

Process of Developing the Dutch National Research Agenda

Background

In November 2014, the Dutch cabinet submitted the policy paper 'Vision for Science 2025' to Parliament. As the title indicates, the paper unfolded a vision of the future of Dutch science. It formulated a number of policy ambitions, the most important being that in 2025 Dutch science should hold a top position in global rankings.

The main strategy to realise this ambition was to enhance coherence and impact by a joining of forces. And the central instrument to make this happen was the development and formulation of a National Research Agenda. This agenda was to meet quite some expectations:

The National Science Agenda will appeal to the imagination; it will inspire and challenge both the research field and society itself to achieve momentous breakthroughs. It will create a better match between research on the one hand, and social and economic needs and opportunities on the other. It will clearly set out those areas in which the Netherlands is to stand out through truly excellent research. By raising the profile of Dutch science with its own agenda, we shall strengthen our position within international partnerships. In specific areas, the Netherlands will take the lead in those partnerships. This is important if we are to attract top talent and safeguard the interests of our knowledge-intensive industry. (Ministry of Education, Culture and Science of the Government of the Netherlands, *2025 Vision for Science: choices for the future*, p. 24)

The aims of the Dutch National Research Agenda were summarised in the mandate letter of 25 November 2014, which stated that the Agenda should:

- identify social themes and top scientific fields;
- build on existing agendas and make connections;
- influence future planning;
- improve the international position of Dutch science and society's engagement in research;
- encourage cooperation and increase its impact throughout the knowledge chain;

- focus on research in which a national approach offers greater value and contributes something that isolated institutions or existing alliances have so far failed to achieve (principle of subsidiarity).

The mandate letter concluded by stating: 'Every matter included in the National Research Agenda should be important, but not every important matter should be included in the National Research Agenda.'

Governance

The mandate to draw up a national research agenda was assigned to the Knowledge Coalition, consisting of the most important umbrella organisations of the Dutch knowledge and innovation system. The Knowledge Coalition installed a Steering Committee responsible for developing the Dutch National Research Agenda. On 23 January 2015, shortly after the mandate had been assigned, the ministers appointed Prof Beatrice de Graaf and Prof Alexander Rinnooy Kan as independent co-chairpersons, deeming them capable of providing authoritative, unifying, and innovative leadership within the process at hand.

The decision to appoint co-chairpersons allowed the burden of work to be shared, reduced vulnerability in the event of absence, and brought different backgrounds and areas of expertise into the process. It also made it possible to benefit from the differences between the two appointees in terms of gender, age, and disciplinary background.

The Steering Committee and chairpersons met once every three weeks from February to December 2015. To ensure continuity and communication with the participating institutions, these meetings were also attended by the official deputies of the Steering Committee members.

The members of the Knowledge Coalition were all part of the Dutch science system and were expected to bear the primary responsibility for implementing the Dutch National Research Agenda. As such, the Steering Committee was considered to be insufficiently representative of society at large. Since it was deemed undesirable to add governmental and civil society parties to the Steering Committee, it was decided to set up a Liaison Group as a separate body. The Liaison Group was appointed in April 2015. Although acting in a private capacity, its members represented a wide range of different social sectors. The Liaison Group offered the Steering Committee solicited and unsolicited advice, attended the preparatory conferences, and

built relationships with strategic agendas, knowledge-based institutions, and advisory bodies.

The chairpersons and the Steering Committee were assisted by a secretariat headed by the Steering Committee secretary. The secretariat's staff members were nominated by the members of the Knowledge Coalition. Most were affiliated with the Netherlands Organisation for Scientific Research (NWO) in The Hague, which hosted the secretariat. Some staff members were communication specialists. The secretariat also established ongoing working relationships with the communication managers of the Knowledge Coalition members.

The relevant ministers and state secretary, the chairpersons, and the Steering Committee met every quarter to discuss progress. Preparations for these meetings were undertaken by the directors of the relevant ministries, who coordinated with the Dutch National Research Agenda secretary. The secretary also met with ministerial officials every other week.

Communication

One of the critical success factors for the Dutch National Research Agenda was to ensure a broad base of support among the parties involved and their member organisations. The process of developing the Agenda also gave the participants a unique opportunity to show what Dutch research had to offer and, in doing so, to generate and boost support for science and, more specifically, for the Agenda itself. Generating that support was the focus of the relevant communication activities.

With so many parties involved in developing the Agenda, uniform and consistent positioning was very important. The core communication messages were:

- The Dutch National Research Agenda connects: it builds bridges between existing agendas and unites disparate parties.
- The focus is on the content, and not the financial consequences.
- The Agenda encompasses every type of research, from basic to applied and practice-based.
- The Agenda is inspiring and shows the imaginative power of science.
- The Agenda shows that science belongs to everyone.

The communication activities focused on roughly the following three themes:

1 Creating and maintaining support for and commitment to the Agenda by the parties involved

The website was the main communication platform. It was considered important to allow all parties involved to track the process closely on the website. Partners' communication channels, including social media, were also used.

2 Generating broad support for the Agenda and for science in general

The main channels of communication here were the website and social media, alliances with such partners as *New Scientist* magazine, the Lowlands organisation (a music festival) and Kennislink (a popular science website), as well as a media partnership with the popular television talk show *DWDD (De Wereld Draait Door)*.

3 Communication as part of the public consultation procedure

The process of developing the Dutch National Research Agenda was demand-driven. This basic premise offered numerous opportunities to express the connective power of the Agenda, something that called for meticulous, transparent and, above all, interactive communication with those who had submitted questions and other interested parties..

Developing the Dutch National Research Agenda

The process of developing and formulating the Dutch National Research Agenda comprised of numerous steps and phases. The most important of these steps included the following.

Start-up phase

A detailed action plan appeared in the first half of March 2015, fulfilling one of the mandate requirements. The action plan was amended a number of times in the course of the development process in the light of cumulative insights or in response to altered schedules and principles. In the end, an organic approach was adopted approach developed organically and many of the activities and initiatives came about spontaneously, responding to evolving circumstances and opportunities. A virtual environment (base camp) situated in the secretariat provided for the necessary convergence, sharing, and cooperation on projects.

The start-up phase included the construction of a website that functioned as a repository for all information concerning the Dutch National Research Agenda. The website was also used during the public consultations.

Public consultations

In keeping with the mandate, the Dutch National Research Agenda was not an exclusively institutional product, a decision taken primarily to clear the way for innovation. To respond as fully as possible to the Minister's wish that the Agenda should 'appeal to the imagination', and to generate maximum support for the Agenda, the Knowledge Coalition decided to embark on a broad public consultation procedure in which scientists, businesses, governmental and civil society organisations, and individual citizens could provide input.

Public consultations were rolled out in April with the help of a digital module. The public were invited to 'ask a scientist a question'. All residents of the Netherlands could submit questions on the website of the Dutch National Research Agenda, along with an explanation, a few key words, and their email address. No less than 11,700 questions were submitted.

Assessment and clustering of the questions

The initial intention was to assess the suitability of all submitted questions. This task was entrusted to the Royal Netherlands Academy of Arts and Sciences (KNAW) and The Young Academy as independent organisations with the requisite expertise. The Academy and The Young Academy appointed five juries for this purpose, analogous to the five broad areas of science that fall within the Academy's remit (Humanities, Life Sciences, Natural Sciences, Social Sciences, and Technical Sciences). The Steering Committee decided on the composition of the juries, which represented all organisations participating in the Knowledge Coalition.

With so many questions having been submitted, however, there was a change of plans. Instead of an assessment of each question, the questions were clustered and aggregated. The first step was to cluster the questions using intelligent software. The juries then assessed the resulting clusters and reorganised them into a set of 248 clusters. Each cluster was provided with an overarching main question and a brief explanation. In formulating these cluster questions, the juries adhered to the following guidelines:

- 1 research into the question had to be possible within a ten-year period;
- 2 the question had to be challenging and ground-breaking in nature; and
- 3 there had to be prominent Dutch research groups capable of examining the question, or conversely, convincing arguments for building such capacity.

Conferences

Three conferences were held in June. In keeping with the mandate for the Agenda, the conferences focused on 'science4science', 'science4competitiveness', and 'science4society'. Their purpose was to bring further order to the 248 clusters, to add relevant information, and to further aggregate the questions where possible, based on these three perspectives.

A total of 900 persons attended the conferences. The attendees participated in disciplinary and multidisciplinary discussion groups in several different rounds. The outcomes of the conferences were documented in three reports that were submitted to the Steering Committee in early July.

Writing and editing process

During the summer period, the Academy's juries aggregated the cluster questions more extensively based on the outcomes of the conferences. The result was a set of 195 cluster questions. The Steering Committee's aim, however, was to have a National Research Agenda consisting of no more than 150 questions. The Steering Committee therefore appointed a writing group and an editorial panel charged with reducing the number of clusters and refining the questions. The editorial panel was made up of members of the Knowledge Coalition; the writing group consisted mainly of secretariat staff nominated by the members of the Knowledge Coalition.

The writing group proposed to further aggregate the 195 questions into 140 cluster questions, based on the conference outcomes and in consultation with the editorial panel. All questions were also recast into a fixed format, including an explanation of the question itself, a demonstration of the connective power of the question (establishing connections between different disciplines and sectors, between various types of research from basic to applied, and between various research aims), and examples of the diversity of underlying questions submitted by the public.

Connections with existing agendas

From March to September 2015, the secretariat compiled a survey of existing research and policy agendas pursued by research institutions, governmental and civil society organisations and linked these agendas to the Dutch National Research Agenda questions.

The survey was the result of desk research. The secretariat searched the organisations' websites for research themes and priorities. One problem encountered was that there were major differences between research descriptions in terms of level of aggregation. To do justice to the various organisations, the secretariat worked exclusively with the organisations'

own texts. Links to source pages were also included in the list. As a next step, the 140 cluster questions of the Dutch National Research Agenda were linked to the organisations' priorities.

Routes through the Dutch National Research Agenda

Between July and October, the focus was on framing and editing the questions. The structure of the final result also gradually became clear. The authorities had expected the Dutch National Research Agenda to identify a small number of priority research themes for policymaking and funding purposes. However, it quickly became clear that identifying only a small number of themes would do no justice to the depth and diversity of questions, nor to the very broad scope of existing research. The idea of plotting routes through the Dutch National Research Agenda arose during the conferences as a way of exploiting the depth of the 140 questions and fulfilling the mandate to make connections.

A route is a collection of related cluster questions that focus on a complex social, scientific or economic issue. While cluster questions connect original questions, routes connect the 140 cluster questions and other research and policy agendas by linking the questions to these agendas. A route is an instrument that allows users to approach a subject from different perspectives and discover which research groups are already working on it or which governmental or civil society organisations regard it as important. Routes can also help in the search for multi-sector and multidisciplinary research partners. 16 example routes that offer opportunities to make new connections were plotted out and incorporated by the Steering Committee in the Dutch National Research Agenda.

The Dutch National Research Agenda, on paper and digital

Once it had been decided *what* the Knowledge Coalition would produce – i.e. 140 cluster questions and 16 example routes – the next important question was *which form* the Dutch National Research Agenda would take. The answer was both a paper and a digital version. The digital version was considered to have various advantages: it would be easy for the Dutch public to access, and it would simplify management and updating. A digital environment would also allow users to get the most out of the dynamic routes.

The paper version of the Dutch National Research Agenda consists of an introduction that explains its aim and structure, the 140 cluster questions, and the 16 example routes. The 140 cluster questions are divided into five chapters:

- Man, the environment, and the economy;
- Individual and society;

- Sickness and health;
- Technology and society;
- Fundamentals of existence.

It concludes with a number of appendices that report public consultation statistics, provide a list of research and policy agendas, and describe the relationship between the 140 cluster questions and ten themes borrowed from the EU's Horizon 2020 programme.

The paper version of the Dutch National Research Agenda was presented to the authorities in November 2015. The digital version went live at the same time. At that point, it consisted of the original questions linked to the 140 cluster questions, which in turn were connected to the survey of existing research and policy agendas. It also consisted of the 16 example routes. One of the aims of the follow-up (see below) is to refine and extend the digital version of the Dutch National Research Agenda and to promote its usage for various purposes.

Special communication activities

Since early summer 2015, numerous special communication activities have been undertaken to raise familiarity with the Dutch National Research Agenda amongst the general public. This has promoted exchange between society and the research landscape and enhanced public support for science at large and the research agenda in particular.

'In Conversation'

Starting in early July, the possibility was created for the secretariat of the Dutch National Research Agenda to put organisations in touch with persons who had submitted a question concerning a theme relevant to the organisation's own field of activity. These organisations could then invite such persons to meetings, for example, or alert them to news of relevance to the subject of their question. For this purpose, the secretariat developed a digital tool that allowed organisations to approach persons who had submitted questions without violating their privacy. The tool gave those who had submitted questions the opportunity to communicate with researchers and other parties who shared their interests.

By the time the Dutch National Research Agenda was released, more than half of those who had submitted questions had received invitations to lectures, public meetings, and online forums of all kinds from a range of different organisations. Participating organisations included the National Institute for Public Health and the Environment (RIVM), the Royal

Netherlands Meteorological Institute (KNMI), Utrecht University, and the Royal Holland Society of Sciences and Humanities (KHMW).

Lowlands Science

Lowlands Science was an alliance between the Lowlands music festival organisation, Campagnebureau BKB, *New Scientist* magazine, the Royal Academy, and the Dutch National Research Agenda organisation. Its aim was to make science comprehensible for the general public, and it was organised during the Lowlands festival (21 to 23 August 2015). Several months prior to the event, an invitation to submit research proposals was distributed among scientists, universities, and research groups. The best proposals were presented daily at Lowlands. The NWA organisation invited a number of persons who had submitted questions to attend Lowlands Science and to put their questions to the researchers present that day. The invitation received a huge response. The secretariat filmed two encounters between individuals and scientists. They can be found at www.wetenschapsagenda.nl.

Living Room Lectures

The secretariat of the Dutch National Research Agenda cooperated with the Ministry of Education, Culture and Science on organising seven 'living room lectures' during the National Science Weekend. The living room lectures focused on submitted questions that had already been answered. Those who had posed questions welcomed a scientist into their home to discuss and answer the question, sometimes in the presence of a small audience. The Science Minister and State Secretary attended two of the lectures. Interested viewers could watch a live stream of the living room lectures in Periscope.

Society of Arts

Filmmaker Inge Meijer was commissioned by the Society of Arts and the Dutch National Research Agenda organisation to produce a film about the Agenda highlighting the role of those who had submitted questions. Meijer's aim was to film meetings between such individuals and scientists to show, at a micro level, the essence of the Dutch National Research Agenda: the convergence of science and society. Her film featured a number of living room lectures. It premiered on 29 November 2015 during the EUREKA! Festival in Amsterdam.

Besides Meijer's film, two other filmmakers produced films inspired by the questions submitted. Dutch poet laureate Anne Vegter composed a

poem about the Dutch National Research Agenda. Finally, artist Koert van Mensvoort produced 'in vitro ice cream' that was served at the EUREKA! Festival to get participants thinking about food and sustainability.

EUREKA! Festival

The EUREKA! Festival, held on Sunday 29 November 2015, showcased science in all its many facets. Following the official presentation, this event unveiled the Dutch National Research Agenda for the general public.

The festival was held in Amsterdam and attracted about 3000 visitors. The festival programme was the result of collaboration with the communication departments of the various Knowledge Coalition partners and their organisations. A number of research universities adopted parts of the programme, the universities of applied science made a substantial contribution with their 'innovation catwalk', and The Young Academy filled one of the festival locations. The Society of Arts chose the festival to premiere its film about the Dutch National Research Agenda and delegated artists to reflect on the questions that had been submitted. Nijmegen's 'InScience' film festival organisation scheduled the remaining programme of science films. Shell, Unilever, and other businesses also cooperated.

Books

Publisher Nijgh & Van Ditmar published a book by science journalist Malou van Hintum on the development of the Dutch National Research Agenda, entitled *Wat wil Nederland weten?* (What does the Netherlands want to know?). Kennislink published a book answering a number of the questions posed.

Follow-up

The Dutch National Research Agenda – and especially the digital version – helps individuals and organisations find research partners that will enhance their efforts. To further this process, a series of 'route workshops' have been scheduled (starting in late 2015 and continuing in 2016) during which potential partners can explore the possibility of plotting new routes or elaborating on existing ones. To align the routes with existing agendas as closely as possible, the organisations will be asked to refine and maintain the connection between the Dutch National Research Agenda and the existing agendas.

One of the aims of the route workshops is to continue prioritizing the themes within the Dutch National Research Agenda. The Knowledge Coalition will use the outputs of these workshops as input for a manifesto advocating an integrated science, technology, and innovation policy that it will submit to the Dutch government.

The Knowledge Coalition does not regard the present 'product' as the finish line, but rather as the start of a revitalized and enhanced partnership, not only between its own members but also between other parties in Dutch society that have a deep interest in research. It is important to update the Dutch National Research Agenda at regular intervals in order to continue pursuing the current strategy, anticipate new developments, and above all maintain the momentum and support that has been generated for the current Agenda.

Reflections in retrospect

The process of formulating the Dutch National Research Agenda was once described as 'building an aircraft while in full flight'. The scale of the mandate and its expressed level of ambition, the composition of the Knowledge Coalition, the limited time available (nine months), and the innovative nature of the procedure made the process complicated and stressful. A number of underlying principles also raised the bar for those in charge: *everyone* was invited to contribute their input; none of those who had submitted questions should come away disappointed.

The chairpersons, the Steering Committee, and the secretariat have worked hard on the process and are satisfied with the result: a Dutch National Research Agenda consisting of 140 questions, 16 'exemplary routes', unexpected cross-connections, and a great deal of publicity for science – and especially Dutch science.

The mandate

The Knowledge Coalition's mandate was multifaceted in nature. The Dutch National Research Agenda was set up to encourage cooperation, unexpected connections, and imagination; to align research more closely to social and economic opportunities and requirements; to reflect and influence existing agendas; to demonstrate the excellence of Dutch research, make breakthroughs possible, and in doing so boost the international position of Dutch research; to have the support of the general public; and to make choices. Looking back on the process, the Steering Committee feels that it has successfully fulfilled this mandate.

Governance

Cooperation within the Knowledge Coalition – and the advice of the Liaison Group representing various segments of society at large – turned out to be an important prerequisite for the process leading to the Dutch National Research Agenda. All stakeholders were involved. They came to understand each other better, and to acknowledge their shared interests, including in the longer term. The members of the Knowledge Coalition did however have highly diverse organisations behind them that wanted to be involved and acknowledged. This made decision-making difficult at certain points.

As an independent party, the chairpersons were free to appear in the media and in other external contexts. Their activities generated support for the Dutch National Research Agenda and brought it into the limelight. The secretariat – consisting of representatives of the Knowledge Coalition – fast-tracked cooperation within the coalition; the representatives benefitted from each other's expertise and their shared aim stood above those of the separate parties.

Both the Steering Committee and the secretariat maintained innovative working methods. Although they initially adhered to the action plan, the process of decision-making and follow-up gradually became more organic. This approach created scope for creativity and unanticipated inspiration that enriched the outcomes of the process. The secretariat's method – working on projects in a virtual environment and making use of each other's complementary expertise – made it possible to facilitate and anticipate the cumulative insights of the Steering Committee and chairpersons.

Public consultations, assessment, and conferences

The public consultation procedure got many Dutch people from outside the scientific community involved in the Dutch National Research Agenda. The number of questions submitted exceeded expectations. The Steering Committee came to realise that it is rather difficult to manage processes closely during a public consultation procedure. No one could say how useful the outcomes of public consultation would be. Those who submitted questions did not know what would be done with their input, and scientists feared that ordinary citizens would decide what research they would be undertaking.

The Academy and The Young Academy made a valuable contribution by managing the task of assessment. In part thanks to their authority, their deep roots in science and innovation, and the meticulous way in which they clustered and aggregated the questions submitted, they ensured that the cluster questions would be framed in properly scientific terms, and

that those who submitted questions would recognize their input in the relevant clusters.

The conferences proved to be excellent occasions for bringing together scientists, businesses, and society to discuss the juries' output. The attendees – approximately 900 in all – helped aggregate the cluster questions more precisely and contributed to their interdisciplinary nature.

Communication

The communication activities concerning the Dutch National Research Agenda sparked a huge response, as was evident from the almost 12,000 questions that were submitted. The activities also led to interaction between different disciplines, businesses, and civil society organisations, and between scientists and the general public. The various parties engaged with one another at different meetings and forums. Their interaction is a valuable outcome of this process.

Time frame

The timeline for this ambitious mandate was nine months. This did not deter the Steering Committee from launching various ambitious initiatives, such as the public consultation procedure and three major conferences. This was the first time ever that a national research agenda had been developed in this fashion, and it was uncharted territory for all those involved. That led to enormous creativity, but also put enormous pressure on the chairpersons, the Steering Committee, and the secretariat in every stage of the process. In addition, the broad spectrum of organisations represented in the Knowledge Coalition made rapid decision-making difficult. In the end, however, the mandate was fulfilled within the prescribed nine months.

Choices

As the process unfolded, it became clear to those involved that a national research agenda should in fact represent the full breadth of science. The task of choosing specific focus areas was decided against, first of all by the juries, who had no choice but to group as many questions as possible into valid clusters rather than select a specified number from among those submitted. This process continued during the conferences. It was unrealistic to expect sophisticated, well-argued choices fully supported by the participating organisations within the time remaining. With no prospect of additional funding, an important additional incentive for making choices was lacking.

The Steering Committee embraced the idea of the routes, meant to represent the connections between questions and parties. It will take

more time to refine this idea, which will in fact lead to choices being made by means of a bottom-up process. After the release of the Dutch National Research Agenda, a series of route workshops will be organised whose outcomes will be presented to the relevant ministers and state secretary in mid-2016.

Innovation

The mandate given to the Knowledge Coalition had innovation as one of its key aims. Innovation was therefore a priority in the process. The Knowledge Coalition took an innovative approach in formulating 140 research questions illustrating the broad landscape of Dutch science and enjoying the support of the entire Knowledge Coalition. The process of enquiry also led to new products. The first is the digital version of the Dutch National Research Agenda, which shows the connections in that landscape, invites parties to enter into new alliances, and is constructed in a way that makes updating easy. The second is the idea of the routes, mentioned previously, which will serve as an impetus for bottom-up connections in the science and innovation sector. The third and final product is *In Conversation*, which will be continued after the completion of the Dutch National Research Agenda. *In Conversation* also illustrates the interaction that this process has generated between science and the public.

In addition to the Dutch National Research Agenda itself, the most important outcomes of the past nine months are the innovative process and the subsidiary products of that process.