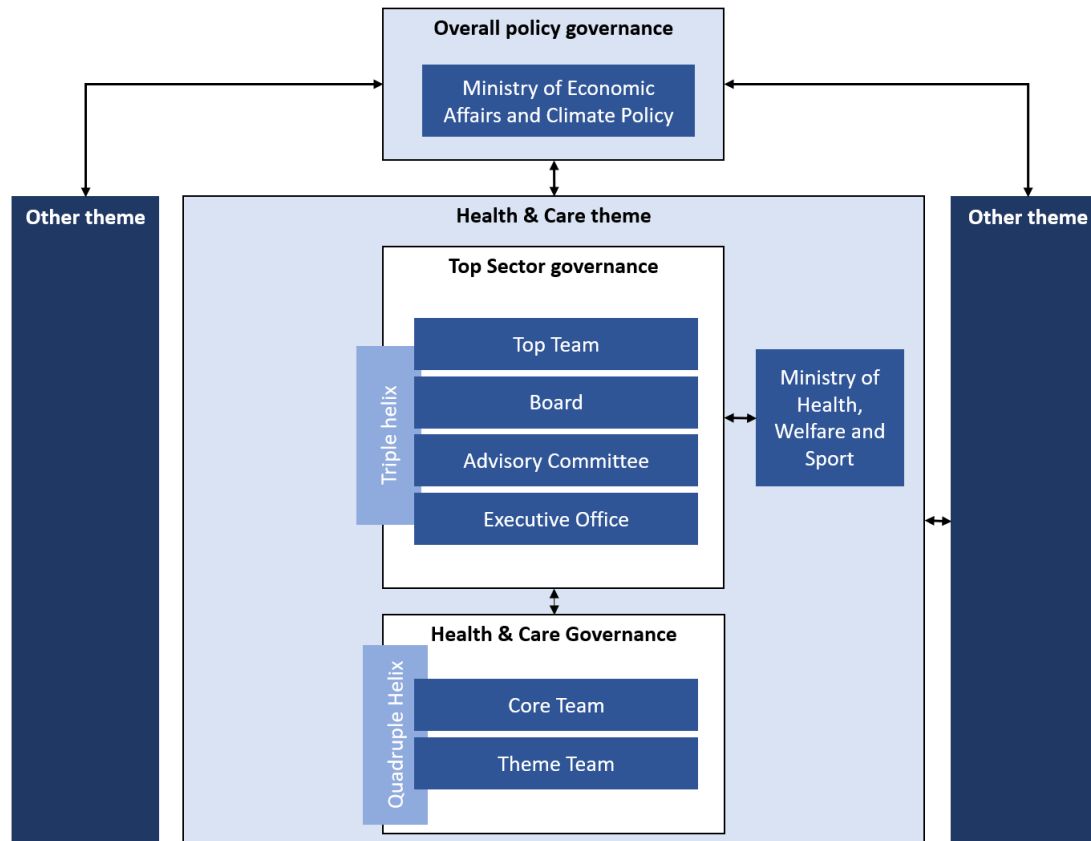
<b>Task</b>	<b>Mission arena member</b>
Setting up the mission arena	<ul style="list-style-type: none"> <li>- Ministry of Economic Affairs and Climate Policy: involving the Ministry of Health, Welfare and Sport and the Top Sector Life Sciences and Health.</li> <li>- Top Sector Life Sciences and Health: including quadruple helix stakeholders into the health and care governance.</li> </ul>

Mission formulation	<ul style="list-style-type: none"><li>- Ministry of Health, Welfare and Sport: formulating the health and care missions, including mission I.</li></ul>
Mobilisation of MIS components via mission governance actions	<ul style="list-style-type: none"><li>- Ministry of Economic Affairs and Climate Policy: generic innovation instruments, financing the Top Sectors.</li><li>- Top Sector Life Sciences and Health: creating a mission agenda and covenant detailing the pathway towards reaching the mission, executing several mission specific instruments, and constant mobilisation of additional MIS components</li><li>- Quadruple helix stakeholders: health and care governance within Top Sector structure</li></ul>
Continued, reflexive governance	<ul style="list-style-type: none"><li>- Ministry of Economic Affairs and Climate Policy: monitoring the overall policy.</li><li>- Ministry of Health, Welfare and Sport: monitoring the health and care aspect of the policy.</li><li>- Top Sector Life Sciences and Health : monitoring the mission specific activities and impact.</li></ul>

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**Figure 4**

*The mission arena of the Health and Care missions, in relationship to the mission arenas of other societal themes.*



#### 4.2.2 Overall MIS

In the overall MIS, the 97 coalition partners of the quadruple helix mentioned in the Knowledge and Innovation Covenant 2020-2023 (Health Holland, 2019c) are closest to the mission arena. They support the health and care missions and their deliverables as mentioned in the Knowledge and Innovation Agenda either in mind, in kind, and/or in cash, although some are more connected to other missions than the one studied in this thesis. Out of the 97 KIC partners, 63 have specified what and how they will contribute between 2020 and 2023. In addition, many of the mentioned coalition partners are umbrella organisations, connecting even more organisations to the mission goals. This includes for example the eight Regional Development Agencies and the Universities of Applied Sciences via the Netherlands Association of Universities of Applied Sciences. The extent to which these organisations are familiar with and feel connected to the mission and its goals differs.

Also closely related to the mission arena are multiple institutes that subsidize science and innovation in mission-related calls, that get their funding from several ministries, such as the Netherlands

Enterprise Agency, the Dutch Research Council and health research and innovation promotor ZonMw. There also are several related Knowledge and Innovation Agendas from other Top Sectors that are directly connected to the mission I, most notably those about key enabling technologies and methodologies (see table 8, and the one about agriculture, water and food, of which the stimulation of the production and consumption of healthy and sustainable food is a part (Top Sector Agri & Food, Top Sector Horticulture & Top Sector Water, 2021). The by the Ministry of Health, Welfare and Sport funded RIVM (National Institute for Public Health and the Environment) is also an important contributor to the mission. Not only are they involved in researching public health and environment, they have also been commissioned by the ministry to monitor the health and care goals of the policy.

Outside of the Mission-oriented Top Sector and Innovation Policy, there are also two sets of missions that are closely related to the goals of the studied mission. In the Netherlands there is the National Prevention Agreement (Ministry of Health, Welfare and Sport, 2018) in which over 70 organisations including the Ministry of Health, Care and Sport are involved in missions focused on preventing smoking, being overweight, and alcohol abuse. The mission arena of these missions is in close contact with the mission arena of the studied mission, and according to interviewees efforts are often combined. On a European scale, the Horizon Europe programme (European Commission, 2019a) is important to mention. In this programme there are five missions dealing with societal challenges of which several are connected to the health and care missions and mission I. The subsidies that go along with this can be supportive of the studied mission too.

Lastly, there are many organisations and initiatives in different sectors, in different local governments, and in communities of citizens that have goals related to the mission goals and could contribute to reaching them, but predate the mission and/or are not directly connected to its execution. For example, Limburg Positief Gezond (Limburg Positive Health; n.d.), hosted by the on civilian initiatives focused Burgerkracht Limburg.

#### *4.2.3 Formal Institutional Context*

One important institutional context according to interviewees is the European framework for state aid for research and development and innovation (European Union, 2014), which dictates the limits of innovation policies of European member states. According to interviewees, this framework is in some instances conflicting with the ambitions of Mission I because it is mostly aimed at supporting fundamental science and technological development and is not as supportive of social innovation.

Another important institutional context is the Dutch Healthcare System (Ministry of Health, Welfare and Sport, 2016), which is made up of four separate laws that are organised partly nationally and partly regionally, and partly publicly and partly privately. In practice, this means that 'care' and 'cure', the social domain, and youth health and care are all executed under a different law. Furthermore, not all regionally executed laws have the same regional boundaries. Another important characteristic of the Dutch Healthcare System is that is focused on health and care at an individual level

#### 4.2.4 Rationales Behind Governance Actions of Ministries and Related Institutes

The Ministry of Economic Affairs and Climate Policy knows many instruments that have the goal to generically stimulate research, (technological) development and innovation in the Netherlands (Topsectoren, n.d.). Some of them, such as the innovation stimulation instrument for small and medium companies that collaborate over region borders, now mostly accept applications that are in line with the Knowledge and Innovation Agendas of the Top Sectors, including the one detailing mission I. Several research and innovation calls from other ministries and related institutes are currently also aligned to the mission goals as detailed in the agendas (see table 8).

**Table 8**

*Subsidising institutes and related ministries*

<b>Name</b>	<b>Related ministry</b>	<b>Aims to promote</b>
The Netherlands Enterprise Agency	Ministry of Economic Affairs and Climate Policy	Entrepreneurship (RVO, n.d.)
The Dutch Research Council	Ministry of Education, Culture and Science	Research (NWO, n.d.)
ZonMw	Ministry of Health, Welfare and Sport	Health research and innovation (ZonMw, n.d.)

#### 4.2.5 Rationales Behind Governance Actions of Top Sectors

In table 9 an overview of the Top Sectors' governance actions and rationales can be found. Most of them, with the exception of GROZ are related to the previously described rationales of the Ministry of Economic Affairs and Climate Policy.

**Table 9**

*Top Sectors' governance actions and rationales*

<b>Rationale</b>	<b>Definition and status</b>
Public-private collaborations and projects	In a public-private partnerships or project (PPP) within a Top Sector, the state and businesses work together on projects that address the societal challenges of the mission policy, often for a longer period of time (Topsectoren, n.d.). The goal is to reach better solutions and to reduce the risk of entrepreneurship for the entrepreneur. In practice, every Euro of private cash for research and development from a business to a research institute gets matched by € 0.30 of subsidy. The money that was made available for these collaborations in 2019 and 2020 shows

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a significant increase compared to the period before that. The PPP is not new, but now refocused to align to the goals mentioned in the Knowledge and Innovation Agenda of mission I. So far, 10 partnerships and 25 projects aligned to the studied mission have been supported by the Top Sector Life Sciences and Health (Health Holland, 2021b)<sup>3</sup>.

**Key enabling technologies** This concept encompasses those technologies that are characterised by a broad field of application, and that are deemed to be crucial in addressing societal challenges and/or stimulating the economy (Elsevier, 2018). From 8 clusters of technologies, 94 multiannual programmes were created to become a research and development focus to support reaching mission goals (Holland High Tech, 2019). Three of these programmes are meant to support the studied mission specifically: industry 4.0 for the built environment, life sciences technologies, and smart cities for people with dementia (Health Holland, 2021 a). The key enabling technologies have their own Knowledge and Innovation Agenda, executed by the Top Sector High Tech Systems and Materials, and are a focus for PPP too.

**Key enabling methodologies** This concept encompasses the toolbox of the creative professional that can support the development and scale-up of innovations for societal change (ClickNL, 2020). For the studied mission the main key enabling methodologies are: behaviour and empowerment, and experimental environment (Health Holland, 2021a). This policy instrument was added to the mix relatively late, and currently had less dominance in the policy mix than for example the key enabling technologies. The key enabling methodologies have their own Knowledge and Innovation Agenda, executed by the Top Sector Creative Industry, and are a focus for PPP too.

**GROZ** The GROZ programme is supposed to lead to implementation of the missions. It contains three sub-instruments: illustration projects, networking activities for social entrepreneurship and field labs (called GROZzerdammen) (Health Holland 2021a; Health Holland, 2021b). This programme was created through the initiative of the Top Sector Life Sciences and Health, and is mainly focused on the overarching goals of the health and care missions. Connecting the interests and strengths of

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<sup>3</sup> For a Dutch overview of all PPP calls open in 2021, see: [https://publicaties.zonmw.nl/fileadmin/zonmw/documenten/LSH/LSH\\_PPS/LSH\\_PPSdag\\_2021/Overzicht\\_van\\_alle\\_openstaande\\_publiek-private\\_subsidieoproepen\\_in\\_2021.pdf](https://publicaties.zonmw.nl/fileadmin/zonmw/documenten/LSH/LSH_PPS/LSH_PPSdag_2021/Overzicht_van_alle_openstaande_publiek-private_subsidieoproepen_in_2021.pdf)

the diverse regional and national stakeholders to each other is an important focus of GROZ.

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### 4.3 System function analysis

In this third step of the result section, the strengths and weaknesses of the system functions are discussed, after which an overview is shown in table 10.

#### *SF1: Entrepreneurial Activity*

In general, interviewees (11) describe that there is a lot of entrepreneurial activity in the form of pilot projects and start-ups within the MIS. Five interviewees mention that the entrepreneurial climate in the Netherlands is most positive for start-ups focused on the worried well: the health conscious consumer that often is relatively healthy already and that is willing to pay for a health focused product or service, for example in the form of an e-health application, a biofeedback wearable or a health scan service. Here, an individual entrepreneur can often find the best business case. In addition, interviewees involved in regional or local health and care describe that there are many civilian initiatives active in the Netherlands focused on meeting local health and care needs.

One type of solution that is currently less represented in the entrepreneurial activity according to interviewees (7) is activity focused on people with lower health skills and from less well-off socio-economic groups as these individuals are often not capable or willing to pay for solutions. Here, interviewees describe uncertainty about who is responsible for financing the solutions (SF6), making it difficult for the individual entrepreneur to find a business case. Five interviewees mention the importance of developing alternative business models. Some examples of this type of experimentation can be found, but in the Dutch context it is currently mostly on an initial pilot level. One example is the shared savings model (Menzis, 2018) where health and care stakeholders try to save money while benchmarking or increasing the quality health and care, and share the savings among the stakeholders. A shared savings example at a community level is the lot model (*'kavelmodel'* in Dutch; HealthKIC, 2021), where stakeholders within a local context collaborate across domains to stimulate health of the lot and finance via a shared investment fund.

Another negative aspect of current entrepreneurial activity is that many initiatives stay on a relatively small scale. Here, interviewees indicate two important causes. Firstly, due to the broad and scattered nature of the overall MIS and the health and care system in combination with the regulation density of the system, moving on from pilots or prototypes is described to be difficult. Secondly, interviewees related to citizen initiatives describe how difficult it is to get structural support (SF6) in developing their solutions. Often, their ideas do not fit within the language and boundaries of the system, limiting this type of demand driven experimentation and entrepreneurship.

Lastly, five interviewees describe a bias for technological entrepreneurship over social entrepreneurship. One reason for this is that technological development is often considered to be more



tangible than the process of achieving social change. This creates a situation where entrepreneurship is too often supply driven, instead of focused on societal demands.

The mission arena undertakes many governance actions focused on this system function. As mentioned, the Ministry of Economic Affairs and Climate Policy has many instruments that generically support entrepreneurial activity, in addition there are related institutes that subsidize entrepreneurial activity. The Top Sector Life Sciences and Health supports entrepreneurial public-private collaborations and projects. Furthermore, within GROZ social entrepreneurship is focused on specifically, although currently on a small scale especially in comparison to technology focused entrepreneurship.

### *SF2: Knowledge Development*

According to interviewees (10), much fundamental knowledge to understand why certain groups of people stay healthy or develop illnesses during their lifetime is developed, taking into account many different types of factors (biology, lifestyle and behaviours, living environment, and interactions between these factors). This research has and is leading to a complex understanding of what factors solutions should target in order to reach the mission goals. This knowledge has also led to many clinically proven solutions to be developed. In addition, according to a study by Elsevier (2018) the Netherlands is a strong contributor to worldwide research into Key Enabling Technologies.

Even though, as described above, knowledge development in the Netherlands is quite strong, one point that many interviewees (12) emphasize is that the potential societal impact of this knowledge is currently not being reached as valorisation of knowledge<sup>4</sup> is often insufficiently a part of the knowledge development process. Specifically, interviewees express the need for more practical application oriented knowledge development in the context of the potential user, and including a multidisciplinary view of the studied topic to ensure that knowledge development better supports societal embeddedness of solutions. For example, one interview mentioned that knowledge about how something works does not automatically lead to the capacity to implement, as this would require a different type of knowledge development.

The mission arena is actively involved in stimulating knowledge development that is relevant to the mission goals, for example via mission related science calls of the Dutch Research Council (NWO, 2020), or science and innovation calls by ZonMw (ZonMw, 2020). In terms of the abovementioned practical knowledge development, the Top Sector Life Sciences and Health is attempting to stimulate stakeholders to take an active role, and with some success. For example, the Universities of Applied Sciences have formed theme tables where the universities collaborate on contributing applied knowledge to the mission themes (Vereniging Hogescholen, 2021). With other stakeholders this is proving to be more difficult. For example, the middle-level vocational institutes (MBOs) experience that the focus of the health and care governance of the Top Sector currently is too specialised and technology oriented to align well with the very practical focus of these institutes. In addition, several interviewed stakeholders mention that it is hard to get

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<sup>4</sup> the process of creating value from knowledge by making it suitable and/or available for economic and/or societal use (Rathenau, 2016)

involved in consortia for knowledge development via the Top Sector structure because not all types of institutions are well supported in terms of funding (SF6). One mentioned example of this is Pharos, an expertise centre for reducing health differences that is not an official knowledge institute. In terms of contributing to practical knowledge development, the Top Sector Life Sciences and Health is making an effort in the GROZ programme.

### *SF3: Knowledge Diffusion*

Interviewees (11) describe that many MIS stakeholders are active in spreading knowledge in the form of scientific publications, news media, education programmes, congresses, and more. Knowledge diffusion between scientists within the same research field was described to be good in particular. Although the quantity of knowledge sharing was judged to be good, several aspects limit the quality of knowledge diffusion, meaning that knowledge diffusion often remains superficial and does not lead to required next practical research or innovation steps.

Firstly, interviewees (12) mention the importance of domain transcending knowledge diffusion in order to stimulate multidisciplinary and valorised knowledge development (SF2). This connection was described to be a two way street, as knowledge diffusion tends to be more significant when knowledge development is domain transcending due to the deeper involvement of all domains. Currently, the connection between social and natural scientists and fundamental and practice based scientist is described as limited, although according to several interviewees a shift towards more collaboration is currently happening. For example, interviewees related to subsidy institutes mention that this is increasingly incorporated in research and innovation calls. The mission arena is contributing to this type of collaborations via the public-private partnerships and projects it promotes and via the concept of learning communities (where different types of researchers and public and private partners are learning, and innovating together).

Secondly, the MIS is described by interviewees (9) and by the Rathenau Institute (2017) to be fragmented and heterogeneous, meaning that knowledge questions arising at different levels (between domains or at different geographical levels) are often not connected to each other. This finding is connected to the institutional context of the fragmented Dutch health and care system. Consequently, similarities and differences in health and care issues between municipalities are not always well known, and the national government is limited in its role as organisation responsible for national health at a systemic level. Interviewees mention the negative consequences of this on knowledge development (SF2). For example, one interviewee active at a regional scale mentioned that pilot studies performed in one region with underwhelming results are often too easily pitched to and then repeated in another region. In addition, the limited knowledge diffusion has a negative influence on the scale-up of regional health and care solutions because the solutions are often too fragmented to spread to other regions (SF5). As a first step to address this issue, the Ministry of Health, Welfare and Sport has stimulated and subsidised the formulation of regional approaches within regional alliances (Ministry of Health, Welfare and Sport, 2021). (This initiative is not an official part of the Mission-oriented Top Sector and Innovation Policy, but illustrates that the studied

mission as formulated by the ministry aligns with policy that predates mission I.) Additionally, the GROZ initiative of the Top Sector Life Sciences and Health is specifically focused on connecting regions, and is organising meetings to connect regional approaches to one another (Health Holland, 2021b), and to stimulate knowledge sharing.

#### *SF4A: Problem Directionality*

The redirection of Top Sector policy from a focus on sectoral interests to societal challenges shows a clear directionality. It is detailed in both the parliamentary policy documents of the Ministry of Economic Affairs and Climate Policy (Ministry of Economic Affairs and Climate Policy, 2018; 2019) and the Knowledge and Innovation Agenda of the Top Sector Life Sciences and Health (Health Holland, 2019). Interviewees closely related to the Top Sector mention that this new type of agenda setting has led to more coherence in the focus of the Top Sector, and to more awareness by many stakeholders that are closely related to the Top Sector of the societal problems related to the studied mission. Importantly, the Top Sector was described by many interviewees to be very active in spreading the mission's problems and framework, and continually puts effort into connecting with more stakeholders both nationally and regionally.

One factor limiting the influence of problem directionality actions within the MIS is the fragmentation of the MIS as described in the context of knowledge diffusion (SF3): the broadness and scatteredness of actors, sectors and policy regions that the mission arena is trying to influence. For example, several contacted stakeholders<sup>5</sup> declined to be interviewed in the context of this study because they saw themselves as barely connected to the studied mission. In addition, one interviewee with an expertise in prevention focused ecosystems described that ownership of mission I within the MIS was low, because for many stakeholders other prevention agreements (either national or regional) were more at the forefront of their minds, a finding that was corroborated by regional government interviewees. This is exacerbated by the approach that the Ministry of Health, Welfare and Sport has to the mission-oriented policy. According to several interviewees, the ministry does not prioritise the mission as a policy instrument over other policy instruments. Additionally, at a national government level, connections between the Ministry of Health, Welfare and Sport and other ministries with regards to the mission goals was described by four interviewees as too loose to connect the theme of health and care to other domains.

#### *SF4B: Solution Directionality*

Interviewees describe a wide range of possible solutions, and seem to agree that reaching the mission goals is dependant on many different types of stakeholders taking many small steps towards incorporating these solutions. In addition, interviewees agree on the necessity of social design methodologies and social solutions accompanying technological ones to ensure societal embeddedness of solutions. Within the

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<sup>5</sup> These stakeholders were involved in public-private collaborations or projects that were related to mission I according to the website of the Top Sector Life Sciences and Health and developing knowledge or solutions that could contribute to the mission goals. For example: research into the effects of microplastics on human health.

mission arena, the Top Sector Life Sciences and Health is the actor that is actively involved in giving the solution strategy directionality, for example with the presentation of the future visions (*toekomstbeelden*) for the mission (Health Holland, 2021). A large focus is on demand driven solutions on the community level and on non-healthcare related solutions with a large impact such as how the construction of sewerage or the public education law that makes education compulsory have improved quality of life in the past.

Although interviewees judge the Top Sector Life Sciences and Health to be a motivated advocate of the abovementioned solution directions, the extent to which the Top Sector itself can stimulate these solution directions is limited due to its research, (technological) development and innovation focused legal role (Ministry of Economic Affairs and Climate Policy, 2019b). Consequently, the governance actions that the Top Sector undertakes and the funding (SF6) that it can provide to initiatives steers solution development towards a narrow definition of innovation and stimulating future earning capacity. Here, it can be seen how the goals of the overall Mission-oriented Top Sector and Innovation Policy and the health and care goals of the studied mission can be incompatible, creating an ambivalent solution directionality. Much of the effort towards the advocated solution directions is expected to come from the overall MIS in the form of (private) investments, but here interviewees describe a hesitance to invest in prevention solutions (SF6) and unclarity who should take the first step.

#### *SF4C: Reflexive Governance*

Within the MIS three types of monitoring of the mission are happening, all with a different goal in mind. The following can be constructed based on interviews with involved stakeholders:

1. The Ministry of Economic Affairs and Climate Policy is responsible for the monitoring of the input and output of public-private collaboration projects. This type of monitoring is new for the ministry, and is mainly science and technology focused. Other types of monitoring are seen as the responsibility of the Top Sector Life Sciences and Health and the Ministry of Health, Welfare and Sport.
2. The Top Sector Life Sciences and Health is responsible for the monitoring of the mission specific activities. It sees monitoring as an iterative process and aims to include many stakeholders in the process. The Top Sector does two types of monitoring. Firstly, that of the Knowledge and Innovation Covenant (Health Holland, 2019) activity via impact pathways (coalition partner related input, activities, output, outcome and impact). To accompany these impact pathways they have created a visual representation of what society should look like in 2030 based on the mission goals (Health Holland, 2021). Additionally, the Top Sector is currently creating a novel framework for a 'succes analysis', which will attempt to monitor how public-private partnerships are contributing to system transition. Based on a presentation given by the Top Sector on the topic, it can be said that this framework is currently mostly theoretical. It is unclear when and how it can be used in practice.

3. The National Institute for Public Health and the Environment has been commissioned by the Ministry of Health, Welfare and Sport to monitor the mission progress based on health and care indicators. These indicators have been chosen from existing data from a variety of sources, of which not all are updated annually (RIVM, 2020). Specifically the contributions of several indicators related to lifestyle (behaviour), labour and environment are taken into account in relationship to burden of disease. Interestingly, the indicators do not take all aspects mentioned in the Knowledge and Innovation Agenda (Health Holland, 2019) into account. For example, for lifestyle only percentages of adults and youths that smoke and percentages of people that comply with exercise guidelines are taken into account (bringing the indicators close to the goals of the prevention agreement of the ministry). It is mentioned that this might change in the future.

Overall it can be said that a wide variety of monitoring has been initiated in light of the studied mission. Both goals of the mission policy are taken into account: dealing with societal challenges and stimulating future earning capacity. However, two potential obstacles to true reflexive governance can be found in the monitoring practices. Firstly, the different monitoring methods are currently not being integrated in order to evaluate the entire breadth of the policy, consequently they are unlikely to lead to a readjusting of policy instruments. However, as the monitoring practices are still being developed in parallel to the execution of the mission policy, this might change in the future.

Secondly, in the current monitoring there is a clear bias for research, (technological) development and innovation that can stimulate future earning capacity, which does not take into account the contributions of social solutions in reaching the goals of the studied mission. Interviewees judge the benefits of technology oriented solutions and fundamental science as easier to quantify (for example via an increasing technological readiness level or the number of citations) compared to the economic impact of social prevention solutions (which will mainly prevent future costs), and societal impact of solutions. Although the Top Sector has ambitions to monitor both, it is currently unclear how.

#### *SF5: Market Formation and Destabilization*

For this system function, market formation and scale-up for solutions that are focused on high-end consumers was described to be good by interviewees (5), because, as explained in the context of entrepreneurial activity (SF1) these consumers often are able to and willing to spend money on their own health, resulting in a clear business model. Several limitations can be found here too.

Firstly is the difficulty of scaling up beyond an initial pilot level for solutions of which the business model is less clear. According to interviewees (6) there is less support for scaling up prevention solutions than there is for the start-up phase because of this reason. Individual stakeholders are hesitant to be the first to invest in the solutions (SF6), even though, even though they might benefit from catering to this niche market if more stakeholders were to invest. One important reason for this mentioned by interviewees is that

the solutions often result in long-term cost reductions that benefit the whole of society more than the individual investor(s).

Another factor limiting market formation according to interviewees (6) is that many solutions are not demand driven nor co-created with potential users. In the context of health and care solutions that are meant to interfere in the personal environment of individuals this is deemed to be crucial in order to create a niche market. Too often, complicated implementation processes are saved for later in the developmental process of the solution instead of incorporating it from the start. In addition, because many solutions are context dependent, they are not easy to scale-up elsewhere without additional research.

Within the health and care system, scale-up of innovation can also be difficult due to the fragmentation and inertness of the system. Often, solutions are developed on a small scale within a section of the system. The incentive to collaborate is low, thus limiting scale-up and impact of individual solutions. An example mentioned by an interviewee is the public-private collaboration focused on the digital elements of the youth care system. Youth care is currently a municipal responsibility, creating a decentralised system. All regions have their own private ICT supplier. When one region innovates its digital care, neither the individual region nor the ICT supplier are likely to invest in scale-up to other regions, as they cannot expand their market. However, the quality of youth care in the Netherlands might benefit from scale-up.

#### *SF6: Resources (Re)allocation*

Interviewees (8) describe resource allocation to be good when a clear business case can be made, and individual investors can benefit from their investments. As explained in the context of entrepreneurial activity (SF1) this is mostly true when a product or service is aimed at consumers. It often involves research, (technological) development and innovation. However, with regards to resource (re)allocation, interviewees also describe some significant limitations.

Firstly, interviewees (7) mention that stakeholders are hesitant to allocate resources to social design processes and social solutions for which the benefits for the individual investor are less clear. In contrast, the resources available for research, (technological) development and innovation are described to be larger. A reallocation of funds is currently limited according to 5 interviewees due to commercial interest. Furthermore, the interviewees express the need for more flexible and inclusive financial instruments that better take the co-dependency of technology and social design processes into account, to support societal embeddedness of solutions. This latter point is currently a topic on the agenda of many funding institutes according to related interviewees, but several civilian-scientists and design professionals express that they currently don't experience the funding system as being targeted to them.

Secondly, as explained before in the context of market formation (SF5), funding solutions within the health and care system is complicated due to its fragmentation. Additionally, the system is very focused on curing and caring for the individual instead of on the health of the collective. According to interviewees involved in health and care execution, this makes the funding of solutions focused on the collective hard within the boundaries of the current system.

Lastly, interviewees related to citizen initiatives or so-called ‘bottom-up’ initiatives express a difficulty in obtaining structural funding from municipalities, especially compared to professional health and care providers. As procurement of care often involves contracts for longer periods of time, the budget for new and more experimental initiatives is often limited. In addition, when the merits of a new initiative are measured over a short period of time even though the benefits of a change process might take more time to manifest, as is often the case with prevention initiatives, the resources for these types of initiatives are further limited.

The mission arena allocates resources via the public-private collaborations and projects (Top Sectoren, n.d.), and via research and innovation calls of related institutes. Here, a general focus on promoting research, (technological) development and innovation can be seen too.

#### *SF7: Creation and Withdrawal of Legitimacy*

Interviewees (15) mention that many stakeholders of the MIS are engaging in lobbying activities focused on health through preventative lifestyle and living environment solutions. Much of the lobbying is focused on a more active role for the government in influencing lifestyle and living environment, on reducing health differences between different socio-economic groups, and on adopting a broader view of what health is (more than just an absence of disease). Overall, interviewees judge prevention of disease to be better on the political agenda than it was a few years ago, but it is also mentioned that there are still important ethical debates needed in society to create more legitimacy. Most importantly, a bigger role for the government in influencing lifestyle and living environment is not uncontested. Solutions can be seen as limitations of personal freedom and/or as patronizing by the government (for example, a sugar tax). Opposition is described to mainly come from stakeholders (including civilians) with liberal political views, and from incumbents from industries (with their own strong lobby) that would be hindered by a focus on lifestyle and living environment (for example the food industry). One interviewee with expertise in the lifestyle lobby described that the influence of this latter group (the food and pharmaceutical industries were specifically mentioned) on this debate is still too substantive. The recent Covid19 pandemic was described by 9 interviewees to have a significant positive influence on the debate in favour of the mission goals, as it has brought the societal costs of individual poor health to the forefront.

**Table 10**

*Strengths and weaknesses of each respective system function*

<b>System function</b>	<b>Strength/weakness</b>
SF1: entrepreneurial activity	(+) good entrepreneurial climate for start-ups focused on the worried well (+) good entrepreneurial climate for technological entrepreneurship (+) many health and care focused civilian initiatives exist throughout the country

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	<ul style="list-style-type: none"> <li>(-) limited business case for entrepreneurial activity focused on those not capable or willing to pay for solutions individually</li> <li>(-) limited large scale business model experimentation focused on principles like shared savings (Menzis, 2018)</li> <li>(-) difficulty moving on from pilots or prototypes to larger scale experimentation</li> </ul>
SF2: knowledge development	<ul style="list-style-type: none"> <li>(+) strong fundamental knowledge development</li> <li>(+) many clinically proven solutions are developed</li> <li>(+) the Netherlands is a strong contributor to worldwide research into key enabling technologies (Elsevier, 2018)</li> <li>(-) valorisation of knowledge is often insufficiently a part of the knowledge development process</li> <li>(-) knowledge development is insufficiently domain transcending</li> </ul>
SF3: knowledge diffusion	<ul style="list-style-type: none"> <li>(+) stakeholders are active in spreading knowledge through many different media, meant for different types of audiences</li> <li>(-) knowledge diffusion is often superficial and not domain and region transcending, and thus does not lead to relevant new research or innovation</li> </ul>
SF4A: problem directionality	<ul style="list-style-type: none"> <li>(+) redirection of Top Sector policy from sectoral interests to societal challenges has led to more coherence in the focus of the Top Sector Life Sciences and Health</li> <li>(-) many stakeholders do not feel connected to the mission</li> <li>(-) the Ministry of Health, Welfare and Sport does not prioritise the mission as a policy instrument over other policy instruments</li> </ul>
SF4B: solution directionality	<ul style="list-style-type: none"> <li>(+) a strong solution directionality focused on a change of social relations and societal embeddedness of solutions is provided by the Top Sector Life Sciences and Health</li> <li>(-) governance actions steer the solution development in another direction, mainly towards science, (technological) development and innovation, creating an ambivalent solution directionality</li> </ul>
SF4C: reflexivity	<ul style="list-style-type: none"> <li>(+) a wide variety of overall policy and mission specific aspects are monitored</li> </ul>



	<p>(-) monitoring methods are currently not integrated in order to evaluate the entire breadth of the policy</p> <p>(-) there is a bias for research, (technological) development and innovation that can stimulate future earning capacity in the monitoring</p>
SF5: market formation and destabilization	<p>(+) there is clear market formation for solutions focused on the high-end consumer</p> <p>(-) there is not enough scale-up support for many prevention solutions that do not have a short term business model but save society money in the long term</p> <p>(-) prevention solutions are often not demand driven, limiting the market formation</p> <p>(-) scale-up in the health and care system is difficult due to regulation density and fragmentation of the system leading to low incentive to collaborate</p>
SF6: resources (re)allocation	<p>(+) there are many resources available for science, (technological) development and innovation that can stimulate future earning capacity</p> <p>(-) less support for social entrepreneurship and social design processes</p> <p>(-) inclusivity and flexibility of financial instruments is limited</p> <p>(-) difficulty for citizen initiatives gaining structural support from municipalities</p> <p>(-) funding prevention solutions within the health and care system is difficult due to its fragmentation and its focus on the curing and caring of the individual instead of the collective</p>
SF7: creation and withdrawal of legitimacy	<p>(+) many stakeholders are active in lobbying activities focused on health through preventative lifestyle and living environment solutions</p> <p>(+) the Covid19 pandemic has brought the societal costs of individual poor health to the forefront in societal debates</p> <p>(-) opposition comes from those seeing solutions as limitations of personal freedom and/or patronizing by the government</p>

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#### 4.4 System Barriers Analysis

In the previous section, many system function strength and weaknesses that are either stimulating or hampering mission progress were discussed (table 10). In this section, three important system barriers that are of influence on many of the system functions are focused on: the lack of a short term business case for the individual organisation for most prevention solutions, the bias within the MIS to mainly support research, (technological) development and innovation, and the fragmentation of domains and regions of the MIS. Below, they are discussed in detail, and an overview can be found in figure 5.

There currently is a limited short term individual business case for prevention solutions of which the benefits tend to be long-term and in the form of cost reductions over the whole of society, instead of mainly for the investors. This leads to a reluctance to be the first to invest (SF6) into the demand driven innovation processes that are crucial for substantive societal impact according to interviewees, even though significant investments by the overall MIS are currently expected by the mission arena. For the studied mission, these processes encompass both experimentation (SF1) and practical knowledge development (SF2) in the context of all involved stakeholders, and simultaneously creating niche markets by developing solutions through this social design (SF5).

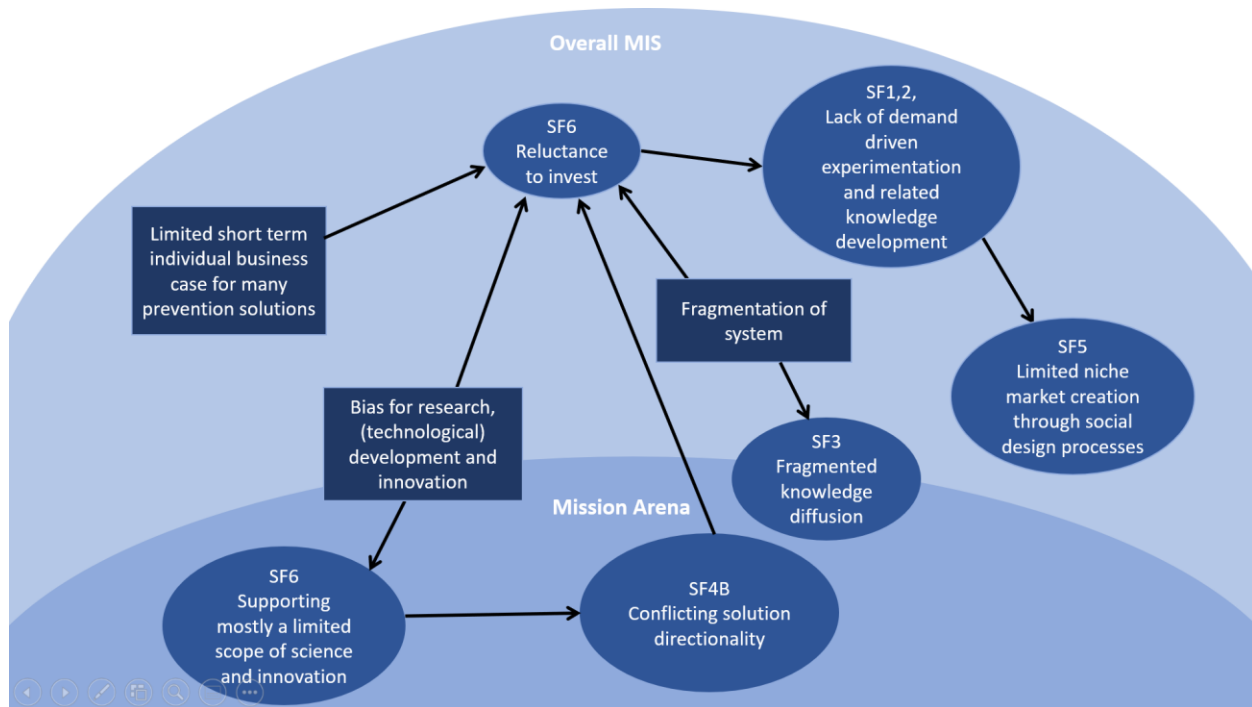
The lack of an individual short term business case for many relevant solutions ties in with the bias that exists both within the overall MIS and within the mission arena for technological development and fundamental science over social design and solutions and practical, implementation oriented research. In general, when a product or service is tangible and has a relatively straightforward developmental trajectory it is currently better supported than when a solution requires complex social design processes involving a wide variety of stakeholders to shape and embed the solution to fit within the context of the user. However, as explained it is this social aspect of innovation which is crucial to reach the mission. Within the mission arena, this bias can be found in the narrow definition of innovation that dictates the kind of solutions that the Ministry of Economic Affairs and Climate Policy and the Top Sector Life Sciences and Health can (financially) support (SF6). The boundaries of innovation policy and its current financial instruments do not match up with the type of social solutions that the Top Sector (the main executor within the mission arena) is aiming to support and promote for the studied mission, leading to a conflicting solution directionality (SF4B). Consequently, there are high expectation of stakeholders in the overall MIS to invest in the type of social solutions that are not well supported by the mission arena.

Lastly, the fragmentation of the studied MIS is an important systemic barrier. Within the health and care sector the country has been divided into differently organised regions responsible for policy execution for different health and care laws that are often poorly connected to each other. The scattered responsibilities within the system create a situation where stakeholders do see the importance of the mission and its solutions, but ultimately do not feel the responsibility to be the first to invest in prevention of (burden of) disease (SF6). In addition, reaching the mission requires actions far beyond the boundaries of the health and care sector, but it is currently not by default that stakeholders outside of these boundaries feel that they are bound together by a shared and overarching goal: mission I. Making prevention of (burden

of) disease a priority in all aspects of life is precisely the societal change that still needs to happen. Currently, the fragmentation of the system is a hurdle for knowledge diffusion and for the mission arena in diffusing the mission's problems and solutions to all relevant stakeholders (SF3).

**Figure 5**

*Systemic barriers*



#### 4.5 Analysis of Governance Actions

In this final part of the results section, the mission governance actions (of primarily the mission arena) are evaluated in the context of the identified barriers of section 4.4.

Firstly, it should be mentioned that so far, the launch of the Mission-oriented Top Sector and Innovation Policy has not brought about any radically new policy instruments from the Dutch government. In fact, the goal has been from the start to put an emphasis on refocusing existing policy research and development instruments on the mission goals, and making it easier for organisations to make good use of these instruments (Janssen, 2020; Ministry of Economic Affairs and Climate Policy, 2018). It is because of this lack of new instruments that the governance actions of the government are perpetuating the bias for research, (technological) development and innovation. Clearly, when stimulating future earning capacity is a prerequisite for a solution to be well supported by governance instruments, a wide variety of prevention solutions that will save money in the long term instead of stimulating the GDP in the short term, is not supported. However, as explained reaching the health and care mission is dependent on this latter category. To as a government truly depart from old innovation paradigms, expanding the definition of innovation to include the complex social design processes necessary for societal embeddedness of

innovation, and focussing more governance actions on these types of processes is crucial. However, this change in perspective is unlikely to result from the current monitoring methods, as they are not focused on evaluating the rationale behind the policy. Furthermore, currently the governance actions of the government do not signal true transformative and directive governance as direction is expected to come from other stakeholders of the quadruple helix.

GROZ is the rationale that targets both dealing with the fragmentation of the system by being more inclusive to all the stakeholders of the MIS and by stimulating meetings and the formation of consortia on different geographical levels, and the lack of a short term individual business case by stimulating different forms of collaboration and financing of solutions. In addition, it attempts to address the bias for research, (technological) development and innovation that exists within the MIS by stimulating complex social design processes focused on shaping and embedding solutions to fit within the context of the user. However as explained before, within their legal role the Top Sector is limited in the (financial) support it can provide for initiatives like GROZ (Ministry of Economic Affairs and Climate Policy, 2019) . Consequently, the efforts of the Top Sector concerning GROZ are currently limited to illustrating and promoting the GROZ ideals and urging other stakeholders to become active in the movement (Health Holland, 2020). When comparing these efforts to the (financial) support of the mission arena that currently exists for research, (technological) development and innovation, it is but a small part of the governance actions taking place.

Thirdly, the public-private collaborations and projects, either related to the health and care missions or to the key enabling technologies and methodologies, are important in stimulating collaborations between different domains and potentially between different regions. However, just like other policy instruments it is limited by the narrow definition of innovation (Health Holland, n.d.) in the projects and collaborations it promotes. Furthermore, according to interviewees the PPP are only effective in cases where private commitment is likely, as it is private cash that leads to the subsidy of this instrument (Topsectoren, n.d.). In cases where innovation is necessary from a public perspective but private commitment is unlikely, as is the case with many prevention solutions, the instrument cannot effectively support innovative efforts depending on other stakeholders of the quadruple helix.

Lastly, via research and innovation calls from a variety of institutes that fit the mission goals there is potential to both stimulate domain transcending research projects that are important for substantive knowledge diffusion and the practical knowledge development that is currently insufficiently focused on. However, for it to reach this potential the calls will have to become more inclusive to stakeholders of the quadruple helix beyond scientists and/or entrepreneurs. As explained, not all stakeholders (for example citizen scientists or social design professionals) experience that the calls are currently truly obtainable for them due to the strictness of the rules for application, even when the calls are theoretically targeted to them<sup>6</sup>.

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<sup>6</sup> For example: the citizen science call by ZonMW (ZonMw, 2021).

## 5. Discussion

In this section of the thesis, reflections on the policy and theoretical contributions, and limitations of the study are discussed. Additionally, suggestions for future research will be given.

### 5.1 Policy contributions

Based on the analysis of the case study of this thesis, contributions to policy practice of the studied mission can be made. By using MIS theory, this thesis has included the perspectives of a wide variety of stakeholders of which some well connected to the mission arena and others with more distance to it, and created an overview of the system of the mission and its dynamics. This has resulted in the identification of strengths and weaknesses that exist within the system (see table 10) and of three important systemic barriers that influence many of the weaknesses. In the final part of the result section, the extent to which the mission arena is currently addressing these barriers is discussed. Based on this, several policy recommendations can be made.

Firstly and most importantly, it is crucial to reconsider what the role of the government in the policy should be and what level of priority should be given to it. Currently, policy instruments are mostly tied to the Ministry of Economic Affairs and Climate Policy, resulting in a focus on their science, (technological) development and innovation paradigm. However, the formulated health and care missions move beyond this narrow definition of innovation, and ask for investments in demand driven social experimentation and social design processes. By scrutinising the rationales behind current governance actions, and specifically the extent to which societal challenges such as reducing lifestyle and living environment related burden of disease and stimulating future earning capacity are always compatible, governance actions could be better adapted to mission I (and possibly other missions). The focus of the policy could be expanded in cooperation with other ministries like the Ministry of Health, Welfare and Sport and beyond. Here, the paradigm of a single ministry with regard to societal challenges can be complemented by the paradigms of other ministries, resulting in a conscious effort to as a government become a source of directional, transformative change<sup>7</sup>.

A more actively involved government will be able to address several barriers that the market so far has not been able to deal with, but that are crucial to reach societal change. For example, to steer conversations between stakeholders of the MIS away from who will ultimately benefit from individual investments into prevention, policy instruments could be focused on stimulating forms of collaboration that are based on a shared savings (Menzis, 2018) or a similar model. Also, policies like a sugar tax can be used to steer the stakeholders of the MIS into the right direction.

Furthermore, the argumentation above can be extended towards other governance actions that were evaluated in section 4.5 of this thesis. As the GROZ initiative addresses many of the systemic barriers that were identified, the mission arena could support it better with funding for the (regional) ecosystems and

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<sup>7</sup> This reasoning is in line with Braams et al. (2021). In this paper more information about the rationale behind the role of government in societal transitions can be found.

consortia that are engaged in demand driven social innovation that GROZ attempts to strengthen. Furthermore, the public-private collaborations and projects instruments could be expanded or a new instrument could be created to better support innovative efforts that stakeholders of the quadruple helix focused on public interests are attempting to undertake, but that are currently unaided by private cash. Additionally, it could be investigated how to better adapt research and innovation calls to stakeholders of the quadruple helix other than scientists or entrepreneurs.

## 5.2 Theoretical contributions

By being the first to study a case in the health domain, one with a high level of wickedness (Wanzenböck et al., 2020) and a relatively large social innovation component, several contributions to Mission-oriented System (MIS) theory can be made.

In previous MIS literature (Hekkert et al., 2020; Wesseling & Meijerhof, 2021) the importance of social innovation is discussed, but its inclusion in the framework is limited. Based on the arguing of the theory part of the thesis and on the analysed data, a new perspective on the definitions and roles of both social and technological innovation can be given. This thesis argued that in the context of societal missions, changing social relations to support transformative change is important for all innovations. Therefore, technological and social innovation are best viewed as part of a continuum instead of as two dichotomous categories. Based on the interview data it can be added that the social aspect of innovation is a process of shaping and fitting an innovation into the context of the involved stakeholders, often in cocreation with involved stakeholders. Technological development can be a prerequisite for this process to be successful, but ultimately technological development is not the aspect of innovation that will lead to transformative change on its own.

Within the MIS framework, the perspective above currently has the most direct consequences on the solution part of the problem-solution diagnosis. For the solution diagnosis this thesis has made a first step to expand the focus beyond technological readiness of innovations. In the future, new readiness tools will need to be developed taking other readiness dimensions into account to truly make this part of the MIS analysis reflect the extent to which solutions can contribute to societal change.

Furthermore, the perspective proved useful during interviewing to shed some light on how to best support the process of societal embeddedness of solutions in a health context. In a health context civilians (either individually or in a community context) make up an important group of stakeholders. Since civilians are a heterogeneous and not formally organised group of stakeholders, the process of societal embeddedness of many solutions was judged by many expert interviewees to require a regional or local focus that could be strengthened by actors at a national level responsible for enabling knowledge sharing, (financial) resources and supportive legislation. Interestingly, this empirical finding is in line with the theoretical argumentation of Wanzenböck and Frenken (2020). Future research could further investigate the dynamics within and between different geographical levels dealing with societal challenges. Here, MIS

theory could be used both for a comparison between different levels and to identify interactions between different levels.

Although the theoretical findings above are interesting, they are currently based on a single case study and of a generic nature. Future research into the dynamics of societal embeddedness of innovation could shed more light on the topic and dive into detail about different types of societal embeddedness approaches.

### *5.3 Limitations*

Even though the thesis has made contributions to both MIS theory and policy practice, there are several limitations to the research design that should be discussed. Firstly, because a single case study was studied using qualitative methods, some dependence on the interpretations of the researcher are to be expected, potentially influencing reliability. Efforts were made to limit this bias, for example using an interview guide and a coding scheme based on the MIS framework, and checking for intercoder reliability (which was sufficient). Secondly, although the research design has given a detailed understanding of system dynamics, the single case study design does have consequences for the external validity of the results. When interpreting the results, it is important to reflect on which aspects of it can be generalized and which cannot.

Furthermore, due to a combination of the extensiveness of the used framework, the broadness of the studied mission and the relatively loose connections between its structural components, the resulting analysis was complex. To ensure feasibility and clarity, some level of detail was lost. The resulting thesis gives an overview of the structure and barriers of the system and the connections between them, but certain themes that were touched upon might benefit from further study. For example: the dynamics of the studied mission when comparing the national and the regional/local scale, the roles of different types of citizen initiatives, and the dynamics of phasing out the old.

Thirdly, the approach towards the solution diagnosis was of an explorative nature due to a lack of appropriate readiness level tool. Although the solution diagnosis can be viewed as an illustration of the broadness of possible solutions and the dimensions on which they can differ, no distinctions could currently be made as to the potential of solutions to contribute to the mission.

Lastly, the study was conducted at the beginning of mission execution, meaning that the policy itself and the roles of stakeholders is still being formed and the effects of governance actions are in development too. Furthermore, the study was conducted during a global pandemic that was often mentioned as having a large effect on the system. Looking at the system though a longitudinal MIS approach is important to fully appreciate the significance of governance actions and the influence of the pandemic.

## 6. Conclusion

In this thesis the Mission-oriented Innovation System (MIS) of Health Mission I of the Dutch Mission-oriented Top Sector and Innovation Policy was studied according to the five analytical steps of MIS theory (Wesseling & Meijerhof, 2021). This with the goal to evaluate the extent to which the systemic barriers present in the MIS are being adequately targeted by the current governance actions. Below the sub-research questions of this thesis are answered first, after which the main research question is answered.

Firstly, within the problems and ‘wants’ section it was described that the studied mission has a focus on reducing lifestyle and living environment related burden of disease, but is a part of a policy framework that is equally focused on stimulating future earning capacity. Next, it was explained what type of prevention solutions could best support mission I. It was found that primary prevention (reducing the occurrence of disease) has the most potential to give the most health at the lowest costs. For lifestyle, focussing on social determinants of health besides lifestyle factors is key. For living environment, both the natural, man-made and digital elements should be taken into account. Furthermore, to reach societal impact with solutions, societal embeddedness should be a focus of all solutions. For some solutions, innovative use of technology is integral to this whereas for others the real innovation lies in the use of social design practices. Using an explorative approach, four other differences in focus of solutions were identified.

Next, in the structural analysis, the roles of the three key actors of the mission arena were described, with the Ministry of Economic Affairs being responsible for the overall policy, the Ministry of Health, Welfare and Sport for mission formulation, and the Top Sector as the main agenda setter and executer. It is mainly the Top Sector that plays a big role in spreading the mission goals and framework to stakeholders of the quadruple helix. An effort is made to include more than only the ‘usual suspects’. In general, there are many organisations and initiatives that are a part of the overall MIS, some are only loosely connected to the mission arena. Two important formal institutions are the European framework that dictates the boundaries of state aid for research, (technological) development and innovation, and the Dutch Health Care system which consist of four laws that are separately executed. Furthermore, it was found that the rationales behind governance actions of the mission arena were mostly based on the research, (technological) development and innovation paradigm of the Ministry of Economic Affairs, although the Top Sector approaches the mission from another rationale with GROZ.

In the system functions analysis and systemic barriers analysis multiple barriers were identified in the overall system. The fragmentation of sectors, domains and geographical regions was identified as an important barrier influencing the MIS, limiting the responsibility felt by individual stakeholders to be the first to invest in prevention solutions, and hindering the domain transcendence of knowledge diffusion. Additionally, this barrier influences the mission arena, because it makes it more difficult to spread the mission’s problems, framework and solutions to relevant stakeholders. Another barrier was the lack of short term individual business case for many prevention solutions for which individual entrepreneurs currently find it hard to find a short term business case as the benefits of these solutions tend to be long term and over the whole of society. When comparing technological and social innovation, a third barrier was found:



a general bias for research, (technological) development and innovation over social design and solutions, as the latter category often has a less tangible and less straightforward developmental trajectory requiring a complex social design process.

Lastly it was analysed to what extent the governance actions of the mission arena are able to address the identified systemic barriers. It was found that the governance actions tied to the Ministry of Economic Affairs and Climate Policy, are currently perpetuating the previously described bias for research, (technological) development and innovation by sticking with existing policy instruments that are supposed to stimulate the future earning capacity. The most effective governance actions in terms of targeting the systemic barriers are instruments that are a part of GROZ, however due to the limited scale of this programme its potential is limited too.

To conclude and to answer the main research question, it was found that some governance actions are currently targeting the identified barriers, but that this potential is limited because the government currently has only to a small extent departed from old innovation paradigms and is still using mostly the same type of governance actions as before the Mission-oriented Top Sector and Innovation Policy was launched. In addition, the direction given to the MIS by the government is limited because a large executional role is entrusted to the Top Sector Life Sciences and Health and to other stakeholders. However, they too are currently limited by the boundaries of the innovation paradigm of the Ministry of Economic Affairs and Climate Policy in their governance actions. Therefore, the Top Sector Life Sciences and Health can identify the need to approach the mission based on broader definitions of innovation, but can only change their governance actions accordingly to a small extent. In order to show truly directional governance and a departure from old innovation paradigms, the policy could be expanded and complemented by paradigms of other ministries. Furthermore, to address the identified barriers of the system, efforts could be made to adapt or create new governance actions to better support (regional) initiatives from all stakeholders of the quadruple helix that are involved in the demand driven innovation that is crucial to reaching mission I.

## 7. References

### Scientific

- Breschi, S., & Malerba, F. (1997). Sectoral innovation systems: technological regimes, Schumpeterian dynamics, and spatial boundaries. *Systems of innovation: Technologies, institutions and organizations*, 130-156.
- Bryman, A. (2016). *Social Research Methods (5th ed.)*. London: Oxford University Press.
- Cajaiba-Santana, G. (2014). Social innovation: Moving the field forward. A conceptual framework. *Technological Forecasting and Social Change*, 82, 42-51. <https://doi.org/10.1016/j.techfore.2013.05.008>
- Carlsson, B., & Stankiewicz, R. (1991). On the nature, function and composition of technological systems. *Journal of evolutionary economics*, 1(2), 93-118. <https://doi.org/10.1007/BF01224915>
- Cooke, P., Uranga, M. G., & Etxebarria, G. (1997). Regional innovation systems: Institutional and organisational dimensions. *Research policy*, 26(4-5), 475-491. [https://doi.org/10.1016/S0048-7333\(97\)00025-5](https://doi.org/10.1016/S0048-7333(97)00025-5)
- Djojosoeparto, S.K., Eykelenboom, M., Poelman, M.P. et al. Stakeholder views on the potential impact of a sugar-sweetened beverages tax on the budgets, dietary intake, and health of lower and higher socioeconomic groups in the Netherlands. *Arch Public Health* 78, 125 (2020). <https://doi.org/10.1186/s13690-020-00507-x>
- Farhud, D. D. (2015). Impact of lifestyle on health. *Iranian journal of public health*, 44(11), 1442.
- Feenstra, F. (2021). Reactivating Hospital, Active Patients Through Special Design. *HERD: Health Environments Research & Design Journal*, 14(1), 87-105. <https://doi.org/10.1177/1937586720966757>
- Freeman, C. (1995). The 'National System of Innovation' in historical perspective. *Cambridge Journal of economics*, 19(1), 5-24. <https://doi.org/10.1093/oxfordjournals.cje.a035309>
- Frenken, K. (2017). A complexity-theoretic perspective on innovation policy. *Complexity, Innovation and Policy*, 3(1), 35-47. <https://doi.org/10.20377/cgn-41>
- Gerten, E., Beckmann, M., & Bellmann, L. (2019). Controlling working crowds: The impact of digitalization on worker autonomy and monitoring across hierarchical levels. *Jahrbücher für Nationalökonomie und Statistik*, 239(3), 441-481. <https://doi.org/10.1515/jbnst-2017-0154>
- Haddad, C., Nakić, V., Bergek, A., & Hellsmark, H. (2019). The design and organization of innovation policy The policymaking process of transformative innovation policy: a systematic review. *4th Int. Conf. Public Policy* 1-45.
- Hekkert, M. P., Janssen, M. J., Wesseling, J. H., & Negro, S. O. (2020). Mission-oriented innovation systems. *Environmental Innovation and Societal Transitions*, 34, 76-79. <https://doi.org/10.1016/j.eist.2019.11.011>

- Hekkert, M. P., Suurs, R. A., Negro, S. O., Kuhlmann, S., & Smits, R. E. (2007). Functions of innovation systems: A new approach for analysing technological change. *Technological forecasting and social change*, 74(4), 413-432. <https://doi.org/10.1016/j.techfore.2006.03.002>
- Hung, L., Hudson, A., Gregorio, M., Jackson, L., Mann, J., Horne, N., ... & Phinney, A. (2021). Creating Dementia-Friendly Communities for Social Inclusion: A Scoping Review. *Gerontology and Geriatric Medicine*, 7, 23337214211013596. <https://doi.org/10.1177/23337214211013596>
- Janssen, M. J., Torrens, J. C. L., Wesseling, J., Wanzenböck, I., & Patterson, J. (2020). *Position paper 'Mission-oriented innovation policy observatory'*. Retrieved from: <https://www.uu.nl/sites/default/files/MIPO%20position%20paper%20-%20v21-05-2020.pdf>.
- Jusot, F., Or, Z., & Sirven, N. (2012). Variations in preventive care utilisation in Europe. *European Journal of Ageing*, 9(1), 15-25. <https://doi.org/10.1007/s10433-011-0201-9>
- Kaplan, R. M. (2000). Two pathways to prevention. *American Psychologist*, 55(4), 382–396. <https://doi.org/10.1037/0003-066X.55.4.382>
- Kobos, P.H., Malczynski L. N., Walker, D.J., Borns, and G. T Klise., (2018), Timing is everything: A technology transition framework for regulatory and market readiness levels, *Technological Forecasting and Social Change*, 137, 211-225. <https://doi.org/10.1016/j.techfore.2018.07.052>
- K. Krippendorff, 2013, *Content Analysis: An Introduction to Its Methodology*, 3rd ed. Thousand Oaks, CA, USA: Sage, PP. 221–250
- Lundvall, B.-Å., 1992. *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. Pinter, London
- Marmot, M. (2005). Social determinants of health inequalities. *The lancet*, 365(9464), 1099-1104. [https://doi.org/10.1016/S0140-6736\(05\)71146-6](https://doi.org/10.1016/S0140-6736(05)71146-6)
- Mazzucato, M. (2018). Mission-oriented innovation policies: challenges and opportunities. *Industrial and Corporate Change*, 27(5), 803-815. <https://doi.org/10.1093/icc/dty034>
- Mitchell, R., & Popham, F. (2008). Effect of exposure to natural environment on health inequalities: an observational population study. *The lancet*, 372(9650), 1655-1660. [https://doi.org/10.1016/S0140-6736\(08\)61689-X](https://doi.org/10.1016/S0140-6736(08)61689-X)
- Mohnen, S. M., Groenewegen, P. P., Völker, B., & Flap, H. (2011). Neighborhood social capital and individual health. *Social science & medicine*, 72(5), 660-667. <https://doi.org/10.1016/j.socscimed.2010.12.004>
- Mulgan, G., Tucker, S., Ali, R., & Sanders, B. (2007). *Social innovation: what it is, why it matters and how it can be accelerated*. Retrieved from: <https://wayback.archive-it.org/org-467/20200807110009/https://eureka.sbs.ox.ac.uk/761/>
- Murray, E., Hekler, E. B., Andersson, G., Collins, L. M., Doherty, A., Hollis, C., ... & Wyatt, J. C. (2016). Evaluating digital health interventions: key questions and approaches. <https://doi.org/10.1016/j.amepre.2016.06.008>

- Nandhini, B. S., & Sheeba, J. I. (2015). Online social network bullying detection using intelligence techniques. *Procedia Computer Science*, *45*, 485-492. <https://doi.org/10.1016/j.procs.2015.03.085>
- Odgers, C. L., & Jensen, M. R. (2020). Annual Research Review: Adolescent mental health in the digital age: facts, fears, and future directions. *Journal of Child Psychology and Psychiatry*, *61*(3), 336-348. <https://doi.org/10.1111/jcpp.13190>
- Pel, B., Haxeltine, A., Avelino, F., Dumitru, A., Kemp, R., Bauler, T., ... & Jørgensen, M. S. (2020). Towards a theory of transformative social innovation: A relational framework and 12 propositions. *Research Policy*, *49*(8), 104080. <https://doi.org/10.1016/j.respol.2020.104080>
- Pol, E., & Ville, S. (2009). Social innovation: Buzz word or enduring term?. *The Journal of socio-economics*, *38*(6), 878-885. <https://doi.org/10.1016/j.socec.2009.02.011>
- Renalds, A., Smith, T. H., & Hale, P. J. (2010). A systematic review of built environment and health. *Family & community health*, *33*(1), 68-78. doi: 10.1097/FCH.0b013e3181c4e2e5
- Sachs, J. D., Schmidt-Traub, G., Mazzucato, M., Messner, D., Nakicenovic, N., & Rockström, J. (2019). Six transformations to achieve the sustainable development goals. *Nature Sustainability*, *2*(9), 805-814. <https://doi.org/10.1038/s41893-019-0352-9>
- Sagner, M., McNeil, A., Puska, P., Auffray, C., Price, N. D., Hood, L., ... & McEwen, B. S. (2017). The P4 health spectrum—a predictive, preventive, personalized and participatory continuum for promoting healthspan. *Progress in cardiovascular diseases*, *59*(5), 506-521. <https://doi.org/10.1016/j.pcad.2016.08.002>
- Sandén, B. A., & Hillman, K. M. (2011). A framework for analysis of multi-mode interaction among technologies with examples from the history of alternative transport fuels in Sweden. *Research Policy*, *40*(3), 403-414. <https://doi.org/10.1016/j.respol.2010.12.005>
- Sardi, L., Idri, A., & Fernández-Alemán, J. L. (2017). A systematic review of gamification in e-Health. *Journal of biomedical informatics*, *71*, 31-48. <https://doi.org/10.1016/j.jbi.2017.05.011>
- Schot, J., & Steinmueller, W. E. (2018). Three frames for innovation policy: R&D, systems of innovation and transformative change. *Research Policy*, *47*(9), 1554-1567. <https://doi.org/10.1016/j.respol.2018.08.011>
- Smit, L. A., & Heederik, D. (2017). Impacts of intensive livestock production on human health in densely populated regions. *GeoHealth*, *1*(7), 272-277. <https://doi.org/10.1002/2017GH000103>
- Steward, F. (2012). Transformative innovation policy to meet the challenge of climate change: sociotechnical networks aligned with consumption and end-use as new transition arenas for a low-carbon society or green economy. *Technology Analysis & Strategic Management*, *24*(4), 331-343. <https://doi.org/10.1080/09537325.2012.663959>
- Suurs, R. A. (2009). *Motors of sustainable innovation: Towards a theory on the dynamics of technological innovation systems*. Utrecht University.

- Terstriep, J., & Rehfeld, D. (2020). Bridging local embeddedness and global dynamics—the economics of social innovation. <https://doi.org/10.1080/09654313.2020.1766106>
- van Rij, E., & Altes, W. K. K. (2014). Integrated air quality and land use planning in The Netherlands. *International Journal of Law in the Built Environment*, 6(1/2), 194-210. <https://doi.org/10.1108/IJLBE-03-2013-0007>
- Walt, G., & Gilson, L. (1994). Reforming the health sector in developing countries: the central role of policy analysis. *Health policy and planning*, 9(4), 353-370.
- Wanzenböck, I., & Frenken, K. (2020). The subsidiarity principle in innovation policy for societal challenges. *Global Transitions*, 2, 51-59. <https://doi.org/10.1016/j.glt.2020.02.002>
- Wanzenböck, I., Wesseling, J. H., Frenken, K., Hekkert, M. P., & Weber, K. M. (2020). A framework for mission-oriented innovation policy: Alternative pathways through the problem–solution space. *Science and Public Policy*, 47(4), 474-489. <https://doi.org/10.1093/scipol/scaa027>
- Wenzel, M., Krämer, H., Koch, J., & Reckwitz, A. (2020). Future and Organization Studies: On the rediscovery of a problematic temporal category in organizations. *Organization Studies*, 41(10), 1441-1455. <https://doi.org/10.1177%2F0170840620912977>
- Wesseling, J., & Meijerhof, N. (2021, June 29). Developing and applying the Mission-oriented Innovation Systems (MIS) approach. <https://doi.org/10.31235/osf.io/xwg4e>
- Wittmann, F., Hufnagl, M., Lindner, R., Roth, F., & Edler, J. (2020). *Developing a typology for mission-oriented innovation policies (No. 64)*. Fraunhofer ISI Discussion Papers- Innovation Systems and Policy Analysis.

### Non-scientific

- Austerlitz Zorgt. (n.d). Austerlitz Zorgt. Retrieved from: <https://www.austerlitzzorgt.nl/>
- Cloudwatchhub. (n.d.). Readiness for Market: More than completing software development. Retrieved from: <https://www.cloudwatchhub.eu/exploitation/readiness-market-more-completing-software-development>
- Elsevier. (2018). Quantitative Analysis of Dutch Research and Innovation in Key Technologies. Retrieved from: <https://www.elsevier.com/research-intelligence/resource-library/quantitative-analysis-of-dutch-research-and-innovation-in-key-technologies>
- European Commission. (2014). Framework for State aid for research and development and innovation. Retrieved from: [https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:52014XC0627\(01\)](https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:52014XC0627(01))
- European Commission. (2019a). Horizon Europe. Retrieved from: [https://ec.europa.eu/info/sites/info/files/research\\_and\\_innovation/knowledge\\_publications\\_tools\\_and\\_data/documents/ec\\_rtd\\_factsheet-horizon-europe\\_2019.pdf](https://ec.europa.eu/info/sites/info/files/research_and_innovation/knowledge_publications_tools_and_data/documents/ec_rtd_factsheet-horizon-europe_2019.pdf)
- European Commission. (2019b). State of Health in the EU: The Netherlands Country Health Profile 2019. Retrieved from: [https://ec.europa.eu/health/sites/default/files/state/docs/2019\\_chp\\_nl\\_english.pdf](https://ec.europa.eu/health/sites/default/files/state/docs/2019_chp_nl_english.pdf)

- Goetheer, A., van der Zee, F. A., & de Heide, M. J. L. (2018). De Staat van Nederland Innovatieland 2018: Missies en 'Nieuw' Missiegedreven Beleid. Retrieved from: <http://publications.tno.nl/publication/34627285/45Et7M/goetheer-2018-staat.pdf>.
- Innovation Fund Denmark. (n.d.). Societal Readiness Levels (SRL) defined according to Innovation Fund Denmark. Retrieved on 07-01-2021 from: [https://innovationsfonden.dk/sites/default/files/2018-08/societal\\_readiness\\_levels\\_-\\_srl.pdf](https://innovationsfonden.dk/sites/default/files/2018-08/societal_readiness_levels_-_srl.pdf)
- Limburg Positief Gezond (n.d.) Retrieved from: <https:// limburgpositiefgezond.nl/>
- Ministry of Economic Affairs and Climate Policy (2018). Naar Missiegedreven Innovatiebeleid met Impact. Retrieved from: <https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/kamerstukken/2018/07/13/kamerbrief-naar-missiegedreven-innovatiebeleid-met-impact/Kamerbrief+Naar+Missiegedreven+Innovatiebeleid+met+Impact.pdf>
- Ministry of Economic Affairs and Climate Policy (2019a). Missies voor de toekomst. Retrieved from: <https://www.topsectoren.nl/binaries/topsectoren/documenten/publicaties/2019-publicaties/september-2019/23-09-19/factsheet-missies-voor-de-toekomst/Factsheet+Missies+voor+de+Toekomst.pdf>
- Ministry of Economic Affairs and Climate Policy (2019b). Missiegedreven Topsectoren- en Innovatiebeleid. Retrieved from <https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/kamerstukken/2019/04/26/kamerbrief-over-missiegedreven-topsectoren-en-innovatiebeleid/kamerbrief-over-missiegedreven-topsectoren-en-innovatiebeleid.pdf>
- Ministry of Economic Affairs and Climate Policy. (2019c). Instellingsbesluit topteam Missiegedreven Topsectoren- en Innovatiebeleid. Retrieved from: <https://zoek.officielebekendmakingen.nl/stcrt-2019-71799.html>
- Ministry of Health, Welfare and Sport. (2016) Het Nederlandse zorgstelsel. Retrieved from: <https://www.rijksoverheid.nl/documenten/brochures/2016/02/09/het-nederlandse-zorgstelsel>
- Ministry of Health, Welfare and Sport. (2018). Nationaal Preventieakkoord. Retrieved from: <https://www.rijksoverheid.nl/ministeries/ministerie-van-volksgezondheid-welzijn-en-sport/documenten/convenanten/2018/11/23/nationaal-preventieakkoord>
- Menzis. (2018). Shared Savings. Retrieved from: <https://www.menzis.nl/zorgaanbieders/zorginkoopbeleid-2017/shared-savings>
- Monnie Movement. (n.d.) Seev. Retrieved from : <https://www.seevapp.nl/>
- NASA. (2012). Technology Readiness Level. Retrieved from: [https://www.nasa.gov/directorates/heo/scan/engineering/technology/txt\\_accordion1.html](https://www.nasa.gov/directorates/heo/scan/engineering/technology/txt_accordion1.html)
- NWO. (n.d.). NWO. Retrieved from: <https://www.nwo.nl/>
- NWO. (2020). Missiegedreven Calls KIC. Retrieved from: <https://www.nwo.nl/onderzoeksprogrammas/kennis-en-innovatieconvenant-kic/missiegedreven-calls-kic-2020-2023>

- Ministry of Health, Welfare and Sport. (2021). Regiobeelden. Retrieved from:  
<https://www.dejuistezorgopdejuisteplek.nl/regiobeelden/meer-informatie/>
- RIVM. (2005). Trends in the environmental burden of disease in the Netherlands, 1980-2020. Retrieved from: <https://www.rivm.nl/publicaties/trends-in-environmental-burden-of-disease-in-netherlands-1980-2020>
- RIVM. (2018a). Gezondheidsverschillen. Retrieved from: <https://www.vtv2018.nl/gezondheidsverschillen>
- RIVM. (2018b). Ranglijst aandoeningen op basis van ziektelast (in DALY's). Retrieved from:  
<https://www.volksgezondheidenzorg.info/ranglijst/ranglijst-aandoeningen-op-basis-van-ziektelast-dalys>
- RIVM. (2020). Monitor missies Gezondheid en Zorg. Retrieved from:  
<https://www.volksgezondheidenzorg.info/monitormissiesgezondheidenzorg/achtergrond>
- RIVM. (2021). Ziektelast in DALY's. Retrieved from: <https://www.volksgezondheidenzorg.info/ziektelast-nederland>
- RIVM. (n.d.). Rijksvaccinatieprogramma. Retrieved from: <https://rijksvaccinatieprogramma.nl/>
- RVO. (n.d.). RVO. Retrieved from: <https://www.rvo.nl/>
- TNO. (2019). Societal Embeddedness Level method.
- Top Sectors. (n.d.).> Topsectoren. Retrieved from: <https://www.topsectoren.nl/innovatie>
- Health Holland . (2019a). Dutch cabinet established 25 missions for the future: 5 address health & care. Retrieved from: <https://www.health-holland.com/news/2019/05/missiegedreven-innovatiebeleid>
- Health Holland. (2019b). Gezondheid & Zorg: Kennis- en Innovatieagenda 2020-2023. Retrieved from:  
<https://www.health-holland.com/publications/useful-documents/kia>
- Health Holland. (2019c). Gezondheid & Zorg: Kennis- en Innovatieconvenant 2020-2023. Retrieved from:  
<https://www.health-holland.com/publications/useful-documents/kic>
- Health Holland. (2021a). Jaarverslag 2020. Retrieved from: <https://www.health-holland.com/sites/default/files/downloads/Jaarverslag%202020.pdf>
- Health Holland (2021b). Toekomstbeelden 2030. Retrieved from: <https://www.health-holland.com/publications/useful-documents/toekomstbeelden-2030>
- Health Holland. (n.d.). PPP Allowance (Match Call). Retrieved from: <https://www.health-holland.com/funding-opportunities/tki-match>
- Top Sector Agri & Food, Top Sector Horticulture & Top Sector Water. (2021). Kennis- en Innovatieagenda. Retrieved from: <https://kia-landbouwwatervoedsel.nl/documenten/>
- Holland High Tech. (2019). Kennis en Innovatieagenda Sleuteltechnologieën. Retrieved from:  
<https://www.hollandhightech.nl/kia-sleuteltechnologieen>
- ClickNL. (2020). Onderzoeksagenda sleutelmethodeologieën (KEM's) voor missiegedreven innovatie. Retrieved from: <https://www.clicknl.nl/onderzoeksagenda-kems-missiegedreven-innovatie/>
- HealthKIC. (2021). Totstandkoming Kavelmodel. Retrieved from: <https://www.kic.nl/artikel-totstandkoming-kavelmodel>

- Vereniging Hogescholen. (2021). Aanmelden voor nieuwsbrief 'hbo KIC-inzet). Retrieved from:  
<https://www.vereniginghogescholen.nl/kennisbank/praktijk-en-onderzoek/artikelen/aanmelden-voor-nieuwsbrief-hbo-kic-inzet>
- ZonMw. (n.d.). ZonMw. Retrieved from: <https://www.zonmw.nl/>
- ZonMw. (2020). NOW Kennis- en Innovatie Convenant. Retrieved from : <https://www.zonmw.nl/nl/onderzoek-resultaten/nwo-kennis-en-innovatie-convenant/>
- ZonMw. (2021). Call 'Citizen Science voor Gezondheid en Zorg' opent 11 februari. Retrieved from:  
<https://www.zonmw.nl/nl/actueel/nieuws/detail/item/call-citizen-science-voor-gezondheid-en-zorg-opent-11-februari/>
- Zorginstituut Nederland. (n.d.). Gecombineerde Leefstijlinterventie (GLI) (Zvw). Retrieved from:  
<https://www.zorginstituutnederland.nl/Verzekerde+zorg/gecombineerde-leefstijlinterventie-gli-zvw>



## Appendix A: Interview guide (based on Wesseling & Meijerhof, 2021)

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### General questions

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- |  |   |
|--|---|
| 1. How do you/how does your organisation contribute to health mission I/prevention/a healthy lifestyle and living environment?                 | - Some follow-up questions based on the expertise and background of the specific interviewee. |
| 2. Based on your opinion, what are the respective roles of technological and social solutions in reaching health mission I?                    |   |
| 3. Based on your opinion, which technological and social solutions for health mission I get the most attention and support in the Netherlands? |   |

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### Identification of system function strengths and weaknesses

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- |  |  |
|--|--|
| 4. On a scale of 1-5, how much <b>entrepreneurship</b> (start-ups, new business models, experiments with new solutions) lifestyle and living environment related health solutions exists in the Netherlands? | - How does the implementation of health mission I influence this?<br>- Is there a difference in social and technological entrepreneurship? |
| 5. On a scale of 1-5, to what extent is enough of the right <b>knowledge and R&amp;D</b> developed related to lifestyle and living environment in the Netherlands?   | - How does the implementation of health mission I influence this?<br>- Is there a difference in social and technological knowledge?        |
| 6. On a scale of 1-5, to what extent is <b>knowledge</b> related to lifestyle and living environment <b>diffused</b> to stakeholders in the Netherlands?   | - How does the implementation of health mission I influence this?<br>- Is there a difference in social and technological knowledge?        |
| 7. On a scale of 1-5, to what extent are <b>stakeholders actively involved</b> with health mission I?  |  |

8. On a scale of 1-5, to what extent is there a clear **vision** about which with lifestyle and living environment related health solutions can contribute to mission I?
9. On a scale of 1-5, to what extent is the **progress** of mission I **measured**/mapped and evaluated?
10. On a scale of 1-5, to what extent is there a **market** for lifestyle and living environment related health solutions in the Netherlands?
11. On a scale of 1-5, to what extent is it possible to obtain **financial or other resources** for developing lifestyle and living environment related health solutions in the Netherlands?
12. On a scale of 1-5, to what extent are stakeholders of mission I involved in **lobbying** activities for (certain) lifestyle and living environment related health solutions
13. Are there any strengths and weaknesses influencing mission I still to be discussed?
- Does this lead to a readjusting of the plans?
  - How does the implementation of health mission I influence this?
  - Is there a difference for social and technological solutions?
  - How does the implementation of health mission I influence this?
  - Is there a difference for social and technological solutions?
  - How does the implementation of health mission I influence this?
  - Is there a difference for social and technological solutions?

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### Dealing with barriers

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14. In your opinion, what is necessary to reduce barriers to reaching health mission I?
15. In your opinion, which legislative changes can potentially support health mission I?
-

## **Appendix B: Information Letter for Interviewees**

Dit interview draagt bij aan mijn scriptieonderzoek naar de stand van zaken van gezondheidsmissie I van het topsectorenbeleid:

*“In 2040 is de ziektelast door een ongezonde leefstijl en -omgeving met 30% afgenomen.”*

Specifiek ben ik benieuwd naar:

- hoe deze missie en het netwerk eromheen tot stand zijn gekomen en zich tot nu toe hebben ontwikkeld,
- hoe zowel technologische en sociale oplossingen kunnen bijdragen aan de gestelde maatschappelijke problemen, en hoe deze zich ontwikkelen wanneer de missie is geformuleerd,
- welke barrières men tegenkomt in de praktijk,
- en hoe deze barrières aangepakt (kunnen) worden.

Dit interview zal circa 45-60 minuten in beslag nemen. Met uw toestemming, neem ik graag het interview op, transcribeer ik het en zal ik de informatie van het interview in mijn thesis gebruiken. Alle informatie zal opgeslagen worden volgens de wet Algemene Verordening Gegevensbescherming (AVG). In mijn thesis zal ik geen namen van individuen noemen, maar wellicht wel enkele functietitels en enkele individuele quotes. Voor publicatie zal ik hiervoor nog per mail toestemming vragen. Geeft u hier toestemming voor in de wetenschap dat u ten alle tijden tijdens of na het interview uw toestemming in kan trekken?

### **Algemene vragen over gezondheidsmissie I**

16. Hoe draagt u/uw organisatie bij aan gezondheidsmissie I/preventie/een gezonde leefstijl en -omgeving?
17. Naar uw mening, welke technologische en sociale oplossingen die bijdragen aan gezondheidsmissie I krijgen de meeste aandacht en support in Nederland?

### **Mogelijke barrières van gezondheidsmissie I**

18. Op een schaal van 1-5, hoeveel ondernemerschap (startups, nieuwe verdienmodellen, experimenten met nieuwe oplossingen) rondom leefstijl gerelateerde gezondheidsoplossingen is er in Nederland?
19. Op een schaal van 1-5, in hoeverre is er genoeg van de juiste kennis en R&D rondom leefstijl gerelateerde gezondheidsoplossingen in Nederland?
20. Op een schaal van 1-5, in hoeverre verspreidt kennis rondom leefstijl gerelateerde gezondheidsoplossingen zich effectief in Nederland?
21. Op een schaal van 1-5, in hoeverre zijn stakeholders actief betrokken bij gezondheidsmissie I?
22. Op een schaal van 1-5, in hoeverre is er een duidelijke visie over welke leefstijl gerelateerde gezondheidsoplossingen bij kunnen dragen aan gezondheidsmissie I?

23. Op een schaal van 1-5, in hoeverre wordt de voortgang van gezondheidsmissie I gemeten/in kaart gebracht en de bijbehorende doelen geëvalueerd?
24. Op een schaal van 1-5, in hoeverre is er een markt voor leefstijl gerelateerde gezondheidsoplossingen in Nederland?
25. Op een schaal van 1-5, in hoeverre is het mogelijk om financiële of andere middelen voor leefstijl gerelateerde gezondheidsoplossingen te verkrijgen in Nederland?
26. Op een schaal van 1-5, in hoeverre doen stakeholders van gezondheidsmissie I aan '*lobbying*' voor (bepaalde) leefstijl gerelateerde gezondheidsoplossingen in Nederland?
27. Behalve de barrières die al zijn besproken, ervaart u nog andere barrières voor het behalen van gezondheidsmissie I/het verspreiden van leefstijl gerelateerde oplossingen in Nederland?

#### **Het wegnemen van barrières**

28. Naar uw mening, wat is er nodig om barrières die gezondheidsmissie I/het verspreiden van leefstijl gerelateerde oplossingen in de weg staan te verminderen in Nederland?
29. Naar uw mening, welke veranderingen aan wet- en regelgeving kan de Nederlandse overheid doorvoeren om gezondheidsmissie I/het verspreiden van leefstijl gerelateerde oplossingen beter te ondersteunen?

### Appendix C: Calculation of Krippendorff's Alpha (Krippendorff, 2014)

In table C it can be seen how the fragments were recoded for the calculation of Krippendorff's Alpha. The numbers each represent one of the system functions, of which there are nine coding categories. Below the table, the calculation that was performed in R is shown.

**Table C**

*Coded fragments used for the calculation of Krippendorff's Alpha*

<b>Fragment</b>	<b>Coder 1</b>	<b>Coder 2</b>	<b>Coder 3</b>	<b>Coder 4</b>
<b>1</b>	1	1	1	1
<b>2</b>	3	3	3	3
<b>3</b>	5	5	5	5
<b>4</b>	7	7	7	7
<b>5</b>	2	2	2	2
<b>6</b>	9	9	9	9
<b>7</b>	7	9	8	1
<b>8</b>	8	8	8	8
<b>9</b>	5	5	5	5
<b>10</b>	3	3	3	3
<b>11</b>	4	4	4	4
<b>12</b>	7	7	7	7
<b>13</b>	1	5	1	3
<b>14</b>	7	4	5	2
<b>15</b>	7	4	9	9
<b>16</b>	1	1	5	5
<b>17</b>	4	1	4	4
<b>18</b>	9	9	9	9
<b>19</b>	3	3	3	3
<b>20</b>	2	2	2	2
<b>21</b>	6	8	5	6
<b>22</b>	2	2	2	2
<b>23</b>	6	6	6	6
<b>24</b>	8	8	8	8
<b>25</b>	1	1	1	1
<b>26</b>	6	6	6	6
<b>27</b>	7	7	7	7
<b>28</b>	8	8	8	8
<b>29</b>	4	7	5	4
<b>30</b>	2	2	2	2

```

> data <- read.csv("finalkrippa.csv", sep=';', head=TRUE)
> data2 <- as.matrix(data)
> data3 <- t(data2)
> library(DescTools)
> KrippAlpha(data3, method="nominal")
$method
[1] "Krippendorff's alpha"

$subjects
[1] 29

$raters
[1] 4

$irr.name
[1] "alpha"

$value
[1] 0.7474527

$stat.name
[1] "nil"

$statistic
NULL

$cm
      [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9]
[1,]   16    0    2    3    6    0    1    1    1
[2,]    0   48    0    1    1    0    1    0    0
[3,]    2    0   36    0    1    0    0    0    0
[4,]    3    1    0   20    3    0    4    0    2
[5,]    6    1    1    3   26    2    2    1    0
[6,]    0    0    0    0    2   26    0    2    0
[7,]    1    1    0    4    2    0   36    1    3
[8,]    1    0    0    0    1    2    1   36    1
[9,]    1    0    0    2    0    0    3    1   26

$data.values
[1] "1" "2" "3" "4" "5" "6" "7" "8" "9"

$nmatchval
[1] 348

$data.level
[1] "nominal"

attr(,"class")
[1] "irrlist"

```