

Investment agenda for research and innovation

15 September 2016

The Knowledge Coalition



The Knowledge Coalition is issuing an urgent and ambitious call to government and industry to invest more in research and innovation, in the exceptional opportunities presented by the National Research Agenda, and in the breadth of the National Research Agenda system. The Knowledge Coalition's investment agenda offers a tangible plan for doing so, with a long-term budget of an extra 1 billion euros a year.

The world is facing new challenges that urgently need to be addressed. They will require us to make fundamental transitions in such areas as health care, public administration, sustainable energy, the circular economy, and the global food supply. Their solutions will depend on research and innovation, and the Netherlands has an important role to play in this regard. But these challenges also create new opportunities, because research and innovation are enriching for society. The National Research Agenda brings breakthroughs in science, society and the economy within reach.

1 Threats and opportunities for prosperity and wellbeing

Urgency

Society is facing enormous challenges. Climate change, environmental pollution, the exhaustion of natural resources, and biodiversity loss are growing problems. In many areas of the world, inequality, conflict and hopelessness are undermining social cohesion and posing a threat to peace and security. Globalisation, urbanisation and digitisation can magnify local problems unexpectedly. The urgent need to improve sustainability and resilience in countless sectors means that the world is facing far-reaching transitions in the economy, society and governance. The necessary transitions are international in nature, and their impact will be felt around the world, including in the Netherlands. Our country is also facing major challenges of its own, for example the transition to sustainable energy management, health care reform, and the creation of a circular economy. These unavoidable transitions will make major demands on research and innovation, but they will also create opportunities. The Netherlands has a firm basis for tackling these challenges and contributing to their solutions. We carry out outstanding research in many disciplines, and are world leaders in some fields. Dutch enterprises are at the top of the international rankings in various sectors, often building on scientific foundations. The recent *European Innovation Scoreboard 2016* showed that the Netherlands is an innovation leader. But that is no reason to rest on our laurels.

The focus in recent years has been on efficiency and closer cooperation. That has led to new relationships and co-financing between the national and regional government, the national government and the EU, and private and public parties. At the moment, however, many innovation projects and research plans languish in drawers because public funds are limited. Rough estimates show that more than 200 million euros in private commitments are not invested in the Netherlands.¹

¹ 1. See *NL Next Level: Nederland innovatief toeland*

The complex nature of the transitions we are facing makes heavy demands on our innovation system and calls for a new approach:

- from a largely disciplinary to an interdisciplinary attitude to research and innovation
- towards closer collaboration across sector boundaries
- from a linear innovation model to a network approach, requiring more circulation of knowledge in the research and innovation system.

Investing in the National Research Agenda is the ideal way to build on the fertile soil of present-day policy and take the following steps towards the necessary transitions by generating new knowledge and achieving greater knowledge circulation and absorption.

Need to invest in research and innovation

The Knowledge Coalition is launching an investment agenda that will allow us to capitalise on the National Research Agenda and improve the Netherlands' research and innovation system across its entire breadth. Besides the urgency of the necessary transitions, two other factors play a role.

1. There is a direct relationship between investing in research and innovation on the one hand and prosperity and wellbeing on the other. The Netherlands is a knowledge-driven society. To flourish, it needs a strong research and innovation system. That is the basis for high-value employment.² All the evidence shows, however, that the country is underutilising talent and neglecting promising research. More private and public investment is required across the entire spectrum of basic, translational, practice-based, applied and innovation-driven research if we are to grasp the exceptional opportunities of the National Research Agenda to promote wellbeing, jobs and sustainable growth.³
2. If our present policy remains unchanged, government investment in research will decline by half a billion euros over the next few years.⁴ Our position at the top will be under threat, especially since other countries such as Germany are investing *more* in research. Even more worrying is that research and innovation are already feeling the pinch in the present financial framework. Budgets for applied research and indirect funding award percentages have been declining for years. The discretionary margin that universities and university medical centres are allowed in direct funding is shrinking year by year. The budgets allocated to universities of applied sciences are not adequate enough to allow them to live up to their full innovative potential. The financing instruments meant to help SMEs utilise new technology and innovation have been dismantled, leaving the full potential of knowledge and innovation untapped. Dutch private investment in R&D is increasingly going to countries where public research funding has remained level or even increased.

² See *Kiezen voor duurzame groei. Rapport Studiegroep Duurzame Groei, Rijksoverheid, July 2016.*

³ See the recent Commission Staff Working Document. *Country Report The Netherlands: Shifting public expenditure to growth-friendly areas such as R&D and improving conditions to unlock private R&D investments has the potential to improve the Netherlands' long-term growth potential (EC, 2016: p. 3).*

⁴ *Rapport werkgroep Wetenschap, Onderzoek, Ontwikkeling en Innovatie ten behoeve van de Studiegroep Duurzame Groei, July 2016.*

Ambitious

Over the past six months, researchers at research universities, university medical centres, universities of applied sciences, research institutes, applied research (TO2) organisations, civil society organisations, government organisations and enterprises – from SMEs to multinationals – have engaged in a unique and critical review of the questions that make up the National Research Agenda. Thousands of researchers and other interested parties have attended dozens of workshops in order to reduce the questions to twenty-five 'routes', i.e. coherent sets of questions around which communities of stakeholders in science, enterprise, government and society are clustered.

The appendix to this investment agenda - the Portfolio for research and innovation – describes these routes. They are wide-ranging and varied, like the issues that the Netherlands is facing. The portfolio identifies those domains in which the Netherlands can make a real difference and has comparative advantages over other countries. It is therefore an ambitious and conceptually solid strategic agenda for investment in research and innovation.

⁵ Open science refers to the idea that research data and the outcomes of scientific research should be disseminated and made accessible to all interested parties in society, while respecting intellectual property rights.

⁶ See *Kiezen voor duurzame groei. Rapport Studiegroep Duurzame Groei, Rijksoverheid, July 2016, p. 49.*

The National Research Agenda kicked off a process that has revealed and made hitherto neglected relationships possible: relationships between curious citizens and researchers, between researchers in different sectors and disciplines, and between researchers and innovation partners, e.g. enterprises and civil society organisations. This process keys into the trend towards open science,⁵ strengthening the ties between science and society.

It has also shown us that we can get much more out of our current system. Once we connect up the dots between the questions in the National Research Agenda, countless new opportunities for research and innovation in challenging areas will suddenly come to light. To actually link up the disparate parts of the system, however, extra investment is needed.⁶ The Portfolio for research and innovation shows which conclusive steps can then be taken. It specifically links scientific strengths with societal challenges and economic opportunities. That is precisely the strategy advocated by the Dutch Government in its science policy document *Vision for Science 2025*.

2 Investing in the research and innovation system

Two interrelated investment programmes: the *Spankracht* programme and the *Draagkracht* programme

The investment that the Knowledge Coalition favours consists of two coordinated components. The first is the theme-driven component, in which new investment is used to capitalise on the opportunities revealed by the National Research Agenda. The Portfolio for research and innovation offers a conceptual framework for this. The associated programme proposed by the Knowledge Coalition is entitled '*Spankracht*', a reference to how we can span the divide between disciplines and sectors.

The second component is entitled '*Draagkracht*' because its aim is to maintain and bolster the broad, internationally competitive basis needed for tomorrow's research and innovation programmes. Its purpose is to invest in talent and infrastructure in the research and innovation system – an investment needed to support future innovative theme-based collaboration and to tackle the challenges that society faces.

2.1 *Spankracht* programme

The Knowledge Coalition advocates a new programme-based approach – the *Spankracht* programme – that builds on and complements the existing activities of the Knowledge Coalition partners and, consequently, functions as a crossover mechanism in and of itself. The theme-driven framework for this programme is a direct outcome of the new connections created by the routes of the National Research Agenda. The communities that have taken shape along these routes are ready to join forces in innovative partnerships whenever the opportunity presents itself, in so far as they are not already active in joint projects. The routes and the 'game changers' that have been identified within them are an ideal pipeline for a promising investment portfolio. At the time of publication, 25 routes had already been proposed and worked up in detail by parties in the field. The Portfolio for research and innovation is the interim result of their efforts. It is a dynamic portfolio and will therefore offer scope in the years ahead for new initiatives and new routes alongside the existing ones, based on and in the spirit of the National Research Agenda. Careful management of the portfolio's composition and its continued development is therefore an important area of attention. In this dynamic context, it will be necessary to make choices in pursuit of a uniquely theme-driven policy.

The *Spankracht* programme goes a step further than existing programmes because it promotes multi-sector collaboration across the entire knowledge chain. It also breaks down the barriers between existing funding mechanisms. That requires a new governance model. To manage the portfolio and make theme-driven choices, the Knowledge Coalition recommends assembling an independent, broadly composed programme committee. The committee's task will be to promote excellence in research with an impact on society and the economy, in accordance with best practices. Its members will be nominated by the Knowledge Coalition, which will monitor the committee's work from afar.

The Knowledge Coalition believes that the *Spankracht* programme should be incorporated into the existing institutional and legal frameworks of the research and innovation system. The NWO's Gravitation programme or its decentralised boards can serve as an example. The basic notion here is to guarantee its independence, transparency, quality and effectiveness.

The *Spankracht* programme in a nutshell:

- Radically innovative in terms of substance and mission-oriented ('man-on-the-moon');
- Focused on generating value in science, the economy and society;
- Organisationally unifying thanks to its interdisciplinary nature and cross-sector collaboration between nodes in the network;
- Well-balanced with respect to fundamental, policy-based, applied, practice-based and innovation-driven activities;
- Long term in nature, with corresponding funding levels and as 'full cost' as possible;
- Flexible division of roles and possible phased participation of partners in consortia (public-private and public-public alliances);
- Aligned with existing knowledge and innovation agendas and ministerial policy agendas;
- Bonuses for 1) obtaining European funding for the programme; and/or 2) public-private partnerships; and/or 3) investment by ministries or other government bodies (public-public alliances). To fund such bonuses, existing arrangements (e.g. EU matching, Top Sector Consortia allowance and SME Innovation Incentives) will need to be expanded.⁷
- Gradual increase in co-financing and assurance of continuity.

The *Spankracht* programme will explicitly allow for innovative partnerships between public and private parties and between differing public parties. The Portfolio offers many opportunities in this respect. The programme will not only focus on increasing public investment but also encourage Dutch enterprises to invest more in R&D, or attract R&D from foreign enterprises. The programme will be designed and developed to leverage private investment in R&D. That means that it will not replace the government's Top Sectors policy but instead build on, maintain and intensify public-private partnerships in the Netherlands' top economic sectors. Businesses, consortia or Top Sector Consortia active in the Netherlands' top economic sectors will be encouraged to join other parties in *Spankracht* consortia or to take a leading role in such alliances.

The *Spankracht* programme committee will work out the further details of the programme. At regular intervals within five-year funding periods, the programme committee will issue a call for proposals for long-term research and innovation programmes. Funding will be awarded to specific initiatives and consortia based on the quality, relevance and potential of the proposals. The total structural investment required for the *Spankracht* programme will be 0.5 billion euros per annum.

⁷ Enterprises and knowledge-based institutions regard the current Top Sector Consortia allowance – intended to promote public-private partnerships – as too restrictive, among other things owing to the low percentage that is applied.

2.2 Draagkracht programme

A sense of wonder – one not necessarily tied to theme-driven frameworks – but also the ability to recognise opportunities and want to tackle societal challenges form the basis for scientific ingenuity and innovation. Giving such drivers free rein and the right support is the key to pushing the boundaries in a way that promotes innovativeness, prosperity and wellbeing. One criterion for a healthy research and innovation system that will keep the Netherlands at the top of the international rankings is an attractive research climate in which researchers receive career support and access to a sound research infrastructure, and in which entrepreneurs have the leeway to innovate. The Spankracht programme can only succeed if built on a firm, broad, superior knowledge base.⁸ To achieve this, we will need to invest more in talent and in an appropriate research infrastructure. The Netherlands must increase its investment in a broad knowledge base in proportion to the impetus generated by the Spankracht programme. The extra investment across the entire research and innovation system will create the conditions for attracting and retaining talent and helping it to develop. But it will also take the ability to generate, circulate and absorb knowledge to a higher level, so that civil society organisations and enterprises, especially SMEs, can apply that knowledge to maximum effect in new products and services.

⁸ Viewed from an international perspective, this includes the balanced representation of the humanities, the social and behavioural sciences, and science and technology (see the Bruins/Duisenberg motion).

There is no question that investment in science has a positive influence on ‘human capital’, i.e. the knowledge, attitudes and skills of future generations of workers in a knowledge-driven society. We should encourage graduates and PhDs to fan out to all sectors of science and innovation. This means creating career paths at research universities, universities of applied sciences, university medical centres, research institutes, national knowledge-based institutions, policy assessment agencies, and organisations for applied research, but also at enterprises, civil society organisations and in government. Interaction between the various sectors, united through the National research agenda, makes it possible to recognise talented individuals, guide them to the right career (including in new and innovative enterprises), and connect them to a dense network of contacts, in the spirit of the Agenda.

It is extremely important to science and innovation that we attract, nurture and support the development of scientific talent. This is one way that we can invest in our knowledge-driven society and economy. Talent flourishes best when it is given every opportunity to do so. That ‘opportunity’ consists of a supportive environment, time to carry out research, and excellent facilities. Opportunity must be interpreted broadly: it also includes resolving matching issues so that the pursuit of basic research can be guaranteed across the board, creating leeway for a societal knowledge base in applied and practice-based research, and improving the award percentages so that we can continue to retain talent and facilitate more high-value research.

The research and ICT infrastructure also need strengthening. The necessary investment should target large-scale research infrastructures (for example the national Health-RI now under development), the IT infrastructure for research and innovation, facilities for applied research, and trial areas for innovative activities.

The current set of instruments, for example the National Roadmap for Large-scale Research Facilities, is not yet equipped to achieve the aims and interdisciplinary alliances.

The Knowledge Coalition calls on parties that are actively involved in investing in large-scale research facilities and the IT infrastructure⁹ to align their programmes with the National Research Agenda.

The Knowledge Coalition also wants to draw attention to applied research facilities and trial sites, including centres of expertise, pilot plants, living labs and field labs, the more so because the Portfolio for research and innovation makes frequent reference to them. These trial sites allow many different enterprises to work with knowledge-based institutions on testing whether specific knowledge and technology can be applied in new products, processes and services. The field labs, for example for smart industry, develop, test and implement efficient, low-threshold solutions.¹⁰ Pilot plants can develop and demonstrate new bio-based processes. If SMEs were to participate more, R&D expenditure would increase and create knock-on effects in terms of revenue and employment. The current set of funding instruments is largely inadequate for supporting trial sites of this kind.

Another means of encouraging (more) new activity is the incubator. Incubators can boost the innovation system by facilitating collaboration between different regions. Regional ‘hotspots’ are a source of considerable innovative activity. What is also needed, however, is an integrated approach with cross-collaboration between multiple administrative levels.¹¹ Two Dutch incubators are already ranked among the top ten in Europe, a quality level that should become standard for the Netherlands. The aim is to guarantee the quality and boost public-private financing of such incubators and other campuses of national significance. Another important task is to continue the national valorisation programme.

Smaller enterprises are not capable of gathering all the relevant competences on their own. Cooperation within the SME chain and between different sectors is therefore important for knowledge circulation and absorption. Growth is possible in many domestic sectors by improving the implementation of available new innovations, technologies and production methods. In collaboration with applied and practice-based research institutions, diffusion to SMEs must be improved to ensure that new technology reaches down to and is utilised at every level of enterprise, across the entire board, by providing information and low-threshold access .

By investing in talent and infrastructure and resolving associated problems, we can create a basis that will allow the National Research Agenda and dedicated theme-driven research to flourish, both now and in the future. The *Draagkracht* programme will require structural funding of 0.5 billion euros per annum.

Final remarks

In the view of the Knowledge Coalition, an extra investment of 1 billion euros a year, earmarked for the two interrelated components of the investment agenda – the *Spankracht* and *Draagkracht* programmes – will enable the Netherlands to maintain and improve its leading edge in research and innovation. This is an urgent matter, because our country is facing pressing transitions even as its capacity for research and innovation is being eroded. These investments will allow the Netherlands to grasp the many opportunities described in the National research agenda for tackling the major challenges of our time and for boosting society, the economy and science in sustainable ways.

⁹ Such as the Permanent Scientific Committee for Large-Scale Infrastructure. For investment in the IT infrastructure, please see *the AWTI advisory report Klaar voor de Toekomst? Naar een brede strategie voor ICT*, September 2015. IT is also a point of concern in the government’s top sectors policy and in the ‘digital society’ programme of the Association of Universities in the Netherlands (VSNU).

¹⁰ The Smart Cities route, for example, argues that participatory action research, citizen science (e.g. with apps) and sensor-assisted data research can make cities into living labs for exploring societal and urban issues.

¹¹ *Rapport werkgroep Wetenschap, Onderzoek, Ontwikkeling en Innovatie ten behoeve van de Studiegroep Duurzame Groei*, July 2016.

The Knowledge Coalition consists of:

- Royal Netherlands Academy of Arts and Sciences (KNAW)
- MKB-Nederland (Federation of Dutch SMEs)
- Netherlands Federation of University Medical Centres (NFU)
- Netherlands Organisation for Scientific Research (NWO)
- TO2 Federation (Federation of Applied Research Institutes)
- Association of Universities of Applied Sciences
- Confederation of Netherlands Industry and Employers (VNO-NCW)
- Association of Universities in the Netherlands (VSNU)