Science Works!

NWO STRATEGY 2023-2026

NWO

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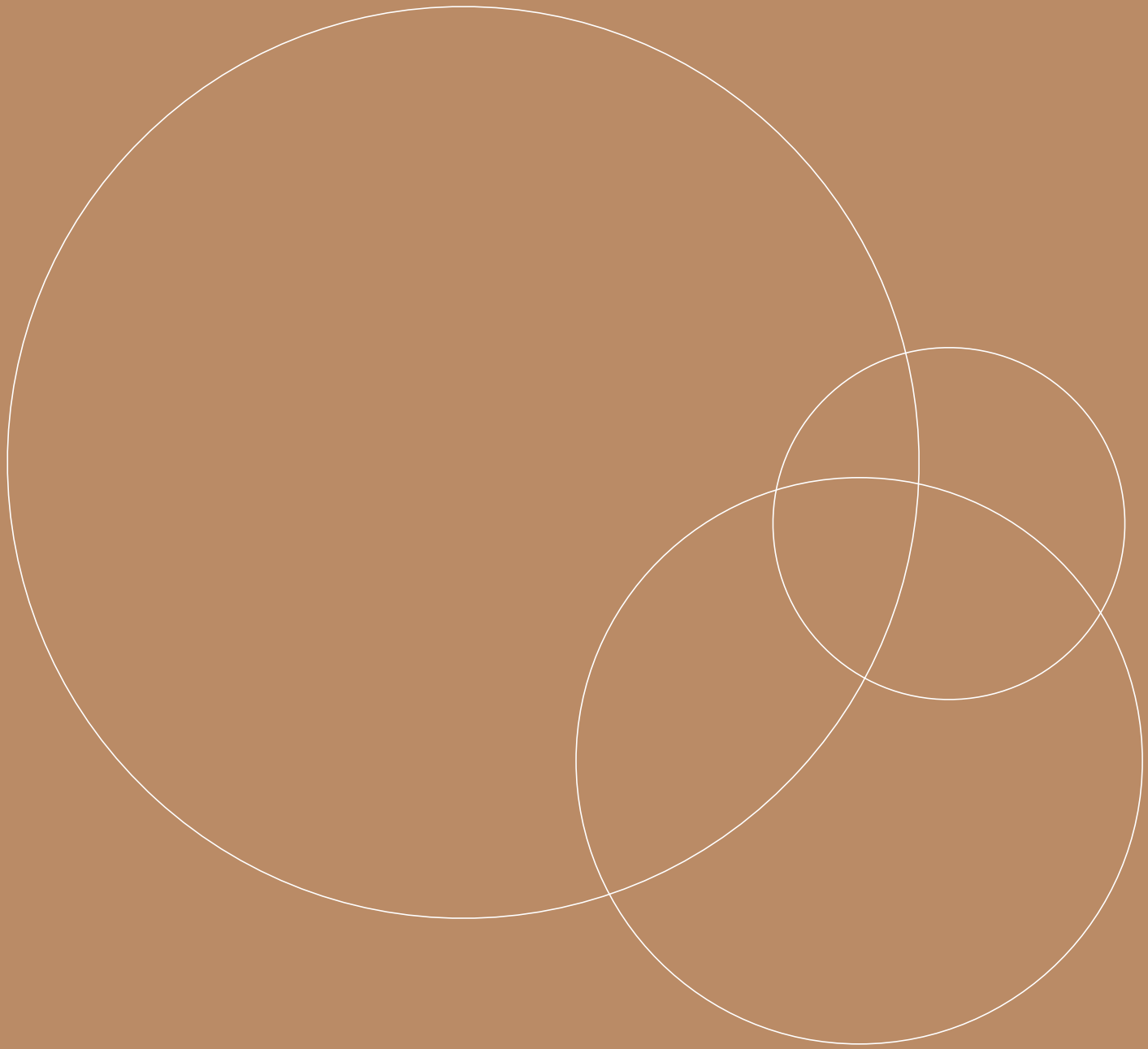
Tebbe & Staal



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Contents

Foreword

Fantastic new ideas, insights and applications we had no knowledge of before. Concrete solutions to problems we face in the here and now. Scientific research – fundamental, thematic and practice-oriented – plays a key role in shaping us as human beings and as a society. And our country, socially and economically.

It is the responsibility of the Dutch Research Council (NWO) to ensure that science can fulfil the function society demands of it. And that science can surprise and inspire society, and thereby enrich it. We perform that role as a connector and as a funder, as well as through the research carried out by our national research institutes.

Dutch scientific research is world-renowned and we want to maintain and build on that position. Science works! sets out the strategy we will follow over the next four years to achieve our ambitions. We have defined four essential building blocks for success: a healthy research culture, a robust research system, coherent research agendas and unimpeded collaboration. This strategy document also incorporates the recommendations from the evaluation of NWO in 2021.

Many people inside and outside NWO have provided input for this strategy. We are grateful to all of them for their engagement and for the views, ideas and thoughts they expressed. Together we are making the Netherlands a wiser country. By creating a research landscape in which free spirits dare to tread new and surprising paths. By delivering science that is valued by society. By ensuring that science works!

Marcel Levi, President of the Executive Board of NWO

The role of NWO

The scientific research conducted in the Netherlands is highly regarded. The Netherlands wishes to maintain and strengthen its prominent position. NWO contributes to the quality of the Dutch research landscape in three ways: as a connector of researchers, knowledge users and society; as a funder of research; and as a researcher, through our own research institutes.

The science budget and the parameters of science policy in the Netherlands are fixed by the Minister of Education, Culture and Science. NWO is an independent science funding body whose task is to help implement the science and innovation policy. We set our own priorities and implement them ourselves. Our statutory task is to advance the quality of scientific research and to initiate and stimulate new developments. Our Taskforce for Applied Research SIA is dedicated to enhancing the quality and impact of applied research by the universities of applied sciences. In this way, science can perform its crucial role for the knowledge economy and in resolving major societal issues.

We guarantee quality and innovation across the spectrum of Dutch research by establishing independent committees of scientists, often with members from other countries, to assess research proposals. Only the best proposals are approved. We also promote the transfer of the knowledge generated by the research we fund and carry out ourselves. At the same time, we foster national coordination and connections with other knowledge institutions and societal stakeholders. Our institutes initiate research and make connections within their respective fields of research, for example by managing and participating in research infrastructures and by collaborating with universities.

In 2017, we considerably' simplified our governance model to accommodate developments in science policy. Consequently, we are better able to build bridges between disciplines, but also between science and society, including the business community. In 2015, we collaborated with knowledge institutions, industry and societal organisations in drawing up the Dutch National Research Agenda. Consequently, together with those organisations we are opening science up to the general public and finding innovative ways of involving citizens in science's search for answers to the challenges we face.

We closely monitor trends in the national and international knowledge landscape, interpret them and respond to them. One important development is the Open Science movement, which promotes more open and participatory research, with the results – publications, data, software and other forms of scientific information – being shared and made available for use or reuse in other contexts at the earliest possible opportunity. The effect is to magnify and accelerate the impact of research on science and society.

The rise of open science and the advance of digitisation have opened up many new forms of collaboration among scientists themselves and with partners in other fields. Another important development in the Netherlands is the trend towards offering researchers and other staff of knowledge institutions greater recognition and reward for their efforts. This calls for a fundamental change in behaviour and in leadership style within knowledge institutions.

We would now like to take you through the developments as we see them.

Developments in society and science

Science and society are inextricably linked. Developments in society therefore have a direct impact on science, and thus on the work carried out by NWO. Focusing on scientific challenges and issues for which society wants answers, including the place of science in the public imagination, we will continue to closely monitor, and where possible anticipate, future developments.

NWO in a changing society

Search for balance in the definition of welfare

Growing efforts are being made to find ways of integrating and balancing the economic, social and ecological aspects of the concept of welfare. In addition to economic growth and income, facets such as health, education, security, access to services, social cohesion, diversity and the environment are now receiving more attention in the formulation of ambitions for the future. On a global level, the Sustainable Development Goals have been adopted to represent the importance of the various dimensions of welfare for sustainable development. Research reflects this broader perspective, for example through interdisciplinary collaboration.

Focus on societal challenges

The potential for economic growth is no longer the sole, or even the primary objective in the government's demand-driven science and innovation policy. Science and innovation should help to address broad societal issues. The EU Framework Programme for Research and Innovation, for example, has formulated missions for targeting research and innovation specifically at urgent societal challenges. In the Netherlands, the National Research Agenda encompasses a wide range of prioritised societal issues, while the Mission-driven Top Sectors and Innovation Policy, although incorporating economic objectives, focuses mainly on addressing the challenges facing society.

The important role that research and knowledge can play in finding answers to complex societal challenges has led to a sharp increase in the resources for thematic research. However, funding for curiosity-driven research has not risen as fast. That constitutes a risk because the latter type of research is essential for guaranteeing society's permanent access to a reservoir of new concepts and ideas in the longer term

International collaboration

A global crisis like Covid-19 exposes the interdependencies of countries. The war in Ukraine shows how dramatically geopolitical situations and power relations can shift. Major challenges facing the Netherlands and Europe cannot be seen in isolation from worldwide developments. The corona pandemic is an obvious example of a complex problem with transnational causes that requires global solutions, also from science. International scientific collaboration is therefore essential. Meanwhile, the competition between countries is growing. The demand for talented scientists in emerging countries (such as China, India, Turkey and Indonesia) will continue to grow in the coming years. Like their counterparts elsewhere in the European Union and in the United States, Dutch universities and universities of applied sciences are committed to attracting and retaining international talent.

International scientific collaboration contributes to the development of scientific knowledge, but can also influence and strengthen international relations. Accordingly, in the Western world science diplomacy is increasingly regarded as an extension of foreign policy. It is vital that themes such as academic freedom and knowledge security are not forgotten in the process.

Utilisation of knowledge from society

The science community needs to collaborate more in order to contribute to solutions for societal challenges. Collaboration occurs at different levels: between scientific disciplines and within the knowledge chain, but also with societal organisations and potential users of the knowledge outside the science domain (transdisciplinary collaboration). The latter form of collaboration involves utilising the knowledge possessed by actors such as societal organisations, interest groups, governmental bodies and companies and conducting 'open' research with the help of citizens (citizen science). People from outside the scientific community can contribute worthwhile experience and practical knowledge which can prove useful for the application of the results of research in practice. The involvement of citizens can also help to generate public support for and trust in science.

NWO in a changing society

Information dissemination and fake news

Information spreads quickly on social media. Although transparency benefits, the distinction between opinion and fact is sometimes blurred. Social media have also helped to accelerate the dissemination of fake news. Dealing with incorrect information is a major challenge for society and for science. It calls for the prompt generation of verifiable evidence to prevent the production of false information, or to refute it if necessary. Science has to set the right example in terms of showing how information has been produced. These factors underline the importance of transparency in research. They also confirm the importance of compliance with the Netherlands Code of Conduct for Research Integrity,[1] which highlights principles such as honesty, scrupulousness, transparency, independence and responsibility.

Freedom of speech and threats to personal safety

Threats against scientists make it increasingly difficult to conduct a proper debate on controversial issues. Threats compromise the personal safety of researchers who place their knowledge at the service of the public debate, and thus harm our knowledge society and can undermine faith in academic freedom and trust in science.

Integrity and security

The sharper focus on research relating to the challenges facing society calls for multi-party collaboration. Safeguarding the integrity of science must be a major priority in order to avoid any pretense of conflicts of interest or manipulation and to preserve trust in science. There are also risks attached to international cooperation. Knowledge security is an important topic in science today. Western countries are increasingly critical in their choice of themes on which they will collaborate in research and the countries they will partner with.

Evidence-informed research funding

It is becoming increasingly important to back up decisions on research funding with facts. The growing significance of *evidence-based* (choices based on facts) or *evidence-informed* (choices based on facts and experiences) decision-making also applies to research funding itself. Worldwide, financiers of research are assessing their own functioning more critically: are their methods of assessing research fair? Do their policies promote greater inclusion and integrity in science? What is the societal and scientific impact of their financial instruments? Research on research (and on funding of research), the investigation of how research is funded and carried out, has really taken off.

Public debate

The complexity of societal challenges is also propelling a value-driven debate in society. Subjects such as respect and equality, inclusion, sustainability and the colonial past are high on the public agenda in the Netherlands and many other European countries. Consequently, the work of researchers is increasingly under the microscope, while simultaneously they are expected to play an active role in the debate.

[1] NWO | Netherlands Code of Conduct for Research Integrity.

Trust in science

Research culture

Against the background of a changing society, the science community is devoting greater attention to the research culture. Respect for different academic careers, for diversity and inclusion and for scientific integrity and the reduction of high workloads are high on the agenda, as are the subjects of academic freedom and the safety of researchers. All this especially in the context of the challenge of retaining talented researchers for the Netherlands.

Broader assessment and recognition

The San Francisco Declaration on Research Assessment (DORA) in 2012 constituted international recognition of the need to improve methods of assessing scientists and research results. DORA helped to launch a movement aimed at modernising the system of assessment of research and researchers. The quality of scientists and research cannot be determined solely on the basis of the number of publications or citations. Researchers do far more than publish articles and their output can take various forms. For example, research can have a positive impact by yielding new insights and applications that advance the public debate. Because of the trends described above, the importance of traditional channels of publication is diminishing. Meanwhile, various movements are growing in stature. One of them is the Open Science movement, which aims for more open and participatory research, the results of which are shared and made available for reuse as quickly as possible. There is also growing attention for FAIR data: data that is Findable, Accessible, Interoperable and Reusable for other researchers and interested parties. In light of these developments, research financiers and knowledge institutions around the world are currently revising their assessment frameworks.

Workload in knowledge institutions: vulnerable young talent

The level of education of the Dutch population is rising: more than 40% of young adults obtain a higher education diploma, with around 16% of them earning a university degree. The student numbers contribute greatly to the work pressure on researchers, whose teaching obligations leave them less time for research. Meanwhile, the knowledge institutions devote part of their research budgets to education, but still expect the researchers to do the research. They are therefore more dependent on grants from funding organisations like NWO to carry out that research. This increases the application pressure, but does not lead to more applications being granted.

The heavy workload is not conducive to a healthy working climate for researchers. The situation creates the risk of disruption to both teaching and research and could have a detrimental effect on the appeal of science in general (a brain drain).

Furthermore, the environment in which researchers work is not always safe and there are still too many instances of undesirable behaviour. This is another aspect of the culture that demands attention.

From gender equality to broad diversity and inclusion

In 2020, the government launched an action plan for greater diversity and inclusion in higher education and research. The plan was endorsed by NWO. Since 2022, Horizon Europe, the European Union's research and innovation programme, has obliged every organisation that applies for funding to have a gender equality plan. The action plan and Horizon Europe are both based on an integrated approach and a broad definition of diversity and inclusion.

Responding to developments in society

The digital society

The Covid-19 pandemic has helped to accelerate the digitisation of society and make time- and place-independent working and learning commonplace. However, there is also more digital surveilalance and online influencing of behaviour. Artificial Intelligence is a system technology that has entered the bloodstream of society. A relatively new issue confronting society is the question of data ownership. Society, but also science, urgently needs to come up with answers to questions about cyber security, privacy and the growing dependence on large technology platforms.

Data-based science and Big Tech

When data are the basis rather than the result of research, the possibility arises that research questions are determined by the availability of data. Big Tech companies own more and more data, particularly relating to human behaviour, health and feelings of well-being. This can make science dependent on those companies and curtail academic freedom and transparency. In the interests of scientific research, it is important that effective agreements are made at national and international level on access to and utilisation of data so that important sources remain available for research. Furthermore, algorithms – based on such data – must be testable, explainable and modifiable when circumstances demand it. Ethical aspects of the development and use of algorithms are an important subject of research given the technology's potential impact on society. Wherever possible, the aforementioned FAIR principles should also apply to the design and utilisation of data models: data must be findable and accessible, interoperable without restriction and reusable by other researchers and users.

Open science

The Netherlands leads the way in setting conditions for open access to research results and data. Digitisation and open sharing of information facilitate collaboration between disciplines, individuals and organisations and accelerate knowledge development. Numerous possibilities for designing and executing 'open' research are being developed. This calls for a new approach to assessing and supervising projects, without losing sight of knowledge security, on the part of funders of research like NWO.

NWO as science organisation

NWO facilitates top-class research and innovation with scientific and societal impact. We invest an average of one billion euros annually in curiosity-driven research, research related to societal challenges and the Dutch research infrastructure.

NWO as science organisation

NWO performs the roles of *funder* and *researcher* in the Dutch research landscape. We are also a *connector* of parties engaged in scientific research. As an independent body exercising oversight over all the scientific disciplines, we safeguard the quality of research throughout the knowledge chain, while maintaining a good balance between fundamental, thematic and practice-oriented research and between the various disciplines and scientific domains. All are important for fulfilling science's crucial role for the Dutch knowledge economy and for society as a whole.

In performing these roles, NWO functions *actively* and *visibly* as the guardian of research with scientific and societal impact. We fulfil an important bridging function in the knowledge sector between researchers, governmental bodies, politicians, knowledge institutions, industry and other users of scientific knowledge. We are also prominent participants in the public debate by consistently and convincingly conveying how research helps to find solutions for the challenges facing our society. This is a role we intend to further intensify in the coming years.

We can only do this in a climate of solid public *trust* in science, which not only requires that scientific research is transparent and reproducible, but also that NWO itself is clear about its methods and processes. That we are open to criticism and show ourselves to be a learning organisation that is constantly seeking to improve. Where NWO's processes and procedures are felt to be mysterious and complicated, we simplify them and clearly explain the changes. As representative of the interests of the entire spectrum of research, we are a committed and reliable partner for researchers and everyone who has any contact with NWO. In other words, accessibility and transparency are key aspects of the organisation's contacts with the outside world.

AMBITION 1

THROUGH CLEAR COMMUNICATION, WE WILL SHOW THE IMPACT OF SCIENCE AND THE ROLE NWO PLAYS AS A CONNECTOR, FUNDER AND RESEARCHER IN ADVANCING WORLD-CLASS DUTCH SCIENTIFIC RESEARCH.

A brief explanation of the roles we play:

Connector

NWO is a connector in the research system. It fulfils a valuable bridging function between researchers, governments, politicians, knowledge institutions, industry and other knowledge users. Our activities embrace the entire spectrum of research: fundamental, applied and practice-oriented.

Funder

NWO selects and funds research proposals on the basis of recommendations made by leading scientists and national and international experts.

NWO almost always requires knowledge to be utilised in a manner appropriate to the type of research. That is always the case with impact focus research (research designed for application in society), but not always for research with an impact outlook (research that focuses on scientific impact and not necessarily on social impact). Some of our instruments are also specifically designed to facilitate knowledge utilisation, for example to help researchers develop a prototype of their discovery. NWO further promotes the utilisation of knowledge by fostering entrepreneurship in knowledge institutions.

NWO funds research in four domains: Science, Applied and Engineering Sciences (AES), Social Sciences and Humanities (SSH) and Medical Sciences (funded via the Netherlands Organisation for Health Research and Development, ZonMw). These domains work closely together in setting up collaborative programmes with societal partners and with industry. For a number of special programmes, such as Research Infrastructure, the Dutch Research Agenda and the Knowledge and Innovation Covenant, NWO is advised by programme committees.

Researcher

The scientists in our research institutes conduct world-class research. Each institute has its own scientific mission of strategic importance and makes a specific and unique contribution to national and international research. Our institutes offer an appealing environment for researchers from around the world and strengthen science in the Netherlands by recruiting and training talent. We provide this environment together with the institutes of the Royal Netherlands Academy of Arts and Sciences (KNAW) and other national research institutes.

AMBITION 2
NWO'S AMBITION IS TO FURTHER DEVELOP OUR PORTFOLIO OF NATIONAL RESEARCH INSTITUTES IN CLOSE ALIGNMENT WITH DEVELOPMENTS IN THE DUTCH AND INTERNATIONAL KNOWLEDGE COMMUNITY.

NWO's five funding lines

1. **Open Competition**
Funding of curiosity-driven research in the four scientific domains, thus enabling researchers to conduct research into a subject of their own choice without being bound by thematic conditions.

2. **Talent Programme**
Personal funding for individual researchers, whether working in teams or otherwise. For example, we finance curiosity-driven research aligned to the various stages in the careers of researchers through the Talent Programme (Veni, Vidi, Vici).

3. **Collaboration with knowledge users and society**
Projects or programmes for thematic research and valorisation in partnership with external public and/or private parties. These projects or programmes are designed to increase and accelerate the economic or social impact of the research. Examples are programmes or projects falling under the auspices of the National Research Agenda, the Knowledge and Innovation Covenant (focusing on major challenges facing society which require more knowledge and ground-breaking innovations) and the National Growth Fund (large-scale investments to promote long-term economic growth).

4. **Practice-oriented research**
Investment in the professionalisation, quality improvement and self-organisation of practice-oriented research in the universities of applied sciences. This funding is provided using different instruments managed by the Taskforce for Applied Research SIA.

5. **Infrastructure**
Support in constructing and providing access to (large-scale) scientific infrastructure through programmes such as the National Roadmap for Large-scale Scientific Infrastructure. Financial support is provided for the further expansion of the Dutch digital research and data infrastructure, for eScience and computing facilities for example, and to foster coordination and cooperation through Thematic Digital Competence Centers.

The NWO institutes

Together with the KNAW, NWO manages a responsive, proactive and dynamic portfolio of more than twenty research institutes, which is constantly evolving.

AMOLF

Conducts fundamental research into new, strategically important and complex molecular and material systems, in association with universities and industry. AMOLF develops new advanced instruments and quantitative models for this purpose. AMOLF's NanoLab is part of NanoLabNL, which is dedicated to strengthening the Dutch infrastructure for research in the field of nanotechnology.

ARCNL

Conducts fundamental research into the physics and chemistry behind the technology for nanolithography with a view to developing innovative technologies, primarily for the semiconductor industry. ARCNL is a public-private partnership of three Dutch universities and the Dutch semiconductor industry.

ASTRON

Conducts research into radio astronomy and constantly develops new instruments and software for observation systems used in large-scale research facilities around the world. For example, ASTRON manages the LOFAR radio telescope, is involved in the construction of the world's largest radio telescope SKA and is a participant in the European VLBI network for simultaneous observation by multiple radio telescopes.

CWI

Conducts fundamental research at the intersection of mathematics and information science, resulting in fundamental and long-term innovation for society and industry.

DIFFER

Conducts fundamental research into innovative energy technology in the fields of solar fuels and fusion energy. DIFFER also develops innovative technology for the development of instruments and for research in international research facilities, such as the international nuclear fusion reactor project ITER. DIFFER manages the research facility Magnum PSI, the only one of its kind in the world, which is used for research into nuclear fusion, and plans to establish a facility for energy materials research in the coming years.

Nikhef

Conducts research into subatomic particles and particle astrophysics with a focus on investigating the fundamental structure and interactions of the elementary particles and the forces between them on the smallest and largest scales, with the highest possible energy and precision. NIKHEF also develops innovative technologies for instrumentation and research for national and international research facilities such as CERN, KM3NeT, Pierre Auger, XENONnT, eEDM, Virgo and the future Einstein Telescope, as well as managing and arranging access to the data infrastructure of these facilities.

NIOZ

Conducts fundamental multidisciplinary seagoing research into important issues of scientific and social interest concerning the functioning of delta and coastal areas, seas and oceans. Via the National Marine Facility, NIOZ also manages the national research vessels and the equipment and data infrastructure for the Dutch marine research community.

NSCR

Conducts fundamental scientific research into crime and law enforcement. The research is innovative and uses state-of-the-art methods. NSCR manages a unique data infrastructure for the international network of researchers in the field.

SRON

Conducts fundamental astrophysical research and earth observations from space. SRON develops advanced technology and instruments for this research and its instruments have been used on space missions by ESA, NASA and JAXA. The data generated by these missions facilitate ground-breaking research in collaboration with the worldwide research community. SRON is the centre of Dutch participation in ESA missions and directs space research in the Netherlands together with the Netherlands Space Office.

Our strategy

OUR VISION OF DUTCH RESEARCH IN 2030:

“FROM ITS POSITION AT THE HEART OF SOCIETY, SCIENCE AMAZES AND INSPIRES. RESEARCH IN THE NETHERLANDS IS INNOVATIVE, APPEALING AND WORLD-CLASS. SOCIETY RECOGNISES AND ACKNOWLEDGES THE IMPORTANCE OF CURIOSITY AND AN INQUIRING ATTITUDE. SOCIETY RELIES ON AND PARTICIPATES IN GROUND-BREAKING RESEARCH BECAUSE OF THE ESSENTIAL CONTRIBUTION IT MAKES TO OUR FUTURE: AMAZING NEW IDEAS, INSIGHTS AND APPLICATIONS WE HAVE NEVER HEARD OF BEFORE AND FANTASTIC SOLUTIONS FOR CHALLENGES WE FACE IN THE HERE AND NOW.”

NWO’S MISSION READS:

“NWO ADVANCES WORLD-CLASS SCIENTIFIC RESEARCH. THIS RESEARCH HAS SCIENTIFIC AND SOCIETAL IMPACT.”

Building blocks

All references to (scientific) research refer to fundamental, thematic and practice-oriented research.

NWO wants to help create a research landscape that has significant scientific and societal impact worldwide. NWO has defined four building blocks that are important for its vision for 2030. In this section, the building blocks are first briefly summarised, followed by a more detailed description of them and our role in relation to them. The building blocks are not presented in a particular order of importance. They are interconnected and NWO's role in putting each building block in place will vary.

Building block 1

A HEALTHY RESEARCH CULTURE THAT BRINGS OUT THE BEST IN RESEARCHERS

We are building a research culture that unlocks (untapped) talent, provides better and supported solutions for questions and problems, offers more opportunities for collaboration, and promotes social welfare and economic prosperity. In 2030, the working environment for researchers in the Netherlands will be inclusive, diverse, open, sustainable and safe. Talented researchers will receive recognition for their work. Researchers will have room, individually and in teams, to develop their talent, to advance in research or to make a contribution to society outside science. We are creating a culture that prioritises collaboration, respect, safety and mutual trust and in which the integrity of research is evident. Thus science will foster a climate in which there is room for curiosity and new ideas and sharing knowledge is encouraged. That is the key to scientific progress: building on existing knowledge through innovation and disseminating and utilising new knowledge in an accessible manner.

Research makes a significant contribution to society's learning capacity. In addition to knowledge of recent scientific research, well-educated students bring with them the skills to apply the latest knowledge and insights in helping society to address complex problems. This increases the trust in science and confidence in the future.

Building block 2

A ROBUST RESEARCH SYSTEM

A sound research infrastructure is essential. Basic requirements for it are broad accessibility and good structural funding. In 2030, we will make efficient use of our research resources in pursuit of a common interest. Across the research spectrum, researchers will have sufficient funds to do their work. Primary responsibility for the careers of researchers will lie with them and the knowledge institutions to which they are affiliated. In the robust research system of 2030, researchers will have more peace of mind because their careers will be less reliant on temporary funding. There will also be a healthy balance between curiosity-driven research and thematic research that focuses on challenges facing society. The allocation of research funds will provide the necessary continuity for Dutch research in both the long and the shorter term.

Building blocks

Building block 3

COHERENT RESEARCH AGENDAS WITH GROUND-BREAKING PERSPECTIVE

Research plays a crucial role in offering society the future perspective it needs. The Netherlands is taking the lead in some research areas because we are already at the forefront of developments in those areas or precisely because we want to have a greater impact in them. This means that in the coming years choices should be made on the basis of a common strategic interest rather than in response to issues as they arise. In this way, we will enhance the synergy between research programmes and prevent knowledge institutions from duplicating each other's work. Decisions will be guided by the international context, not only because of the strong interconnectedness with other countries and the cross-border framework within which research is conducted, but also because so many issues need to be addressed with a transnational strategy.

Building block 4

UNIMPEDED COLLABORATION TO INCREASE IMPACT

National and international collaboration have helped to make Dutch research among the best in the world. Collaboration between researchers and with societal actors, citizens and knowledge users increases the scientific and societal impact of research. Collaboration creates more opportunities for innovation. Collaboration removes barriers between organisations, countries and sectors, but also transcends boundaries between and within disciplines and between fundamental, thematic and practice-oriented research. By doing so, it creates opportunities to deliver the innovation we are striving for. Accordingly, in 2030 collaboration will come naturally and easily to participants in the research process: collaboration will be facilitated and stimulated more than at present and research networks will receive long-term support.

The four building blocks in the NWO strategy

Many parties will be involved in implementing this strategy: research institutions, the business community, societal organisations and citizens. NWO will be a driving force behind the efforts of these stakeholders to realise the ambitions.


A HEALTHY RESEARCH CULTURE THAT BRINGS OUT THE BEST IN RESEARCHERS
A ROBUST RESEARCH SYSTEM
COHERENT RESEARCH AGENDAS WITH GROUND-BREAKING PERSPECTIVE
UNIMPEDED COLLABORATION TO INCREASE IMPACT

1.

A healthy research culture

The research culture in the Dutch knowledge institutions affects how researchers can do their work, how research is carried out and how we communicate about research. A healthy research culture is a culture that attracts talent and recognises and rewards the unique contributions that people make. Trust in science and academic freedom are priorities in this respect. A healthy research culture brings out the best in researchers and research teams, fosters collaboration and helps in attracting and retaining talent. NWO regards a healthy research culture as a prerequisite for advancing world-class research.

Knowledge security, open science, recognition & rewards, diversity & inclusion, scientific integrity and sustainability. These are all important themes for NWO. We will work with knowledge institutions, the government and societal partners in establishing a healthy research culture and make agreements on what is needed to maintain and strengthen it, for example by removing unwanted incentives. Obviously, the responsibility for working conditions and the research culture lies with the knowledge institutions themselves. NWO's principal responsibility as funder is to mitigate the effects of negative aspects, such as hypercompetition (an unhealthy level of competition among applicants) and the Matthew effect (applicants who have received funding once are more likely to receive funding again the next time). These six closely interconnected themes are discussed and our ambitions for them are explained in the following sections.

AMBITION 3

NWO WANTS TO SET AN EXAMPLE AS AN EMPLOYER IN THE DUTCH RESEARCH LANDSCAPE. OUR INSTITUTES OFFER AN INCLUSIVE, DIVERSE, OPEN, SUSTAINABLE AND SAFE WORKING ENVIRONMENT THAT ENCOURAGES A HEALTHY RESEARCH CULTURE. A HEALTHY RESEARCH CULTURE AT THE INSTITUTES INCREASES THEIR ATTRACTIVENESS TO A WIDE RANGE OF TALENTED RESEARCHERS. OUR INSTITUTES ARE DRAWING UP PLANS THAT ADDRESS ALL ASPECTS OF A HEALTHY RESEARCH CULTURE. THEY ARE OPEN TO SUGGESTIONS FROM THEIR RESEARCHERS AND MONITOR THEIR RESEARCH CULTURE THROUGH A PERIODIC EMPLOYEE SURVEY. AS AN EMPLOYER, NWO AIMS FOR AN EMPLOYEE SATISFACTION RATING OF 8 OR HIGHER.

AMBITION 4

NWO WILL MAKE AGREEMENTS WITH KNOWLEDGE INSTITUTIONS AT THE INSTITUTIONAL LEVEL[2] ABOUT ISSUES SUCH AS OPEN ACCESS, DATA MANAGEMENT, AND DIVERSITY AND INCLUSIVENESS POLICIES. THIS WILL ALLOW US TO DROP REQUIREMENTS AT THE APPLICANT LEVEL. AS A RESULT, WE WILL CREATE A HEALTHIER RESEARCH CULTURE IN THE INSTITUTIONS, BUT ALSO REDUCE THE WORKLOAD FOR APPLICANTS.

AMBITION 5

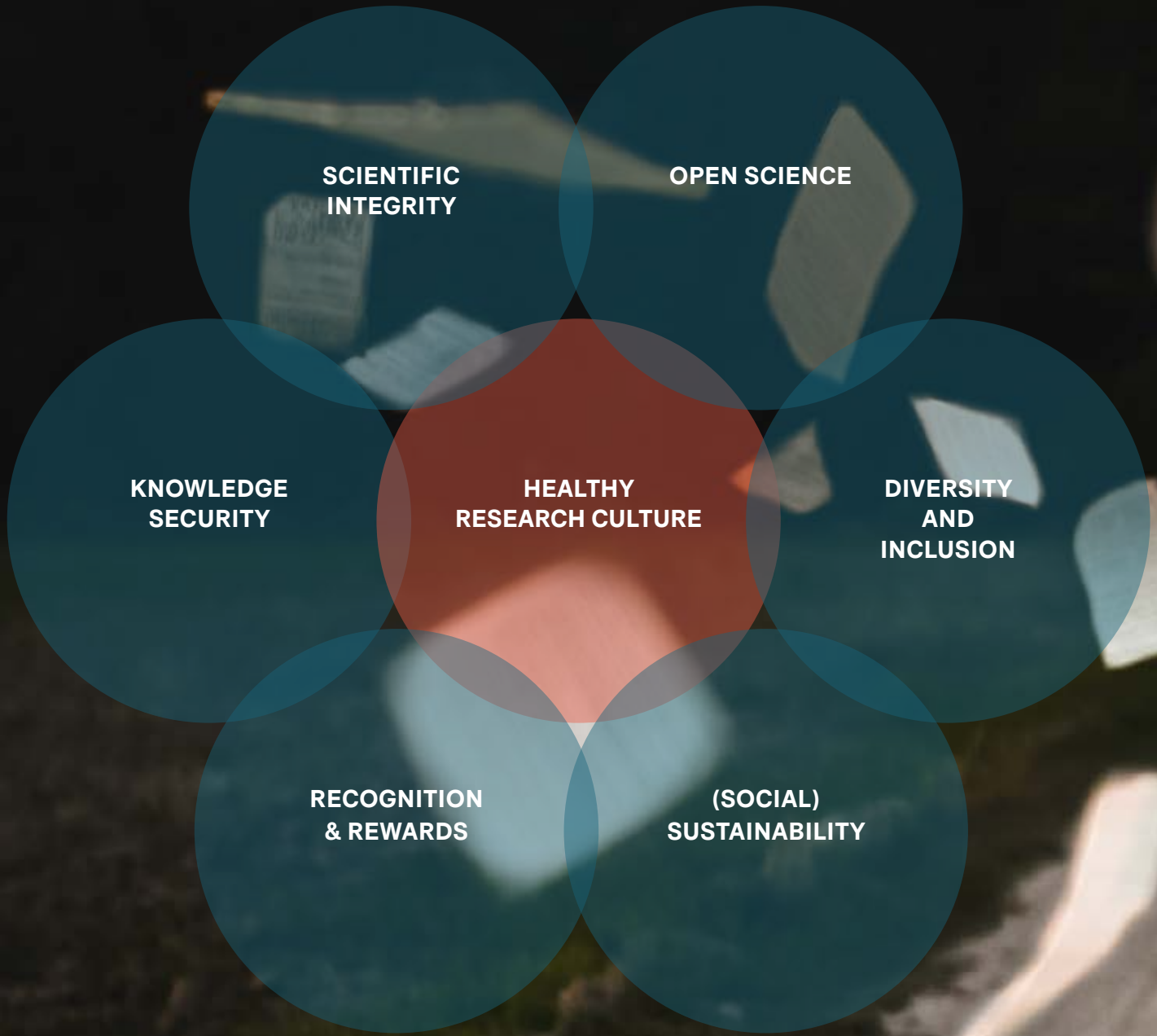
THE WORK PRESSURE AT KNOWLEDGE INSTITUTIONS IS HIGH. NWO WANTS TO HELP RESEARCHERS USE THEIR TIME MORE ECONOMICALLY. THIS CAN BE DONE, FOR EXAMPLE, BY SPEEDING UP AND SIMPLIFYING OUR APPLICATION PROCEDURES AND BY MAKING THEM LESS OF AN ADMINISTRATIVE BURDEN. THIS WILL ALSO HELP TO REDUCE RESEARCHERS' WORKLOAD (SEE ALSO ROBUST FUNDING AND UNIMPEDED COLLABORATION).

AMBITION 6

NWO WILL EXAMINE THE SCIENCE SYSTEM AS A WHOLE, IN PARTICULAR OUR OWN ROLE AS A FUNDER IN THAT SYSTEM (RESEARCH ON RESEARCH). THIS WILL ENABLE RESEARCH ASSESSMENT, FUNDING, PROGRAMMING AND POLICY TO BE FORMULATED IN A MORE EVIDENCE-BASED MANNER.

[2] Following the lead taken by the European Research Council in relation to the Horizon Europe programme, whereby institutions commit themselves to meeting a number of basic conditions when a staff member is awarded funding.

Elements of a healthy research culture



Knowledge security

The knowledge security policy aims to protect sensitive knowledge from undesirable transfer, while at the same time safeguarding scientific integrity and academic freedom. In a secure environment, researchers and other staff members can make optimal contributions to research and feel free to do so. The knowledge sector and the Dutch Ministry of Education, Culture and Science have jointly drafted National Knowledge Security Guidelines, which set out policy measures that research institutions can take to prevent undesirable knowledge transfer while safeguarding core academic values.

AMBITION 7

NWO WILL IMPLEMENT THE POLICY MEASURES IN THE NATIONAL KNOWLEDGE SECURITY GUIDELINES[3] IN OUR OWN INSTITUTES AND IN ASSESSMENT PROCESSES. WE WILL EXCHANGE KNOWLEDGE AND EXPERTISE WITH OUR INTERNATIONAL SISTER ORGANISATIONS AND WITHIN THE KNOWLEDGE COALITION.

[3] National Knowledge Security Guidelines | Report | Rijksoverheid.nl

Open science

A more open research practice geared to collaboration has greater impact on society and science. To generate this impact, science must be as open as possible: findable, accessible and reusable for other researchers, businesses or societal organisations. Open science is more than free access to scientific publications and data. It is a movement to make international research output (including publications, data, software, methods, prototypes and manuals) openly available at the earliest possible moment and to encourage its reuse through collaboration. Open science can also contribute to scientific integrity and interoperability, thus strengthening trust in science. This transparency and openness are essential for collaboration between scientific and societal partners. At the same time, it is important to be aware of the risks of expanding digitisation and the role of commercial parties in that development. In the last few decades, scientific institutions have become increasingly dependent on corporate suppliers (particularly Big Tech companies) for various data services which have actually been developed with publicly funded research. The Netherlands and Europe need to coordinate their ambitions if they are to preserve, or where necessary regain, their 'digital sovereignty'.

The National Programme Open Science (NPOS) is coordinating the efforts of the stakeholders in the Dutch knowledge sector to make the transition to open science. The programme has set the following goals for 2030:

- knowledge institutions, governments, industry and citizens work closely together to further strengthen the international position of Dutch science and to ensure that optimal use is made of the knowledge created for the benefit of society;
- processes of scientific (co-)creation, evaluation, quality assurance and communication are inclusive, efficient, transparent and ethical;
- obstacles to access to all scientific output have been removed in the Netherlands, so that any interested party can reuse it and benefit from it; and
- input for and output from research – such as data and software – are findable, accessible, interoperable and reusable (FAIR) and are openly accessible to the extent permitted by law.

OPEN ACCESS
FAIR DATA
OPEN SOFTWARE
CITIZEN SCIENCE

AMBITION 8

NWO ENCOURAGES THE TRANSITION TOWARDS OPEN SCIENCE (OPEN ACCESS, FAIR DATA, OPEN SOFTWARE AND CITIZEN SCIENCE). NWO WILL CONTINUE TO TAKE THE LEAD BY USING INSTRUMENTS THAT CONTRIBUTE TO THIS AMBITION, SUCH AS (GRANT) CONDITIONS, (FINANCIAL) SUPPORT OF OPEN SCIENCE, RECOGNISING AND REWARDING RESEARCHERS WHO PUT OPEN SCIENCE INTO PRACTICE, AND ENCOURAGING DEVELOPMENTS IN THE FIELD.

LOFAR: RADIO GALAXY ZOO

The Low Frequency Array (LOFAR) telescope is the world's largest and most powerful low-frequency radio telescope. LOFAR is operated by the Netherlands Institute for Radio Astronomy (ASTRON) as part of an an international partnership. In a major observation programme, to date researchers have discovered approximately 4 million new sources of radio waves in the universe. A few hundred thousand of them have such a complex structure that it is difficult to determine which galaxy is emitting the radio signals. In other words, what phenomena, such as outbursts from black holes, cause radio waves in which galaxies. In the citizen science project Radio Galaxy Zoo: LOFAR, a large number of volunteers are helping to crack this huge and difficult problem by classifying observed sources in order to discover where and in what type of galaxy they are to be found. From behind their own computers at home, the volunteers link the radio sources to the correct galaxies on the Radio Galaxy Zoo website. By the beginning of 2022, more than 10,000 volunteers had been able to classify almost half of all the data.

Recognition & Rewards

NWO is a firm supporter of the new system of recognition and rewards in science.[4] We had earlier signed the San Francisco Declaration on Research Assessment (DORA), an international statement on the need to improve the ways in which researchers and the results of research are evaluated. The starting point of the declaration was that researchers and research proposals should be assessed on their merits and not merely on the basis of – sometimes bias-sensitive – quantitative indicators. Quality is always the decisive factor for NWO when awarding research grants, also in the new system of recognition and rewards. Other aspects of a healthy and appealing research culture that NWO wishes to cultivate are collaboration, communication, leadership and mentoring. One of the ways in which we will promote that culture is by revising the format of CVs to give researchers greater scope to provide – evidence-based – arguments of what makes them the best candidate.

AMBITION 9

IN THE COMING PERIOD, NWO WILL CONTINUE TO ACTIVELY PROMOTE A BROADER WAY OF RECOGNISING AND REWARDING SCIENTIFIC TALENT IN ITS ASSESSMENT SYSTEM:
- THE NARRATIVE CV WILL BE FURTHER DEVELOPED INTO AN EVIDENCE-BASED CV;
- NWO WILL PROVIDE APPLICANTS, COMMITTEE MEMBERS AND REFEREES WITH INFORMATION AND SUPPORT ABOUT THE NEW RECOGNITION AND REWARDS SYSTEM AND WHAT THE IMPLICATIONS ARE FOR RESEARCH ASSESSMENT;
- NWO WILL REMAIN COMMITTED TO AVOIDING BIAS IN RESEARCH ASSESSMENT AND PROMOTING THE RESPONSIBLE USE OF METRICS.

AMBITION 10

THE NWO INSTITUTES WILL JOINTLY ALIGN THEIR HIRING AND PROMOTION POLICIES WITH THE PRINCIPLES OF THE NATIONAL RECOGNITION AND REWARDS PROGRAMME.

[4] Recognition & Rewards | Room for everyone's talent (recognitionrewards.nl)

Diversity and inclusion

Diversity and inclusivity enhance the quality of research. An inclusive and diverse research culture engenders inspiration, creativity and innovation. Research conducted through the joint efforts of people with different expertise and varying backgrounds and perspectives can also produce better results. As a funder of research and as an employer, NWO is dedicated to fostering a diverse and inclusive research culture in the widest sense. To promote equality of opportunity among applicants, it is not only important that proposals are assessed transparently and objectively, but also that barriers that nurture inequality are removed. There is still inequality in science. There are still fewer members of some social groups engaged in research. For example, there are fewer women in the exact sciences and technical sciences, while Dutch researchers with a migration background are under-represented in science as a whole.

Diversity in content enhances the quality and impact of research. Research that reflects the diversity of society is more representative and more recognisable. What issues should be given priority in research and innovation, and why? Which perspectives should be considered? What is the impact of research and innovation for society as a whole? These are questions we must keep asking ourselves.

INCLUSIVE ASSESSMENT

AMBITION 11

NWO AIMS TO BE A FRONTRUNNER IN EUROPE IN THE INCLUSIVE ASSESSMENT OF GRANT APPLICATIONS. IN DOING SO, WE WILL TAKE INTO ACCOUNT INCLUSIVENESS IN RESEARCH CONSORTIA AND IN THE DESIGN OF RESEARCH PROJECTS.

AMBITION 12

NWO WILL ENCOURAGE GROUPS OF RESEARCHERS WHO ARE UNDER-REPRESENTED AND CREATE MORE ROOM FOR THESE GROUPS IN OUR FUNDING INSTRUMENTS.

Scientific integrity

Integrity is a core value of science. Preventing, promptly identifying and responding adequately to breaches of integrity are important for the quality of research, but also for preserving trust in science. NWO's policy is closely aligned with the policies of Universities of the Netherlands and the KNAW. The Netherlands Code of Conduct for Research Integrity (2018) guides our policy on integrity. Everyone applying for funding from NWO is required to declare that they are familiar with the code and will comply with it. We have drawn up a scientific integrity complaints procedure and established a reporting centre for handling complaints about researchers who receive NWO funding. Since 2020, we also have a Code for Dealing with Personal Interests,[5] which prescribes how decisions regarding personal interests during the process of awarding grants must be explained and recorded.

NWO is conscious that because we manage and allocate a substantial amount of public money, our employees and others who act in our name must possess a strong sense of responsibility and ethical awareness. Our stakeholders must be able to trust us to act responsibly.

INTEGRITY
IS A CORE VALUE
OF SCIENCE

AMBITION 13

NWO WILL MAKE AN EFFORT, WITHIN ITS OWN SPHERE OF INFLUENCE, TO PREVENT, DETECT AND ADEQUATELY RESPOND TO BREACHES OF INTEGRITY IN THE BROADEST SENSE.

[5] NWO | Code for Dealing with Personal Interests

Sustainability

Sustainability is a major priority for NWO, not only in relation to the programmes we support and the social sustainability of the goals we pursue, but also in our own operations. In our role as funder, we will develop initiatives to reduce the ecological footprint of research and researchers.

REDUCING RESEARCH'S ECOLOGICAL FOOTPRINT

AMBITION 14

NWO HAS DEVELOPED A ROBUST SUSTAINABILITY AMBITION, AIMED AT EMBEDDING SUSTAINABILITY IN OUR OPERATIONAL MANAGEMENT AND FUNDING INSTRUMENTS. INSPIRED BY THE INTERNATIONAL UN PARIS AGREEMENT AND THE DUTCH CLIMATE AGREEMENT, WE HAVE SET OURSELVES THE GOAL OF BECOMING CLIMATE-NEUTRAL AS AN ORGANISATION (OFFICE ORGANISATION, INSTITUTES AND FUNDING POLICY) BY 2030.

2.

A robust research system

STABILITY AND TRUST

A robust research system creates stability and trust and is simultaneously flexible enough to respond to new developments. A robust system makes effective and efficient use of resources. The responsibilities of the various funders are clear and complementary: the first flow of funds provides the structural resources for meeting the basic requirements of the Dutch research system; NWO grants (second flow of funds) give the system flexibility – through cross-institutional competition they provide incentives for the entire Dutch research system.[6] In addition, via our institutes we provide basic financing for cross-institutional infrastructure or programmes in the national interest.

[6] (Contract) research paid for by governments, the European Union, companies and non-profit organisations (third flow of funds) and research financed by fundraising (fourth flow of funds) are other important components of the Dutch system of research funding but are disregarded here.

NWO's ambitions for a robust system

The Ministers of Education, Culture and Science and of Economic Affairs and Climate Policy jointly formulate science and innovation policy. NWO plays a key role in implementing that policy. A robust research system is not just a fundamental requirement for enabling NWO to accomplish its mission, we are also jointly responsible for maintaining the stability and balance in the system. Within that framework and subject to our statutory remit, we set our own priorities and decide how we will implement the government's policy. It is important that in the process a balance is maintained between the basic funding for knowledge institutions and the research infrastructure on the one hand, and project funding on the other.

A robust research system leaves room for every type of research (fundamental, thematic and practice-oriented) by every discipline. Essentially, the system is open to any research question. In a robust system, there is a balance between the resources available for curiosity-driven research and for thematic research. Furthermore, the availability of funding is also predictable for a lengthy period (at least seven to ten years).

Knowledge Coalition
NWO chairs the Knowledge Coalition, a consortium of knowledge institutions and employers' organisations in the field of research and innovation in the Netherlands. Together with the partners in the coalition, we are lobbying for an increase in the structural funding of the Dutch knowledge and innovation system. Our target is investment of 3% of GDP in science and innovation, to be spent across the entire spectrum of the knowledge chain.

Balance between curiosity-driven and thematic research

The resources available to universities for curiosity-driven research are steadily declining, due in part to rising student numbers and matching pressure. On the other hand, funding for thematic, or 'demand-driven' research, in other words where the subject matter is determined not by the researcher but by others (the society), has risen in the Netherlands in recent years. The public expects – correctly – that this research will benefit society and provide solutions for societal problems in the shorter term.

However, that research has to be 'nourished' by bottom-up research where the subject matter or research method is determined exclusively by the researcher. Naturally, fundamental research can be concerned with a problem confronting society, but the research is not dictated by third parties.

NWO's budgets for funding thematic research are covered by its funding lines[7] *Collaboration with knowledge users and society (funding line 3)* and *Practice-oriented research (funding line 4)*. NWO's grants for curiosity-driven research are allocated under the Open Competition and Talent Programme instruments. The annual budget for the Open Competition has recently risen from 100 to 125 million euros for all science domains. In the same period, the government has earmarked substantial additional funds for thematic research (covered by the National Research Agenda) and for projects contributing to the country's sustainable earning capacity (covered by the National Growth Fund).

NWO's objective is to achieve a balance of 1:1 between the budgets for curiosity-driven'research and for demand-driven, thematic research. In our view, that is the ideal ratio in a robust research system.

[7] Based on the current financial framework; budgets for scientific infrastructure benefit both thematic and curiosity-driven research.

Success rates in calls for Open Competition and Talent programmes

NWO is strengthening curiosity-driven research in response to the enormous demand for funding of this type of research from knowledge institutions. One effect of that demand is the high level of application pressure and the small chance of making a successful application in calls for the Open Competition and Talent programmes. We are often unable to fund research proposals that are classified as 'high quality' by international referees.

On its own, increasing the budgets for curiosity-driven research is unlikely to significantly increase the success rate of applications. In their *Integral plan to reduce pressure on the science system*, Universities of the Netherlands and NWO presented a series of measures that should be taken to reduce the pressure on the system. In association with Universities of the Netherlands and the knowledge institutions, we are continuing to make agreements and adopt measures that might somewhat reduce the large number of applications to NWO. Some of the measures we can implement ourselves, some will be taken by the universities.

Steps that NWO can take itself include providing better information, creating the possibility of continuous submission of applications to funding instruments and investigating the option of spreading and introducing quotas for calls for proposals. Meanwhile, we will also explore what effects new measures arising from the Coalition Agreement could have on the matching pressure, for example. In the forthcoming strategy period, we will endeavour to reduce the work pressure in the field by simplifying the application process.

AMBITION 15

NWO WILL MAKE ADDITIONAL RESOURCES AVAILABLE FOR CURIOSITY-DRIVEN RESEARCH. IT WILL ACHIEVE THIS BY ALLOCATING FUNDS FROM THE COALITION AGREEMENT TO THE OPEN COMPETITION, FOR EXAMPLE.

AMBITION 16

NWO IS AIMING FOR A SUCCESS RATE OF AT LEAST 25% IN THE OPEN COMPETITION AND THE TALENT PROGRAMME.

AMBITION 17

NWO WILL REVIEW ITS AWARD POLICY AND FURTHER ALIGN IT WITH THE AMBITIONS FOR A HEALTHY RESEARCH CULTURE. ANY BUDGET FREED UP WILL BE USED TO FUND THE TALENT PROGRAMME.

A clear, goal-oriented and effective set of funding instruments

NWO employs a wide variety of funding instruments, many of them small. These instruments often have their own sub-goals, conditions, criteria and duration and it is not always clear how these aspects are related in each instrument. It is often difficult for applicants to identify which of NWO's instruments would be the most suitable. In the coming period, we will therefore strive to constantly improve the clarity, goal-orientation and effectiveness of our funding instruments.

AMBITION 18

NWO WILL EXAMINE WHERE THE POLICY GOALS OF SMALLER, LONG-TERM FUNDING INSTRUMENTS, ONCE INTENDED AS A TEMPORARY INCENTIVE, HAVE BEEN SUFFICIENTLY DEVELOPED OR IMPLEMENTED TO ALLOW THEIR INTEGRATION INTO LARGER, MORE STRUCTURAL FUNDING INSTRUMENTS. NWO'S AIM IS THUS TO REDUCE THE NUMBER OF (SMALL) FUNDING INSTRUMENTS BY AT LEAST 25 PERCENT WITHIN THE NEXT STRATEGY PERIOD.

AMBITION 19

NWO WILL MAKE THE RANGE OF AVAILABLE FUNDING OPPORTUNITIES TRANSPARENT FOR APPLICANTS. NWO WILL USE THE FIVE FUNDING LINES AS A STARTING POINT: OPEN COMPETITION, TALENT, COLLABORATION WITH KNOWLEDGE PARTNERS AND SOCIETY, APPLIED RESEARCH, AND INFRASTRUCTURE. NWO'S AIM IS THUS TO INCREASE THE COHERENCE BETWEEN THE VARIOUS FUNDING INSTRUMENTS.

AMBITION 20

NWO WILL ALSO INCREASE THE EFFICIENCY OF FUNDING INSTRUMENTS BY ACCELERATING AND SIMPLIFYING PROCESSES. WE WILL SIMPLIFY THE APPLICATION PROCESS BY REDUCING, INNOVATING OR FURTHER AUTOMATING VARIOUS STEPS IN THE PROCEDURE. IN DOING SO, WE WILL DO OUR UTMOST TO MAINTAIN QUALITY AND ACCURACY. WE WANT TO SHORTEN THE TURNAROUND TIME OF PROCEDURES BY ABOUT 20 PERCENT AND REDUCE THE WORKLOAD FOR RESEARCHERS, REFEREES AND COMMITTEE MEMBERS BY ABOUT 25 PERCENT.

AMBITION 21

NWO WILL INCREASE THE EFFECTIVENESS OF FUNDING INSTRUMENTS BY DEVELOPING CONDITIONS AND CRITERIA THAT FOCUS EXCLUSIVELY ON THE PRIMARY OBJECTIVE OF THE FUNDING INSTRUMENT. PRECONDITIONS AND REQUIREMENTS REGARDING THE FORM ALWAYS FOLLOW FROM THE OBJECTIVE. SCIENTIFIC QUALITY REMAINS THE MOST IMPORTANT CRITERION FOR ALL RESEARCH.

Modernisation and continuity of research infrastructures

Large-scale scientific infrastructures are very important for modernising research and achieving breakthroughs in every scientific domain. They contribute to innovation and to solving major scientific and societal issues.

Together with the knowledge institutions and the government, NWO finances large, widely accessible research infrastructures and facilities for both fundamental and applied research. These facilities can be highly specialised instruments such as large telescopes, high field magnets or advanced sensors and monitoring networks, but equally 'virtual' facilities such as massive databases, computer networks or data and sample collections. NWO promotes the establishment or improvement of large research facilities and infrastructure with which the Netherlands can confirm and maintain its prominent international position. Additional investment can be made in new research consortia and new research infrastructures, through subsidies from the National Growth Fund for example. The Einstein Telescope is a good example of this (see next page).

NWO is certainly conscious of the need for the long-term conservation of infrastructure, but does not make permanent long-term funding commitments. Researchers from around the Netherlands (and beyond) must be able to rely on the continuity and accessibility of research infrastructures which are flexible enough to adapt to changing scientific and societal needs. It is therefore also important to modernise research infrastructures. Our institutes play an important role in the sustainable management of large international research facilities and access to them.

International cooperation is important for financing and managing large and advanced research facilities and providing access to them for researchers. The Netherlands is a member of organisations[8] that play a role in developing and managing large-scale scientific infrastructure. Institutes and universities often host or serve as a gateway to large research infrastructures, both national and international. An important mission of NWO is to explore, together with the knowledge institutions, the chances and possibilities of reaching agreement with foreign research funders on the joint construction or shared use of facilities, and investigating what memberships are needed for that purpose. This could also require the phasing out of existing participations.

The vastly greater level of digitisation also calls for better support of researchers in every branch of science in the form of further expansion of the digital research and data infrastructure. NWO's investment in this area follows the lines set out in its Implementation Plan Investments Digital Research Infrastructure.[9] It also promotes collaboration on specific research themes through Digital Competence Centres.

AMBITION 22

NWO WILL MAKE ADDITIONAL INVESTMENTS IN (LARGE) RESEARCH INFRASTRUCTURES. WE WILL DO THIS BY DEPLOYING ADDITIONAL RESOURCES FROM THE COALITION AGREEMENT.

AMBITION 23

NWO WILL CONTINUE TO INVEST IN INTERNATIONAL MEMBERSHIPS, WHICH PLAY A KEY ROLE IN ENSURING ACCESS TO INTERNATIONAL RESEARCH FACILITIES FOR DUTCH RESEARCHERS.

[8] Usually international (treaty) organisations and European Research Infrastructure Consortia (ERICs)
[9] NWO | Implementation Plan Investment Digital Research Infrastructures

EINSTEIN TELESCOPE

The Einstein Telescope will be an underground gravitational wave detector. Powerful laser beams bounce between ice-cold, vibration-free mirrors at the ends of vacuum tunnels that stretch for kilometres. This is curiosity-driven research in its purest form. Gravitational waves contain information about the most extreme phenomena in the universe, from the nature of black holes and neutron stars to the first moments after the Big Bang. Gravitational waves allow us to study the universe as never before. The European Einstein Telescope can detect up to a thousand times more sources of gravitational waves than any of its predecessors. One possible site for the telescope is the border region of the Netherlands, Belgium and Germany (Meuse-Rhine Euroregion), because of its tranquillity, the stability of the ground and the strong local ecosystem of knowledge institutions and high-tech companies. The potential of the Einstein Telescope represents a great opportunity to strengthen the Netherlands' position in the field of international science and to boost the country's earning capacity in the medium and long term.

The Dutch government supports the ambition of bringing the Einstein Telescope to the Netherlands. In anticipation of an actual bid, it announced an investment of 42 million euros from the National Growth Fund. A sum of 870 million euros has also been earmarked for the Dutch contribution to the costs of constructing the observatory.

Our NIKHEF consortium coordinates the research into gravitational waves in the Netherlands and is playing a major role in the preparations for the Einstein Telescope. NWO wholeheartedly supports these ambitions.

Practice-oriented research at universities of applied sciences

Practice-oriented research is an integral and indispensable component of the knowledge and innovation system. Universities of applied sciences conduct this type of research in collaboration with the professional practice. The research explores specific issues raised by the practice and by society, and the knowledge resulting from the research flows directly back into the practice. Practice-oriented research has its own particular function and structure and therefore requires its own specific approach and method of assessment. The Ministry of Education, Culture and Science anchors practice-oriented in the government subsidy for the universities of applied sciences. It also provides an essential second stream of funding, which is disbursed primarily through our Taskforce for Applied Research SIA. NWO thus has a specific funding line for practice-oriented research and our ambition is to embed this type of research and the Taskforce for Applied Research SIA more deeply into the NWO organisation in the coming years, with the goal of improving and integrating practice-oriented research within NWO and so providing coherent support for the research carried out at the universities of applied sciences.

AMBITION 24

NWO WANTS TO EMBED APPLIED RESEARCH AT UNIVERSITIES OF APPLIED SCIENCES IN ITS STATUTORY REMIT. IN DOING SO, WE WILL BROADEN OUR TASK TO INCLUDE RESEARCH CARRIED OUT BY UNIVERSITIES OF APPLIED SCIENCES, INCLUDING PROMOTING IMPACT AND ENCOURAGING COLLABORATION BETWEEN AND WITHIN UNIVERSITIES OF APPLIED SCIENCES AND WITH OTHER KNOWLEDGE INSTITUTIONS.

3.

Coherent research agendas

Major societal and scientific challenges are making growing demands on science. The Netherlands plays a prominent role in many important fields of science and research themes. To maintain this position and to continue making a coherent and targeted contribution to meeting these challenges, it is essential to strengthen and create synergy in the research of the relevant knowledge institutions, societal partners, research programmes and knowledge agendas.

NWO's ambitions for coherent research agendas

NWO funds and conducts research linked to relevant research agendas, including 'routes' of the Dutch Research Agenda, Knowledge and Innovation agendas, the missions of institutes, sector plans, research programmes, investment plans for infrastructure and ecosystems and the government's policy and knowledge agendas, as well as international agendas such as Horizon Europe and the Sustainable Development Goals. These agendas, each with its own objective, often overlap in terms of content and a shared or overarching focus and perspective. However, the programmatic approach and funding of these themes often lack coherence. It is both necessary and desirable for funds for research to be deployed in a targeted and coherent manner.

NWO actively pursues that goal by coordinating between relevant departments and – in close consultation with the government, the knowledge sector and stakeholders in society – between the various funding instruments and the portfolio of institutes. This includes conducting a dialogue on the optimal governance of the various national research institutes.

Connecting research agendas and strategic programmes

To help create added value and effective use of research agendas, we will strive for connection and coherence at three successive levels:

1. Identifying synergy between research agendas

NWO will support coordination of research agendas by identifying overlapping content and overarching themes they have in common. It will do so by linking researchers with relevant parties on those themes and by coordinating the process.

2. Identifying and developing cross-agenda themes

In consultation with societal and scientific partners, NWO will identify strategic themes that need to be addressed urgently and which can be tackled more effectively with coherent deployment of research resources than with separate research agendas. At the same time, NWO will stimulate the development of these research agendas. To identify these strategic themes, NWO may use field consultations like those periodically organised by the Permanent Committee on National Institutes. NWO will play an active role in exploring and analysing the research landscape, holding consultations and monitoring and evaluation.

3. Strategic programming

We will generate scientific and societal impact effectively by identifying strategic cross-agenda research themes and organising more targeted and coherent deployment of various funding instruments on the basis of those themes. In doing so, we will also take into account the international position of a research domain, its relevance and impact for the Netherlands, and its significance for relevant stakeholders in society.

AMBITION 25

NWO WILL IDENTIFY RELEVANT STRATEGIC THEMES AND STRIVE FOR A COHERENT PROGRAMMING, PLANNING AND USE OF RESEARCH RESOURCES. FOR A NUMBER OF THESE THEMES, NWO WILL DEVELOP A TARGETED APPROACH THAT DEPLOYS STRATEGIC FUNDING INSTRUMENTS AND SEEKS TO ESTABLISH LINKS WITH RELEVANT KNOWLEDGE INSTITUTIONS.

ZERO-EMISSION INLAND SHIPPING

The transport and logistics sector faces serious challenges in the coming decades. The stated ambition of the ‘Green Deal on Sea Transport, Inland Shipping and Harbours’ is to make the transition to a zero-emission sector. Making sea transport and inland shipping a zero-emission and circular sector calls for research into optimising battery and fuel-cell technology, for example. But another important question is how to shape the transition. The research required will draw on expertise in various disciplines, including transition management, behavioural science, business administration, public administration, environmental sciences, law and technical sciences.

NWO is exploring the various aspects of this issue with research programmes under the Dutch Research Agenda and the Knowledge and Innovation Covenant. With the programmes ‘Zero-emission inland shipping’ from the Dutch Research Agenda and ‘Zero emission and circular inland shipping’ from the Knowledge and Innovation Covenant, we will contribute to achieving an important ambition for the Netherlands.

Strengthening self-organisation in the research field

The impact and relevance of research can also be magnified by researchers and research organisations identifying strategic research themes themselves. This means they determine their own focus, profile and form of coordination. Self-organisation, for example in graduate schools, platforms or research councils or around a large scientific infrastructure, will promote that development, which NWO encourages and supports. Sector plans play a major role in that respect.

AMBITION 26

NWO WILL SUPPORT THE DEVELOPMENT, IMPLEMENTATION AND EVALUATION OF SECTOR PLANS WITHIN THE DUTCH RESEARCH LANDSCAPE AND, WHERE POSSIBLE, LINK THEM TO STRATEGIC RESEARCH THEMES.

AMBITION 27

NWO WILL ENCOURAGE FURTHER SELF-ORGANISATION OF THE FIELD, FOR EXAMPLE BY LEAVING CHOICES FOR SCIENTIFIC INFRASTRUCTURE AND ASSOCIATED INTERNATIONAL MEMBERSHIPS TO THE FIELD AS MUCH AS POSSIBLE, BEFORE ACTUAL APPLICATIONS ARE SUBMITTED TO NWO.

Coordinating and connecting role of our institutes

National research institutes are important centres for long-term cross-institutional scientific research and innovation. They help to perpetuate the leading position the Netherlands occupies in the field of research. Our institutes safeguard continuity in the availability and accessibility of national and international infrastructures (such as CERN and SKA). They also initiate and coordinate research programmes of national importance with relevant partners. Our institutes coordinate the Netherlands' strategic input to those partnerships, are at the forefront of the development and construction of ground-breaking software and equipment and support Dutch researchers in operating them.

Our research institutes perform a connecting role in the collaboration within their discipline. They are therefore continuously seeking to strengthen the national links in their research field, by initiating programmes, by entering into structural partnerships with various knowledge institutions, by establishing joint chairs with universities and by participating in universities' study programmes.

We are going to further intensify the policy of making the national research institutes hubs for researchers from different knowledge institutions in the Netherlands. Naturally, the institutes also adapt their portfolios to new challenges and developments in science and society, thus producing new initiatives and enabling research that has received a temporary incentive grant, from the National Growth Fund for example, to progress to more permanent funding. New strategic themes might also lend themselves to research within a single national institute. In 2022, for example, NWO declared 'climate' an overarching research theme.

AMBITION 28

IN THE COMING YEARS, NWO WILL CONTRIBUTE TO THE FORMATION OF A NEW CLIMATE INSTITUTE THAT WILL INCLUDE ALL RELEVANT PARTIES IN THE NETHERLANDS AND REINFORCE TIES WITH INTERNATIONAL PARTNERS.

CLIMATE INITIATIVE

Climate change is one of the greatest challenges facing society. The realisation is growing that climate change is an all-embracing process that is creating enormous uncertainty and risks in numerous respects. Science has a key role to play in formulating integral strategies and scenarios for combatting climate change in the longer term. In the spring of 2022, NWO and KNAW therefore took the initiative to form a taskforce to explore how Dutch climate researchers in every discipline could join forces in implementing a joint national agenda for integrated climate research and how existing knowledge and expertise could be streamlined. The taskforce has written an advisory report with a three-track approach:

1) identifying how to unite the wide range of stakeholders in society in a climate pact;
2) identifying how to form a new consortium of the principal research institutions in the Netherlands to establish a national research centre with the task of accelerating, connecting and strengthening climate research;
3) identifying the most important themes on which a national programme for integrated climate research should focus. In addition to strengthening and expanding existing research, the programme should mainly target 'next-level' integration, a process linking different disciplines, scientific approaches and perspectives, as well as theory and practice.

Research on these three tracks will come together in a single virtual centre, with other stakeholders being involved in formulating and answering questions through the climate pact. This approach will advance and accelerate the crucial transitions society needs to make to meet the challenges of global climate change.

4.

Unimpeded collaboration

To create scientific and societal impact, it is essential to share knowledge, methods and different perspectives on problems to address problems and challenges in a collaborative and coherent fashion. Collaboration is inherent to science, within and across borders and within and across the boundaries of knowledge institutions and disciplines. Collaboration creates possibilities for finding new ideas and solutions through co-creation, provides access to new knowledge and contributes to its utilisation in society.

Important factors for successful collaboration are equality and diversity: partners must be confident that their contribution will be properly valued and that they will be given sufficient opportunity to help in achieving objectives. One way of ensuring this is by involving all of the partners in an interdisciplinary collaboration from the outset. NWO will encourage that process.

Addressing global challenges calls for collaboration between disciplines, but also between actors at regional, national and international level. International collaboration is often a bottom-up and organic process; that is also what makes science a global system. At the same time, international research programmes require coordination in terms of choosing thematic priorities and participating countries.

NWO's ambitions for unimpeded collaboration

NWO will endeavour to make collaboration easier, and thus remove impediments, through our funding instruments and our institutes. NWO will encourage, facilitate and promote national and international networks of researchers and collaboration across the boundaries of institutions and disciplines and with societal partners and the business community.

Coordinating and connecting role of our institutes

NWO has a good overview of the field of science and a clear picture of the various questions, needs and challenges facing our partners. Knowledge networks are a good place to formulate answers for them and to overcome differences. Besides being incubators for new partnerships, they provide an excellent platform for knowledge sharing, in science and in other domains. NWO will therefore encourage such networks and further expand its role as a connector.

Practice-oriented research also creates opportunities to promote collaboration. Practice-oriented research is by design close to the end users, since this type of research is always carried out with partners in the knowledge and innovation chain, including SMEs and public bodies in the regions. This collaboration with the practice gives the Taskforce for Applied Research SIA and the Netherlands Initiative for Education Research (NRO) a direct link to education, where there is a huge demand for practice-oriented research.

AMBITION 29

NWO WILL PLAY A GREATER ROLE IN ENCOURAGING NATIONAL AND INTERNATIONAL KNOWLEDGE NETWORKS AND PROMOTING ALL FORMS OF DISCIPLINARY (MONO-, INTER- AND TRANS-DISCIPLINARY) COLLABORATION, AS WELL AS COLLABORATION SPANNING THE KNOWLEDGE CHAIN, AND KNOWLEDGE BUILDING.

L.INT LECTORATE LINKS CURIOSITY-DRIVEN AND APPLIED RESEARCH

At the beginning of 2022, HAS University of Applied Sciences and the Netherlands Institute for Ecology (NIOO-KNAW) launched a new research group entitled 'Climate-robust landscapes: connecting agriculture and nature'. It is a fine example of a university of applied sciences and a knowledge institute joining forces to accelerate a transition, in this case to a climate-robust landscape. The research focuses on how non-intensive forms of agriculture can help to improve water quality and biodiversity through smart use of the landscape.

The stream valley landscapes of Brabant provide a unique backdrop for experiment. The research group is focusing in these areas on connecting nature and landscape, while also emphasising quality of life, active involvement of citizens and businesses, and strengthening the economy. HAS University of Applied Sciences has already launched a number of individual research projects, but the connection between HAS and NIOO-KNAW has made it possible to bring more structure to those projects and raise the results to a higher level. Businesses, nature organisations, governmental bodies and students are closely involved in the partnership.

This special research group is funded by the Lecturer Positions at Institutes (L.INT) scheme run by the Taskforce for Applied Research SIA. The scheme enables researchers to link the practice-oriented research of universities of applied sciences with research institutes. This structural collaboration strengthens the knowledge and innovation system by combining science, policy and practice.

NETHERLANDS INITIATIVE FOR EDUCATION RESEARCH

The Netherlands Initiative for Education Research (NRO) coordinates and funds education research in the Netherlands. NRO contributes to innovation and improvements in education by coordinating and funding education research and by facilitating the links between educational policy, practice and research. Its work extends to every sector of education (primary education, secondary education, secondary vocational education and higher education), as well as pre-school and early school education and lifelong learning.

NRO pursues its mission by promoting intensive collaboration with scientists, policy makers and professionals in the field of education in its three main activities:

- By making existing knowledge from research on the most important national educational issues findable, accessible and usable, NRO enables professionals in education policy and practice to use that knowledge to improve the quality of education. In that context, NRO focuses on the following aspects: further expansion of the knowledge hub for education (www.onderwijskennis.nl); continuation of the Knowledge Roundabout, where educational professionals can find answers to their questions with the knowledge generated by earlier research (www.kennisrotonde.nl); free access to academic literature for educational professionals (www.voordeleraar.nl); the development of practical guidelines for education (www.onderwijskennis.nl/leidraden); and the organisation of national meetings and networks for discussion of important issues in education.

- NRO commissions high-quality and useful research on the most important issues relating to education. The results of this research, encompassing fundamental, policy-oriented and practice-oriented research, alone or in combination, improve the quality of education. NRO regularly updates the national knowledge agenda for education, which defines the most important issues and knowledge gaps facing education.

- In the process, NRO is building a robust national data infrastructure for education, which provides educational institutions with customised data about their own school. The data provide relevant findings regarding important national trends in student results and make it easier to conduct scientific research into education. The Netherlands Cohort Study on Education (Dutch abbreviation: NCO) currently contains data for primary and secondary education. The NCO will gradually be expanded with data from other educational sectors.

NRO will continue and further expand these three main activities in the coming years. NWO supports NRO's ambition to evolve into an independent national centre of expertise for education in the coming years.

Stimulating conditions and simplified requirements

NWO will encourage collaboration by making its funding instruments as straightforward as possible, by removing administrative obstacles and by concentrating coordination at the programme level in order to avoid over-management at project level. By adopting clear objectives for our instruments, applicants will be able to determine the extent and the forms of collaboration for themselves. That should lead to fewer preconditions for the form of collaboration and a greater focus on the substance.

NWO will promote equality between partners and take account of the actual position of specific parties in a partnership (for example, young researchers and SMEs). We will ensure that those actors can participate on an equal footing in a collaborative project.

AMBITION 30

NWO WILL FINANCIALLY SUPPORT SOCIETAL PARTNERS WHO MAKE A SIGNIFICANT CONTRIBUTION TO THE GOAL OF AN NWO COLLABORATIVE PROGRAMME, FOR EXAMPLE IN THE FIELD OF CITIZEN SCIENCE.

AMBITION 31

NWO WILL FUND PARTS OF THE KNOWLEDGE CHAIN. WE WILL INVEST IN RELATIONSHIPS WITH CHAIN PARTNERS SUCH AS THE NATIONAL ENTERPRISE AGENCY, COMPANIES, KNOWLEDGE INSTITUTIONS (TECHNOLOGY TRANSFER OFFICES AND KNOWLEDGE TRANSFER OFFICES) AND GOVERNMENTAL BODIES. WE WILL THEREFORE ENSURE THAT NWO'S ACTIVITIES ARE CLOSELY ALIGNED WITH THE WORK OF KNOWLEDGE PARTNERS.

Collaboration for impact

Collaboration is also essential for the utilisation of knowledge and insights. Research has an impact through the efforts of researchers across the spectrum of the knowledge and innovation system. But impact is also created by interaction with society, the business community, governmental bodies, citizens, knowledge users, etc. The meaning of the term scientific impact is expanding and it now refers not only to the use of knowledge but also to aspects such as demand articulation, connecting parties and innovation in research. NWO's instruments relating specifically to impact and valorisation are the Faculty of Impact, which is targeted at scientists who would like to start their own business, and the Take-off programme, which promotes entrepreneurship within knowledge institutions.

NWO intends to transform the 'knowledge utilisation policy' into an 'impact-oriented policy'. By changing the orientation of the policy to impact, scientific and societal impact will carry equal weight. In other words, under the new policy applicants will no longer be required to indicate *in advance* how knowledge could be used *later,* but will instead be expected to create opportunities for impact, both scientific and societal. These opportunities will be enumerated as clearly as possible in advance.

AMBITION 32

THE KNOWLEDGE UTILISATION POLICY WILL BE FURTHER DEVELOPED AND BROADENED TO INCLUDE SCIENTIFIC AND SOCIETAL IMPACT. IMPACT WILL THUS BECOME A KEY ELEMENT OF AN APPLICATION.

Effective use of time and effort in forming consortia

We realise that we need to make better use of researchers' time. We can do so, for example, by simplifying NWO's application procedures and lightening the administrative burden. We must also support and optimise the efficiency of the process of forming consortia and partnerships. Establishing a successful partnership sometimes makes extra demands on researchers and social partners.

NWO will also simplify procedures and provide room for experimentation when it comes to the ambitions for the scale of collaboration. For example, allowing complex consortia to be formed in stages and leaving room for smaller consortia could help to reduce the demands made on the time of the researchers concerned.

Successful partnerships could be scaled up and might consequently require financial continuity for a longer period. However, NWO's funding will always come to an end at some point, since knowledge institutions are the enduring organisations in the system and therefore also the launching pad for successors of these programmes. NWO will investigate how we can ensure that successful partnerships can also be successfully embedded in the knowledge institution.

AMBITION 33

NWO WILL INVEST IN A TAILOR-MADE WAY OF FORMING CONSORTIA AND PARTNERSHIPS.

AMBITION 34

NWO WILL INVESTIGATE HOW TO OFFER SUCCESSFUL PARTNERSHIPS (MORE) FINANCIAL CONTINUITY TO BROADEN AND EXTEND THEIR COLLABORATIVE EFFORTS.

Strengthening the global perspective and possibilities for international collaboration

Science cannot exist without international collaboration. Many of the research themes in national programmes like the Dutch Research Agenda and the Knowledge and Innovation Covenant are transnational in nature. They call for cross-border collaboration, consultation and cooperation with international research groups and societal partners worldwide. Numerous global challenges also require collaboration between disciplines and between actors, at both national and international level. The Sustainable Development Goals provide an inspiring framework for research, but even among them choices inevitably have to be made. By promoting bottom-up international consortia, NWO can leave those choices to researchers.

At the same time, the geopolitical landscape is shifting. Economics, politics and security are interrelated in that respect. Knowledge and innovation are increasingly regarded as strategic weapons and used as such. These developments affect everyone in the knowledge sector and it is therefore everyone's task to safeguard knowledge security through international collaboration.

NWO encourages collaboration in European partnerships and networks. We are also involved in bilateral research programmes with strategic partners outside Europe. One example is the Merian Fund for collaboration with emerging countries in terms of scientific research. NWO's criteria for selecting partners for strategic collaboration are guided by the Dutch government's International Knowledge and Talent Strategy,[10] which refers to the principles of equality and reciprocity, amongst others.

In accordance with the International Knowledge and Talent Strategy, NWO facilitates activities relating to science diplomacy and arranges long-term bilateral cooperation with strategic partner countries. NWO will draft a new internationalisation strategy based on the science policy formulated by the Minister of Education, Culture and Science.

AMBITION 35

NWO WILL INCREASE OPPORTUNITIES FOR INTERNATIONAL COLLABORATION IN PUBLIC AND PUBLIC-PRIVATE PARTNERSHIP PROGRAMMES, ENSURING THAT ASPECTS OF KNOWLEDGE SECURITY ARE PROPERLY SAFEGUARDED.

AMBITION 36

NWO WILL FACILITATE SCIENCE DIPLOMACY ACTIVITIES IN LINE WITH THE INTERNATIONAL KNOWLEDGE AND TALENT STRATEGY AND DEVELOP LONG-TERM BILATERAL PARTNERSHIPS WITH STRATEGIC PARTNER COUNTRIES. BASED ON THE GOVERNMENT'S SCIENCE POLICY, NWO IS DEVELOPING A NEW INTERNATIONALISATION POLICY.

[10] International Knowledge and Talent Strategy (IKT), 2020, Parliamentary Papers 26214618

WOTRO – SCIENCE FOR GLOBAL DEVELOPMENT

WOTRO – Science for Global Development is a cross-domain initiative within NWO that finances and facilitates research for inclusive global development. The aim of the initiative is to develop the knowledge and networks needed to find solutions for 'global challenges' in areas such as climate, health, water management, migration and food security. This objective calls for ground-breaking research and long-term collaboration with those countries that are most affected by the challenges. With its combination of fundamental, applied and practice-oriented research, WOTRO can make a contribution to achieving the Sustainable Development Goals.

Collaboration with researchers and societal partners in low- and middle-income countries contributes to new knowledge and solutions and enriches science in the Netherlands. In addition to innovative research, the collaboration also strengthens the local knowledge infrastructure and helps to establish a worldwide network of experts, researchers and policy makers with close links to the Netherlands and Dutch science.

Another aspect of international collaboration is the important role the NWO institutes play in the cooperation relating to large-scale international scientific infrastructure and facilities. In this context, researchers from various countries work together on short- and long-term projects because only through mutual cooperation can the research goals be achieved. This calls for NWO's participation in the formation of consortia and the coordination of their activities, which also enables us to provide lasting support for the management of facilities. This form of collaboration also demands stable long-term funding for the continuous technological development required for these types of facilities. We will endeavour to expand the possibilities for providing this long-term sustainable funding in the coming strategy period.

NWO's people, resources and organisation

From strategy to realisation

NWO is an organisation that performs three roles. It connects science and society. It funds research. And NWO's institutes carry out independent, reliable and world-class research, expanding the frontiers of our knowledge and capabilities with their creativity and perseverance.

NWO is an independent *financier* of research, with efficient and meticulous work processes and staff who are dedicated to delivering research with impact for Dutch society. NWO is aware that research is carried out by people and is therefore very conscious of the human dimension of the work we do. We also understand the potential conflict between the dual roles of funding and conducting research. Accordingly, a strict separation is maintained between the management of our institutes, whose research is carried out under the auspices of the board of the foundation, and the management of the NWO domain organisation, which each have their own independent board, to handle research applications, including those of our own institutes.

NWO's institutes and domain organisations act as a *connector* by building a bridge between research and society. The strength of the institutional organisation lies in bringing together researchers, research agendas and national infrastructure. Equally, the staff and the funding instruments of the domain organisation are focused on collaboration across boundaries between institutions, sectors, disciplines and countries.

We are transparent about our policies, decisions, processes and results. NWO's three disparate roles create a challenging environment with room for people with varied and complementary personal qualities. NWO is proud of the diverse range of committed employees, board members, researchers, advisors and other individuals who enable us to realise our ambitions.

CORE VALUES

Ground-breaking: NWO pioneers and explores the boundaries of existing knowledge, applications and processes

Committed: NWO anticipates on developments in science and in society

Reliable: NWO does what it promises, is honest, transparent and meticulous

Connecting: NWO has an open attitude and connects actors, expertise and agendas

Our people and the organisation's culture

NWO's success in achieving its goal of advancing scientific research and increasing its scientific and societal impact depends entirely on the efforts, the quality, the dedication and the diversity of its employees. An inclusive, diverse, open, sustainable and safe culture is crucial if we are to perform our task optimally. A culture that reflects the key principles of collaboration, respect and mutual trust, all on the basis of integrity.
We are also a learning organisation that appreciates critical feedback. NWO analyses its own working methods and is willing to experiment with them. Following the principle of 'practice what you preach', what we tell others to do we do ourselves, for example with our policies on diversity & inclusion, recognition & rewards and open science. As an employer, we create the conditions for this in our HR policy.

An open and transparent organisation

NWO is characterised by openness and transparency. Our goal is to be transparent in the communication about our research methods and funding, and about our instruments, goals, criteria and the underlying considerations. Transparency also extends to potential conflicts of interest as that is the only way NWO can meet the highest standards of scientific integrity.
Internally, we foster pleasant and professional interaction among staff members, with a strong focus on communication that promotes integrity, safety and learning. Everyone must feel free to express themselves openly and transparently about what we do and who we are, which also means giving individuals the room to make their own decisions on matters that fall within their area of expertise.

A healthy working climate

Parallel with our ambitions for a healthy research culture, we also foster a healthy working climate for our employees. Promoting our employees' vitality and sustainable employability are important elements of the policy we follow to provide a healthy working climate, to limit work pressure and to realise our ambitions.

Diversity and an inclusive culture

Our aim is to provide a safe, inclusive, ethical and pleasant working environment for our employees. Inclusive means that everyone working at NWO feels comfortable and appreciated, regardless of gender, age, sexual orientation, ethnic background, culture or religion. We strive for a workforce composed of individuals with different backgrounds and talents, who respect one another and value the strength that comes from their varied input and perspectives.
NWO employs the talents of its employees in such a way as to create added value for both the organisation and the individual employee. The pursuit of diversity and an inclusive culture is embodied in our recruitment policy, our assessment system, our talent policy and our working conditions policy, as well as in our communication. The result is an inclusive culture in which everyone at NWO is seen for who they are and feels a valued member of a diverse organisation.
We back this policy up with specific measures, for example by raising awareness of the benefits of inclusivity among our employees; seeking a balance in the representation of different groups in our workforce; striving for a high score on job satisfaction; and aligning our institutes' recruitment and promotion policy with the principles of the national recognition & rewards programme.

Knowledge and competency development

NWO wants to be an agile organisation with an outstanding reputation. The commitment and knowledge of our employees are essential for that. As are their competencies, such as situational awareness, international orientation and collaborative skills, the ability to make connections with researchers, knowledge users and societal partners, but also expanding knowledge in areas such as thematic research and data management, optimising processes and new methods of assessment.
Understanding knowledge security and data management and possessing the skills to work in teams are other aspects that are becoming increasingly important for NWO's researchers.

NWO is also committed to constantly promoting the personal development of its employees – whether they work in science, technology, business operations or the grant awarding process – with a view to their sustainable employability. Our talent policy is geared to ensuring that our future workforce possesses and is trained in the skills required to meet our future objectives. In addition to developing competencies, we will need to recruit employees with profiles and insights that NWO does not already possess. In a midst of a 'war for talent' and a challenging labour market, a reputation as a good employer helps in attracting new recruits. A strong labour market presentation, including employer branding, and a package of appropriate and up-to-date employment conditions are just some of the tools we will employ in endeavouring to recruit new talent.

Leadership

Team leads will play a key role in achieving our ambitions as they will be at the forefront of efforts to create a healthy and pleasant working climate. With their knowledge of the goals that have been set and the qualities and ambitions of the employees, team leads are ideally placed to link the two by motivating and encouraging employees to take responsibility for their own personal development and to contribute to realising the organisation's goals. NWO is happy to see team leads encourage their staff to get the best out of themselves. Team leads who are aware of their status as role models in terms of desired behaviour and who offer their subordinates a healthy learning environment in which to work. Team leads who also recognise and reward correct behaviour and good performance.

Leadership in a changing environment with new strategic ambitions also means that team leads themselves must continuously learn and grow. By setting the right example, they will foster an attitude of openness to change, flexibility and constant learning in the members of their team, which will in turn enable us to continue responding to a rapidly changing environment.

Organisational development

To achieve its ambitions, NWO must be agile, future-proof and flexible in its response to external developments. That calls for an organisational structure that fosters efficient and effective working methods, and hence a targeted use of resources. That in turn requires a sound vision and knowledge of organisational development and change management.

AMBITION 37

IN VIEW OF THE 'WAR FOR TALENT', THE ANTICIPATED GROWTH AND THE INCREASING NEED FOR NEW COMPETENCIES. WE WILL PAY SPECIFIC ATTENTION IN OUR HR POLICY TO RECRUITMENT & SELECTION, KNOWLEDGE AND COMPETENCY DEVELOPMENT, A HEALTHY WORKING CLIMATE, DIVERSITY & INCLUSIVENESS, STRATEGIC STAFF DEVELOPMENT, ATTRACTIVE LABOUR MARKET PRESENTATION, AND APPROPRIATE AND UP-TO-DATE WORKING CONDITIONS.

The methods: processes, information and systems

As a learning organisation, NWO will improve the processes, information and systems it needs to implement its strategy by focusing on process-oriented and chain-oriented collaboration and innovative information management processes and digitisation. We will place greater emphasis on the integral coherence and strength of our organisation and our ability to change. To this end, NWO has established a corporate information office (CIO).

Process- and chain-oriented collaboration

We will design and improve our processes with a view to the sectors and chains within which we work. We will follow the standards and initiatives adopted in the sector and as well as those prescribed by the government, such as the Higher Education Sector Architecture, the Dutch Government Reference Architecture and the government-wide programme *Open op Orde.* Following the principle 'open, unless', we will be transparent about our results, processes and data and share our data with chain partners, naturally subject to the applicable frameworks.

Innovative information technology and digitisation

We will also improve our processes through the use of information technology and digitisation. By investing in our information management, we will lay the foundations for innovation in our services. We will also invest in improvements to the systems that support our processes. The result will be a robust, secure and reliable organisation-wide IT infrastructure. NWO will continue to invest in the security of that infrastructure.

Integral coherence

Nowadays, chains, processes, systems and data are so tightly interlinked that they cannot be seen in isolation from each other. What is needed is an architectural approach, in which improvements are always made with their coherence and their impact on processes, information, data, systems and employees in mind. We will also take account of the need for integrated coherence in the chains and sectors we collaborate with.

Sustainability

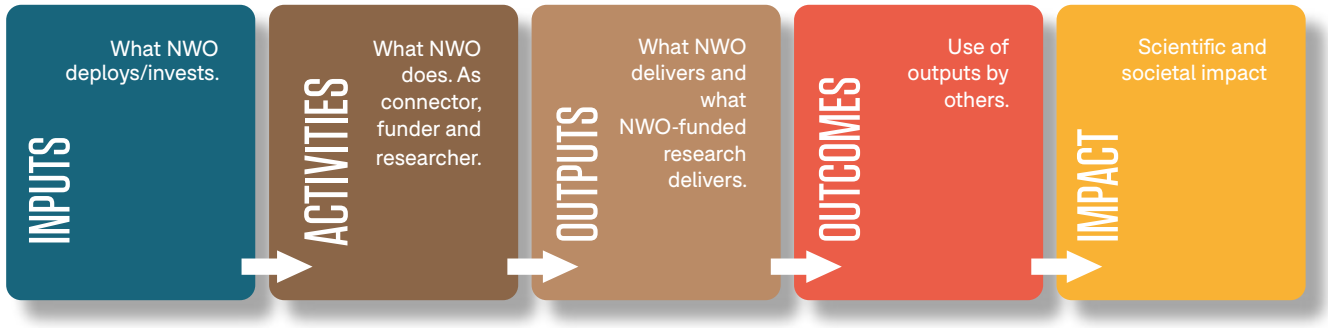
NWO's aim is to be a climate-neutral organisation by 2030. To achieve that, we will have to set targets for the sustainability of our operations, building management and procurement, but will also have to substantially diminish our carbon footprint by reducing the number of flights made by NWO's staff and committee members.
We will shortly be drafting a strategy for meeting the biggest challenge we face, which is to make all the research conducted and financed by NWO climate-neutral.

Security

The changing geopolitical relationships, the increasing activity of state actors, the threats against scientists who take part in the public debate, but also changes in legislation, are all aspects that make security a relevant theme for NWO.
The combination of openness and transparency in its operations aspired to by NWO and its mission of carrying out research with societal impact sometimes requires our researchers to speak out in the public debate. In the last few years, however, they have regularly been confronted with threats and intimidation. Leadership is required from our board members and team leaders in defending them.

In 2021, NWO's computer network was hacked and the organisation was rudely awakened to the need to tighten up its own cybersecurity policy. We will continue to monitor and evaluate that policy in the coming period. NWO's ambitions for knowledge security will influence the partnerships entered into by the NWO institutes and the themes covered in international collaborative research programmes financed by NWO.

Learning along the path to impact



NWO intends to strengthen its position as a funder and connector by systematically monitoring and evaluating processes and activities and by encouraging 'research on research'. This will enable us to realise the ambitions enumerated in this plan in the coming years, and adjust them where necessary.

NWO will systematically monitor its activities and their results in order to gain a clearer picture of the progress being made with the implementation of this strategy. As a result, we will also be better able to account for the legitimacy of our spending of public funds, and adjust our reporting when new circumstances demand it.

Until now, NWO has focused in its monitoring on measuring the efficiency of our processes. This type of monitoring and evaluation is very important for NWO's funding role. But monitoring and evaluation of the effectiveness of its operations is equally important. With a system of cyclical evaluation of its strategy and processes, NWO can learn where improvements can or must be made to realise its strategic ambitions. This evidence-informed method of improving processes through monitoring, evaluation and learning will make NWO even more conscious of its goals.

The monitoring, evaluation and learning (MEL) system for determining the efficiency of NWO's processes and the effectiveness of our approach will be incorporated in everyday practice during this strategy period. To this end, we will carefully map the impact chain, or impact pathway, of our activities in order to measure the extent to which those activities contribute to the positive (societal and/or scientific) impact of research. We will then write a step-by-step plan, with indicators for each step in the plan, showing how and within what period we will achieve our goals.

AMBITION 38

NWO WILL IMPLEMENT A MONITORING, EVALUATION AND LEARNING (MEL) SYSTEM. THIS WILL MAKE IT POSSIBLE TO MONITOR AND EXAMINE NWO'S LEVEL OF FUNCTIONING AND THE IMPACT OF OUR POLICY AND FUNDING. THE FINDINGS WILL ENABLE NWO TO CONTINUOUSLY IMPROVE ITS EFFECTIVENESS AND EFFICIENCY.

Learning through research on research

As we have indicated in this strategy document, we intend to improve our understanding of the efficiency and effectiveness of our activities, processes and procedures. NWO plans to make its own practice, and the science system as a whole, the subject of research. We will facilitate and initiate scientific and practice-oriented research into the practice and funding of research and/or the functioning of the Dutch science system in general. By making research the subject of research, our science system will develop the expertise to design research policy and funding in a more effective and efficient manner. Where there are advantages to international collaboration (economies of scale), NWO will work with the Research on Research Institute (RoRI), a worldwide international alliance of centres of expertise, research institutions, research financiers and academies.

In conclusion

This strategy document sets out the challenges facing Dutch science and the role NWO wishes to play in addressing them. We have outlined a number of developments that shed new light on the relationship between science and society. It is a close relationship, but one that is sometimes also sensitive. We have sketched how we can contribute to creating optimal societal and scientific impact. How we can maintain and strengthen trust in science. How we can contribute to collaboration and connection. To progress. With this strategy we want to help build a healthy science and innovation system, one in which knowledge institutions, the business community, societal organisations, governmental bodies and citizens all have an important role to play. We have defined four crucial building blocks for a properly functioning system. A healthy research culture, with attention for diversity and inclusion, scientific integrity, sustainability and open science. A robust research system, in which talent is given the room it needs and research infrastructures and our funding instruments allow science to flourish. Coherent research agendas through which we connect knowledge partners and society across disciplines, types of research and countries. And unimpeded collaboration, whereby stimulating conditions and uncomplicated requirements lead to inspired researchers who dare to take on global challenges.

We have defined 38 ambitions for the contribution that NWO hopes to make in realising this vision. We will translate these ambitions into plans to be implemented by NWO's various organisational units. The progress being made in achieving the ambitions will be monitored across NWO. As a learning organisation, we will investigate what our own impact is and how we can increase it.

We cannot achieve our ambitions without our partners in the knowledge chain and our own employees. Talent that helps to advance science, society and the country, day in and day out. We can also not achieve those ambitions without the free spirit of the researcher who dares to tread new paths. The researcher who inspires, amazes and provides insights that are new to us. Who brings science and the world one step further with fresh ideas and new results. The researcher who demonstrates in everything he or she does that science works!


NWO