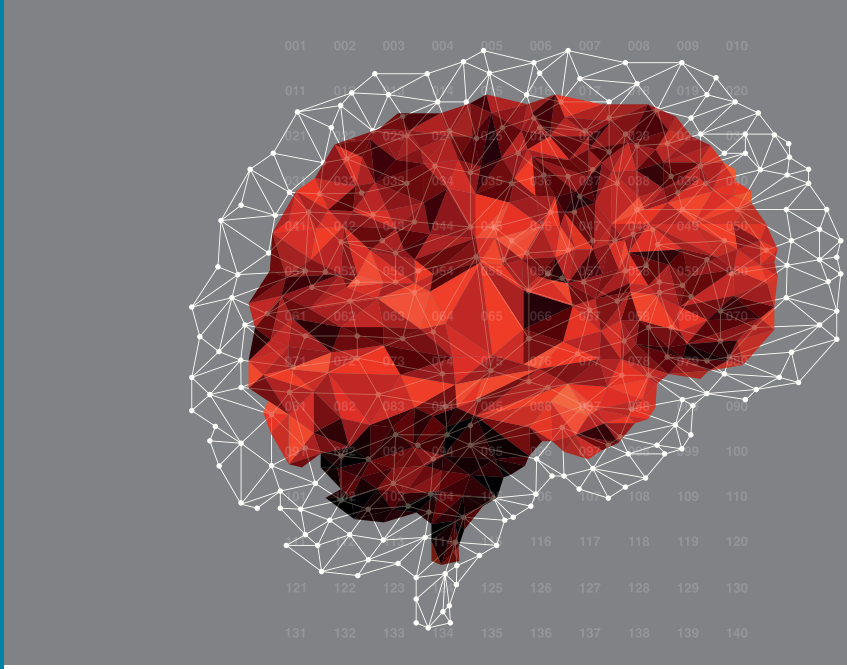

Edited by Beatrice de Graaf,
Alexander Rinnooy Kan and Henk Molenaar

# The Dutch National Research Agenda in Perspective

## A Reflection on Research and Science Policy in Practice

Amsterdam
University
Press

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Amsterdam University Press

Cover illustration: DimarDesign

Cover design: Coördesign, Leiden
Lay-out: Crius Group, Hulshout

Amsterdam University Press English-language titles are distributed in the US and Canada by the University of Chicago Press.

ISBN 978 94 6298 279 6
e-ISBN 978 90 4853 282 7 (pdf)
DOI 10.5117/9789462982796
NUR 600

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# Foreword by Jet Bussemaker, Minister of Education, Culture and Science

As I see it, imagination and connection are the two most important characteristics of science and the Dutch National Research Agenda.

Imagination is a vital prerequisite for developing new perspectives in scientific research. After all, we are now developing the knowledge we will need in the future.

Imagination finds expression in the vast number of questions posed by scientists, citizens, businesses, and civil society organisations as part of the Dutch National Research Agenda – close to 12,000 questions on a wide variety of themes and topics. These range from the human significance of art to organising healthcare on the basis of unique and individual characteristics, showing the depth of people's interest in and commitment to the world of science: one of the main reasons why the Dutch National Research Agenda exists.

The questions the Agenda addresses also illustrate the challenges that science is facing in the years to come, and the essential nature of connection and cooperation between sectors and disciplines.

If we want to find answers that have an impact on society, I firmly believe that we need to come up with new, creative combinations. Combinations between technology and art, between historical roots and futuristic concepts, facts and imagination, science and the working world, new and existing knowledge. The Dutch National Research Agenda invites us to make these connections and to embrace cooperation throughout the chain of knowledge, in particular with society.

One inspiring example is the collaboration between museums, universities, universities of applied sciences, and industry, aimed at developing innovative products on the basis of long-established museum collections. One research group is using the collection of the Naturalis Biodiversity Centre in Leiden to develop natural sweeteners, which can be sustainably cultivated and help prevent diabetes. Museum collections are also a source of expertise, for example helping customs officials to detect endangered wood species in musical instruments.

The essays in this volume, all of which reflect upon the Dutch National Research Agenda, can be seen as an ode to imagination and connection. They are also an ode to critical inquiry, encouraging us to continue to interrogate the types of questions we ask.

*Dr Jet Bussemaker*
*Minister of Education, Culture and Science of the Netherlands*

# Introduction

*Beatrice de Graaf, Henk Molenaar, and Alexander Rinnooy Kan*

## Asking questions

'What is the proper use of the word "no" and what isn't?' 'Would it be possible to create a funicular to the moon?' Questions like these are more likely to be asked by curious students or children than by sophisticated researchers. And yet this type of unbounded curiosity remains one of the main drivers behind fundamental scientific research. That is why these and nearly 12,000 other questions were all admitted onto a nationwide platform with the intent to aggregate the national curiosity of the Dutch – a platform that was designated to become the Dutch National Research Agenda.

Both the agenda's format and process were unique in their kind. All earlier national efforts undertaken in other countries had opted for a top-down format, in which the customary committee of wise advisors produced a respectable but rather predictable outcome. The bottom-up approach favoured in the Netherlands was hotly contested and heavily debated. But in the end, it produced a rich research menu, identifying a range of issues that appeal to the research community as well as to the general public (see Annex for a description of the process of developing the Dutch National Research Agenda).

Thus, one of the characterizing features of the Dutch National Research Agenda was precisely that it was created through public consultation. Nowadays, this sort of consultation is used commonly in a variety of areas. It is, of course, used by business enterprises to assess and gauge consumer preferences and desires, and it also figures in political decision-making processes such as crafting a national referendum, or in other forms of participatory democracy. As such, the format is not new at all. However, for academic science and research, 'citizen science' is a relatively new notion. Crowdsourcing has only recently become a resource for long-term funding for new research. As Ed Brinksma points out in his contribution, the use of the internet has irrevocably speeded up and expanded public engagement with academic research and innovation far and wide. Increasingly, research projects do not only take shape through the interaction of government, science, and industry; citizens – be they amateur scientist, investor, consumer, societal stakeholder, inventor, or entrepreneur – and the public at large have become contributing voices as well.

The desire to provide public knowledge, to generate scientific insights for and with society and industry, is not a new phenomenon as such. Throughout the centuries, the university was the very place where clerical elites, politicians, state representatives, and diplomats were educated, preparing them to assume their role in the power system of the day. When the Dutch universities were liberated from French rule and restored to national autonomy in 1815, a system of higher learning and academic research was established that was geared towards 'producing a learned elite for the country'. It was, at the time, most notably staffed with theologians, philosophes, *hommes des lettres*, and a few medical professors, mathematicians, and physicists. Research back then responded to demands from the public domain, in particular from the newly created seats of power and administration, but also from the churches. Large chunks of the government's research budget were allocated to the salaries of theological professors (two thirds of Utrecht University's students were theologians, aspiring to the clerical robe). In 200 years, academia has shifted gears. Today's science policymakers respond much more to requests from industry and commerce. They tend to stress the importance of 'Science Parks' for research and innovation in the natural and life sciences.

Not everything from the past needs to be preserved, nor does every recent research innovation call for emulation. It is also undoubtedly the case that research projects today are being influenced by a widely expanded audience, and that researchers themselves are confronted with many more conflicting demands than they have ever been before. Since 1945, society's role and the citizen's place with respect to institutions of higher education and academic research have grown: the general public is eventually the ultimate recipient of scientific findings; parents send their sons and daughters off to university; a sizeable portion of citizens' taxes helps fund the national research and teaching budgets. Not surprisingly, the populace demands something in return. But what exactly?

Since the Enlightenment, modern universities and research institutes have undergone a Baconian revolution, placing professionalization of academic standards, disciplinary differentiation, and specialization at the zenith of their ambitions. Only when science is first and foremost allowed to render service to science itself and formulate its own questions, the conventional wisdom says, will it be able to open new horizons and optimally serve society and industry in its wake. Science does not simply respond to already formulated questions, it invents and formulates new ones, answers needs and concerns that were not there before. Today's graduate and postgraduate students are therefore trained simultaneously to work

towards professionalization and specialization, on the one hand, and to transcend boundaries and share their insights with society, on the other.

The art of asking the right questions is therefore exactly that: an art, combining hunches and sound professional disciplinary knowledge with a long-term dedication to unleash creative energy to meet the needs and concerns arising from the public or from commerce and industry. In this context, the emergence of a new kind of 'citizen science' – of new instruments to involve and mobilize the public – does not come as a surprise. Today's societies are highly educated and perfectly able to act not just as benefactors of science, but as co-creators of research needs, aims, and constraints as well.

Academic research has, to a notable degree, always been a public service. But in opening up the Dutch National Research Agenda to the public, the public voice in the bottom-up articulation of programming science has been made more explicit and visible as a channel of influence in its own right. In this volume we will further explore, debate, and contest the arrangement between science, industry, government, and the public in generating research.

Asking questions – *sapere aude!* – is one of the core ingredients of becoming an adult, of transcending existing cognitive constraints. In that spirit, questions are also being asked in this volume regarding the uses, benefits, challenges, and risks of creating and having a research agenda, about the scope of research policy itself, and concerning the ways in which government involvement in research and scholarship can and should work – or not.

## Structure of this volume

In this volume the making of the Dutch National Research Agenda is described as a case study of a new way of asking questions and of combining research and the public domain, but it is also intended to critically evaluate the desirability and (im)possibility of steering science as such. Can/may the public intervene from the outside in the inner world of research dynamics? Is allocating budgets a one-way street? Should science decide on its own, citing the so-called Haldane principle, on how to spend these precious public resources? The process of crafting the platform for the Dutch National Research Agenda inspired various rounds of debates, criticisms, and reflections on the use and nature of science and on the entanglement of science, science policy, and the public, thereby contributing to a lively atmosphere of academic discussion. This volume is an attempt to unravel

these discussions and make them accessible to a larger public of interested citizens, scientists, and policymakers in the Netherlands and abroad.

This volume is structured around three strands in the debate that surfaced between 2014 and 2016, while the agenda was being created: 1) the process of developing the agenda as such, 2) the (im)possibility of steering science, and 3) the use of science in a wider philosophical and historical context.

The first part of this volume is dedicated to the process of agenda-setting. José van Dijck, President of the Royal Netherlands Academy of Arts and Sciences (KNAW), takes the lead in highlighting how the agenda became a national exercise in asking science 'researchable' questions. For her, asking the 'right' research questions is one of the highest arts in academia. She explains how the agenda offered a platform that triggered 'new collective insights, unexpected alliances, and novel routes through known territories'.

Henk Molenaar, secretary to the Dutch National Research Agenda, describes how the agenda was launched, and how it set out to establish 'big questions' and forge interrelationships between the multifarious research programmes of universities, research institutes, private sector companies, and other knowledge organisations. He identifies three nodes of debate that permeated the whole of the agenda-setting process: the relation of the agenda to unfettered research, the tension between disciplinary diversity and thematic focus, and the question of legitimacy and public support. Is science inherently legitimized in open, democratic societies or does it benefit from explicit public involvement?

This agenda-setting process is put into a wider, international context by Wim de Haas of the secretariat of the Dutch National Research Agenda, who examines practices of thematic research prioritization in various countries. Daan Andriessen and Marieke Schuurmans focus on the place of the universities for applied science, or colleges (*hogescholen*) within this process, institutions of higher learning that sometimes tend to be overlooked in scientific research debates. According to them, these colleges are very well-positioned to participate in the task of focusing and clustering: '[Their focus] on practice-oriented research and their strong network in professional practice will ensure that the National Research Agenda truly contributes to society'.

In the second part of this volume, the (im)possibilities of intervening with and steering science are debated. The chapters here echo the intense academic and public debate during the process of the agenda-setting activities. Maarten Prak and Coenraad Krijger, from the perspective of the Netherlands Organisation for Scientific Research (NWO), underscore the

fundamental problem of science policy: the fact that 'results of research projects cannot be predicted (because if they were, research would be futile)'. So, how – given the prospect of unpredictable results – can huge sums of public money be spent legitimately and wisely? Their contribution presents an illuminating overview of types of science policy and various dimensions of research impact. In addition, Barend van der Meulen (Rathenau Institute) further elaborates on this theme by comparing science policy with a principal-agent game, in which all players have to cooperate in order to minimize uncertain outcomes as well as the risks of wasting scarce resources.

Next, the Rector of the University of Twente in Enschede, Ed Brinksma, highlights the importance of making connections. For universities of technology, the research portfolio is of course heavily influenced by application domains and stakeholders in industry and society. Brinksma offers a model for approaching the connections between different types of research and science policy. He points out that 'successful research policy is an art of making the right connections: connections between Bohr, Pasteur and Edison types of research, between research and education, with the agendas of regional, national, and supranational governments, with the priorities of industry, and, increasingly, with the preferences of the public'. To boost research and innovation, investments are needed in all of the disciplines – from technology to the humanities, from applied to blue skies research – and most of all in furthering the connections between these different types of research.

From a wholly different angle, Brian Burgoon, Marieke de Goede, Marlies Glasius, and Eric Schliesser, all professors of Political Science at the University of Amsterdam and recipients of large grants from the NWO or the European Research Council (ERC), argue that the tendency of awarding ever larger grants undermines the dynamics of research diversity. Large grants to ever tinier shares of submitted research proposals impose a rat race of winners and losers onto the community of researchers and demoralise promising young scholars. Science policy should therefore also determine a broadening of the available grant mix, as well as a diversification of societal stakeholders participating in the process of agenda-setting.

Bas ter Weel, from the Netherlands Bureau for Economic Policy Analysis, brings an economic perspective to the table and approaches the issue of research steering from the angle of market failure. He ponders the balance between the risk of scattered research and underutilization of complementarities on the one hand, and the far too conservative or market-driven economies of scale on the other. Marten Scheffer and Herman van

de Werfhorst round off this session with provocative pleas for the total abandonment of top-down science planning (Scheffer) and for an equal division of the research budget among individual researchers for them to redistribute amongst themselves and their colleagues (Van de Werfhorst). This revolutionary plan should be read in conjunction with the latter's scepticism vis-a-vis the alleged wisdom of society's competency to allocate resources as compared to that of the scientists themselves.

The third section of this volume zooms out to embrace a wider vista on the question of good governance in science. What is the aim or purpose of the university and of research? Historian Herman Paul makes a case for the reintroduction of the language of vice and virtue in the debate on 'aims of science'. Rather than to profitable outcomes, academic self-management, or an equal division of resources, attention needs to be given to the attitudes, ethics, and habits of researchers and scientists. Good science needs to be historicized and the aims of science have to be put in perspective. Only then will we be able to acknowledge that questions about the aims of science are inherently moral ones.

Paul's argument for opening up the debate to moral questions is further elaborated upon by Beatrice de Graaf's (historian and terrorism expert) analysis of the normative uncertainty underlying the debates and disputes on science policy and legitimacy mentioned above. She outlines two narratives that seek to clarify the academic life and its purpose: the utilitarian 'goose model' (or 'goose with the golden eggs') and the Humboldtian '*Bildung* model'. She shows how the ideas, goals, and expectations of each model continue to compete for recognition and endorsement. And although the former is currently gaining the upper hand, the values of the other model are essential to sustaining the life of the mind. This conflict of values regarding science and the scientist is precipitating a significant degree of uncertainty in politics, academia, and society regarding the aspirations of the academic endeavour. De Graaf makes a case for restoring the balance by acknowledging and defending the diversity and richness of the academic lives at stake, and by countering moves that may cause one vision to monopolize all others.

Philosophers Marcus Düwell and Rutger Claassen continue this line of thinking. While arguing that scientific research is fundamentally about the self-understanding of human beings, they confirm that communal forms of priority setting are sought after since the task of interpreting ourselves is a collective, not an individual one. However, they question the democratic character of the current exchange between scientists, politicians, and policymakers on the one hand, and a wider group of private

(especially corporate) interests on the other, and call for a 'new relationship between the roles of political institutions, societal interest groups, and the researchers themselves'.

Before Louise Gunning, chair of the Dutch National Research Agenda since 2016, closes this volume with an epilogue, André Knottnerus, President of the Netherlands Scientific Council for Government Policy (WRR), pays tribute to the fine-grained, delicate 'ecosystem' of the Dutch research environment and advocates better protection and more respect for this system of diversity.

## An open invitation to connect

To sum up and invite the reader to ponder the preceding arguments, the chapters might be summarised as a collective attempt to highlight the importance of stimulating national and international curiosity, and doing so in a well-balanced, legitimate, democratic, and reflective manner. If we want science and society to move forward and to remain in flux, this infinite curiosity has to be propelled by inquisitive minds finding each other, working together, and transcending boundaries. At the end of the day, the inventory of national curiosity that the agenda set out to be miraculously transformed itself into a treasure trove of broad, mostly multidisciplinary and multi-sector research questions that derive additional legitimacy from the bottom-up way in which the agenda was construed. In a research environment as sophisticated and well-positioned as in the Netherlands, possibly the greatest potential to be unlocked lies in finding a new balance between deep scientific specialization and broad societal interests. The Dutch National Research Agenda might well serve to illustrate these opportunities to a European or global audience in need of a similar innovation.