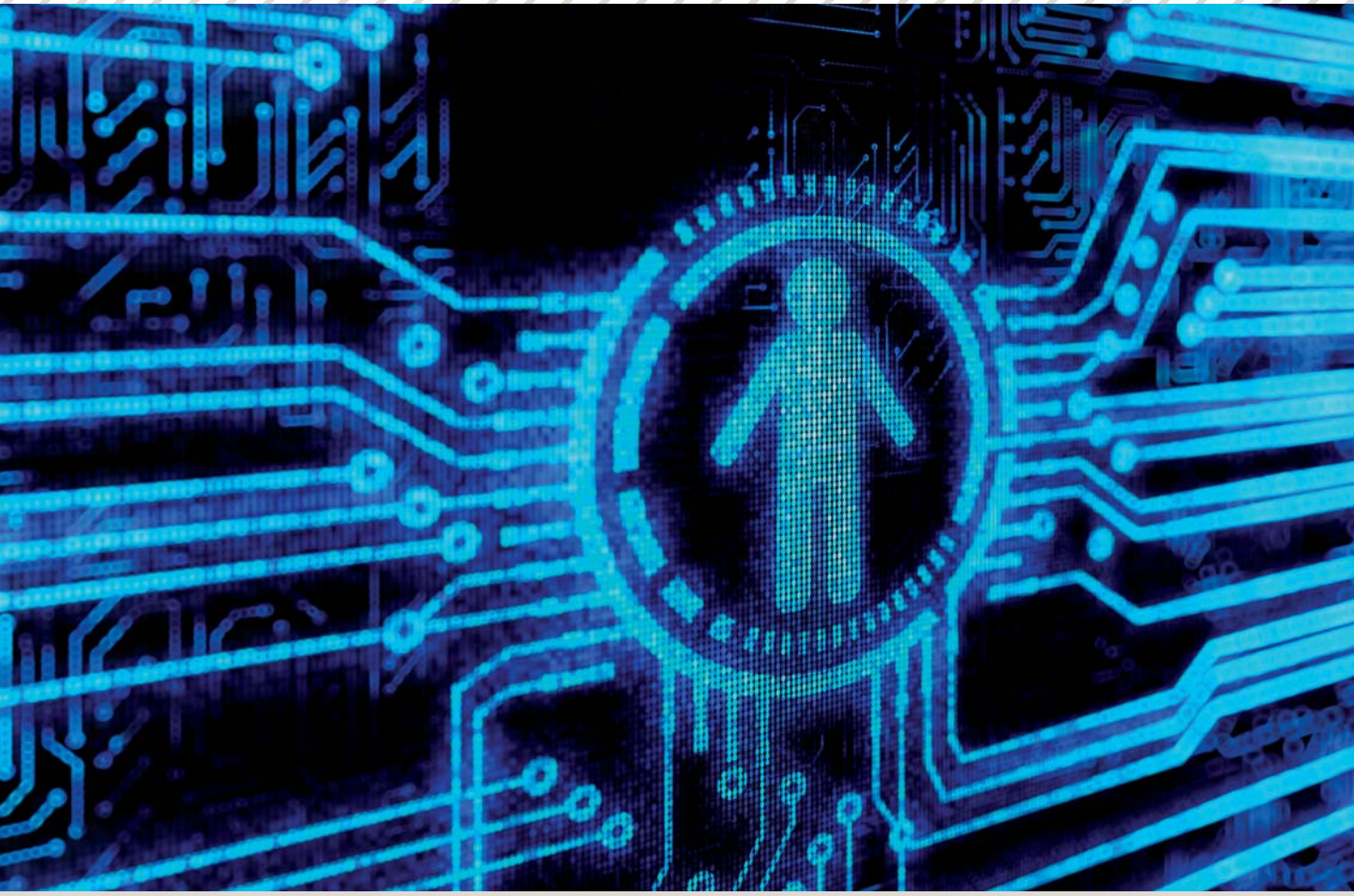
Science System Assessment

Societal Impact Analysis Next Generation Infrastructures

Final Report



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Content

Preface

Next Generation Infrastructures is pleased to present this Social Impact Analysis Report.

Since 2004, when we started our scientific mission to acquire a better understanding of the behavior of infrastructures system, we have seen a vibrant international community emerge in the new discipline of infrastructure systems engineering. More recently we have shifted our focus towards the intended users of our knowledge and actively pursued our societal mission: to help improving infrastructures. To support us in finding and using the mechanisms at work in making impacts on society, we commissioned the Rathenau Institute to perform a detailed impact study.

This report shows that it is difficult to measure the societal impact of research that is largely conceptual, and rarely results in tangible devices or practices that are ready to be implemented. Furthermore, the capital intensity of infrastructure systems and their deep embeddedness in society and the economy imply that they cannot be changed quickly. Change in the world of infrastructures takes a long time, and patience is needed to see the societal impact of our work unfold.

From this report we draw encouragement to further nourish the dialogue between researchers and practitioners so that our theories, insights, simulation games and models continue to find their way to the users.
In time, this dialogue will yield increasing societal impact of Next Generation Infrastructures. We are proud to learn that we are well underway to really make a difference in society.

On behalf of the management team Next Generation Infrastructures,
prof.dr.ir Margot Weijnen

Summary

In this report we present a systematic analysis of the societal impact of the research programme Next Generation Infrastructures. This is a ~50% government funded research programme that runs from 2004-2014.

The aim of our study is twofold. The first aim of this study is to identify the contributions of the research programme to practitioners of infrastructures in the Netherlands. The second aim is to get an insight into the mechanisms through which the research programme has had impact. Based on these insights, NG Infra programme management can enhance the programme activities concerning stakeholder involvement and societal impact.

Approach

Societal impact of scientific research refers to measurable effects of the research funded by the programme in the domain of infrastructures. ‘Measurable’ in this definition is understood both in terms of quantifiable indicators and qualitative measures (‘indications’). With ‘effects’, we refer to changes in use or behaviour of organisations or people (for example using new instruments, introducing new protocols, and so on).

The study has been structured by four research questions:

1. How is the research programme organised in terms of activities, output and outcomes - especially in terms of realising impact among its stakeholders?
2. To what extent and in what ways are societal stakeholders involved in NG Infra and its projects?
3. What impact does NG Infra and its projects have on the activities of stakeholders?
4. How does the organisation of NG Infra and stakeholder involvement relate to the impact it has?

For the analysis we interviewed programme management and theme leaders; we analysed programme documents; we surveyed researchers for all projects funded by NG Infra; we interviewed stakeholders; and we did three case studies on impacts on specific infrastructural developments.

There are some limitations that need to be taken into account in the interpretation of the results. The programme is still running and some of the projects are even still in their start-up phase. While research projects can have an impact already in an early phase, their full impact can only be expected after they have been finished. The programme has an international component, especially through collaborations with partners in India, Germany, Switzerland, Italy, China, Norway and Canada. For pragmatic reasons the impact of these international activities are not analysed in this report.

Results

NG Infra started off as a scientific research programme with little organisation of stakeholder interactions and impact. Since 2008, it has put more effort in stakeholder involvement and impact. NG Infra developed several practices to do so, of which the two dissemination themes,

the Academy, HubHolland Magazine and a programme-wide conference stand out. Furthermore, industry involvement became a project selection criterion. Stakeholder involvement and impact is organised similarly to scientific research; there is a high level of freedom for individual researchers and projects. This is reflected by the different perceptions that theme leaders have of their roles. Some themes organize theme-wide publications or conferences, while others don't. Some theme leaders steer on social relevance; others leave this up to project leaders. An indication of this high level of the self-government of themes and projects is the scattered output pattern of the projects. Many types of outputs are produced, but most of them only in small numbers.

Research projects of NG Infra are relevant to the full range of infrastructural sectors and to different kinds of stakeholders. From the survey we also learn that stakeholders that used the research results are rather heterogeneous and come from a range of different infrastructural sectors. Stakeholders are mainly involved at the programme level and in individual research projects.

Most projects are organised as scientific projects. Very few projects are set up as collaborative projects with stakeholders for the co-creation of knowledge in order to integrate scientific knowledge and practitioners experiences into innovative technologies. In making its research projects more user oriented or get stakeholders more involved, NG Infra might learn from the experiences of others. We know other national research programmes and the Technology Foundation (STW) have successfully tried this before.

The impacts we found are predominantly immediate impacts. Some are intermediate impacts. The most dominant immediate impacts of NG Infra can be summarised as network creation and the changed insights of societal actors. The perception of researchers on the intermediate and ultimate impacts and the results of stakeholder interviews and case studies diverge. Rather high numbers of researchers agreed with statements on the intermediate and ultimate impacts. In the stakeholder views, the importance of NG Infra was acknowledged, but few long-term impacts on organisational practices were reported. These interview results are supported by the case studies.

Most significant is the success of the impact organised at the level of the two dissemination themes, Serious Gaming and the Asset Management Platform. Within the sector and within the knowledge portfolio of NG Infra, likely there are more topics for such dissemination themes. The advantage of organising interactions and impact at the theme level is that knowledge from different projects can be integrated and the efforts get critical mass, both in terms of research results and stakeholders.

At programme level, NG Infra has organised activities like the Academy and programme conferences and network meetings which are highly valued by the stakeholder community and facilitate unplanned knowledge exchange. Dedicated publications like HubHolland Magazine also contribute to the appreciation of stakeholders for NG Infra.

Results of NG Infra can have more impact if results of the projects and expertise of NG Infra researchers are better communicated at programme level. Contributions of NG Infra to important political, societal and organisational issues such as the unbundling of energy companies were invisible in the first phase of the program. In the current phase, the programme might more

openly consider supporting public debate and decision making. Such a public communication strategy requires both facilitation at programme level and the dedication of individual researchers.

In our study, we have tried to take into account the impact NG Infra has had through education at PhD level and the involvement of master's students in projects. The training of new professionals is often perceived by stakeholders as the best impact that university research programmes can have. Probably for organisational reasons, the full performance of the research programme in terms of education is not visible, as PhD graduates and current affiliations are monitored, while this is not being done for Master graduates. It would contribute to NG Infra's profile within the stakeholder community if the impact through education would be mapped more systematically.

Recommendations

The results reflect an increased focus on dissemination, but not yet in an unambiguous way. For the programme these results raise the question of how to move forwards and how to further improve the programme's impact on infrastructural policies and practices in the Netherlands and abroad. Based on our analyses we have formulated six options to consider for the programme board.

1. Formulate more clearly a specific strategy for realising impact, taking into account the academic character of the programme.
2. Map impact performances that relate to the impact strategy more systematically.
3. Build a database of stakeholders involved or interested in the programmes, which can serve as a means to improve regular stakeholder interactions.
4. Involve theme leaders and the programme's other core researchers more directly into the management of impact.
5. Create new dissemination themes on issues that reflect the knowledge needs of stakeholders or critical issues in current infrastructural developments around related projects.
6. Improve stakeholder interactions by creating proper mechanisms that assure that interested stakeholders are kept informed during projects. Have graduate students involved in these interactions.
7. Develop stakeholder relations at different levels and with different expertise in the case of large organisations.

1 Introduction

In the last two decades, throughout Europe there have been enormous developments in what once were stable foundations of modern societies: public infrastructures for water, electricity, gas, communication, transportation, and so on. After decades of use, many became outdated and faced huge maintenance and renewal projects requiring equally huge investments. One by one, country by country and sector by sector, infrastructure companies and governments have been confronted with new technological developments that require and allow new forms of infrastructural management, new services and new consumer relationships. Monopolists are confronted with competition and many of the state companies are privatised. Competition increasingly becomes an international matter; from regional and national to European and global. Companies face the liberalisation and vertical disintegration of generators and distributors of, e.g., energy and telecommunication.

Against the backdrop of these substantive and ongoing changes in infrastructures, the research programme Next Generation Infrastructures (NG Infra[1]) started off in 2004 with support from the Dutch BSIK programme[2]. The main objective of the NG Infra programme is *'to understand how infrastructures work and to develop practical solutions that will steer infrastructural developments'* (NG Infra, 2011). In more practical terms, it wants to prepare infrastructures for the future. To this end, the programme NG Infra aims to gain insight into the functioning of infrastructures, to generate practical solutions, and to educate *'a new generation of researchers that is familiar with both technical and institutional aspects of infrastructures.'* As a result of these activities, dissatisfaction about the functioning of infrastructures should decrease, allowing infrastructure companies to maintain good relations with both the government and customers. Clearly, NG Infra does not only aspire to develop scientific knowledge, but also to have a practical impact on Dutch infrastructures.

In the midterm evaluation of NG Infra, it was concluded that the programme had developed strong relations with societal partners and a number of projects had resulted in outcomes that are of direct importance to the actors involved. However, to date a systematic overview of societal impact at the programme level is not available. Given the practical aspects of its mission, it is difficult to evaluate NG Infra's success without such an overview. Moreover, there is a lack of knowledge regarding the factors or conditions that facilitate the generation of societal impact in a research programme like NG Infra.

The board of the programme has commissioned a societal impact analysis to the Rathenau Instituut. In this report we present a systematic analysis of the societal impact of the NG Infra research programme up to know. The programme itself will run until 2014.

The study is one in a series of studies of the Rathenau Instituut on impact of research. Some of these studies have aimed at developing an approach to evaluate societal contributions in the

1 We noticed researchers frequently use the abbreviation 'NG Infra', while societal actors opt for 'NGI'. Within Dutch science studies NGI often refers to the Dutch Genomics Initiative, a task force linked to the research council NWO. To avoid misunderstandings, in this report we will use the abbreviation NG Infra.

2 BSIK programmes (37 in total) are funded by the Dutch government with an overall budget of €802 million. They typically run four to six years and conduct basic research in multiple projects. Research results are translated into new products, processes or societal concepts. The research consortia are responsible for external knowledge transfer and dissemination (Agentschap NL, 2011).

context of the Dutch audit system for academic research. Others aim at understanding the dynamics of societal impact and analyse how research programme activities have induced interactions between researchers and their social stakeholders. Behind these studies is a perspective on the societal impact of research which focuses on the immediate impacts from the interactions with stakeholders. The advantage is that impact can be empirically researched and results can be related to ongoing research programmes.

1.1 Impact

Often societal impact of research is associated with large effects of scientific research to society in terms of sustainability, health, economic welfare, and so on. Without questioning the value of science for society, usually these effects are not attributable to specific research projects or research programmes. In our study, societal impact of scientific research refers to measurable effects of the research funded by the programme in the domain of infrastructures. 'Measurable' in this definition is understood both in terms of quantifiable indicators and of qualitative measures ('indications'). With 'effects', we refer to changes in use or behaviour of organisations or people (for example using new instruments, introducing new protocols, and so on). We identify such changes both in terms of realised changes and intended changes.

There are different ways to measure the effects. Literature on societal impact of research is dominated by literature on economic impact. Part of this literature studies impacts econometrically, at a high aggregation level. Results seem to depend very much on assumptions, are not related to specific research activities, and, in general, are not considered to be very reliable (Salter & Martin, 2001). In a bibliometric study on 'knowledge utilisation' Estabrooks, Derksen et al. (2008) found that most of this literature is (still) based on models of innovation diffusion and technology transfer.

Literature on non-economic impact is limited, apart from a body of knowledge on the use of research in policy processes (e.g. Weiss, 1979; 1980). More recently this research has taken up insights from science studies and looks at the boundary work that structures the relation between research and policy (e.g. Halffman, 2003; Hoppe, 2005). These studies look at impact in terms of modes of use and transformation of knowledge in the policy process (Maassen & Weingart, 2005). While policy impact is an important contribution of scientific research, it is far from the only one. Moreover, once part of the policy process, the specific contributions of research programmes get subjected to other forces and the actual outcome can hardly be ascribed to the programme itself.

There is a third, emerging stream of literature which focuses on the knowledge exchange and interactions between researchers and other societal actors (firms, NGOs or governmental bodies). Examples are studies on Knowledge Value Mapping (Rogers & Bozeman, 2001; Bozeman & Rogers, 2002), the Compass Card / Laboratory Activity Profiles (Laredo et al.), the Payback model (Hanney et al., 2000; 2003) and the ERiC methodology (Spaapen et al.). Most of these studies map interactions and knowledge streams inductively. Often they aim at more quantitative data, and are made to support research management or evaluation studies.

Our methodology is closely related to this last stream in its emphasis on productive interactions

between researchers and other social actors. It assumes such interactions are a necessary condition for any societal impact to occur. Interactions can be directly between people, but also through intermediate products such as texts, software tools and models. Furthermore, we distinguish between interactions that have occurred occasionally and those that result in an ongoing interaction up to a level of networks. Often, the latter are conceived to be more productive in terms of dedicated knowledge production as well as knowledge transfer and use.

One of the advantages of this approach is that we can look at impacts during the entire research process. In many accounts of impacts of research, the impact is still conceptualised as a result of completed research and delivered knowledge. In reality, researchers have interactions with stakeholders already before and during the research process and impact already occurs while the research is still being done. Such impacts may already occur when research agendas are set and stakeholders get inspired by the way a researcher defines a problem. Some programmes organise such interactions systematically up to a level where the knowledge relation between researcher and stakeholders is better conceptualised as one of a co-creation of knowledge rather than a task division of knowledge producer and knowledge user.

In our methodology we make use of logic models to reconstruct the relationships between the objectives of the programme and the activities as well as the intended outputs and different forms of impacts (McLaughlin & Jordan, 1999). Logic models or programme logics distinguish between immediate impacts, intermediate impacts and long-term impacts. Our focus on interactions between researchers and stakeholders implies a focus on the immediate impacts of these interactions. Intermediate impacts occur either when relationships between researchers and stakeholders continue within networks or when research results get embedded within stakeholder practices. While further downstream long-term impacts might be anticipated, we would claim that both in terms of time and in terms of causality these long-term impacts, even if they are measurable, cannot be attributed to the specific programme.

A final word on our notion of stakeholder. The notion of stakeholder has emerged in management studies as a concept that focuses the attention of managers on the actors in the environment of the firm. In its first, general definition, stakeholders are those actors that can affect an organisation or can be affected by the achievements of an organisation (Freeman, 1984). Traditionally, management studies tend to focus on shareholders and stockholders as the owners of the firm. Stakeholder theory puts other actors like governments, neighbourhoods of firm locations, labour unions, consumer groups and the likes to the foreground: these are social actors that affect or are affected indirectly by the firm and need to be taken into account to understand the performances of the firm more broadly.

We use the notion of stakeholder in a similar way. In their activities and outputs, researchers and research management usually focus on their peers and other scientific (funding) bodies that emphasise the scientific quality of research. In this study, stakeholders are those social actors that do not belong to the academic community related to the NG Infra research programme but are part of professional infrastructure communities, the business world, the policy world, and so on. So while some of these social actors are formally part of the NG Infra programme, through membership of user boards, advisory committees and sometimes project teams, in this study they are considered to be stakeholders of the programme. The early results on the programme logic, reported in the next chapter, legitimise this choice.

1.2 Aim of the study and limitations

The aim of our study is twofold. The first aim of this study is to identify the contributions of the research programme to practitioners of infrastructures in the Netherlands. Therefore, the impact of the programme on the scientific community is not part of this analysis. The programme has an international component. Collaborations with and contributions by the programme to research capacity on infrastructures in India, Germany, Switzerland, Italy, China, Norway and Canada are a significant part of the activities. For pragmatic reasons the impact that these international activities have are not analysed in this report.

The second aim is to get an insight into the mechanisms through which the research programme has had impact. We focus on the interactions between researchers and their stakeholders, and some of these interactions will be more effective than others. Based on these insights, NG Infra programme management can enhance the programme activities concerning stakeholder involvement and societal impact.

The report is commissioned by NG Infra itself in order to broaden the accountability towards the programme's funders, in addition to an evaluation of scientific quality and productivity. The study, however, is set up more as a learning evaluation than as a summative evaluation, and our conclusions and recommendations aim at supporting the programme management to improve.

In this respect it is important to note that the programme is still running and some of the projects are even still in their start-up phase. When analysing impact, time is an important dimension to consider and although research projects can have impact already at an early phase, their full impact can be expected only after they are completed.

Moreover, it should be mentioned that our analysis of the societal impact of NG Infra relies to a significant extent on the perceptions of the researchers involved. Their affiliation to NG Infra may create a positive bias in their observations. Unfortunately, monitoring impact has not been an issue for all researchers involved in the programme, and as a result available data on impact was limited. In particular we have tried to make an inventory of NG Infra's stakeholders through a survey among researchers, but we were not really successful. The limited list of stakeholders compiled in this way was insufficient for a reliable survey. Instead, perceptions of the impact of stakeholders have been collected through interviews and case studies.

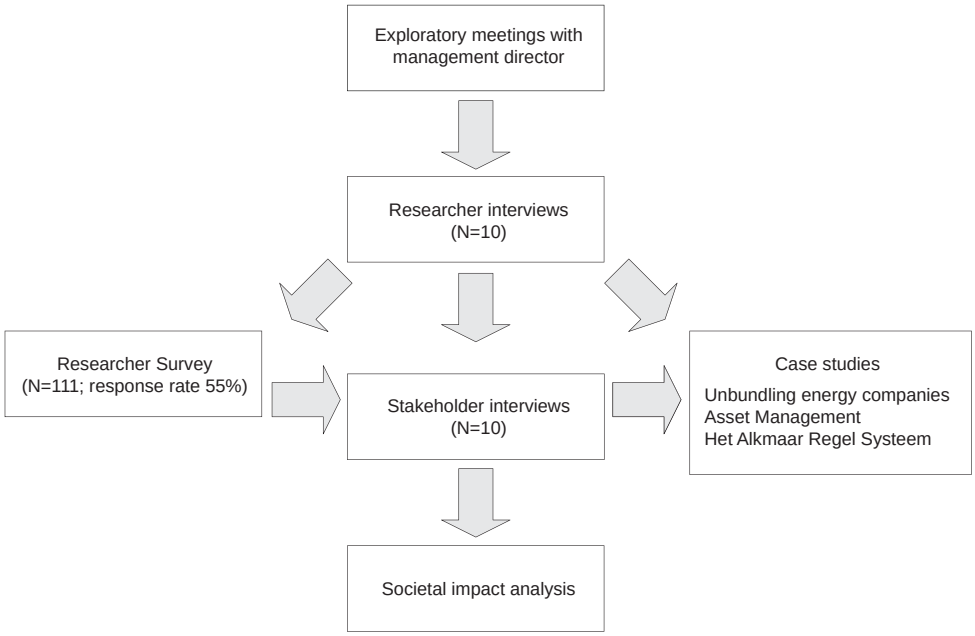
1.3 Research questions and methods

In order to meet the two aims we will answer four research questions:

1. How is the research programme organised in terms of activities, output and outcomes - especially in terms of realising impact among its stakeholders?
2. To what extent and in what ways are societal stakeholders involved in NG Infra and its projects?
3. What impact do NG Infra and its projects have on the activities of stakeholders?
4. How does the organisation of NG Infra and stakeholder involvement relate to the impact the programme has?

In order to answer these questions we have used a mixed-method approach. We have investigated the societal impacts of the programme through the analysis of relevant documents (see box 1), interviews with (sub)programme leaders, a researcher survey, stakeholder interviews and three case studies. Figure 1 provides a summary of the steps.

Figure 1 Summary of Research Design



Box 1 List of studied documents of NG Infra

Studied documents

BSIK programme proposal
Programme website Next Generation Infrastructures
Programme database
Programme financial overviews
Programme brochures
Annual report 2008
Self-Assessment 2010
QANU Research review Technology, Management, Policy and Industrial Engineering 2010
Advice of the 'Commissie van Wijzen' in reaction to the midterm evaluation of BSIK projects

We have interviewed two of three scientific programme directors. The programme is divided into seven themes. Of five themes we have interviewed theme leaders and of two themes we have interviewed senior researchers. In total we have interviewed ten researchers. Appendix I shows an overview of interviewees. During one hour semi-structured interviews, they were asked questions about the organisational structure of the programme and their tasks within that structure; research methods; users and user interaction (communication channels); and societal impact. Appendix II contains the interview protocol. During the study we had regular contact with the managing director of the programme. Next to that, we organised two feedback meetings with programme management and researchers to reflect on intermediate results.

Based on these interviews and NG Infra's programme documentation, we have reconstructed the programme logic. The programme logic is a representation of the relations between the programme activities, its goals, output and impact as perceived by actors closely involved in the programme management. Moreover, programme logics delineate the domain of the impact analysis and help to structure data collection in subsequent steps (McLaughlin & Jordan, 1999; Williams et al., 2009). Chapter 2 reports on the programme logic of NG Infra.

We designed a web-based survey ground on the programme logics to validate the programme logics and to get a deeper understanding of it. For all known projects (111), the survey was sent to one of the researchers involved. In most cases, the survey was sent to the project leader. Researchers who led multiple projects were sent surveys for no more than two projects. Surveys for the other projects were sent to another involved researcher in that project. For non-Dutch speaking researchers, the survey was translated in English and personally distributed. The response rate was 58%, which is high. The survey included items on objectives of the research project within the overall programme; involvement of societal actors; project activities and outputs; dissemination of results; perceived use of results by societal actors; and overall aims and goals of NG Infra. The complete survey, in Dutch, is added in appendix III.

After consultation with NG Infra managing directors and based on survey results, we interviewed ten stakeholders. These stakeholders differ in their level of involvement (programme, theme and project), and in their organisational type and sector. Some of them make use of NG Infra's knowledge more strategically, others more operationally. Appendix I shows an overview of the interviewed stakeholders. Interviews included items on the role of the stakeholder in the programme; involvement in research and other NG Infra activities; use of research output and results; impact on their organisation; and overall appreciation of the programme and projects. The full item list for the interviews is in appendix II.

Finally, we analysed three cases of impact reported in programme documentation and interviews in considerable detail. We have selected a case from the early days of the programme, a case half way during the programme and a recent case, to analyse differences over time. These case studies are:

1. The traffic management system 'Het Alkmaar Regel Systeem (HARS);
2. The unbundling of energy companies, a major infrastructural change which related to series of research projects and research themes within the programme;
3. The practice of asset management, for which the programme had developed the Asset Management Platform.

Cases were selected because of the difference in sector they aimed at (energy, infrastructure wide, and roadways) and the type of result (advice, network creation, and implementation of a product). The case-studies are based on interviews, a survey and document analysis. In each case, the main stakeholders involved were interviewed, and relevant reports, websites, news features and other documents were analysed to identify the contribution of NG Infra research to this practice. More details about the precise methods used in each case will be given in Chapter 4.

1.4 Report outline

Chapter 2 reports on the mission of the NG Infra research programme and the organisational structure of the programme. Based on the interviews, we describe how programme management and theme leaders are organised for societal impact. The chapter end with a logic chart of the programme. This chart visualises how the activities of the programme support the mission, and it serves as an important heuristic in the subsequent chapters.

Chapter 3 discusses societal stakeholders of the programme and the impact of the programme on their activities. We report the main results of the survey and juxtapose these with results from interviews with stakeholders. The involvement of stakeholders is studied both at programme level and at project level. What is the role of stakeholders in conducting research? What programme output do they use and how do they value that output? What impact does NG Infra have on their activities?

In Chapter 4 we present the results of the three case-studies. For each of the case study we describe both the steps we took for data collection and the results of each step. As expected, the impact of each case is rather different, and we use different data collections for each case study.

In the last chapter we bring the results together to answer the four main questions and present some recommendations.

2 Programme Logics of Next Generation Infrastructures

Research programmes can have multiple functions and goals. The core of most programmes is the organisation of funding and the performance of scientific research to develop knowledge in a particular area. Increasingly, however, research programmes also serve wider goals such as evidence-based policy or contributions to economic growth or sustainability. As part of the BSIK regulation, NG Infra is an example of a research programme that has a wider goal than only developing scientific knowledge. The programme also aims to develop technical and governance solutions that will be applied by infrastructure companies and government bodies. The programme funds and coordinates research and organises additional activities that reach out to societal stakeholders that may benefit from the research results.

The first step in our societal impact analysis is to investigate the relation between activities and the societal impact aimed for. This step results in a presentation of the so-called 'programme logics' (W.K. Kellog Foundation, 2001). The programme logics provide an overview of the relations between the societal goals, programme goals, activities, (expected) output, (expected) outcomes and (expected) societal impact of the programme.

This chapter describes the programme and presents the programme logics based on interviews with programme leaders and theme leaders, and programme documents.

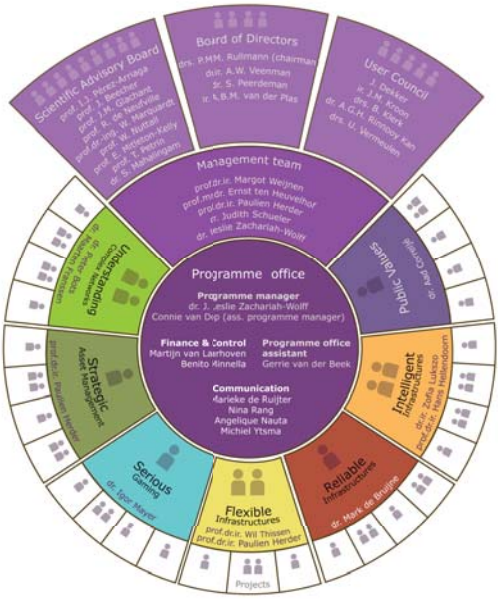
2.1 Organisation of the programme

The NG Infra research programme builds upon a preceding Interfaculty Research Centre of Delft University of Technology (TU Delft), in which many researchers were involved and one of the scientific directors was programme leader. The programme itself runs from 2004 to 2014 with a total budget of 40 million euros, of which 20 million euros is government funding (BSIK funding) and 20 million euros is co-funded by the participants in the programme. NG Infra combines sociological and technical approaches to cover all relevant aspects of infrastructures – technical, social and organisational – and their mutual relations. The mission of the programme is *'to understand how infrastructures work and to develop practical solutions that will steer infrastructural development'* (NG Infra, 2011), which reflects both scientific and societal goals. Research results are shared with governments, private companies, public organisations and knowledge institutes.

In its first phase, up to 2008, emphasis has been mainly on knowledge development and building the research capacity and competence for research on infrastructures. In the second phase, from 2008 onwards, knowledge dissemination has been receiving more specific attention and specific themes and activities have been initiated to this end.

Organisationally, the centre of the programme is the Faculty of Technology, Policy and Management of TU Delft. Figure 2 is a self-visualisation of the organisational structure of NG Infra. The board is end responsible, but it has delegated daily responsibility to the scientific and

Figure 2 Organisational chart NG Infra (source: NG Infra)



managing directors. This management team aims to stimulate programme-wide activities, such as the NG Infra Academy and HubHolland Magazine. The programme management aims to increase societal impact at project level with targeted calls and industry involvement as a requirement for projects. Intervention on the project level is delegated to theme leaders. The programme office (located in the centre) supports both the programme direction as well as research and dissemination activities (located in the outer rings). These activities are organised in five research themes and two dissemination themes. The design of the programme aims to stimulate knowledge exchange among the themes. Joint project calls and jointly organised workshops are a means to serve this goal. Theme leaders are responsible for the content and administration of the themes. They monitor the scientific direction and coherence of the theme and select projects. While programme management set industry involvement as a project selection criterion after 2008, some theme leaders use it as a strict criterion and others don't use it at all. Theme leaders don't feel they have a strict steering function, as *'what is blossoming bottom up, should not be steered hierarchically.'* Furthermore, they gather annual project reports and organise dissemination to societal actors.

The Scientific Advisory Board is composed of international peers. It reflects on the scientific progress and direction of the programme and has an advisory role in project selection. Each project proposal is independently reviewed by two members of the Scientific Advisory Board. Their assessment is taken into account, but it is not necessarily decisive. Moreover, once per year this board provides advice concerning the scientific direction of the programme.

The programme's User Council consists of six high profile members, like presidents of energy network companies and railway companies, the president of the Social and Economic Council of the Netherlands and top level civil servants of the Ministry of Infrastructure. The council meets

twice a year and is regularly renewed to keep focus and to maintain value. The council has an advisory role and reflects on the societal relevance of the programme. Unlike the Scientific Advisory Board, it does not have a role in project selection. Projects can have their own user councils for monitoring and advisory purposes. On top of that, some themes have organised their own user councils, which don't have a formal role in the programme. An example is Public values, which involved practitioners when composing a vision document.

Table 1 lists the budgets for and objectives of the activities of NG Infra. The five research themes make up two third of the budget. The more fundamental research theme, Understanding Complex Systems, aims to support the more applied research themes with basic knowledge concerning infrastructures. The applied themes are Flexible Infrastructures, Intelligent Infrastructures and Reliable Infrastructures; the research theme Public Values is a generic applied theme of relevance for all three other applied themes. Within the research themes, most projects are organised as PhD projects.

Beside these five research themes, since 2008 NG Infra has included two dissemination themes: Serious Gaming and Strategic Asset Management. These have evolved over time in response to stakeholder needs and are funded through the budget on knowledge dissemination. They built upon knowledge developed in one or more of the research themes. Within Serious Gaming, games on real world complex infrastructural problems are built and used to develop possible solutions together with societal partners. The second theme is a platform for infrastructure asset managers (NG Infra, 2011b). The NG Infra Academy, organised in 2009 and 2010, is also part of the knowledge dissemination budget.

Table 1 Budget of NG Infra and theme objectives

Theme	Objective	Budget (M€)
Understanding Complex Systems (23 projects)	To obtain a fundamental understanding of the complexity of the next generation of infrastructures	8
Flexible Infrastructures (21 projects)	To ensure long-term flexibility for the next generation of infrastructures, while maintaining their stability and reliability	5
Intelligent Infrastructures (19 projects)	To develop advanced methods and tools for the operation and control of existing infrastructures	5.5
Reliable Infrastructures (14 projects)	To develop design approaches, technological innovations and new inter-organisational arrangements to be better prepared for failures and their damaging effects	4
Public Values (28 projects)	To assess and redefine public and private values in the light of European liberalisation and to develop new governance models for safeguarding these values	5
Knowledge Dissemination (36 projects)	To translate NG Infra body of knowledge into practice, other domains and other countries	4
Reservation Umbrella Contracts	To establish a long-term cooperation with Alliander and Haven Bedrijf Rotterdam	5
Programme Office	To monitor projects; synthesise; facilitation exchange	3.5
Total	**-**	**40**

Table 1 gives an indication of the budgets for themes. The dissemination themes Serious Gaming and Strategic Asset Management do not have their own budgets and are part of the dissemination budget. Out of this budget the programme also funds the NG Infra Academy, organised in 2009 and 2010. The Academy is a summer school for young researchers and young professionals. It allows them to explore latest infrastructure developments and to create a network in the field of infrastructures (NG Infra, 2011c). The reservation for umbrella contracts is meant for co-funding long-term collaborations between multiple projects with a power grid company and the Rotterdam Harbour. Finally, the programme office is financed out of the programme budget. An important share of the budget of the office also is used for dissemination activities.

2.2 Logic chart

Programme logics show the pathways from activities, via output and outcomes to societal impact of the programme. Programme logics do not only reveal official activities, output and outcomes, but also more informal or unintended ones, to give insight into what is actually going on in a research programme. Based upon a round of interviews with one or two leaders from each theme and two of the scientific directors of NG Infra, as well as on programme documentation, the programme logics of NG Infra have been reconstructed. Results have been discussed with the programme management at a presentation of mid-term results of this study. Figure 4 presents the resulting logic chart.

Activities are the acts that the programme organises to produce output. For NG Infra, activities are research projects, advisory and reflection roles, writing publications, organising meetings and providing education. Outputs are the products resulting from the activities. For NG Infra, outputs are scientific publications, concepts and theories, answers to questions from stakeholders, contacts between practitioners and researchers, advice and reflective conversations, professional publications, media appearances and meetings, master's degrees[3] and PhD degrees, participants in postgraduate education, bilateral contacts between practitioners, networks around themes, participants in practice oriented meetings, and new research questions.

Outcomes are the use of output and the benefits that result from using the programme's output. In the case of NG Infra, outcomes include use in scientific, policy and management discussions, knowledge transfer, co-creation of knowledge, use of advice and reflections, relevant jobs, dissemination of concepts, theories and tacit knowledge, and bilateral sharing of knowledge among practitioners.

The ultimate impacts of the programme are difficult to link to outcomes directly. Therefore, impacts are divided into immediate impacts, intermediate impacts and ultimate impacts. Immediate impacts are the adoption of knowledge or change of insights. An example is the case of societal actors realising the value of a specific tool or concept for their organisation. Intermediate impacts are a change of acting by stakeholders, resulting from the immediate impact. This could be the implementation of a tool in the organisations. Ultimate impacts are the

3 Though not a formal part of the programme, master's degrees are an indicator of knowledge dissemination. Master's students who base their master's thesis on involvement in a NG Infra project can be expected to have embodied part of the programme's knowledge.

results of the change of acting. Examples of ultimate impacts that NG Infra aims at are preparing infrastructures for the future and improving relations between the organisations responsible for infrastructures and their customers and governments.

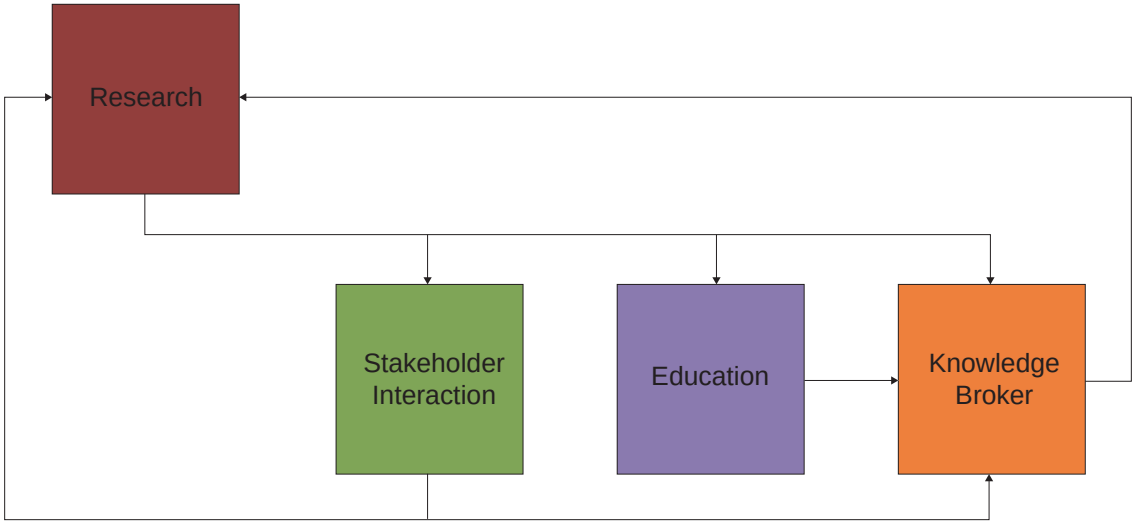
In the logic chart of NG Infra, we can distinguish four main pathways from projects towards outcomes and impacts.

1. The first pathway is that of scientific research being scientifically published and contributing to the development of scientific knowledge. Though one can think of further impacts of this scientific knowledge by uptake in new research and by stakeholders not involved directly in the NG Infra programme, we have only looked at this pathway to the extent by which the research outputs have been taken up by stakeholders. Examples are: the use of scientific knowledge in scientific and policy discussions and answers to stakeholder questions.
2. The second pathway is built upon stakeholder interactions. Researchers interact with stakeholders within the programme, for example through user councils at the programme level, theme level and project level, but also externally through advisory roles to the government, for instance. Stakeholder interaction may lead to co-creation of knowledge, knowledge transfer and interest and reactions from practice on research.
3. The third pathway is education. This includes both the education of master's students and PhD students and postgraduate education of professionals. The NG Infra Academy and simulation games are also part of this pathway. Potential outcomes are the adoption of NG Infra concepts and tools through educated people.
4. In the fourth pathway, NG Infra functions as a knowledge broker. As such, NG Infra organises networks around infrastructure developments and provides these networks with knowledge from NG Infra itself, and brings in knowledge from other networks. The Asset Management Platform is part of it. The pathway leads to the sharing of information and the dissemination of concepts, tools and tacit knowledge.

Note that the logic chart is an aggregation of the results of a series of interviews and several programme documents. At the programme level, the logic chart is recognised as a fair representation of how the programme works. In the interviews with theme leaders we found that none of the team leaders had the full programme as a reference for managing its theme. Research is perceived as the core of the programme, and involvement in other activities seems to be more a result of either the interest of individual researchers or of initiatives at the level of the programme management.

Figure 3 shows the relations between the four pathways of the logic chart of NG Infra. Figure 4 shows the complete overview of the logic chart, including all the activities, outputs and outcomes.

Figure 3 Logic chart basic pathways of NG Infra



2.3 Conclusions

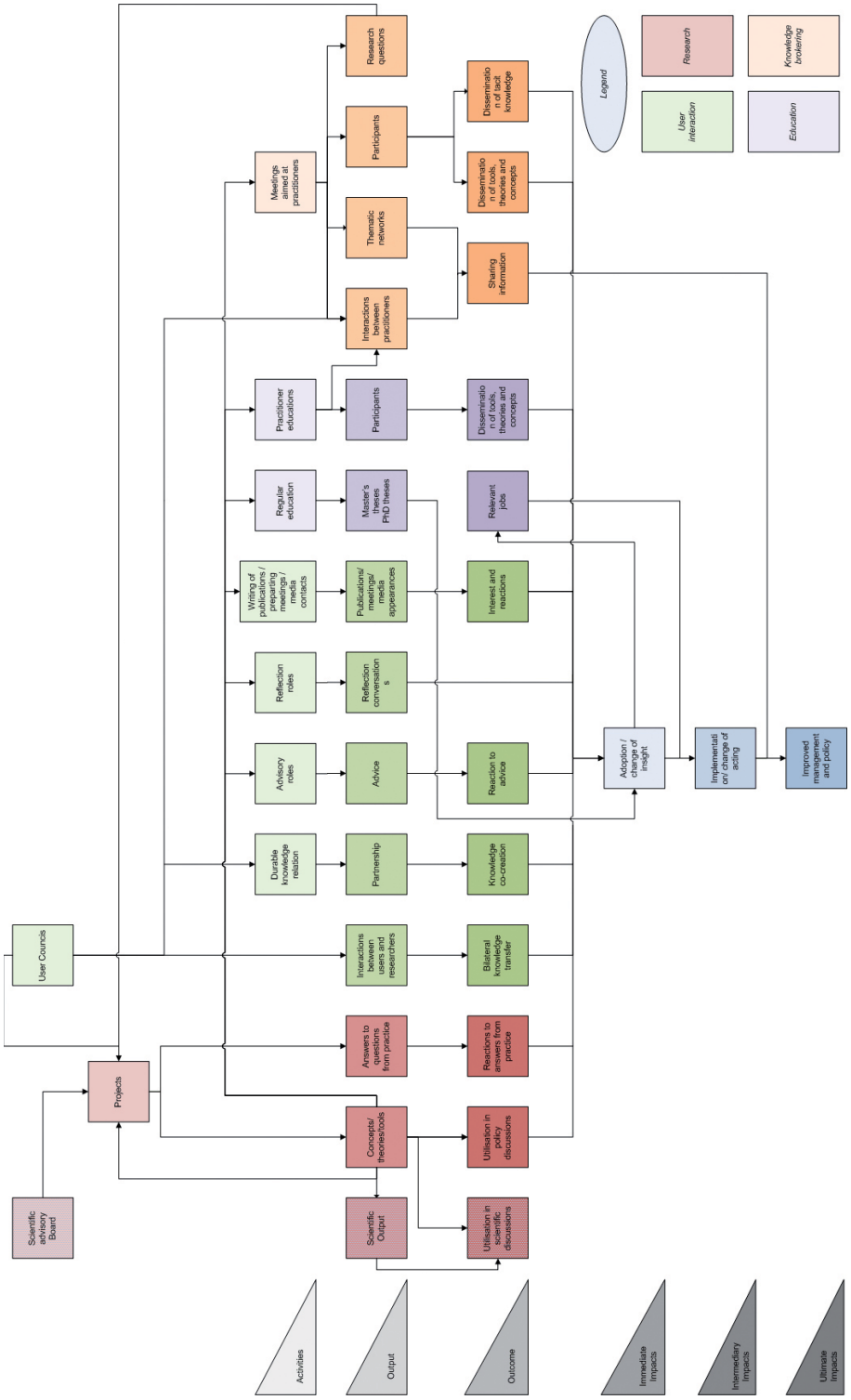
NG Infra has a dual mission: to generate both knowledge and practical applications in the context of infrastructures. In this chapter we have looked at the organisation of the programme. We have analysed relationships between various themes. Through interviews and programme documentation, we have also analysed how programme management perceives the relationships between the programme activities and the impacts.

The programme has several themes and is designed to stimulate knowledge exchange between the research themes. Over time, especially since 2008, it has developed a number of clear pathways for improving its impact. Not only scientific researchers have a role in the programme, but also societal actors such as firms and governments. These actors have a formal role in the user council of the programme: namely, to reflect on the societal relevance of the research, in the editorial board of HubHolland Magazine to put discussion topics on the agenda through HubHolland Magazine, and to participate in research projects. Less formally they are involved in thematic networks.

The programme has three main pathways to support interaction with societal stakeholders and induce the impact of its research results. We identified stakeholder interaction, education and the function of knowledge broker. These pathways are all connected to scientific research. Within the pathways, activities are organised and output and outcomes are realised that could potentially have societal impact. Two knowledge dissemination themes, Serious Gaming and Strategic Asset Management, have been officially introduced as themes in 2008 in reaction to knowledge needs from societal actors.

Although knowledge dissemination is of growing importance, management is still organised according to academic standards. As a result, each theme is managed in a different way to fit

Figure 4 Logic Chart of NG Infra



management to specific needs. Some theme leaders regard their role as merely administrative; allocating funding and collecting annual reports. Others also aspire to enhance the coherence of their theme or aim to stimulate the societal relevance of the research conducted in their theme. To this end, theme leaders use various means, including practice-oriented project selection and stimulating researchers to organise workshops and conferences for stakeholders.

The relations among the pathways and activities, output, outcomes and impact have been represented as the logic chart of the programme. Taking the logic chart as a starting point, the next two chapters analyse to what extent the pathways are used and result in interaction with societal actors, and to what extent these interactions result in societal impact.

3 Stakeholders and Impact

Transferring knowledge and achieving societal impact requires interactions between scientific researchers and societal actors. These interactions can take place before doing research, while formulating research questions and determining the research design; during the actual research; and afterwards when results are disseminated and implemented.

In this chapter, interactions between researchers in the NG Infra programme and stakeholders will be discussed. The results are based on interviews with ten NG Infra researchers, a survey among NG Infra researchers (N=64) and ten stakeholder interviews. Stakeholders can be societal actors that are formally involved in the programme, but also societal actors that are potential beneficiaries of NG Infra's activities. In this chapter, first the involvement of stakeholders in the programme will be discussed. Then, we will take a look at the programme output relevant to stakeholders. Next, the usage of programme output by stakeholders and the impact it had on them will be discussed.

The programme is characterised by a phase of building a body of knowledge up to 2008, and a phase in which that body of knowledge was extended and actively disseminated from 2008 onwards. To study the effect of the focus on knowledge dissemination, results concerning the managerial design of the projects are also presented per phase. The official start date of a project is used to assign it to the first phase (before 1/1/2008) or the second phase (on or after 1/1/2008). Results concerning output, outcomes and impact are not presented per phase, since the majority of the projects that were started in the second phase have not been completed yet. Therefore, a distinction on these levels would only give a skewed image.

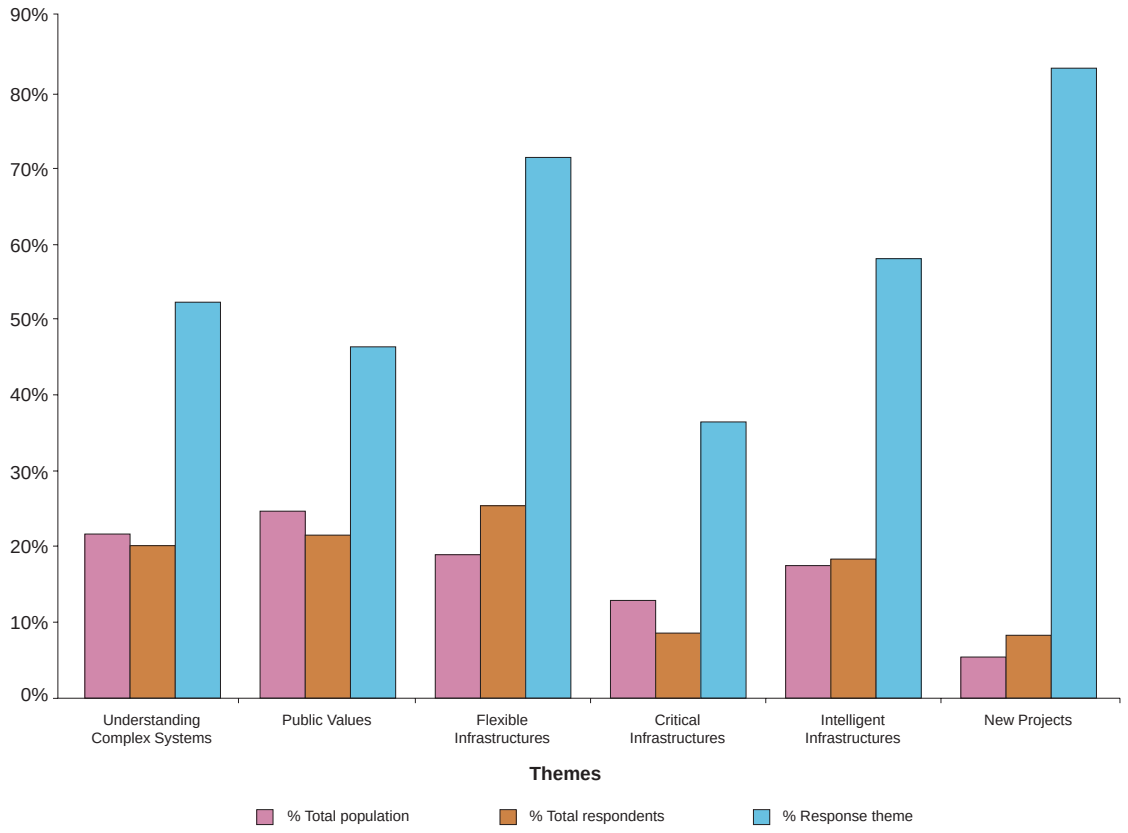
3.1 Sample description researcher survey

The survey was distributed to one of the project members of each of the 111 projects of NG Infra, mostly project leaders. For non-Dutch speaking researchers, the survey was translated into English and personally distributed. In most cases, the survey was sent to academic researchers. In three projects only employees of societal actors were involved, so in these cases they were requested to fill in the survey. We have sent two reminders. In total, 64 respondents filled in the survey, which is a response rate of 58%.

The large majority of respondents (92%) is employed by universities (78% TU Delft, 8% other Dutch universities and 6% international universities), 6% is employed by societal actors (3% knowledge institutes, 1.5% private companies and 1.5% government) and the remaining 2% did not answer the question. The vast majority of TU Delft researchers (77%) are employed by the Faculty of Technology, Policy and Management.

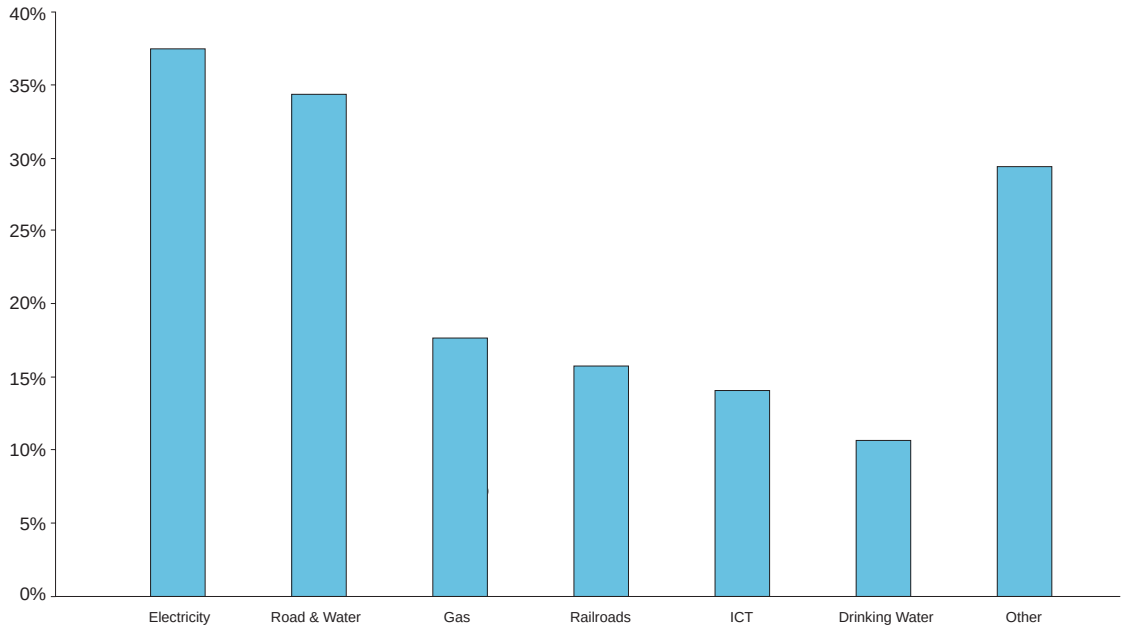
Figure 5 shows the composition of the population and the respondents per theme. Leaving new projects out of consideration, response rates per theme differ between 36% and 71%. As the average response rate is 58%, this means some themes are underrepresented while others are overrepresented.

Figure 5 Composition population and respondents



To put output, outcomes and impact of projects into a realistic perspective, it is important to note that 44% of the projects are completed and 56% are not completed yet. Furthermore, it is of significance to take into account the distribution of the sectoral focus of the projects when analysing the involvement of stakeholders and output and impact of the programme. Figure 6 visualises the distribution. Each sector is represented by at least 10% of the projects. Electricity (35% of projects) and roads and water ways (35%) and are focused upon most. Each project could mention multiple sectors.

Figure 6 Research focus of projects (multiple answers accepted)



3.2. Stakeholder Involvement

3.2.1 Involvement of stakeholders in NG Infra activities

Our basic assumption is that to have any impact, research programmes need to have productive interactions with their stakeholders. One way to establish interactions with stakeholders is to involve them in research projects. Of all NG Infra projects, 63%[4] have involved stakeholders in their projects. An additional 14% has tried to involve stakeholders, but did not succeed (see figure 7). The reasons for this are discussed in paragraph 3.2.4. When comparing the two phases of the programme, we see that the share of projects that successfully involved stakeholders did not increase much. The share of projects that made efforts to involve stakeholders, however, did increase and the share of projects that did not try to involve stakeholders decreased.

Stakeholders of a number of different types of organisations have been involved in the projects. Infrastructure providers (28% of the projects), knowledge institutes (22%) and provinces or municipalities (17%) have been involved the most. Societal organisations (5%), banks (none) and international policy organisations (none) have been involved least. Figure 8 shows the distribution of financial contributions to the overall programme. ‘Public research institutes’ includes both universities and public research organisations like Deltares. Not all stakeholders have been involved financially; some have only signed so-called letters of interest. These

4 52% succeeded in all cases, 11% succeeded to involve stakeholders, but not in all cases.

stakeholders have not been included in the graph. Figure 9 provides a full overview of the types of organisations that are involved in NG Infra's projects. Researchers could give multiple answers per project.

Figure 7 Involvement of stakeholders

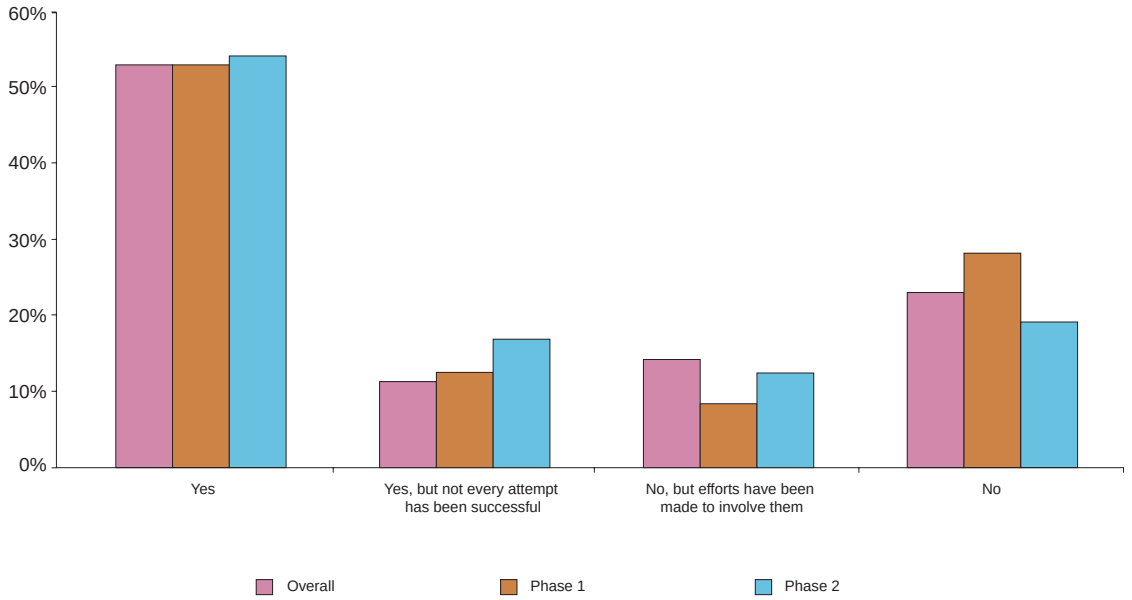


Figure 8 Financial contributions to the programme

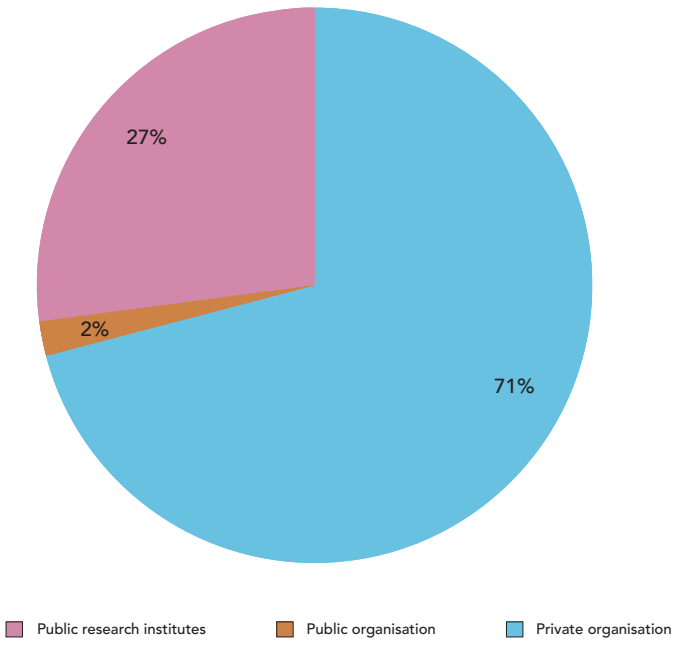
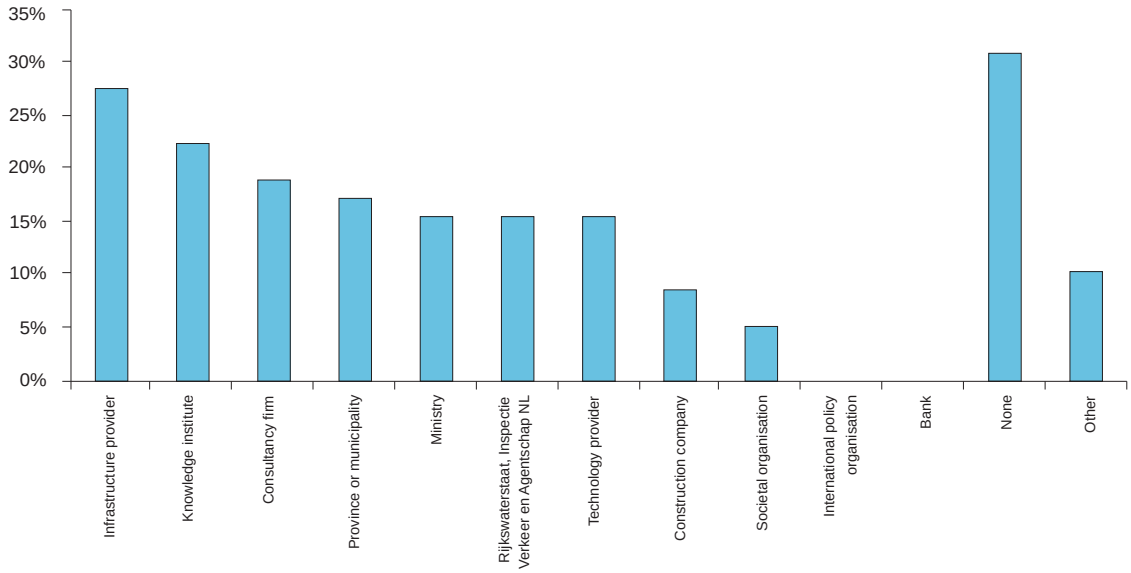


Figure 9 Involvement of societal actors (per organisation type – multiple answers accepted)



3.2.2 Reasons to involve stakeholders

We asked all projects that involved or tried to involve stakeholders (N=44) what the reasons were to involve them. The main reasons are
1. input and knowledge from practice (67%),
2. access to data and experience from practice (65%),
3. aligning research questions to questions from practice (52%), and
4. remaining aligned to knowledge demands from practice during the project (48%).

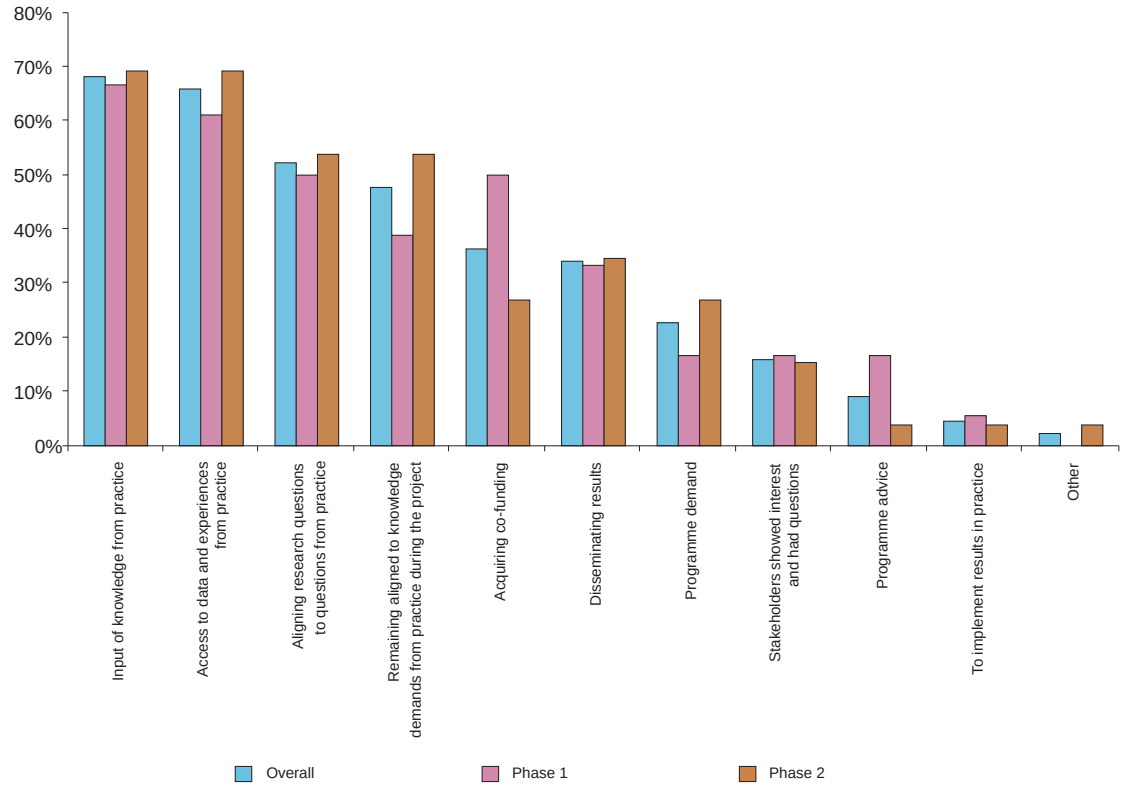
All four reasons relate to the involvement of practice in the programme. Demands or advice at the programme level are reasons to involve stakeholders for respectively 23% and 9% of the projects. When comparing the two phases, the largest differences concern *'remaining aligned to knowledge demands from practice during the project'* (39% versus 54%), *'programme demand'* (17% versus 27%) and *'access to data and experience from practice'* (61% versus 69%). Other reasons to involve stakeholders can be found in figure 10. Multiple answers were accepted.

From interviews with stakeholders, we learn that the main reasons for them to engage in the programme are specific knowledge demands and image building. Stakeholders feel they should anticipate certain developments, such as the replacement of old infrastructures or including societal concerns in their activities, but they sometimes don't know how to do that on their own. In these cases, NG Infra provides a way for them to study these questions, and concerning some questions, NG Infra is seen as the only knowledge provider available.

Image building by involvement in scientific research is important both for organisations and individuals. Firstly, a NG Infra stamp can help to scientifically validate knowledge from practice.

Moreover, involvement shows that an organisation or individual is at the forefront of new developments, which increases competitive advantage. Other reasons are quality control: NG Infra is a gatekeeper for the quality of new contacts and knowledge, as well as ‘philanthropy’, the perception of a social task to sponsor research and educational programmes. For most stakeholders, recruitment of potential employees is not a main motive for involvement in NG Infra projects, although it is an interesting side effect for them.

Figure 10 Reasons to involve stakeholders (multiple reasons accepted)



3.2.3 Realisation of stakeholder involvement

Around 80 societal organisations involved in infrastructures supported NG Infra’s expression of interest in the process of applying for a grant. How have stakeholders been involved after the programme received the grant? Societal stakeholders engage in the programme at different levels and in various ways. Stakeholders are involved at the programme level, theme level and project level and can be involved in, for example, research, dissemination or providing advice. In this section we will report how stakeholders are involved in the programme.

Stakeholders are involved at the programme level in the user council, were five individuals represent societal actors involved in infrastructures. The user council reflects and advises on the societal relevance of NG Infra’s research. At the programme level, some stakeholders are also

actively involved in dissemination. NG Infra, the Ministry of Economic Affairs and Rijkswaterstaat jointly publish HubHolland Magazine. HubHolland Magazine is a platform for organisations in the infrastructure sector that highlights interesting research themes. After each edition there is a high-level meeting, organised by NG Infra, to decide on a follow-up in research and practice. More recently, NG Infra has umbrella contracts ('raamcontracten') with three organisations to organise long-term cooperations on multiple projects.

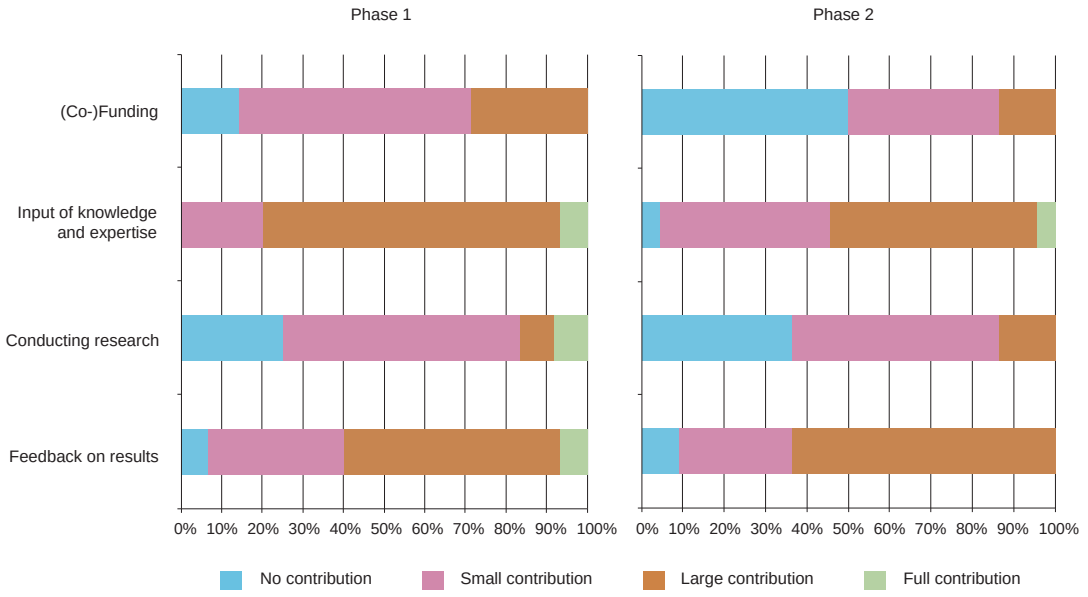
At the theme level, it has been tried to involve stakeholders in conferences and workshops, but in the end stakeholders are rarely present, according to two of the theme leaders. Some of the theme leaders actively stimulate the involvement of stakeholders in research projects, although there are no repercussions for not doing so.

Concerning the project level, the intensity of the interactions between researchers and stakeholders varies strongly, as explained by a number of stakeholders. On one end of the spectrum, in some cases NG Infra researchers work one day a week at the stakeholders office, or vice versa: a stakeholder employee works one day a week at the TU Delft. In other cases, researchers discuss their findings with stakeholders only about once a year or only after the projects are completed. In projects, stakeholders are involved in both research and dissemination activities. Stakeholders are indeed involved in most projects (63%)[5] and are members of the project's user council in 33% of the projects. In the first phase of the programme, 33% of the projects have stakeholders as members of the user council, and in the second phase this is the case for 42%. Of new projects, starting in 2010, this share is 80%.

In projects in which they are involved, stakeholders have a large or full contribution concerning the input of knowledge and expertise (63%) and concerning the provision of feedback on results (61%) (see figure 11). Other types of contributions occur less frequently: in 19% of the projects, stakeholders make a large or full contribution to the co-funding of research and, in 14% of the projects, to the execution of the research.

5 Another 14% tried to involve stakeholders, but did not succeed.

Figure 11 Project contribution of stakeholders

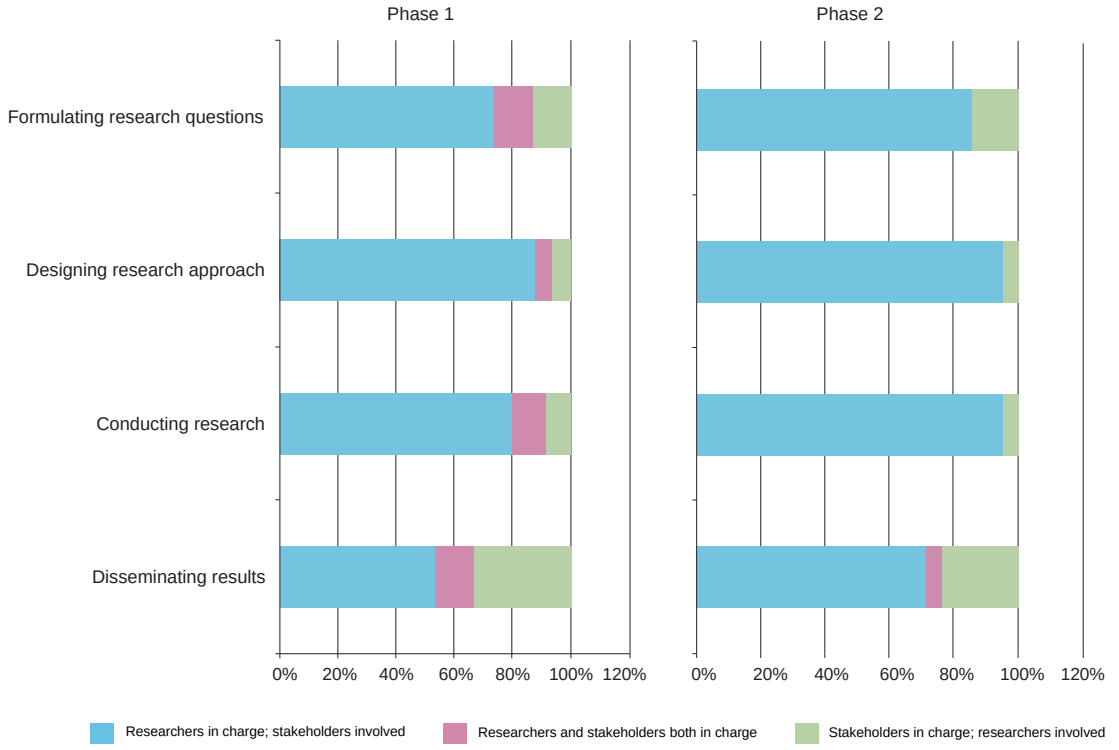


In the majority of projects, researchers are in charge concerning the formulation of research questions (81%), designing the research approach (89%), conducting research (89%) and disseminating results (65%). In a minority of projects, stakeholders take the lead in formulating research questions (14%), designing the research approach (5%), conducting research (5%) and disseminating results (27%). See figure 12.

If we compare the involvement of the stakeholders in projects for the first and second phase of the programme, we see that this involvement decreases slightly. The financial and knowledge contributions of stakeholders decrease, though the latter finding might be a result of the fact that second phase projects are still running. In the second phase, researchers are more in charge of projects than in the first phase.

Most stakeholders we have interviewed perceive that there is sufficient room for them to give their input on the level of questions and research design. Some stakeholders want to have independent knowledge and believe that their steering would harm the independence of researchers. These stakeholders do provide data, contacts and feedback, but they are reluctant to have intensive contacts with researchers concerning the content of the project. In other cases it was the other way around. NG Infra's role was only to guard the scientific quality of the research, since the stakeholder was more knowledgeable on a subject and was therefore the principal investigator. There are also some stakeholders that would have liked to be more intensively involved in research to communicate their needs. They feel that they have been 'used' in the very beginning to show stakeholder interest in the funding application and in the end to provide feedback, but they were forgotten during the actual research phase.

Figure 12 Task division between researchers and stakeholders

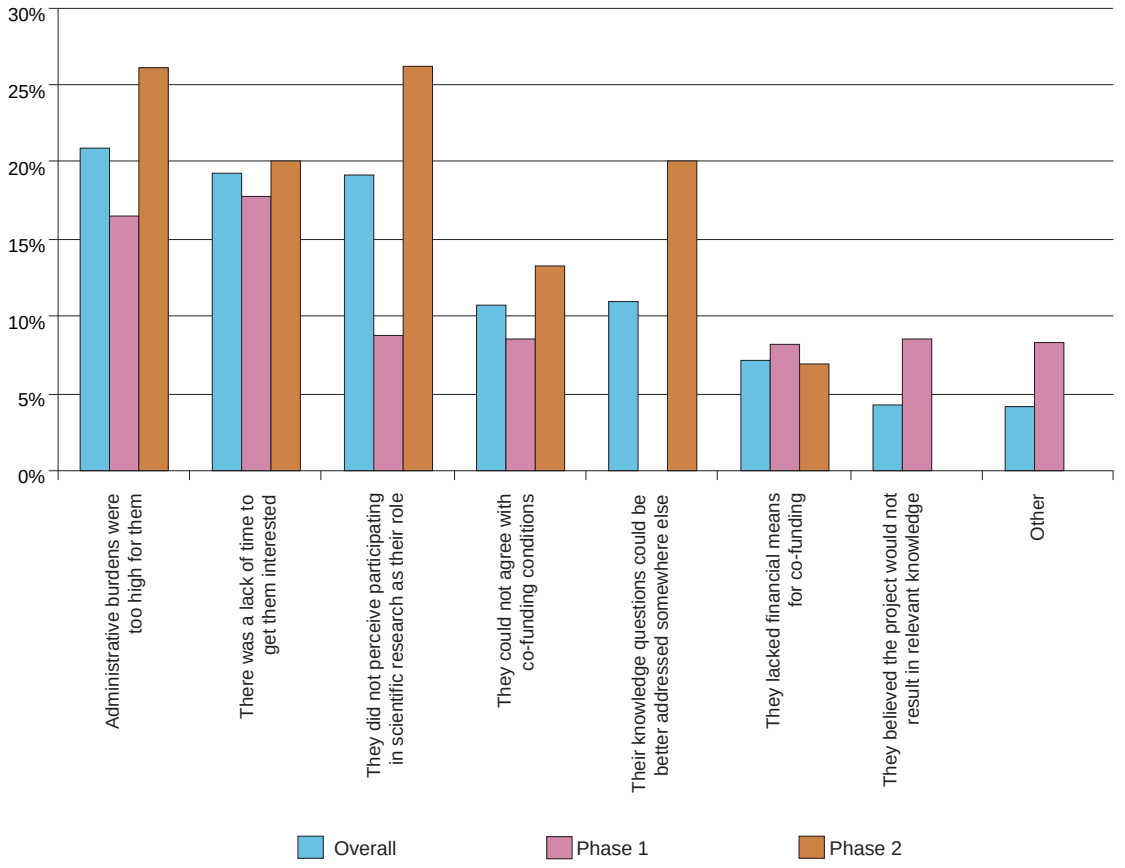


3.2.4 Unsuccessful attempts to involve stakeholders

NG Infra researchers do not always succeed to involve stakeholders in their work, as we have seen in figure 7 in paragraph 3.1.1. Quite some projects have wanted to involve stakeholders, but did not succeed in one or more cases (N=27). The most important barriers reported by these projects are i) administrative burdens of the programme (22%), ii) a lack of time to get them interested (19%), and iii) a negative attitude of stakeholders towards participation in scientific research (19%). The first two reasons are related to the organisation of the programme. Stakeholders who are involved in the programme also mention high administrative burdens that do not compare to the small amounts of financial support provided by the programme.

When comparing the two phases, we see that a larger share of projects in the second phase selected *'their knowledge questions could be better addresses somewhere else'* (0% versus 20%), *'they did not perceive participating in scientific research as their role'* (8% versus 27%), and 'administrative burdens of the programme' (17% versus 27%). *'They believed the project would not result in relevant knowledge'* was selected by 8% of the projects in the first phase and 0% of projects in the second phase. A complete overview of the reasons that researchers provide for stakeholders not to be involved in the project can be found in figure 13. Multiple answers were accepted.

Figure 13 Reasons for no stakeholder involvement (multiple answers accepted)

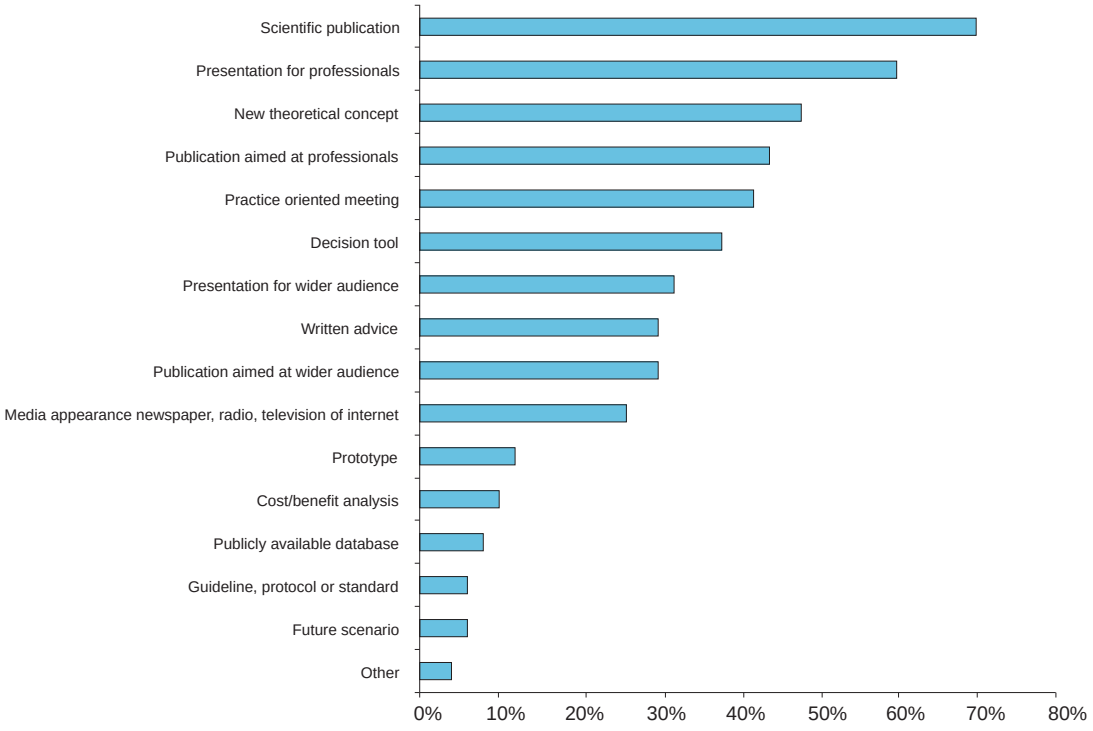


3.3 Programme output relevant to stakeholders

Knowledge is disseminated to stakeholders in a number of ways, before and after final results are made available. The programme disseminates both tacit and codified knowledge. The first is disseminated through people, in meetings and via mobility of people. NG Infra researchers serve as sparring partners in policy discussions, for example. Codified knowledge is disseminated through texts and artefacts, such as reports with policy recommendations.

In the survey, 78% of all projects have reported dissemination of research results (n=50) and 100% of completed projects have done so. Figure 14 shows the share of projects that have resulted in at least one item of output per category. Only projects that produced output are included. Scientific publications rank first, with 70% projects resulting in one or more scientific publications. Second, 60% of the projects that produced output have given presentations for professionals. Nearly half of the projects (48%) have disseminated new theoretical concepts. Projects have resulted least in future scenarios (6%), guidelines, protocols and standards (6%), and publicly available databases (8%). Although all interviewed stakeholders know about at least a number of NG Infra outputs relevant to them, most would like to regularly receive an overall overview of relevant output.

Figure 14 Output of NG Infra projects (multiple answers accepted)

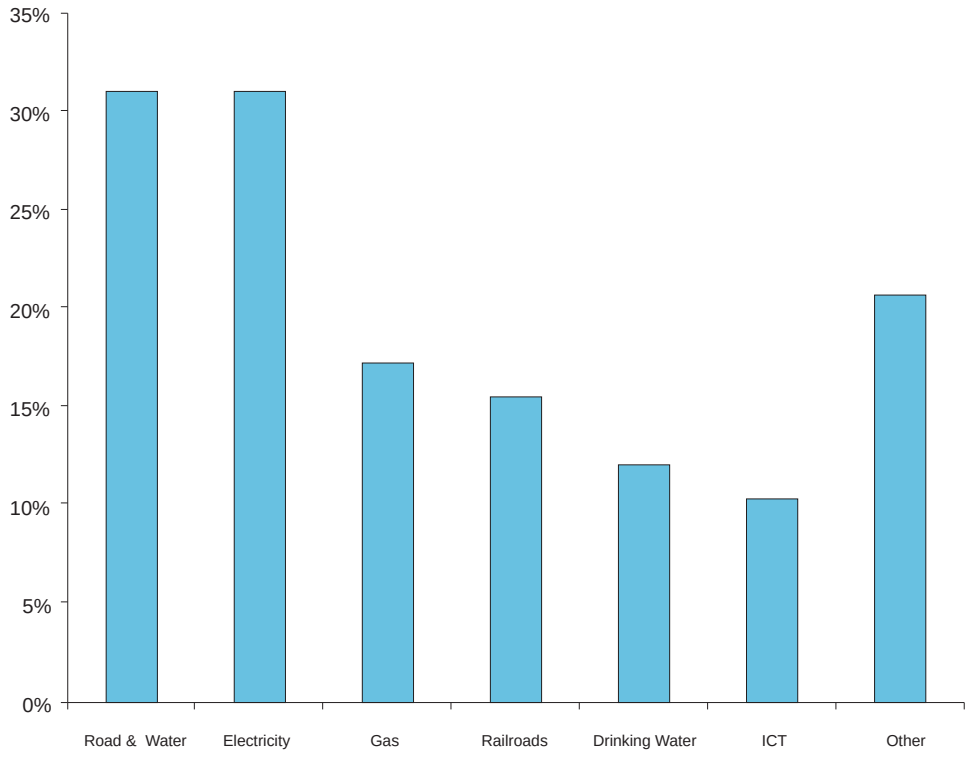


According to the theme leaders, results are insufficiently disseminated through professional journals. Of all projects, 44% have resulted in publications for professionals. The most important reason reported is the lack of academic appreciation for this type of output. Apart from that, 30% of projects that produced output report publications for wider audiences. To increase the chance of publishing opinion articles in newspapers, some researchers collaborate with a specialised media firm.

Beside the delivery of actual products and publications, knowledge is disseminated ‘along the way’ during the research. In projects closely linked with practical applications, knowledge transfer to stakeholders occurs via implementation, for example the implementation of HARS, which is discussed into more detail in paragraph 4.2. In projects with a stronger academic orientation, knowledge transfer is accomplished by brainstorms and sharing project insights via personal interaction.

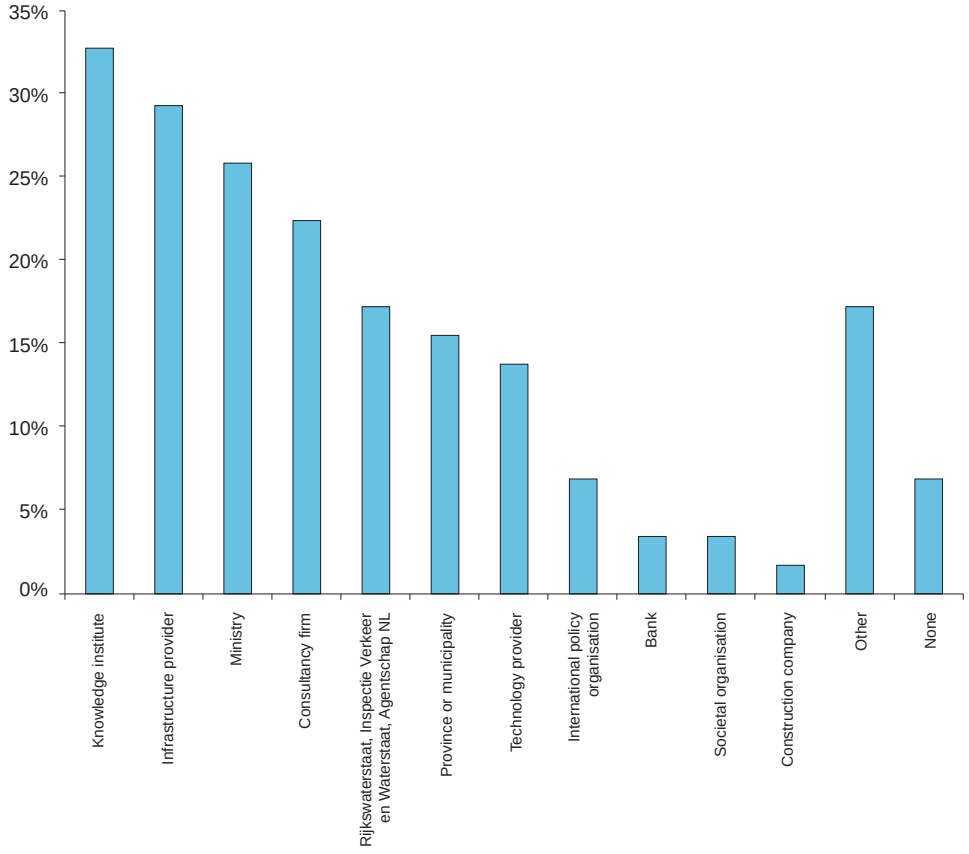
NG Infra produces knowledge relevant for various sectors and types of organisations involved in infrastructures. Of all completed projects (N=28), 96% has shared results with societal actors. Results have been mainly disseminated to stakeholders active in the electricity sector (31%) and the road and waterway sector (31%) as figure 15 shows.

Figure 15 Dissemination to sectors



In terms of organisations, figure 16 shows results have been mainly disseminated to knowledge institutes (33%), infrastructure providers (29%) and ministries (26%). Researchers have least disseminated results with international policy organisations (7%), banks (4%), societal organisations (4%) and construction companies (2%).

Figure 16 Dissemination to societal actors



In general, output produced together with stakeholders can be freely disseminated to other relevant stakeholders. Several of the stakeholders are (still) monopolists in their sector; they don't have to fear competition. On top of that, many organisations have a background as state companies and governments still have a great say in their activities. This means they still aim to support common interest when possible. If competition is feared anyway, the stakeholder can become full owner of research results by paying 100% of the research budget instead of matching NG Infra's budget.

A specific type of output is the education of master's students and PhD students through involvement in NG Infra projects. Stakeholders indicate that NG Infra's master's and PhD students are valuable potential employees. Table 2 shows the absolute numbers of graduated master's students and PhD students, and their employees after graduation. Figure 17 compares the shares of master's students and PhD students per type of employer organisation.

Master's students have graduated in 22% of the projects, resulting in 23 master's degrees. After graduation, they have found employment in a variety of organisations, most prominently knowledge institutes, technology providers and consultancy firms. Master's students are not

monitored as programme output, which explains the fact that five researchers do not know how many master's students graduated in their project and the fact that of nine master's students, their affiliation after gradation is unknown.

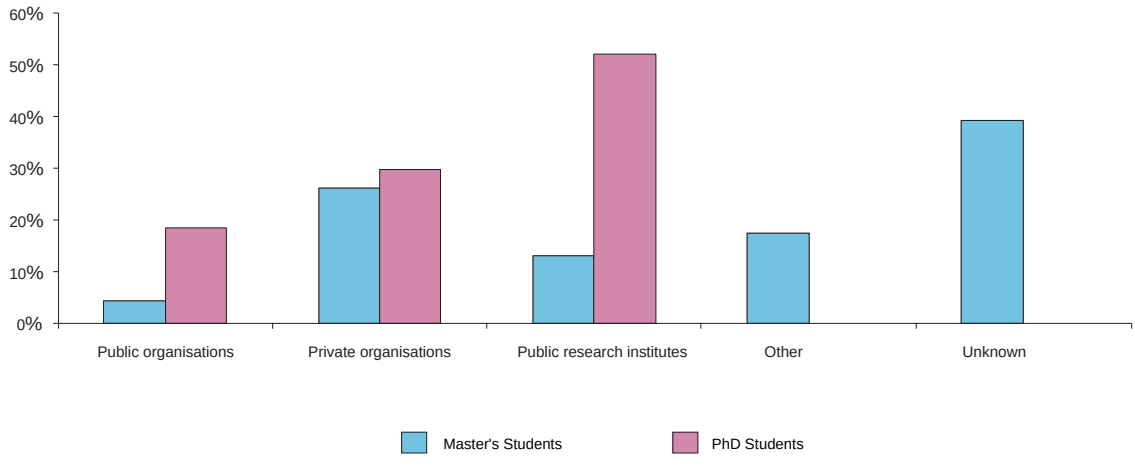
PhD students have graduated in 27% of the projects, resulting in 22 PhD theses. Programme management completed the data, which results in a total of 27 PhD theses. The majority of PhD graduates (14) are currently affiliated to public research institutes.

Table 2 Organisational background of employers of Master and PhD graduates

Type of organisation	Master's Students	PhD Students
Public organisations	1	5
Private organisations	6	8
Public research institutes	3	14
Other	4	-
Unknown	9	-
Total	**23**	**27**

When comparing the shares of master's students and PhD students per type of employer organisation, we see that PhD students far more often continue their careers at knowledge institutes. Furthermore, since master's students are not monitored as programme output, of many more master's students than PhD students it is unknown where they are employed after graduation.

Figure 17 Post graduation affliation of Master's and PhD graduates



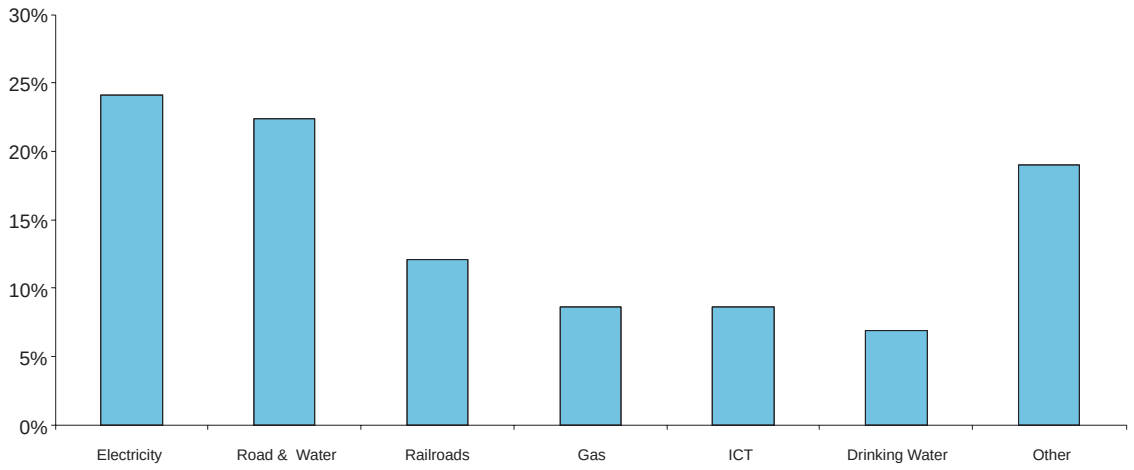
3.4 Use and impact of programme output by stakeholders

The dissemination of relevant output does not directly imply impact, let alone ultimate impacts. In this section we will discuss to what extent stakeholders actually use the knowledge produced by NG Infra and what the impact is on practitioners. We have found a number of cases of immediate impact, some of intermediate impact, but very few cases of ultimate impacts.

Programme output is used in all infrastructure sectors, but mainly in the electricity sector (24% of projects) and the road and waterway sector (22%). Less intensive users are railroads (12%), gas (9%), ICT (9%) and drinking water (7%). Nineteen per cent of the projects report use by other sectors, like energy and transport (see figure 18).

Of 89% (N=28) of all completed projects and of 81% of all projects, researchers report that stakeholders have used their results: knowledge use occurs by various types of organisations, most prominently knowledge institutes (24%), infrastructure providers (21%) and consultancy firms. International policy organisations (4%), construction companies (4%), banks (4%) and societal organisations (4%) rank lowest (see figure 19).

Figure 18 Use of results per sector (multiple answers accepted)



Survey and interview data suggest that NG Infra's impacts are mainly immediate impacts. Asked for the impact of the research that they coordinate, theme leaders mention an *'increase of understanding'*, the provision of *'input, such as new concepts, for policy discussions'* and the *'creation of networks'*. In the survey, 36% of the NG Infra projects report use of their results in policy discussions as impact.[6] Other recurring impacts are new contacts among societal actors (14%), new networks among societal actors (13%), and providing stakeholders access to relevant international infrastructure-related experiences (11%). Intermediate impact is reported by only 9% of the projects, in the form of the development and implementation of concrete products, such as the implementation of a model by ProRail. Another outcome is bringing

6 Most projects from the second phase of the programme are still running; nevertheless, projects from the second phase already report more use in policy discussions (38%) than projects from the first phase (34%).

science and practice closer together. According to 80% of the researchers, their project succeeded in connecting research and practice.

We also asked researchers to what extent they agree to a number of statements concerning the impact of the NG Infra programme as a whole. The vast majority of researchers agreed to the statements concerning immediate impacts. Fewer researchers, but still at least 80%, agree to the statements about the intermediate impacts. The share of respondents who agree to the statement *'Because of NG Infra, practical solutions have been generated for steering infrastructure developments'* increased from 78% in the first phase to 90% in the second phase. Concerning the ultimate impacts, the number of researchers who agree declines to percentages ranging from 19% to 60%.

Figure 19 Use of results by societal actors per organisation type (multiple answers accepted)

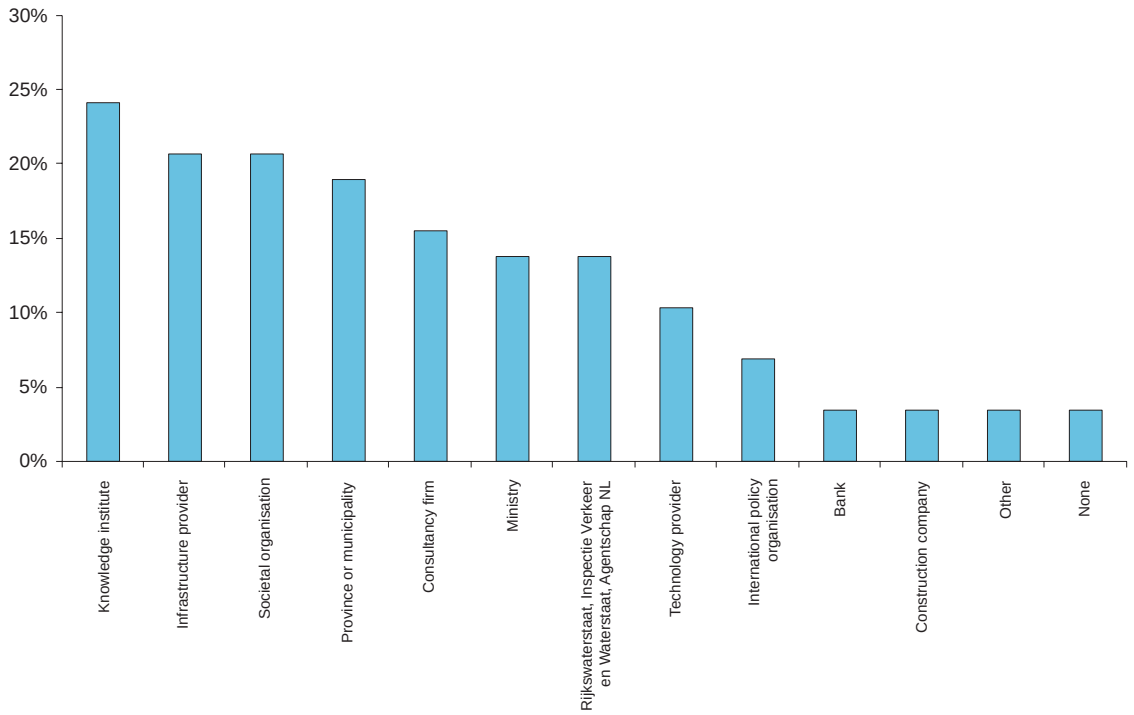


Table 3 Views of NG Infra respondents on impacts of the programme

Statement	Share of respondents who agree		
	Overall	Phase 1	Phase 2
Immediate impacts			
Because of NG Infra, a new generation of researchers that is familiar with both technical and institutional aspects of infrastructures has been educated	94%	91%	97%
Because of NG Infra, insight has been gained in the functioning of infrastructures	87%	74%	97%
Intermediate impacts			
Because of NG Infra, practical solutions have been generated for steering infrastructure developments	85%	78%	90%
Ultimate impacts			
Because of NG Infra, infrastructures are prepared for the year 2030	60%	61%	60%
Without NG Infra, Dutch infrastructure companies would function not as well as they do now	38%	35%	40%
Without NG Infra, Dutch infrastructure companies would have poorer relations with government and customers	28%	30%	27%
Because of NG Infra there is less dissatisfaction concerning the functioning of infrastructures	19%	17%	20%

Stakeholders confirm that NG Infra mainly has immediate impacts up to now. The impacts they report can be divided into two categories. First is the impact on networks: creating or intensifying networks and influencing the discussions in these networks by putting items on the agenda. The Asset Management Platform has contributed to intensifing contact between infrastructure organisations. As a result, organisations more and more consult each other when faced with problems. The academic background of NG Infra is a crucial element of this network, to keep the high-level people of these organisations interested. NG Infra does not only stimulate national networks, it also has a role in linking Dutch organisations to foreign organisations. As a result, the Dutch government has the opportunity to test road developments in China. Regarding long-term investments, a report that presented an inventory of methods used internationally for dealing with long-term investments is also used by Dutch asset managers to discuss this topic. Because of NG Infra, organisations also have access to academic networks and knowledge. Investments in energy infrastructures have been put on the political agenda EU-wide, because of publications by NG Infra researchers.

The second category comprises impacts on insight and understanding, for example of problems and developments. These impacts are a step on the way to intermediate and ultimate impacts. Stakeholders indicate they are developing services and products based on these new insights. ProRail has used serious games to test the effects of changes in rail traffic management. Serious games are simulations that provide a safe testing ground for novel ideals. ProRail tested the idea of high frequency flexible timetables in serious games and also in practice. Thanks to serious gaming, ProRail also got insight in how to deal with moveable bridges in railway timetables. ProRail plans to implement these two insights both within a few years. The implementation of innovations sometimes also depends on other parties, which can delay visible impacts. Insights into the proper balance between the flexibility and robustness of railways need to be agreed upon with the Dutch Railways (NS) first, before they can be implemented. However, ProRail expects these insights will result in more reliable railways and save huge amounts of

money. This means that, thanks to serious gaming, customers will experience a faster implementation of ideas that improve railway traffic. ProRail also uses a situation awareness model developed by a NG Infra PhD student. As a result of this model, situation awareness was raised as a topic within the organisation. At the moment, follow-up research on how to increase situation awareness is being conducted. This may eventually help to decrease the number of train drivers that neglect red signs, for example.

An energy network company reported examples of practical impact. One of them is the adoption by the Dutch Asset Management standards of figures developed by a NG Infra researcher. Also, the quality control of Dutch gas networks is claimed to be based on a first draft of a NG Infra researcher.

3.5 Conclusions

Stakeholders are involved in NG Infra mainly at programme and project level. At programme level they reflect on the societal relevance of the programme through the user council. Stakeholders also participate in disseminating knowledge by means of editorial activities for HubHolland Magazine. At the theme level, user councils also bring together stakeholders. Despite efforts made by theme leaders, it is difficult to get stakeholders to go to workshops and conferences. At project level they are members of user councils in a minority of the projects.

Almost two third of the projects involve stakeholders and efforts to involve stakeholders have increased since 2008. Researchers aim to involve stakeholders for the sake of realising and maintaining connections to practitioners. By involving stakeholders, they get access to their data, knowledge and experiences. They also aim align their work to their knowledge needs, which has become a more important motive over time. The introduction of industry involvement, shown by letters of involvement as a project selection criterion in 2008, can be recognised by the growing share of projects that aimed to involve stakeholders because of programme demand. Stakeholders' motives for engaging in the programme are specific knowledge demands and improving their image by being involved in scientific research. This indicates that stakeholders perceive NG Infra research as relevant. After 2008, fewer stakeholders believed NG Infra involvement would not result in relevant knowledge than in the first phase of the programme. In cases where attempts to involve stakeholders were unsuccessful, this can be attributed to administrative burdens of the programme and a lack of time to realise their involvement.

Taking into account the motives of researchers to involve practitioners, it stands out that in the vast majority of projects researchers are in charge of formulating research questions, designing the research approach and conducting the actual research. For projects started in the second phase of the programme, this is more the case than for projects started in the first phase. The same pattern is found for the stakeholder involvement in the research projects: financial contributions and knowledge input seem to have decreased in the second phase.

These results are put in perspective by rationales of some stakeholders for being involved in research from a distance. By doing so, they aim to prevent steering the research and to assure the development of innovative knowledge. Notably, most stakeholders are involved in the programme in a restricted way. Despite being involved in a project, they don't link up to other NG Infra projects or activities.

Furthermore, we found that second phase projects are more successful in communicating results to stakeholders. Many projects successfully produce output: all completed projects have resulted in output. Scientific publications occur most frequently. Presentations score highest when output is aimed at practitioners. Master's and PhD graduates are also a form of output of the programme.

A majority of projects reports knowledge uptake by societal actors. Actors from the electricity sector, the road sector and the waterways sector, as well as knowledge institutes and infrastructure providers are the main perceived users of NG Infra's knowledge. International policy organisations and societal organisations lag behind regarding knowledge uptake.

The impacts we found are mainly immediate impacts and some intermediate impacts. Projects mostly report impact on policy discussion. Despite the fact many projects from the second phase of the programme are not completed yet, they already report more impact on policy discussions that projects that started in the first phase of the project. Moreover, more researchers involved in projects that were started in the second phase (90%) believe that the programme has generated practical solutions for steering infrastructure developments than researchers involved in projects from the first phase (78%). The most dominant immediate impacts of NG Infra can be summarised as network creation and changed insights of societal actors. In some cases, these immediate impacts have resulted into intermediate impacts like the implementation of a product. Concrete examples of ultimate impacts have not been found, although some societal actors have expressed expectations of the ultimate impacts that NG Infra knowledge will have on their activities.

4 Case Studies

The survey and researcher interviews revealed that NG Infra's main impacts were immediate impacts of the activities and outputs of the programme. In interviews with stakeholders, we got some indications that concepts developed in the programme had been taken up and that in developing new services and infrastructure, results of the programme were of relevance. In interviews and programme documentation we also found some indications of early intermediate impacts or even ultimate impacts that the programme had had. From these indications, we defined three case studies to get in-depth insight in how NGA Infra has had impact beyond impacts reported in chapter 3.

The case studies were chosen to reflect different types of impact and impact on different kind of sectors and processes. The first case study is on a traffic regulation system, in which NG Infra researchers were involved in the beginning of the programme. How did NG Infra contribute to the implementation by different governmental bodies of this product for traffic control? The second case study is on a major infrastructural development in terms of governance and market development, i.e. the unbundling of energy companies. How did the firms and policy makers in the energy sector make use of NG Infra's findings throughout this multiple years covering process? The third case study is more recent and is on asset management. How did NG Infra contribute to network creation and knowledge exchange concerning the concept of asset management in a variety of infrastructure sectors? For each of the cases, we used a case study methodology in which further data collection was guided by the intermediate results of the case.

4.1 HARS

Roads are one of the few public infrastructures fully owned and maintained by the government. Increasingly, governments implement traffic control systems to improve traffic flows, to reduce congestions and get early warnings about traffic problems. The Alkmaar Regel Systeem (HARS) is an example of a traffic-dependent control system used from 2006 to 2011 in the city of Alkmaar. The system was introduced in response to increasing traffic congestion in recent decades. According to the leaders of NG Infra's theme Intelligent Infrastructures and one of the scientific directors of the programme, NG Infra has contributed significantly to the development of the Alkmaar Control System (HARS). In this case study, we have tried to map the contribution to HARS and possible impacts on other traffic regulation systems by interviewing the main actors involved.

4.1.1 Search strategy and results

Step 1: **Interviewing researchers involved in the HARS project**
The first step in our search strategy was an attempt to interview NG Infra researchers that have been involved in HARS. From the NG Infra database, programme managing directors and NG Infra researchers, it did not become clear whom to interview. We learned that two out of the three NG Infra researchers that had contributed to HARS had moved abroad. The third had left TU Delft as well. Contact addresses were not available. Therefore, we decided to directly interview the involved societal actors.

Step 2: **Interviewing societal actors involved in the HARS project**
This step started at the municipality of Alkmaar, where we interviewed a civil servant from the policy & advisory department. Next we contacted both consultancy firms involved. Further investigation at the level of provinces or Rijkswaterstaat was cancelled, because we found limited evidence of interaction between NG Infra, Alkmaar and the consultancy firms.

The employee of the municipality of Alkmaar we interviewed was involved personally in the implementation of HARS, but was not aware of any link between HARS and NG Infra. As he explained, the municipality of Alkmaar in 2005 had announced a contest for solutions to make more efficient use of the ring road of Alkmaar. Two consultancy firms won the contest and together developed HARS. HARS is a flexible system reacting to differences in traffic flow. To simplify the system, roadways around Alkmaar were divided into four groups of different priority. Next, there were different traffic scenarios to which HARS could adapt (peak hours versus off-peak, for example). The system succeeded in accomplishing a more efficient use of Alkmaar's ring road. In 2011, however, HARS was cancelled, because unreliable hardware caused trouble in traffic flows and because routine drivers could not handle a flexible traffic flow: car drivers *'just knew "if traffic lights are green over there, then it will be my turn next", which did not always happen because of the flexibility of HARS'* (interview civil servant, Alkmaar municipality). Solving hardware problems was considered too time and money consuming. On top of that, maintenance costs of, in particular, the *'dynamic route information panels (DRIP)'* were too high. Some insights from HARS, like the semi-rigid programme of the traffic control systems (VRI), are now used in a follow-up system (Wegenwiki, 2011). The municipality of Alkmaar is not aware of the use of HARS in other contexts.

The ultimate responsibility for HARS has always been in the province of Noord-Holland, which was initially positive about the system. Due to a change of staff, however, the province's commitment decreased considerably. Rijkswaterstaat was also positive concerning the results, but has only been involved from a distance.

Both of the consultancy offices associated with HARS were contacted. The first, Goudappel Coffeng, confirmed its contribution to the development of HARS. The firm responded, *'as far as we know, there is no relation between NG Infra and HARS, also after consulting my former colleague'*. The other firm, Trinité Automation, however did confirm a relationship with NG Infra. Although a first version of HARS was running before NG Infra got involved, NG Infra research has been used to improve the system.

4.1.2 Conclusions

The HARS case turns out to be a typical example of a scientific contribution to a technological project that has its own dynamics. Though such contributions may be a significant result for the scientific project, within the implementation of the new technology they easily move to the background. Actual implementation (and thus use of research results) is driven by other factors. Researchers and stakeholders move to new positions, which makes tracing impact even more difficult.

The interviews and other communication with involved societal actors suggest that NG Infra's role in the development of the HARS system has been in the background indeed, and in the

early phases of the project. The Municipality of Alkmaar and Goudappel Coffeng are not aware (anymore) of any NG Infra involvement. Trinité Automation acknowledges a contribution of NG Infra to the improvement the system. Although more information is needed from this firm, available information suggests NG Infra's role has been limited. Ironically, the HARS system itself is not in operation for reasons outside the scope of NG Infra's contributions.

4.2 Unbundling energy companies

The unbundling of energy companies is one of the clear cut examples that legitimised funding bodies and stakeholders about the necessity of the NG Infra programme. A similar unbundling took place for railroads to improve competition. In the telecom sector, a specific agency regulates the market to manage the tension between infrastructure and delivery companies versus delivery-only companies.

In the Netherlands, energy production, transport and delivery used to be organised by public companies, mostly owned by local and regional governments. At the end of the last century, the market for energy services to industry was liberalised and in 2003 the whole market opened, including energy delivery to households. As a result, former public energy companies turned into private companies owning infrastructures for energy transport, production and energy delivery. New entrants at the market for energy had to use the infrastructures of their competitors. In order to create a levelled playing field, the government intended to implement new European market regulations rather quickly and ordered the unbundling of former public companies into an independent network company and an independent production and supply company. The policy met fierce resistance within the House of Representatives, within public debate, as well as among former public companies who feared that without their networks they would easily be dominated by foreign companies.

The unbundling of energy companies is one of the examples of radical changes in infrastructures that legitimised NG Infra's establishment. The process of unbundling took place between 2003 and 2010 against the background of the European-wide privatisation of utility firms and a general policy need for increasing competition in sectors like energy, railroads and telecom. Although the unbundling of energy companies was cancelled at European level, the Dutch Minister of Economic Affairs decided to continue unbundling to increase competition in the energy market. The programme itself aimed to contribute to the unbundling process by providing governments and energy companies with information; this information concerned the unbundling of energy companies into network providers and energy suppliers in political and organisational developments. But the unbundling issue had already reached high tide when NG Infra had just started.

We analysed to what extent these contributions were visible in the public and political debate in the period of 2003 to 2006. Moreover, we interviewed stakeholders about the contributions of NG Infra to intra-organisational processes.

4.2.1 Search strategy and results

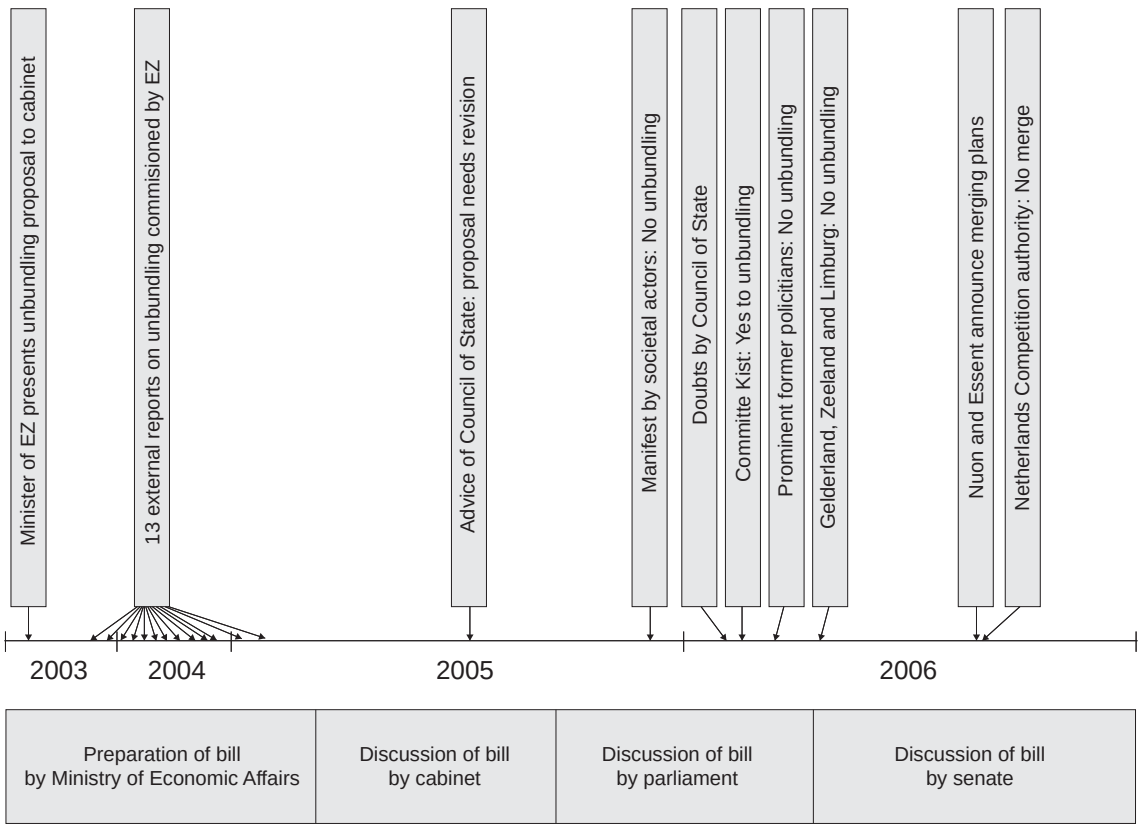
In this case[7] we have used a stepwise approach, in which later steps are informed by results of earlier steps. In the following, we present our methods and results for each consecutive step.

7 The large international project Unbundling is not part of this case.

Step 1: Overview of the unbundling process
We started reading all (99) articles from 2004 to 2007 that were published in the NRC Handelsblad dossier 'Elektriciteit-liberalisering van de energie' of NRC Handelsblad (2005). We created a timeline of events (figure 20) indicating the most important actors and developments in the political and public debate. After the bill passed the House of Representatives and the senate, a managerial process within each firm started to unbundle the network part from the energy supply part.

In this step, we did not find any contributions that could be related to NG Infra. We checked whether this could be because of a lack of the newspaper's interest in scientific contributions, but found evidence to the contrary. A number of full professors from fields of law and business studies from universities in Amsterdam and Groningen regularly provided their views on the unbundling of energy companies.

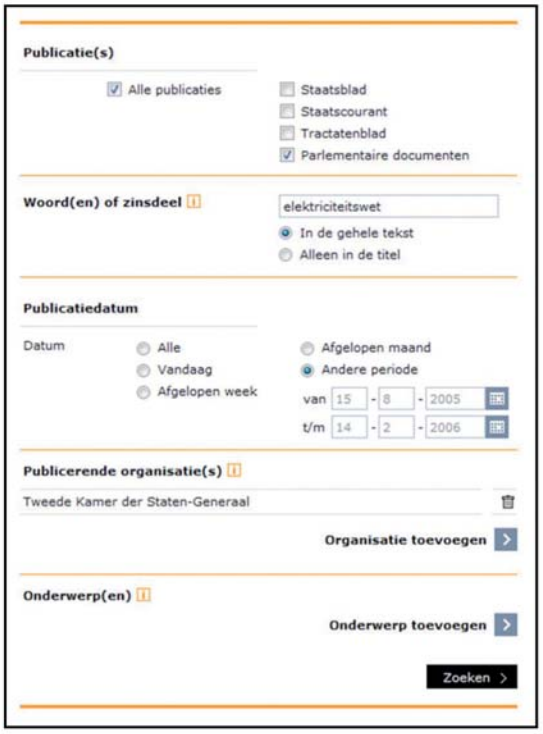
Figure 20 Unbundling time line

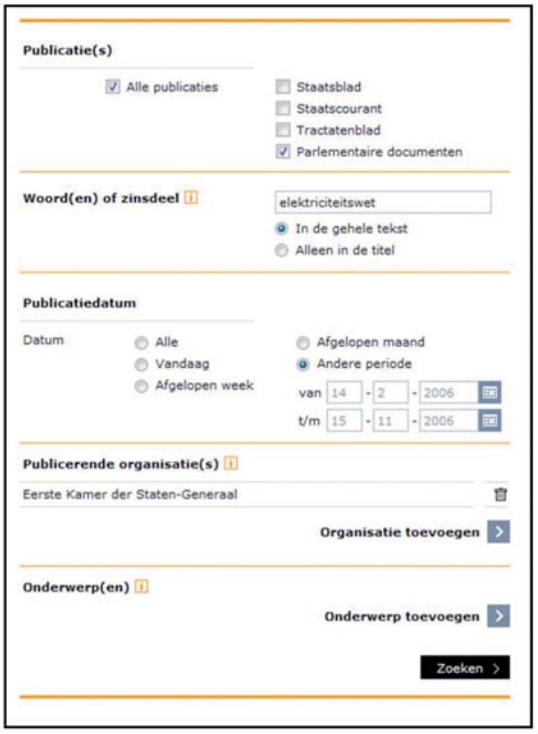


Step 2: expanding our data sources
Taking the timeline as a starting point, additional newspaper articles that appeared in NRC Handelsblad, Financieel Dagblad and De Volkskrant from 2004 to 2007 were gathered using 'splitsing energiebedrijf' and/or 'splitsing energiebedrijven' as search terms in LexisNexis. This

query resulted in 500 articles from which a random sample of 56 articles was studied. These articles were searched for the following search terms: next, generation, infra, Delft, faculteit, publieke waarden, Weijnen and Vries[8]. This search did yield one result showing the contribution of NG Infra to developments regarding the unbundling of energy companies[9]. Again, there were scientific contributions to the discussion by other researchers.

Figure 21 Search entry The House of Representatives and **Figure 22** Search entry Senate





Step 3: focus on politics
We searched documents related to the political process, using the timeline as a heuristic.

The political process can be divided into four phases:
1. preparation of the bill by civil servants, which involved thirteen reports by external organisations;
2. the approval of the cabinet, which includes advice by the Council of State;
3. discussion and approval by The House of Representatives, which includes reports by scientific bureaus of political parties and an amendment;
4. discussion and approval by Senate, which includes a motion and an advisory report.

For these phases we collected all publicly available documents.

8 Last names of researchers were known to have been involved in research related to the subject
9 Laurens de Vries & Margot Weijnen, 2010. Splitsingswet dient algemeen belang. Het Financieele Dagblad (20-08-2010)

The thirteen reports by external organisations commissioned by the Ministry of Economic Affairs could not be traced on the website of the ministry. Using references made in reports of meetings of The House of Representatives and the Senate, five of them have been found on the internet. Reports of meetings of The House of Representatives and the Senate have been collected through www.officielebekendmakingen.nl. Figure 21 shows the search entry for The House of Representatives and figure 22 the search entry for the Senate.

Results that mentioned 'onafhankelijk netbeheer' were selected. This resulted in 14 relevant documents for the House of Representatives, including the advice from the Council of State, and ten relevant documents for Senate. Furthermore, websites of the scientific bureaus of political parties CDA, VVD, PvdA, D66, GroenLinks, SP, ChristenUnie and SGP have been searched for reports on unbundling energy companies. All documents were searched using the following search terms: 'next', 'generation', 'infra', 'Delft', 'faculteit', 'publieke waarden', 'Weijnen' and 'Vries'. If a document yielded a result for one of these terms, the surrounding text was studied for clues of NG Infra involvement.

In this set of collected documents related to the political process, we found one hit related to NG Infra. In November 2004, the report *'Energie keuze(s) belicht, beleidskeuzes voor de inrichting van de electriciteits- en gassector in Nederland'* (Knops et al., 2004) commissioned by the Scientific Institute of the CDA[10], was published. This is the only result suggesting a contribution made by NG Infra. The report identifies choices in policy related to energy. One of these choices is unbundling of energy companies. The authors of the report are in favour of unbundling energy companies. How the CDA used the report in political debates cannot be concluded from the report or reports of the meetings of the Dutch House of Representatives (Tweede Kamer der Staten-Generaal) or Senate.

The limited visibility cannot be explained by a general lack of interest in academic input to this discussion. The advisory report of the Council of State refers to academic knowledge[11] from the field of law (Tweede Kamer der Staten-Generaal, 2005). Reports of meetings of The House of Representatives (Tweede Kamer der Staten-Generaal, 2006) refer to academic knowledge from the field of organisation and organisational change. The House of Representatives invited 22 experts for a hearing concerning the unbundling of energy companies. The fact that two experts were full professors shows there was input of academic knowledge. The Senate refers extensively to a critical report written by a full professor of law (Eerste Kamer der Staten-Generaal 2006b; 2006c; 2006d), and refers to a report commissioned by The House of Representatives, written by two other full professors of law (Eerste Kamer der Staten-Generaal, 2006a). The Ministry of Economic Affairs commissioned a report to a full professor in organisation and organisational change (Tweede Kamer der Staten-Generaal, 2006).

Step 4: focus on firms

In the fourth and final step we interviewed employees of two of the four network providers to get more insight into how NG Infra's knowledge was used by energy companies.

These interviews reveal a picture that differs from the document analysis of the previous steps. Contrary to these observations, both interviewees responded that NG Infra's knowledge has certainly been used in political and organisational developments. Business models developed by

10 Christen Democratisch Appèl, political party

11 Search terms: universiteit, academisch, hoogleraar, prof

NG Infra *'have been used to shape the firms after the unbundling process'*. But it is unclear what the precise impact of these models has been. One interviewee says it is highly likely that NG Infra's knowledge has been used in politics. However, concrete examples could not be provided.

One of the interviewees suggests that the relative invisibility of NG Infra's potential contribution can be explained by political games concerning the unbundling process within both the government and energy companies. According to our interviewee, the network divisions agreed with NG Infra and were in favour of unbundling; the energy provider divisions were not. Since the network divisions were part of bigger companies, they had no say of their own and it would have been risky for individual employees to support NG Infra's views. This might explain why written evidence of the impact of NG Infra's knowledge is difficult to retrieve.

4.2.2 Conclusions

Based on the evidence from publicly available written documents, it is hard to determine whether and how NG Infra contributed to political and organisational developments concerning the unbundling process. In our sample of newspapers, a single piece of evidence of NG Infra's contributions to a societal debate could be found. NG Infra's input for political discussions cannot be found in advisory reports of the Council of State, nor can it be found in reports of meetings of The House of Representatives and Senate, nor in reports commissioned or written by scientific institutes of political parties. There is one report, commissioned by a political party, of which an NG Infra researcher is co-author. Since the report was published two months after NG Infra was launched as a programme, it can be questioned whether this report is based upon knowledge developed in the NG Infra research programme.

From employees of network companies we get a different view on NG Infra's contribution to the unbundling developments. Although they have difficulties pointing out the exact contributions of the programme, they are certain that NG Infra contributed to the discussions and the unbundling of the companies itself.

4.3 Asset Management Platform

Asset management of infrastructures is management of physical assets. It is a professional discipline that includes the selection, maintenance, inspection and renewal of assets. The discipline is about making the right decisions and optimising the operational performance and profitability of assets, such as railways, bridges and power grids (the Institute of Asset Management, 2011).

An external PhD student working at a network company introduced NG Infra to an informal network of asset managers. From then on, NG Infra formalised this network into the Asset Management Platform and developed a research line on asset management. Since 2007, the platform has been looking at questions and answers related to asset management.

NG Infra hosts a network of practitioners dealing with asset management and aims to distinguish itself with an academic perspective and cross-sectoral learning.

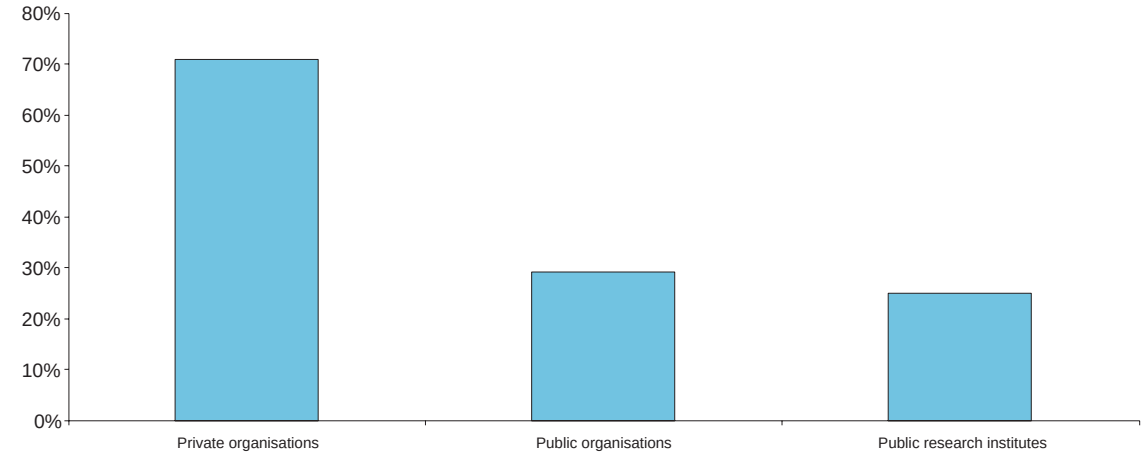
4.3.1 Search strategy

The search strategy has been twofold. As a first step, five practitioners have been interviewed about Strategic Asset Management to explore the functioning of the Asset Management Platform (AMP). Next, 63 participants of the Asset Management Platform have been surveyed through a questionnaire (response rate 40%). Topics that were raised in both the interview and the survey are: professional background; involvement in the platform; use of the platform; and value of the platform for increased asset management awareness as well as concrete organisational changes because of the platform. Appendix II lists the interview protocol and appendix III lists the survey.

4.3.2 Results

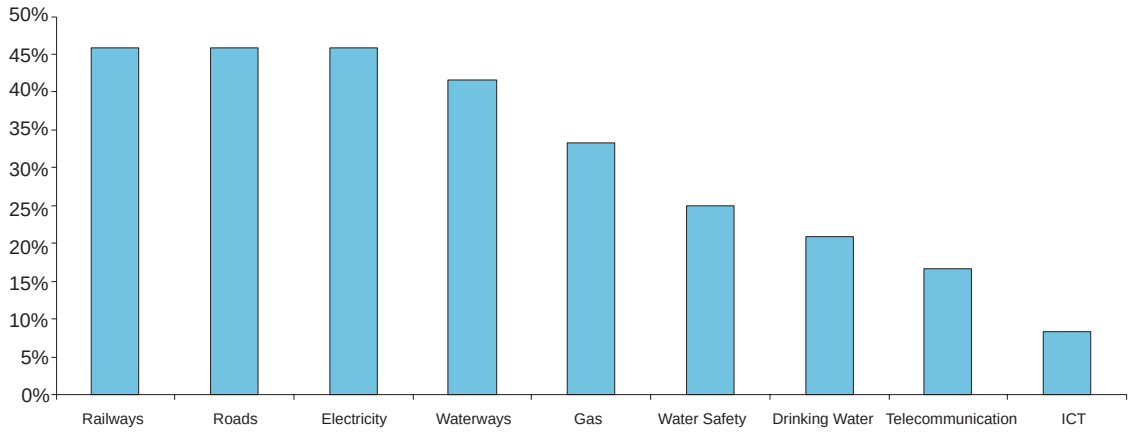
25 AMP members filled out our questionnaire (response rate 40%). Most members have a background in private organisations, like infrastructure providers or network companies (38%) and consultancy firms (21%). Second are public organisations such as Rijkswaterstaat (8%) and Het Havenbedrijf (8%). TU Delft (13%) and other knowledge institutes (13%) are also represented. See figure 23.

Figure 23 Organisational backgrounds of platform members (multiple answers accepted)



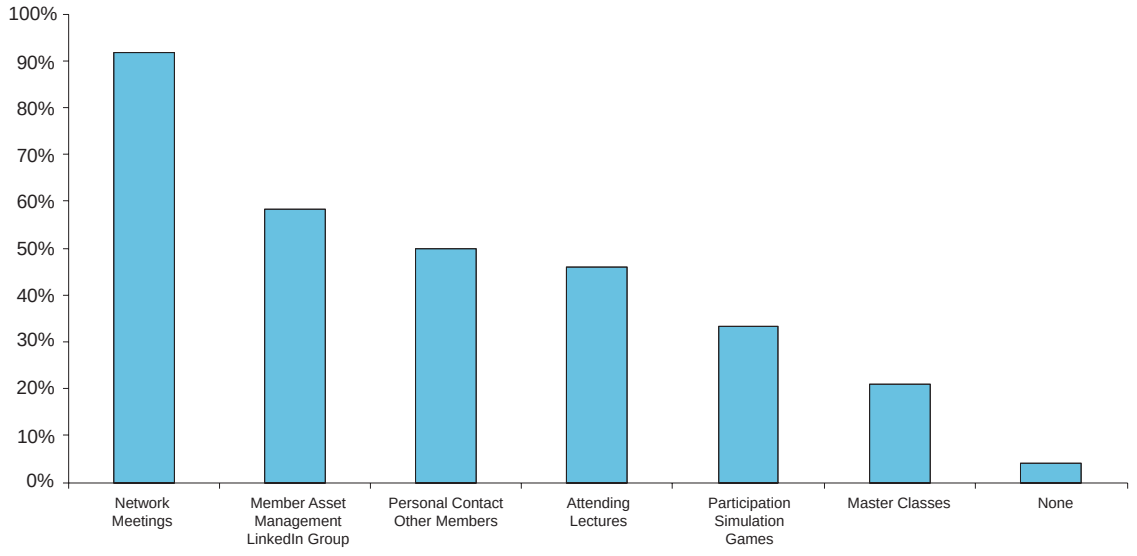
The majority of the respondents work in traditional infrastructure sectors, like electricity, railways and roads (all 46%), as figure 24 shows. Respondents least represent the newer infrastructures telecommunication (17%) and ICT (8%).

Figure 24 Sector representation (multiple answers accepted)



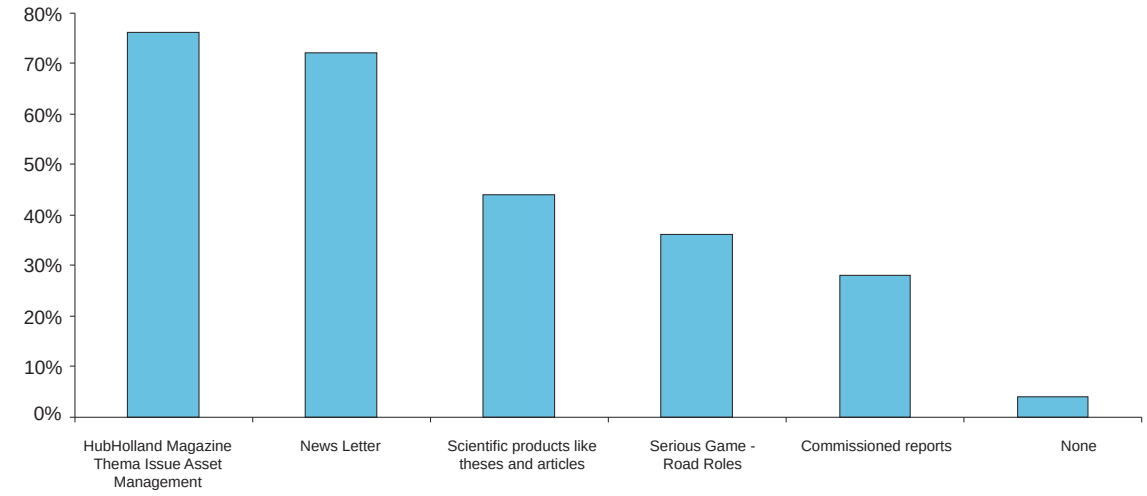
We compiled a list of network activities and asked respondents about their involvement. These activities range from the network meetings to more dedicated activities like simulation games and master classes. Most respondents (92%) participated in the network meetings (see figure 25). The aspect of networking is also reflected by the large share of respondents that participates in the LinkedIn group of the platform (59%) and the share of respondents that has personal contact with other platform members (50%). The knowledge related components of the network score lower: 46% visits lectures, which are usually held at the network meetings; 33% participates in simulation games; and 21% participates in master classes.

Figure 25 Platform involvement



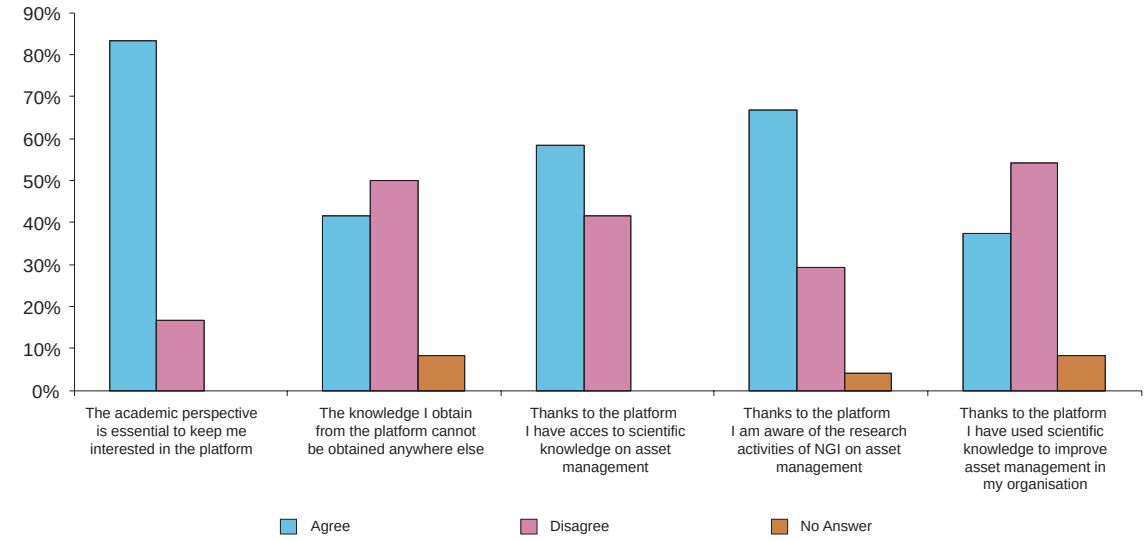
Regarding awareness with AMP's products and services, respondents are most familiar with periodical publications, like HubHolland Magazine (thematic issue on Asset Management) (79%) and newsletters (75%) (figure 26). Of the respondents, 46% knows of scientific publications and 29% knows of commissioned reports by NG Infra, which have not been actively disseminated. Our interviews suggest that some AMP members would like to have more output for direct use, such as specialised education and answers to concrete questions, such as 'how can I implement AM in my organisation?' In particular, one member expressed the need for graduates trained in asset management.

Figure 26 Awareness of platform output



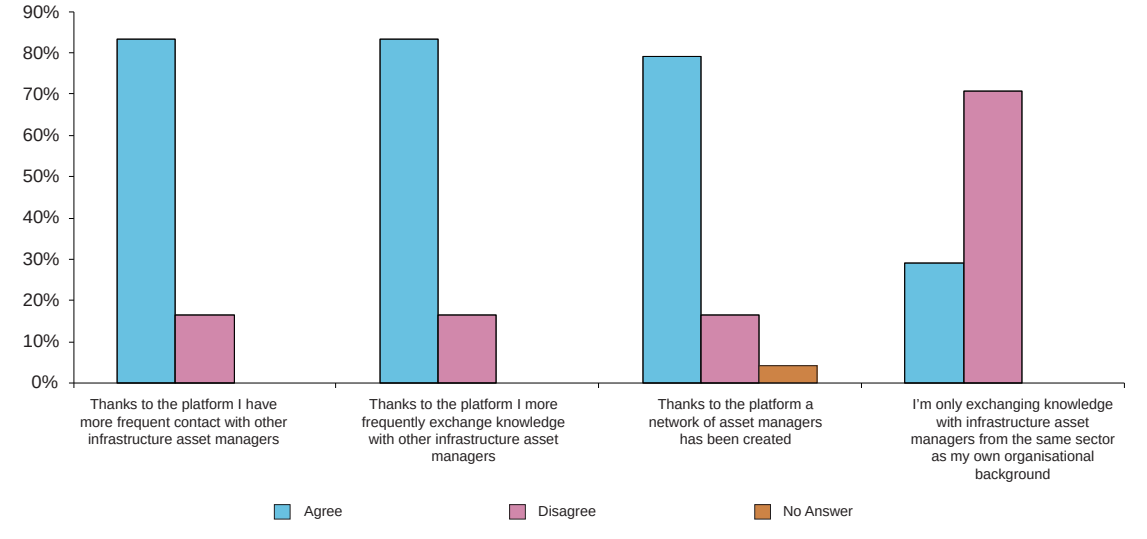
What does AMP mean to its members? How important is the supposed academic nature of AMP? The interviewees indicate that they regard NG Infra as an important consultation partner concerning asset management. Without the platform, it would be more difficult for societal actors to acquire knowledge on asset management. Of the survey respondents, 83% believe the academic nature of the platform is essential to keep them interested (see figure 27). Interviewees agree that the academic setting provides new insights. Only two-thirds (67%) knows what research NG Infra conducts on asset management and 58% also indicates that the platform provides access to scientific knowledge. Far fewer (38%) respondents actually use scientific knowledge to improve asset management within their organisation. Interviewees suggest that the gap between academic knowledge and the world of practitioners is still too large to implement NG Infra's knowledge on asset management. Finally, it must be noted that for 40% of the respondents the knowledge AMP offers is unique.

Figure 27 The role of the platform in scientific knowledge dissemination



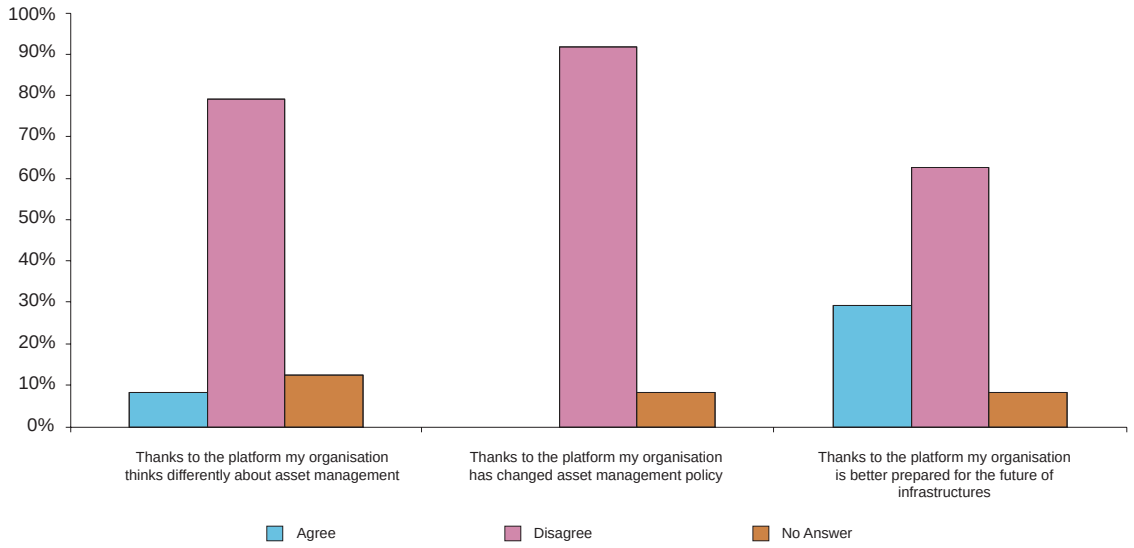
As a result of the platform, 83% of the respondents say they both have more frequent contact with other infrastructure asset managers and they more frequently exchange knowledge with them. The majority of the respondents say they also exchange knowledge with asset managers from other sectors than their own (71%). An illustrative anecdote is the discussion of the effects of heavy snowfall on their organisations between asset managers of Prorail, Rijkswaterstaat and a construction company during the 2011 New Year's drink. Most (79%) respondents say a network of infrastructure asset managers has been established because of the platform. See figure 28. Interviewees confirm these results.

Figure 28 The role of the platform in network creation and knowledge exchange



None of the respondents say their organisation changed policies related to asset management because of the platform. Only a small share of them (8%) perceives their organisation to think differently about asset management thanks to the platform. This image is confirmed by interviewees. Nevertheless, 30% of respondents agree that their organisation is better prepared for the future of infrastructures thanks to the platform. See figure 29.

Figure 29 Immediate and ultimate impacts of the platform



4.3.3 Conclusion

NG Infra has catalysed the developments around asset management and it has created a network around the subject. As a result, organisations seem to make faster progress concerning asset management. The platform fulfils a need that infrastructure organisations have by providing them with academic points of view on asset management.

NG Infra's first aim concerning the platform is that it hosts a knowledge-based network of practitioners dealing with asset management, which distinguishes itself by its academic perspective and cross-sectoral learning. Our data show that the platform succeeds in stimulating knowledge exchange among practitioners from different sectors and organisational backgrounds. There is frequent contact among practitioners: a network has been created. The supposed academic nature of the AMP deserves refining. Both interviews and survey outcomes suggest that practitioners don't have a good overview of the available academic output of NG Infra. Although NG Infra's contribution to AMP is highly valued and it is regarded as an essential element for the success of AMP, we have not yet found evidence of an abundant dissemination of NG Infra's research outcomes through AMP.

Overall, we can conclude that NG Infra hosts a valuable network concerning asset management. The network can be seen as an asset itself in terms of management of research impact. The

network can function not just as a vehicle for dissemination of results, but also for creating long-term stakeholder relationships and aligning research needs and possibilities.

5 Conclusions and Discussion

This study aims to analyse what impact NG Infra has had on practitioners in the infrastructure sectors in the Netherlands. Furthermore, we aimed to get insight in the mechanisms of the programme that induced the impact, and especially those mechanisms that are related to NG Infra as a research programme. In this last chapter we integrate findings in relation to the four research questions. Though it has not been an explicit aim of the project, at the end we will formulate a few recommendations.

The study has been structured by four research questions:
1. How is the research programme organised in terms of activities, output and outcomes, especially in terms of realising impact among its stakeholders?
2. To what extent and in what ways are societal stakeholders involved in NG Infra and its projects?
3. What impact does NG Infra and its projects have on the activities of stakeholders?
4. How does the organisation of NG Infra and stakeholder involvement relate to the impact it has?

Our results are based on four research blocks. First of all, interviews with researchers and a document analysis have been used to reconstruct the programme logics of NG Infra. The result has been used to develop a survey to collect the experiences of researchers within the projects and their perceptions on stakeholder interactions and impacts of their project. In addition to that, we interviewed stakeholders about the impact of the programme on their practice. Finally we did three case studies to get insight in impacts beyond those of interactions with stakeholders.

The overall impression is that the programme started as an academic programme building scientific capacity on issues highly relevant for the infrastructural sectors. The academic character in the first phase can be seen from the management structure with ample space for bottom-up processes, the organisation of studies in PhD projects and the output. In the second phase, more attention has been paid to the dissemination of the results. This has indeed resulted in more attention to user-oriented outputs and dedicated activities to disseminate results.

Overall, the findings suggest that the overall impact so far is more limited than expected and aimed at by the programme. Especially the results of the case studies stand out, as in two of the three case studies the impact results were far less than expected by the programme. We have to add a methodological caution towards quick conclusions in this respect. Impact is difficult to measure and we think that the case studies, above all, show our initial methodological assumption: in studies like these one should emphasise on interactions and immediate impacts and be modest in claiming and expecting to be able to measure further impacts.

5.1 Organisation of NG Infra for realising impact

The logic chart of NG Infra shows four basic pathways of activities, output and outcomes, which are mutually connected. We have labelled these pathways i) research, ii) stakeholder interaction, iii) education, and iv) knowledge brokering. The latter three aim at creating interactions with

societal actors. In principle, the research pathway supplies knowledge to the other pathways. In practice, we have seen this occurring mainly with respect to the second (e.g. umbrella contracts) and third pathways (e.g. PhD research). Knowledge brokering activities (the fourth pathway) does not seem to be systematically fed by research outcomes, as our case study of the Asset Management Platform shows.

The pathways aimed at society include activities that provide researchers with input from practitioners to increase the societal relevance of NG Infra's research. The user council serves this end in the stakeholder interaction pathway. External PhD students (employed part-time by organisations from practice) are links to practice in the education pathway. The programme deliberately decided to put more focus on knowledge dissemination from 2008 onwards. To this end and in reaction to needs from practice, the Asset Management Platform and Serious Gaming have been introduced. Both have a role in the education and knowledge broker pathway.

In the first phase (2004-2008), the programme aimed to create a body of knowledge. During this period there does not seem to have been a programme-wide view on how activities and output should be organised to have impact. After 2008, the programme has more strongly emphasised the importance of knowledge dissemination. Industry involvement has been set as a criterion for project selection, two dissemination themes and the HubHolland Magazine have been introduced in 2008, the NG Infra Academy has been introduced in 2009 and a large stakeholder event (Infratrends) has been organised in 2011. Theme leaders, however, have different perceptions of their roles concerning knowledge dissemination and societal impact. Some themes organise theme-wide publications or conferences, while others don't. Some theme leaders steer on social relevance; others leave this up to project leaders. An indication of this high level of self-government of themes and projects is the scattered output pattern of the projects. Many types of outputs are produced, but most of them only in small numbers.

In conclusion, NG Infra provides the boundary conditions for a wide range of activities, output and outcomes. The degree of stakeholder orientation before 2008 is more a result of project- and theme-level initiatives than of a programme-wide shared vision or framework. From 2008 onwards, multiple initiatives have been developed at the programme level to stimulate knowledge dissemination.

5.2 Involvement of stakeholders NG Infra and its projects

Chapters 2 and 3 present the main evidence for the involvement of stakeholders in NG Infra. The survey results indicate that NG Infra projects are of relevance for the full range of infrastructural sectors and different kind of stakeholders. There seems to be no bias in this respect. We could not survey stakeholders systematically to verify this finding from the stakeholders perception. In interviews we didn't find indications for a bias either. In terms of education, results for next career steps for master's students and PhD students were limited, but they showed a tendency for PhD students to get their next job in research institutes and consultancy.

Stakeholders turn out to be mainly involved at the programme level and in individual research projects. In the second phase of the programme, attempts to involve stakeholders at the project

level have been increasingly compared to the first phase. Attempts to attract stakeholders at the theme level do not seem to have been very successful yet. At the programme level, high-level societal stakeholders monitor the programme in the user council. Other stakeholders participate in the editorial board of HubHolland Magazine where they put issues from practice on the agenda. The NG Infra Academy is also organised at the programme level. Although many interviewed stakeholders are aware of the Academy, none have participated, and we cannot say anything about its effects yet.

The Infra Trends meeting, however, is valued by societal actors as a best practice on how to involve stakeholders. At the project level, stakeholders are involved in one way or another in about two-thirds of all projects. More and more, they also participate in official user councils of the projects. Remarkably, however, their contributions are restricted to providing input from practice, giving feedback, and disseminating results. Their contributions to the actual research seem to be quite modest too, as in nearly all projects, researchers are in charge of formulating research questions, research design and conducting research. These patterns are even stronger in projects that started in the second phase of the project. Although multiple initiatives to stimulate stakeholder interaction have been introduced in recent years, this indicates that NG Infra is still mainly a scientific programme, with a low degree of co-creation of knowledge with societal actors. The dominance of scientific publications in the output pattern supports this conclusion. Moreover, societal actors are involved in a restricted way: they do not link up to other NG Infra projects or activities other than the one they directly relate to.

In conclusion, societal actors are involved at the programme level and at the project level. Efforts to involve them have increased. Our findings indicate that their their position is one at a distance, especially at the project level. Stakeholders can provide input and feedback, but the ‘real work’ is carried out by researchers. In order to achieve societal impact, more structure is required to bundle efforts and knowledge, as the successful themes of Strategic Asset Management and Serious Gaming show. In doing so, small impacts may add up to larger and more visible impacts. Moreover, researchers may become more aware of the knowledge needs of stakeholders, and stakeholders may find it easier to identify useful research projects.

5.3 Impact of NG Infra and its projects on stakeholders

The researcher survey, stakeholder interviews and case studies serve as main data sources for conclusions on NG Infra’s impact. From the survey we learned that stakeholders who used the research results are rather heterogeneous and come from a range of different infrastructural sectors.

The impacts we found are predominantly immediate impacts. Some are intermediate impacts. The most dominant immediate impacts of NG Infra can be summarised as network creation and changed insights of societal actors. The Asset Management Platform is the most successful example that we found of network creation. It clearly stimulates the exchange of knowledge and experience among infrastructure practitioners. Good examples of changed insights concern the level of awareness of developments such as investments in renewing infrastructures and of the value of serious gaming. In some cases, these immediate impacts have resulted into intermediate impacts like the implementation of asset management standards within some firms or the use of models by ProRail developed in an NG Infra PhD thesis.

The perception of researchers on the intermediate and ultimate impacts and the results of stakeholder interviews and case studies diverge. Rather high numbers of researchers agreed with claimed impacts on the intermediate and ultimate impact. These numbers also increase when comparing projects from the first phase to projects from the second phase. In the stakeholder views, the importance of NG Infra was acknowledged, but few impacts on the organisational practices were reported. These interview results are supported by the case studies. Concrete examples of ultimate impacts have not been found, but some societal actors have expressed specific expectations of the ultimate impacts that NG Infra knowledge will have on their activities in the near future.

In conclusion, we can say that over a broad range of projects and activities, the interactions with stakeholders have had immediate impacts, especially in terms of networks and increased understanding. Further impacts are (still) few.

5.4 Organisation of NG Infra and impact

NG Infra started as a predominantly scientific research programme, allocating most of the budget to PhD projects. Only later the programme started to become more systematic in its organisation of the interaction with stakeholders, set up two themes aimed at creating impact, and organised programme level activities like the NG Infra Academy. The findings of this study indicate that apart from the two themes, interaction with stakeholders is either organised at programme level or at project level. In this last section, we look at the relation between programme organisation and impact and come up with some recommendations that may help the programme management to set up a more systematic strategy for stakeholder interaction and impact.

Most projects are organised as scientific projects, aiming at a PhD degree for the involved researcher. Stakeholder are involved, but not to a high extent. More recent projects have user committees. Very few projects are set up as collaborative projects with stakeholders for the co-creation of knowledge, in order to align not just research to stakeholder interests, but to integrate scientific knowledge and practitioners' experiences into innovative technologies. In making its research projects more user oriented or to get stakeholders even more involved, NG Infra might learn from the experiences of others. We know that other national research programmes and, of course, the Technology Foundation (STW), have successfully tried this before.

However, most significant in our findings is the success of the impact organised at the level of the two dissemination themes. Serious Gaming has a prominent role in the collaboration between NG Infra and ProRail, and it has had considerable impact on the implementation of innovations throughout the organisation. We did not analyse the impact of this theme in one of the case studies, but references to impact from Serious Gaming were corroborated by interviews with stakeholders. The case of the Asset Management Platform shows the success of platforms for impact. From stakeholder interviews we get the impression that within the sector and within the knowledge portfolio of NG Infra, there are more topics for which such dissemination themes are an appropriate strategy. The advantage of organising interactions and impact at the theme level is that knowledge from different projects can be integrated and the effort gets some critical mass, both in terms of research results and stakeholders.

Levels of the impact of research programmes do not only depend on the research programme itself, but also on the stakeholders. Though we haven't systematically analysed the organisation of the infrastructural sectors, it is clear that the sector is characterised by rather large organisations – both public and private. Parts of these organisations seem to operate as organisations on their own, while the use of NG Infra results would be facilitated by intra-organisational collaboration. Though such factors are often outside the management scope of research programme, we think that organising interactions and impact at theme level might, to some extent, help maintain relations with different parts of large organisations. In any case, having contacts with only one individual at an organisation is not a strong strategy for having impact on large organisations.

At programme level, NG Infra has organised activities like the Academy, programme conferences and network meetings, which are highly valued by the stakeholder community and facilitate unplanned knowledge exchange. Moreover, dedicated publications like HubHolland Magazine contribute to the appreciation of stakeholders for NG Infra. We think, however, that results of NG Infra can have more impact if the results of projects and expertise of NG Infra researchers are better communicated at programme level. Though impact on issues like the unbundling of energy companies might have been larger than our data showed, we think the programme can do more to support decision making and public debate. Such public communication requires both facilitation of communication at programme level and dedication of individual researchers.

In our study, we have tried to take into account the impact that the NG Infra has had through education at master and PhD level. The training of new professionals is often perceived by stakeholders as the best impact that university research programmes can have. NG Infra has an advantage of having a strong core at one university faculty which would allow for a strong integration of research and education. Though this integration has not been visible in our study, we think that this is more due to the division of organisational responsibilities for NG Infra and the faculty's master's and PhD programmes. It would add to NG Infra's profile within the stakeholder community if the impact through education is mapped more systematically.

5.5 NG Infra as a learning organisation

NG Infra started off with a strong focus on knowledge development. The first aim from 2004 up to 2008 was to build a body of knowledge on the understanding of infrastructures. From 2008 onwards, developing practical solutions to steer infrastructure developments is a second aim of the programme. To support this aim, special attention is given to knowledge dissemination in the second phase of the programme. At the programme level, we see multiple initiatives that have been developed since 2008 to stimulate knowledge dissemination: the themes Serious Gaming and Strategic Asset Management (2008), HubHolland Magazine (2008), the NG Infra Academy (2009) and Infratrends (2011). From interviews with stakeholders, these initiatives have added to the visibility of the programme and are highly appreciated.

Our analysis at the project level reflects the focus on dissemination, but not yet in an unambiguous way. Industry involvement has become a project selection criterion. Not all theme leaders seem to use the criterion in a strict way, but for project leaders the demand has become a more important motive in recent years. Also, more projects have tried to involve stakeholders. Alignment to practice was already an important motive to do so in the first phase of the

programme, but it has increased in importance in the second phase. Actual involvement in the projects, though, seems to have decreased. Fewer projects report substantial financial contributions and knowledge inputs of stakeholders. More researchers involved in projects that started in the second phase believe that NG Infra results in practical solutions for infrastructures. It is too early to expect impacts of projects that started in 2008 and later, but these projects already report more impact on policy discussions.

For the programme, these results raises the question of how to move forward and how to further improve its impact on infrastructural policies and practices in the Netherlands and abroad. Based on our analyses, there are several options to consider for the programme board, of which implementation is partly dependent on the identity and structure of the programme.

The options are not mutually exclusive, but they elaborate on several aspects of the current developments of the programme and of our results.

1. The first option builds upon the logic chart and attempts to map impacts from available project data. The logic chart can be used by programme management to both reflect upon the kind of impacts it aims at, as well as the way in which it wants to contribute to these impacts. Being an academic programme implies expectations from stakeholders about its impacts. Stakeholders expect different contributions compared to the impacts of e.g. consultancy firms or institutes for applied science.
2. The academic identity also implies that impacts will not easily emerge bottom-up, without much management steering. The logic chart can also be used for improving the monitoring of project results. Monitoring can easily move into idle data collection. Through the logic chart, a selection can be made of specific outputs and impacts that are indicative for the programme in order to monitor its performance.
3. The programme may also invest in improving its own database of stakeholders involved or interested in the programmes. Maintaining such a database is time-consuming and requires the commitment of many involved in the programme. Once a reliable database is built, it can serve to disseminate results more broadly and develop dedicated activities for stakeholders.
4. Related to these three options, the fourth option is to more involve theme leaders and the programme's core researchers into the management of impact. Our interviews indicate that there is still quite some divergence in the perceptions of the programme in terms of its aims towards stakeholders. Impacts at programme level might further improve if the management of impact is enforced at the theme level as well. This might also counteract possible stakeholder perceptions that they have been used in the phase of project initiation, but forgotten afterwards.
5. While this latter option focuses at project levels, a fifth option for the programme is to build upon positive experiences with the two dissemination themes. Instead of expecting impact from separate projects, impact can be managed by bringing projects results together in themes that reflect the knowledge needs of stakeholders and critical issues in current infrastructural developments. The actual activities within such dissemination themes may differ, reflecting stakeholder needs and the kind of contribution that the programme wants to make. A contribution in, e.g., improving the political governance of infrastructures aiming at the political debate will need different inputs compared to, e.g., a dissemination theme aimed at supporting firms.
6. From our stakeholder interviews it is clear that different stakeholders have quite different expectations and needs, which might not have been surprising given the range of sectors that

the programme aims at and the diversity of possible stakeholders. Nevertheless, from the interviews and other observations, we can list several possibilities that may easily improve stakeholder interactions.

   a. Improve the possibilities for stakeholders to get insight into the actual research projects being done in the programme, by allowing researchers to present these projects at events or in network meetings attended by stakeholders, by highlighting midterm results in newsletters, or by regularly sharing project briefings with stakeholders.
   b. Make sure that once stakeholders are involved in projects, e.g. through interviews or by providing data for simulation, results of the projects are communicated to these stakeholders with special attention to their situation.
   c. Make more use of graduate students in stakeholder interactions. Often, stakeholders consider human capital as a main “output” of universities.

7. Do not limit contacts with key organisations to the board level. Within infrastructural sectors, often there are some large organisations like ministries and large companies. NG Infra has high-level contact with most of these large organisations. These interactions are crucial for strategic choices of the programme and NG Infra’s position in the broad field of infrastructures. For the impact of projects, relationships with actors at lower strategic and operational levels in the organisations and relationships with departments with specialised responsibilities are of equal importance.

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Appendices

Appendix I Interviewees

Interviewed researchers

Name	Role	Affiliation	Date	Remarks
Dr. Wijnand Veeneman	Researcher Public Values	TU Delft, Faculty of TPM	27-09-2010	
Dr. Mark de Bruijne	Theme leader Reliable Infrastructures	TU Delft, Faculty of TPM	27-09-2010	
Dr. Pieter Bots	Theme leader Understanding Complex Systems	TU Delft, Faculty of TPM	27-09-2010	Combined Interview with Peter Kroes
Prof. Dr. Ir. Peter Kroes	Theme leader Understanding Complex Systems	TU Delft, Faculty of TPM	27-09-2010	Combined Interview with Pieter Bots
Prof. Dr. John Groenewegen	Theme leader Reliable Infrastructures	TU Delft, Faculty of TPM	01-10-2010	
Dr. Ir. Zofia Lukszo	Theme leader Intelligent Infrastructures	TU Delft, Faculty of TPM	01-10-2010	Combined interview with Hans Hellendoorn
Prof. Dr. Ir. Hans Hellendoorn	Theme leader Intelligent Infrastructures	TU Delft, Faculty of 3ME	01-10-2010	Combined interview with Zofia Lukszo
Dr. Ir. Laurens de Vries M.A.	Researcher Serious Gaming	TU Delft, Faculty of TPM	04-10-2010	
Prof. Dr. Ir. Margot Weijnen	Scientific programme director	TU Delft, Faculty of TPM	04-10-2010	
Prof. Dr. Ir. Paulien Herder	Scientific programme director / theme leader flexible infrastructures	TU Delft, Faculty of TPM	07-10-2010	

Interviewed stakeholders

Name	Current Main Occupation	Date	Remarks
Ir. Marc van den Elzen	Manager at Heymans Infra Management	28-02-2011	
Drs. Joost van der Vleuten	Senior strategy advisor at Dutch Ministry of Economic Affairs, Agriculture and Innovation	01-03-2011	
Dr. Ir. Maarten van der Vlist	Top expert 'adaptive water management and space' at Rijkswaterstaat	03-03-2011	
Ir. Jan Peters	Directeur Asset Management at Enexis	21-03-2011	
Drs. Siebe Riedstra	Secretary-General at Ministry of Infrastructure and Environment	22-03-2011	Previously member of User Council
Dr. Ir. Harry van Breen	Innovation Manager at Alliander	21-04-2011	
David Eerdmans	Mobility Consultant at Inno-V advisors	22-04-2011	
Piet Tiggelaar	Staff member advice and policy at Municipality of Alkmaar	27-04-2011	
Arjo van Loo	Manager Innovation Department at ProRail	27-04-2011	
Ir. Ype Wynia	Risk Management Consultant at D-Cision	28-04-2011	Previously risk manager at Essent Network. PhD researcher Asset Management NG Infra

Appendix II Interview protocols

Interview protocol researchers

Theme level

- Gevraagd voor analyse maatschappelijke impact
- Interview: 3 delen
  - Uw achtergrond
  - Organisatie van het thema (en uw rol daarin)
  - Maatschappelijke impact
- Doel: inzichten verzamelen om later brede survey uit te zetten. Bevindingen worden getoetst en bediscussieerd in mid-term bijeenkomst

Achtergrond

- opleiding
- onderzoeksinteresses

Organisatie van het thema

- Onderzoeksonderwerpen
- Uitvoering onderzoek (case studies, etc?)
- Hoeveel projecten?
  - Voornamelijk AIO projecten?
- Dwarsverbanden met andere thema's?
- Projectselectie (maatschappelijke impact?)
- Uw rol?
  - open
  - Maatschappelijke impact?

Maatschappelijke relevantie

- Welke gebruikers?
  - Hoe is dat contact geïnitieerd?
  - Hoe is het contact georganiseerd?
  - Ook anderen dan deelnemers in projecten?
  - Zouden we contact met gebruikers kunnen opnemen?
- Hoe zijn ze betrokken in het onderzoek?
  - Projectontwerp?
  - Uitvoeren onderzoek?
  - Kennisdisseminatie?
  - Geld? Dmv matching/sponsoring/cofinanciering?
  - Andere bijdragen?
- Waar gebruiken ze de onderzoeksresultaten voor?
  - Concrete impacts?
  - Wordt dat actief gevolgd?
- Via welke kanalen komt kennis bij gebruikers terecht?
  - Gaming/simulaties?
  - Teksten (ook niet academisch?)
  - Gemengde publieken (wetenschappelijk domein/maatschappelijk domein?)

    - Waar komen PhDs en Mscs terecht?
        - Verschillen daartussen?
        - Bekend wat reacties van werkgevers zijn?
- Procedures contact gebruikers/maatschappelijke relevantie

Programme level

- Gevraagd voor analyse maatschappelijke impact
- Interview: 3 delen
    - Uw achtergrond
    - Organisatie van het programma (en uw rol daarin)
    - Maatschappelijke impact
- Doel: inzichten verzamelen om later brede survey uit te zetten. Bevindingen worden getoetst en bediscussieerd in mid-term bijeenkomst

Achtergrond

- opleiding
- onderzoeksinteresses

Organisatie van het programma

- Hoe NG infra tot stand gekomen?
    - Wens wetenschappers? Wens maatschappelijke actoren? Samen?
    - Hoe is duidelijk gemaakt dat het programma bestaansrecht had?
- Onderzoeksonderwerpen?
- hoeveel projecten?
    - Voornamelijk AIO projecten?
- Dwarsverbanden met andere grote onderzoeksprogramma's?
- Project en themaselectie (maatschappelijke impact?)
- Uw rol?
    - Maatschappelijke impact?
    - Samenhang doelen NG infra/thema's/projecten?
    - Hoe probeert het bestuur maatschappelijke relevantie in te richten (programma, thema's projecten)

Maatschappelijke impact

- Oorspronkelijk idee over maatschappelijke relevantie van NG infra?
    - Zijn er sinds het begin belangrijke veranderingen geweest?
- Gebruikers
    - Belangrijkste gebruikers
    - Organisatie contact met gebruikers
    - Hoe is het contact met gebruikersraden
    - Procedures contact gebruikers/maatschappelijke relevantie
- Wat werkt er beter en minder goed om impact te genereren?
    - Communicatiekanalen
    - Waar komen PhDs terecht?
- Gerealiseerde impacts
    - Onverwachte impacts?
    - Onverwacht geen impacts?

  - Breder dan directe gebruikers/betrokkenen in projecten?
  - Reactie stakeholders (overheid als geheel! Commissie van Wijzen)
  - Hoe is in t algemeen de kennis over t gebruik van onderzoeksresultaten door gebruikers?
    - Wordt dat actief gevolgd?
- Verwachte lange termijn effecten?
  - Hoe zorgen voor inbedding van kennis na afloop NG Infra?

- Personen die we echt nog moeten spreken?
  - Gebruikers
  - Sleutelfiguren binnen programma m.b.t. maatschappelijke relevantie

Interview protocol stakeholders

1. Inleiding
   a. Doel
   b. Opzet

2. Vaststellen rol in het programma
   a. Wijze
   b. Niveau
   c. Contactpersoon

3. Uitvoering onderzoek
   a. Opstellen onderzoeksagenda
   b. Ontwerp onderzoeksopzet
   c. Uitvoering onderzoek
   d. Verspreiden resultaten

Steeds:

   i. Betrokken: Reden; Waardering betrokkenheid; verbeterpunten
   ii. Niet betrokken: Reden; wenselijkheid betrokkenheid; wijze van betrokkenheid

4. Onderzoeksresulaten NG Infra
   a. Bent u bekend met onderzoeksresultaten?

   Ja

   a. Welke?
   b. Via welke weg?
   c. Waardering
      a. Reden
   d. Gebruik (bij nee: reden)
      a. Wijze

   Nee

   a. Waar in geïnteresseerd
   b. Via welke weg?
   c. Beoordelingscriteria
   d. Gebruik? (bij nee: reden)
      a. Wijze

5. Resultaat voor uw organisatie (alleen indien resultaten gebruikt zijn)
   a. Resultaat?
      i. Reden
   b. Overeenkomst met verwachting
      i. Reden
   c. Belang van resultaten voor organisatie
   d. Financiële waarde

6. Overige activiteiten NG Infra
   a. Bekendheid onderwijsactiviteiten
   b. Bekendheid netwerkactiviteiten
   c. Bekendheid met concepten

Steeds
   i. Welke
   ii. Gebruik
   iii. Waardering
   iv. Gevolgen voor organisatie

7. Belang programma
   a. Wat is er helaas niet gedaan?
   b. Wat als NG Infra er niet geweest zou zijn?

8. Afsluiting
   a. Dank
   b. Voor aanvullende vragen benaderen?
   c. Survey
   d. Op de hoogte houden?

Additional protocol Asset Management\Asset Management Platform
   1. Wat het is
      a. Wie?
      b. Hoe vaak?
      c. Onderwerpen?
      d. Belang van wetenschappelijke inslag
      e. Zichtbaarheid voor sector
      f.Betrokkenheid Heijmans

   2. Resultaten
      a. Netwerken
      b. Kennisuitwisseling
      c. Voor uw organisatie

   3. Waarde
      a. Voor sector
         a. Voor uw organisatie
      b. Voor onderzoek

   4. Rol NG Infra
      a. Zonder NG Infra
      b. Wat zou NG Infra nog meer kunnen doen op dit onderwerp/in deze functie?

Appendix III Surveys

Researcher Survey

Maatschappelijke Impact Analyse Next Generation Infrastructures

Het Rathenau Instituut, afdeling Science System Assessment, werkt momenteel aan een analyse van de maatschappelijke impact van het onderzoeksprogramma Next Generation Infrastructures. In dat kader willen we u een aantal vragen stellen over uw ervaringen in één van de projecten van dit onderzoeksprogramma.
De resultaten van deze vragenlijst zullen gebruikt worden om de maatschappelijke impact op programmaniveau in kaart te brengen. Het is niet onze bedoeling om afzonderlijke projecten te beoordelen. De wetenschappelijke impact is geen onderdeel van deze analyse; dit wordt door het programmabestuur op een andere wijze georganiseerd.

U ontvangt deze vragenlijst omdat u betrokken bent bij één of meerdere projecten van Next Generation Infrastructures. Om de tijdbelasting zoveel mogelijk te beperken, krijgt u slechts één vragenlijst, ook als u bijmeerdere projecten betrokken bent. We willen u dan ook vragen om bij het in vullen van deze vragenlijst steeds het project in gedachten te houden dat in de e-mail die u ontvangen heeft vermeld staat.

Aan het einde van de vragenlijst volgt een algemene open vraag. Daar hebt u de gelegenheid voor het maken van op- of aanmerkingen naar aanleiding van deze vragenlijst.

Hartelijk dank voor uw tijd en medewerking!

Barend van der Meulen
Stefan de Jong (voor vragen bereikbaar via s.dejong@rathenau.nl)

Algemene informatie

1. Wat is uw geslacht?
   - o Vrouw
   - o Man

2. Wat is uw huidige leeftijd?
   - o ….....

3. Bij welke organisatie had u bij aanvang van het project uw hoofdaanstelling?
   - o TU Delft
   - o Andere universiteit
   - o Andere organisatie

4. Bij welke faculteit van TU Delft had u bij aanvang van het project uw hoofdaanstelling?
   - o Bouwkunde
   - o Civiele Techniek & Geowetenschappen

- o Elektrotechniek, Wiskunde en Informatica
- o Industrieel Ontwerpen
- o Luchtvaart- en Ruimtetechniek
- o Techniek, Bestuur en Management
- o Technische Natuurwetenschappen
- o Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen

5. Bij welke universiteit had u bij aanvang van het project uw hoofdaanstelling?
   - o Erasmus Universiteit
   - o Open Universiteit
   - o Radboud Universiteit
   - o Rijksuniversiteit Groningen
   - o TU Eindhoven
   - o Universiteit Leiden
   - o Universiteit Maastricht
   - o Universiteit Tilburg
   - o Universiteit Twente
   - o Universiteit van Amsterdam
   - o Universiteit van Utrecht
   - o Wageningen University
   - o Vrije Universiteit
   - o Andere universiteit, namelijk [toelichting niet verplicht]

6. Bij wat voor organisatie had u uw hoofdaanstelling bij aanvang van het project?
   - o Internationale beleidsorganisatie
   - o Ministerie
   - o Provincie of gemeente
   - o Rijkswaterstaat, Inspectie Verkeer & Waterstaat of Agentschap NL (voorheen SenterNovem)
   - o Infrastructuuraanbieder
   - o Technologieaanbieder
   - o Bouwbedrijf
   - o Bank
   - o Maatschappelijke organisatie
   - o Consultancy bureau
   - o Kennisinstituut
   - o Anders, namelijk [toelichting niet verplicht]

7. Wat was uw functieniveau bij aanvang van het project?
   - o Hoogleraar
   - o Universitair hoofddocent
   - o Universitair docent
   - o Postdoc
   - o Promovendus
   - o Anders, namelijk [toelichting niet verplicht]

8. Wat was uw functieniveau bij aanvang van het project
   - o Senior niveau

- o Medior niveau
- o Junior niveau
- o Anders, namelijk [toelichting niet verplicht]

Vragen over het project

9. Is het project al afgerond?
   - o Ja
   - o Nee

10. Op welke sectoren is het project gericht? [meerdere antwoorden mogelijk]
    - o Spoorwegverkeer
    - o Weg- en Waterverkeer
    - o Gas
    - o Elektriciteit
    - o Drinkwater
    - o ICT
    - o Anders, namelijk [toelichting niet verplicht]

11. In welke mate bent u het oneens of eens bent met de volgende stellingen?

Stelling	Geheel oneens	Oneens	Enigszins oneens	Enigszins eens	Eens	Geheel eens	Weet niet/ Geen mening
Dit project bouwt voornamelijk voort op resultaten van eerder onderzoek waar ik bij betrokken ben geweest.							
Dit project maakt veel gebruik van kennis die uit andere projecten in het NG Infra Onderzoeksprogramma is voortgekomen.							
Het werk in het kader van dit project zou zonder het NG Infra Onderzoeksprogramma niet uitgevoerd zijn.							
Dit project heeft geleid tot een geheel nieuwe onderzoekslijn.							

12. Zijn er maatschappelijke actoren betrokken bij de opzet en/of uitvoering van het project?
    - o Ja
    - o Nee, maar er is wel geprobeerd om hen erbij te betrekken
    - o Nee

13. Waarom hebt u maatschappelijke actoren willen betrekken bij de uitvoering van het project? [meerdere antwoorden mogelijk]
    - o Dit was een eis van het onderzoeksprogramma
    - o Op advies van het onderzoeksprogramma
    - o Om cofinanciering voor het project te verwerven
    - o Om toegang te krijgen tot gegevens en ervaringen uit de praktijk
    - o Om kennis uit de praktijk in te brengen in het project

- o Om de onderzoeksvragen van het project aan te laten sluiten bij de vragen van de praktijk
- o Om gedurende het project de aansluiting bij de kennisbehoefte uit de praktijk te behouden
- o Om de resultaten van het project te communiceren
- o Als reactie op belangstelling en vragen van maatschappelijke actoren
- o Anders, namelijk [toelichting niet verplicht]

14. Voor zover u kunt nagaan, wat zijn de redenen waarom het niet (altijd) is gelukt om maatschappelijke actoren te betrekken bij de uitvoering van het project? [meerdere antwoorden mogelijk]
    - o Zij hadden een gebrek aan financiële middelen voor cofinanciering
    - o Zij beschouwden het niet als hun rol om deel te nemen in wetenschappelijke onderzoeksprojecten
    - o Zij waren van mening dat hun kennisvragen op aan andere manier beter werden geadresseerd
    - o Zij waren van mening dat het project voor hen geen relevante kennis oplevert
    - o Zij waren van mening dat de administratieve last van deelname aan het onderzoeksprogramma te hoog was
    - o Zij konden niet akkoord gaan met de financieringsvoorwaarden van het onderzoeksprogramma
    - o Er was te weinig tijd om hen te kunnen interesseren voor deelname
    - o Anders, namelijk [toelichting niet verplicht]

15. Welke van de onderstaande maatschappelijke actoren zijn betrokken bij het uitvoeren van project? [meerdere antwoorden mogelijk]
    - o Internationale beleidsorganisatie
    - o Ministerie
    - o Provincie of gemeente
    - o Rijkswaterstaat, Inspectie Verkeer & Waterstaat of Agentschap NL (voorheen SenterNovem)
    - o Infrastructuuraanbieder
    - o Technologieaanbieder
    - o Bouwbedrijf
    - o Bank
    - o Maatschappelijke organisatie
    - o Consultancy bureau
    - o Kennisinstituut
    - o Anders, namelijk [toelichting niet verplicht]

16. Hoe zijn deze maatschappelijke actoren betrokken bij de uitvoering van het project?
    - o Zij zijn onderwerp van onderzoek
    - o Zij zitten in de gebruikersraad

17. In welke mate hebben maatschappelijke actoren een bijdrage geleverd aan het project?

Activiteit	Niet	Kleine bijdrage	Grote bijdrage	Volledig
Zij financieren (mede) het onderzoek.				
Zij brengen expertise en kennis in.				
Zij geven feedback op de resultaten.				
Anders, namelijk [toelichting niet verplicht]				

18. Kunt u aangeven hoe de leiding in de uitvoering van het project tussen wetenschappelijk onderzoekers en maatschappelijke actoren verdeeld is voor het formuleren van onderzoeksvragen, het ontwerpen van de onderzoeksopzet en het uitvoeren van het onderzoek?

	Wetenschappelijke onderzoekers hebben de leiding, maar er zijn ook maatschappelijke actoren bij betrokken	**Maatschappelijke actoren hebben de leiding**, maar er zijn ook wetenschappelijk onderzoekers bij betrokken	Maatschappelijke actoren en wetenschappelijk onderzoekers hebben **gelijke verantwoordelijkheid**
Wie formuleren de onderzoeksvragen?			
Wie ontwerpen de onderzoeksopzet?			
Wie voeren het onderzoek uit?			
Wie verspreiden onderzoeksresultaten?			

19. In welke mate bent u het oneens of eens met onderstaande stellingen over het verloop van de samenwerking met maatschappelijke actoren bij de uitvoering van het project?

	Geheel oneens	**Oneens**	**Enigszins oneens**	**Enigszins eens**	**Eens**	**Geheel eens**	**Weet niet/ Geen mening**
Er was sprake van begripsverwarring tussen de wetenschappelijk onderzoekers en de maatschappelijke actoren.							
Wetenschappelijk onderzoekers en maatschappelijke actoren zijn er in geslaagd om wetenschappelijk onderzoek en de maatschappelijke praktijk met elkaar te verbinden.							
Wetenschappelijk onderzoekers stonden open voor de inbreng van maatschappelijke actoren.							
Maatschappelijke actoren stonden open voor de werkwijze en de praktijk van het doen van wetenschappelijk onderzoek.							
Door cofinanciering hadden maatschappelijke actoren invloed op de inhoud van het project.							
Er was te weinig tijd voor de communicatie tussen wetenschappelijk onderzoekers en maatschappelijke actoren.							
Door de kwaliteitseisen die aan wetenschappelijk onderzoek worden gesteld, was het project voor maatschappelijke actoren niet interessant.							
Door het toegepaste karakter was het project niet interessant voor wetenschappelijke onderzoekers.							
De kennisvragen van maatschappelijke actoren sloten goed aan bij het kennisaanbod van wetenschappelijk onderzoekers.							

20. Hoeveel masterstudenten zijn in het project afgestudeerd?
    - o …....
    - o Onbekend
    - o Geen

21. Waar zijn deze masterstudenten na hun afstuderen gaan werken?

Organisatie	Aantal
Internationale beleidsorganisatie	
Ministerie	
Provincie of gemeente	
Rijkswaterstaat, Inspectie Verkeer & Waterstaat of Agentschap NL (voorheen SenterNovem)	
Infrastructuuraanbieder	
Technologieaanbieder	
Bouwbedrijf	
Bank	
Maatschappelijke organisatie	
Consultancy bureau	
Kennisinstituut	
Anders, namelijk [toelichting niet verplicht]	
Onbekend	

22. Hoeveel promovendi hebben hun proefschrift voltooid in het project?
    - o …....
    - o Onbekend
    - o Geen

23. Waar zijn de promovendi na voltooiing van hun proefschrift gaan werken?

Organisatie	Aantal
Internationale beleidsorganisatie	
Ministerie	
Provincie of gemeente	
Rijkswaterstaat, Inspectie Verkeer & Waterstaat of Agentschap NL (voorheen SenterNovem)	
Infrastructuuraanbieder	
Technologieaanbieder	
Bouwbedrijf	
Bank	
Maatschappelijke organisatie	
Consultancy bureau	
Kennisinstituut	
Anders, namelijk [toelichting niet verplicht]	
Onbekend	

24. Door middel van welke van de volgende (op de praktijk gerichte) producten zijn de projectresultaten verspreid? [meerdere antwoorden mogelijk]

Product	Aantal
Nieuw theoretisch concept	
Besluitvormingsmethode of –tool	
Geschreven advies	
Prototype	
Vakpublicatie	
Praktijkgerichte bijeenkomst	
Publicatie voor breder publiek	
Mediaoptredens krant, radio, televisie, internet	
Presentatie voor breder publiek	
Presentatie voor vakpubliek	
Richtlijn, protocol of standaard	
Publiek toegankelijke database	
Toekomstscenario	
Kosten-batenanalyse	
Wetenschappelijke publicatie	
Anders, namelijk [toelichting niet verplicht]	
Geen	

24. Door middel van welke van de volgende (op de praktijk gerichte) producten zijn de projectresultaten verspreid? [meerdere antwoorden mogelijk]

25. Met welke maatschappelijke actoren zijn de projectresultaten gedeeld? [meerdere antwoorden mogelijk]
    - o Internationale beleidsorganisatie
    - o Ministerie
    - o Provincie of gemeente
    - o Rijkswaterstaat, Inspectie Verkeer & Waterstaat of Agentschap NL (voorheen SenterNovem)
    - o Infrastructuuraanbieder
    - o Technologieaanbieder
    - o Bouwbedrijf
    - o Bank
    - o Maatschappelijke organisatie
    - o Consultancy bureau
    - o Kennisinstituut
    - o Anders, namelijk [toelichting niet verplicht]

26. Op welke sectoren zijn de projectresultaten gericht? [meerdere antwoorden mogelijk]
    - o Spoorwegverkeer
    - o Weg- en Waterverkeer
    - o Gas
    - o Elektriciteit
    - o Drinkwater
    - o ICT
    - o Anders, namelijk [toelichting niet verplicht]

27. Wat zijn de belangrijkste theoretische concepten die uit het project zijn voortgekomen? (maximaal 3)
    - o ……
    - o ……
    - o ……

28. Wat zijn de belangrijkste besluitvormingsmethodes of -tools die er uit het project zijn voortgekomen? (maximaal 3)
    - o ……
    - o ……
    - o ……

29. Welke van de volgende praktijkgerichte bijeenkomsten zijn er binnen de projecten georganiseerd?
    In de eerste tabel kunt u het totaal aantal van dit type bijeenkomst aangeven.
    In de tweede tabel kunt het totaal aantal deelnemers dat dit type bijeenkomst heeft bezocht aangeven

	Totaal aantal bijeenkomsten			
Praktijkgerichte bijeenkomst	**Geen**	**1-2**	**2-5**	**Meer dan 5**
Workshops				
Masterclasses				
Gaming sessies				
Netwerkbijeenkomsten				
NG Infra Academy courses				
Anders, namelijk…				

	Totaal aantal deelnemers			
Praktijkgerichte bijeenkomst	**Minder dan 10**	**10 tot 20**	**20 tot 50**	**Meer dan 50**
Workshops				
Masterclasses				
Gaming sessies				
Netwerkbijeenkomsten				
NG Infra Academy courses				
Anders, namelijk…				

30. In welke mate bent u het oneens of eens met de volgende stelling?

Stelling	**Geheel oneens**	**Oneens**	**Enigszins oneens**	**Enigszins eens**	**Eens**	**Geheel eens**	**Weet niet/ Geen mening**
Dit project heeft veel kennis opgeleverd die in andere projecten in het NG Infra onderzoeks-programma gebruikt is.							

31. Tot welke resultaten heeft het verspreiden van onderzoeksresultaten van het project geleid? [meerdere antwoorden mogelijk]
    - o Nieuwe onderzoeksvragen
    - o Nieuwe contacten met maatschappelijke actoren die (nog) niet in het project betrokken waren
    - o Reactie van maatschappelijke actoren op vakpublicaties
    - o Reactie van breder publiek op publicatie
    - o Reactie van maatschappelijke actoren of breder publiek op mediaoptreden

32. Welke maatschappelijke actoren hebben gebruik gemaakt van de producten die uit het project zijn voortgekomen? [meerdere antwoorden mogelijk]
    - o Internationale beleidsorganisatie
    - o Ministerie
    - o Provincie of gemeente
    - o Rijkswaterstaat, Inspectie Verkeer & Waterstaat of Agentschap NL (voorheen SenterNovem)
    - o Infrastructuuraanbieder
    - o Technologieaanbieder
    - o Bouwbedrijf
    - o Bank
    - o Maatschappelijke organisatie
    - o Consultancy bureau
    - o Kennisinstituut
    - o Anders, namelijk [toelichting niet verplicht]
    - o Geen

33. Uit welke sectoren komen de maatschappelijke actoren die gebruik gemaakt hebben van de producten die uit het project zijn voortgekomen? [meerdere antwoorden mogelijk]
    - o Spoorwegverkeer
    - o Weg- en Waterverkeer
    - o Gas
    - o Elektriciteit
    - o Drinkwater
    - o ICT
    - o Anders, namelijk [toelichting niet verplicht]…

34. Voor zover u weet; tot welke resultaten heeft het project voor maatschappelijke actoren geleid? [meerdere antwoorden mogelijk]
    - o Geïmplementeerd advies
    - o In opdracht ontwikkeld en geïmplementeerd product
    - o Gebruik van onderzoeksresultaten in beleidsdiscussie
    - o Nieuwe contacten tussen maatschappelijke actoren
    - o Nieuwe netwerken tussen maatschappelijke actoren
    - o Toegang tot relevante infrastructuur ervaringen in het buitenland
    - o Anders, namelijk [toelichting niet verplicht]

35. In welke mate bent u het oneens of eens met de volgende stellingen over de maatschappelijke bijdragen van het project?

Stelling	Geheel oneens	Oneens	Enigszins oneens	Enigszins eens	Eens	Geheel eens	Weet niet/ Geen mening
De belangrijkste maatschappelijke bijdragen van de onderzoeksresultaten van het project zijn op lange termijn te verwachten							
De maatschappelijke bijdragen van de onderzoeksresultaten van het project zijn eenvoudig vast te stellen							

36. Tot slot leggen we u graag zeven stellingen voor over de maatschappelijke bijdragen van het gehele onderzoeksprogramma Next Generation Infrastructures. In welke mate bent u het oneens of eens met de volgende stellingen?

Stelling	Geheel oneens	Oneens	Enigszins oneens	Enigszins eens	Eens	Geheel eens	Weet niet/ Geen mening
Dankzij het Next Generation Infrastructures onderzoeksprogramma zijn infrastructuren voorbereid op de situatie in 2030							
Dankzij het Next Generation Infrastructures onderzoeksprogramma is er een nieuwe generatie onderzoekers opgeleid die bekend is met zowel technische als institutionele aspecten van infrastructuren							
Dankzij het Next Generation Infrastructures onderzoeksprogramma is inzicht verkregen in de werking van infrastructuren							
Dankzij het Next Generation Infrastructures onderzoeksprogramma zijn praktische oplossingen gegenereerd om sturing te geven aan infrastructurele ontwikkelingen							
Dankzij het Next Generation Infrastructures onderzoeksprogramma is er minder ontevredenheid over de werking van infrastructuren							
Zonder het Next Generation Infrastructures onderzoeksprogramma zouden Nederlandse netwerkbedrijven minder goed functioneren							
Zonder het Next Generation Infrastructures onderzoeksprogramma zouden Nederlandse netwerkbedrijven slechtere verhoudingen met de overheid en klanten hebben							

37. Graag zouden wij een vragenlijst voorleggen aan maatschappelijke actoren die op enige wijze kennis hebben genomen van het onderzoeksprogramma Next Generation Infrastructures. We hopen dat u bereid bent ons in contact te brengen met enkele partijen die direct in de projecten betrokken zijn, met wie resultaten gedeeld zijn en/of die gebruik hebben gemaakt van de onderzoeksresultaten. **Kunt u van maximaal vijf maatschappelijke actoren die van uw project kennis hebben genomen de contactgegevens in onderstaande tabel vermelden?**
    Deze contactgegevens worden alleen gebruikt voor de maatschappelijke impact analyse van het onderzoeksprogramma Next Generation Infrastructures.

Naam	Organisatie	E-mail adres

38. Mogen wij naar aanleiding van deze vragenlijst contact met u opnemen voor eventuele aanvullende vragen?
    o Ja
    o Nee

39. Wilt u op de hoogte gehouden van de resultaten van deze maatschappelijke impact analyse?
    o Ja
    o Nee

40. Mogelijk hebt u nog op- of aanmerkingen naar aanleiding van deze vragenlijst. Deze kunt u hieronder kwijt.

Dit was de laatste vraag. Nogmaals hartelijk dank voor uw tijd en medewerking!

Asset Management Survey

Maatschappelijke Impact Analyse Next Generation Infrastructures

Geachte heer/mevrouw,

Het Rathenau Instituut, afdeling Science System Assessment, werkt momenteel aan een analyse van de maatschappelijke impact van het onderzoeksprogramma Next Generation Infrastructures. U hebt deelgenomen aan activiteiten van het Asset Management Platform van het onderzoeksprogramma. In dat kader willen we u een aantal vragen stellen over uw ervaringen met betrekking tot het platform. Er zijn gesloten vragen, stellingen en twee open vragen. Aan het einde van de vragenlijst volgt bovendien een algemene open vraag. Daar hebt u de gelegenheid voor het maken van op- of aanmerkingen naar aanleiding van deze vragenlijst.

Bij de gesloten vragen en stellingen kunt u uw antwoord kenbaar maken door het correspondeerde vakje aan te klikken. Bij nogmaals klikken verdwijnt het kruisje weer. Bij de open vragen kunt u in het tekstvak uw antwoord geven. Het tekstvak past zich aan de lengte van uw antwoord aan.
U kunt de ingevulde vragenlijst versturen naar s.dejong@rathenau.nl

Hartelijk dank voor uw tijd en medewerking!

Prof. Dr. Ir. Paulien Herder, Scientific Director Next Generation Infrastructures
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(voor vragen bereikbaar via s.dejong@rathenau.nl)

NEXT
GENERATION
INFRASTRUCTURES

Den Haag, 8 april 2011

Algemene informatie

1. Wat is uw geslacht?
   - ☐ Vrouw
   - ☐ Man

2. Wat is uw leeftijd?
   ……. jaar

3. Wat is uw functieniveau?
   - ☐ Junior niveau
   - ☐ Medior niveau
   - ☐ Senior niveau

4. Mijn verantwoordelijkheden zijn voornamelijk
   0 Strategisch van aard
   0 Operationeel van aard

5. Ik ben werkzaam bij
   - ☐ TU Delft
   - ☐ Internationale beleidsorganisatie
   - ☐ Ministerie
   - ☐ Provincie of gemeente
   - ☐ Rijkswaterstaat, Inspectie Verkeer & Waterstaat
   - ☐ Agentschap NL (voorheen SenterNovem)
   - ☐ Infrastructuuraanbieder / netwerkbeheerder / netwerkbedrijf
   - ☐ Technologieaanbieder
   - ☐ Service provider / aannemer / bouwbedrijf
   - ☐ Dienstaanbieder
   - ☐ Bank
   - ☐ Maatschappelijke organisatie
   - ☐ Consultancy bureau
   - ☐ Kennisinstituut
   - ☐ Anders, namelijk

6. De organisatie waar ik werkzaam ben, is actief in een of meer van de volgende sectoren
   - ☐ Spoorwegen
   - ☐ Wegen
   - ☐ Waterwegen
   - ☐ Gas
   - ☐ Elektriciteit
   - ☐ Drinkwater
   - ☐ Waterveiligheid
   - ☐ ICT
   - ☐ Telecommunicatie
   - ☐ Anders, namelijk

7. Ik ben op de volgende manieren betrokken bij het Asset Management Platform
   - ☐ Deelname aan netwerkbijeenkomsten
   - ☐ Deelname aan Master Classes
   - ☐ Bijwonen van lezingen
   - ☐ Deelname aan simulatiespellen
   - ☐ Lid van Asset Management groep op LinkedIn
   - ☐ Persoonlijk contact met andere leden
   - ☐ Anders, namelijk
   - ☐ Geen

   ☐ Ik ben bekend met de volgende producten van het Asset Management Platform
   - ☐ Nieuwsbrief
   - ☐ Hub Holland Magazine – Themanummer Asset Management
   - ☐ Serious Game “Road Roles”
   - ☐ Rapport “Leren van andere organisaties – lange-termijn vervanging” (rapport)
   - ☐ Wetenschappelijke producten, zoals proefschriften en artikelen
   - ☐ Anders, namelijk
   - ☐ Geen

8. Graag leggen we u een aantal stellingen voor het Asset Management Platform

Stelling	Oneens	Enigszins oneens	Enigszins eens	Eens
De wetenschappelijke invalshoek is essentieel om mijn belangstelling voor het platform vast te houden	☐	☐	☐	☐
De kennis die ik via het platform verkrijg kan ik niet elders verkrijgen	☐	☐	☐	☐
Dankzij het platform heb ik meer contact met andere infrastructuur asset managers	☐	☐	☐	☐
Dankzij het platform wissel ik kennis uit met andere infrastructuur asset managers	☐	☐	☐	☐
Dankzij het platform is er een netwerk van infrastructuur managers ontstaan	☐	☐	☐	☐
Ik wissel alleen kennis uit met andere andere infrastructuur asset managers uit dezelfde sector(en) als waarin mijn eigen organisatie actief is	☐	☐	☐	☐
Dankzij het platform heb ik toegang tot bruikbare wetenschappelijke kennis over asset management	☐	☐	☐	☐
Dankzij het platform ben ik op de hoogte van de onderzoeksactiviteiten van NGInfra op het gebied van asset management	☐	☐	☐	☐
Dankzij het platform wordt er binnen mijn organisatie anders gedacht over asset management	☐	☐	☐	☐
Dankzij het platform heb ik nieuwe opdrachtgevers en/of afnemers gevonden	☐	☐	☐	☐
Dankzij het platform is binnen mijn organisatie het beleid gewijzigd op het gebied van asset management	☐	☐	☐	☐
Dankzij het platform heb ik wetenschappelijke kennis ingezet om asset management in mijn organisatie te verbeteren	☐	☐	☐	☐
Dankzij het platform is mijn organisatie beter voorbereid op de toekomst van infrastructuren	☐	☐	☐	☐

9. Wat betekent het Asset Management Platform voor u?

10. Zonder het Asset Management Platform zou ik niet… (maak zelf af)

11. Mogen wij naar aanleiding van deze vragenlijst contact met u opnemen voor eventuele aanvullende vragen?
    - ☐ Ja
    - ☐ Nee

12. Wilt u op de hoogte gehouden van de resultaten van deze maatschappelijke impact analyse?
    - ☐ a
    - ☐ Nee

13. Mogelijk hebt u nog op- of aanmerkingen naar aanleiding van deze vragenlijst. Deze kunt u hier vermelden

Dank voor uw medewerking, dit is het einde van deze vragenlijst.

Who was Rathenau?

The Rathenau Instituut is named after Professor G.W. Rathenau (1911-1989), who was successively professor of experimental physics at the University of Amsterdam, director of the Philips Physics Laboratory in Eindhoven, and a member of the Scientific Advisory Council on Government Policy. He achieved national fame as chairman of the commission formed in 1978 to investigate the societal implications of micro-electronics. One of the commission's recommendations was that there should be ongoing and systematic monitoring of the societal significance of all technological advances. Rathenau's activities led to the foundation of the Netherlands Organization for Technology Assessment (NOTA) in 1986. On 2 June 1994, this organization was renamed 'the Rathenau Instituut'.

The Rathenau Instituut promotes the formation of political and public opinion on science and technology. To this end, the Institute studies the organization and development of science systems, publishes about social impact of new technologies, and organizes debates on issues and dilemmas in science and technology.

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