

FOR SCIENCE AND SCHOLARSHIP



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# FOR SCIENCE AND SCHOLARSHIP

THE ACADEMY IN THE KNOWLEDGE-  
DRIVEN SOCIETY

STRATEGIC AGENDA 2010-2015

The Academy is obliged to submit a strategic plan to the Minister of Education, Culture and Science in 2010. As the Academy's primary source of funding, the Minister wishes to be informed of its medium-term aims, the main outlines of its policy, and the priorities that it has set. The Academy's present Board has decided to cast the strategic plan in the form of a strategic agenda for the 2010-2015 period. The agenda defines the strategic issues that the Academy will be working on for the coming five years and clarifies these for the Minister and other external parties and for the Academy's members and staff.

# PREFACE

The Academy has clearly opened its doors and windows to the world in the past few years (if I may be permitted to use a somewhat hackneyed image), literally speaking in the Trippenhuis Building, now attracting a younger and broader audience, and metaphorically speaking within the scientific community, with which the Academy has become more engaged. In doing so, the Academy is responding to the demand that science should play a clearer role in the major issues of our age, such as education, research policy and innovation, and the use of research results in relevant social and political issues. As a national institution, the Academy can fulfil its role with great prestige and in its own particular way, always basing its work on excellence in science and scholarship and acting as a unifying factor for other parties. It must nevertheless take note of the fact that authority – even scientific authority – does not come automatically these days, but must be ‘earned’ in a critical and open dialogue with the public and other institutions. That is why in the years ahead, the Academy will be emphasising the value and significance of science more than ever before, by explaining tirelessly how research works, by training the spotlight on the younger generation, and by finding new ways to stir up public enthusiasm for meaningful questions and even more meaningful answers.

If the Academy is to make a transparent contribution in this way, it must have a better idea of its role. This strategic agenda therefore devotes three entire sections to the Academy’s core roles: as a society of outstanding scientists and scholars; as an organi-

sation for national research institutes; and as an advisory body. Its other activities are derived from these three roles. The Academy is facing great challenges in all these areas. How can a learned society use its concentrated excellence to expand the role of science and scholarship? How can the institutes improve their position as research centres both in the Netherlands and internationally? And how can the Academy produce more advisory reports that have both an impact on society and sound scientific underpinnings?

Fortunately, we have much on which to build. The previous strategic plan, *Sustainable Science*, described the Academy's long-term strategy for its various departments and institutes in clear and precise terms. The Academy has made important progress towards implementing this strategy, and many parties have expressed their appreciation for its new positioning. The challenge that the Academy faces in the years ahead is to stay this course by defining specific actions within the overall framework that has been defined. The present document therefore complements *Sustainable Science* while also taking into account the Academy's current ambitions with respect to maintaining and improving our knowledge-driven society.

Adhering to this agenda will make heavy demands on the Academy's members, its institutes, and its Bureau. The Academy must not only be an organisation of outstanding people, but also an outstanding organisation. It is a complex institution with a variety of different responsibilities and aims, many of them the product of history and not always arranged in the most logical manner. The biggest challenge is to make the entire complex more unified and consistent by linking the Academy's various activities. An overriding aim will remain that of linking the Academy both to other parties and to society in general. It is therefore highly appropriate for a prestigious institution such as the Academy to step out of its authoritative role and become (even) more open. After all, it is precisely in times like the present that we need to hear the independent, wise, inspiring, and at times adamant voice of science ringing out clearly above the rest.

Robbert Dijkgraaf  
President

May 2010

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# 1. INTRODUCTION

The essence of science is curiosity, an intrinsic human characteristic. The need to study and acquire knowledge lies at the heart of modern society. Expanding our knowledge not only enriches us culturally and emotionally but also contributes to the prosperity and well-being of society. The challenges facing science and scholarship lie both in explaining the world around us and in identifying and solving the major scientific questions troubling society, both present and future. One key aspect of this is to educate and inform new generations.

The Royal Netherlands Academy of Arts and Sciences (KNAW) unites these various aspects of science and scholarship by its very nature. Generally speaking, the Academy plays three core roles: it is a learned society of scientists and scholars, it is an organisation for national research institutes, and it is an advisory body. Traditionally, the Academy functions as a society that brings together outstanding scientists and scholars from every discipline. In addition to the scientific and scholarly discourse that takes place within its ranks, the Academy – basing itself on a broad concept of science and scholarship – is also a forum for knowledge-sharing about numerous social and cultural issues. In a time in which specialisation and fragmentation are increasing, it plays a special part in preserving unity in science and

Core Academy tasks:  
learned society,  
institutes and  
advisory

scholarship. The society makes the Academy the most obvious authority when it comes to assessing and advising on the practice of science in the Netherlands. In addition to its role as a learned society and advisory body, the Academy is also responsible for the policy and management of nineteen research institutes in the humanities, social sciences and life sciences.

## 1.1 Role and position of the Academy

The Academy's learned society gives it a unique position in the Dutch scientific community, allowing it to serve as the voice of science and to effectively represent the interests of science and scholarship. It also provides the basis upon which the Academy carries out its statutory advisory role, giving it the authority to make judgements and issue recommendations based on substance and scientific expertise. The Academy thus regards it as its duty to advise on topics that touch on Dutch science and scholarship as a whole, and to draw attention at an early stage to trends in society that may influence the practice of science. The Academy's advisory reports also provide a scientific/scholarly basis for policy debates on social issues, and they make a factual contribution to public debate – a debate that can sometimes be encumbered by too much information, in particular owing to such communication channels as the Internet. Recent examples are the discussions about mathematics teaching and the climate.

Voice and  
conscience of science

The Academy works to advance its views, which are important for the Netherlands' science and innovation policy, in cooperation with other parties active in the Dutch research community, including the Dutch universities (united in the Association of Universities in the Netherlands, VSNU), the Netherlands Organisation for Scientific Research (NWO, the foremost research funding organisation in the Netherlands), the leading technology institutes, the Netherlands Organisation for Applied Scientific Research (TNO), and many others. In addition to the Academy, the Dutch Government also takes the advice of the Advisory Council for Science and Technology Policy (AWT) and the Scientific Council for Government Policy (WRR). In its role as the representative of science and scholarship, the Academy serves as a linking pin between these various parties.

### *Organisation for national research institutes*

In addition to its role as the voice and conscience of science, the Academy is also an umbrella organisation for numerous national research institutes. The Academy institutes, which are active in the humanities, the social sciences and the life sciences, serve as national expertise centres and/or are responsible for national facilities and collections, making them agenda-setting organisations in the Netherlands in their specific fields. The national

Organisation for  
national research  
institutes

natural science institutes do not fall under the Academy umbrella; they are associated with the NWO.

In view of the above, the following guideline can be identified for the Academy:

*'As the forum, conscience, and voice of the arts and sciences in the Netherlands, the Academy promotes the quality and represents the interests of Dutch scholars and scientists and ensures that they make the best possible contribution to the cultural, social, and economic development of Dutch society.'*

*Sustainable Science*, the Academy's previous strategic plan, offered a clear view of the future that – in keeping with the title – looks beyond the four-year planning period. Although many of the policy intentions expressed in that plan have been carried out,<sup>1</sup> the Academy's long-term aims and the course it has charted for itself continue to apply. The present strategic agenda should therefore be regarded as a follow-up to *Sustainable Science*. It is more concrete in nature, and specifies a number of priorities. It begins by discussing the plans and aims related to the Academy's three core roles (learned society, institutes, advisory body), followed by its responsibility for communication and internationalisation as derived from these roles. It ends by sketching the financial and organisational consequences of its aims. Before describing these various elements in the following section, we will look briefly at a number of considerations that have underpinned this strategic agenda.

Strategic agenda  
with specific  
intentions

## 1.2 For science and scholarship

Because the Academy works within the context of scientific practice, it can serve as a powerful voice for science in society and effectively represent the interests of science and scholarship. Its key objectives are research across a broad spectrum, intellectual freedom, quality and integrity in science and scholarship, and relevance to society.

### *Science for a sustainable knowledge-driven society*

The Academy regards the sustainability of Dutch scientific practice as an important issue. A sustainable knowledge-driven society is one that, in addition to knowledge utilisation and applied research, also offers ample scope for fundamental research targeting the long term. In addition to the

Importance of  
research to a  
sustainable society

<sup>1</sup> See Appendix 1 for the performance checklist for the 2007-2010 Administrative Agenda.

intrinsic value of scientific practice, fundamental research is based on originality and inventiveness. Major scientific breakthroughs are often the result of research with no strings attached, whose outcome is often difficult to predict. The growing pressure placed on fundamental research is eroding the foundations of our knowledge-driven society. The Academy will therefore continue emphasising the role and necessity of fundamental research.

### *Cultivating talent and promoting excellence*

Cultivating talent

For scientific practice to be sustainable, we must not only promote excellence in research but also cultivate talent and the highest possible quality in education. Young and talented researchers should be encouraged to use their intellectual capacity in education, science and scholarship. Conversely, science and scholarship should provide fertile ground for cultivating the intellectual capacity of researchers. The Academy believes it is one of its key tasks to promote excellence across the board: both in science and scholarship and in education, so that future generations will be capable of making innovative contributions to all sectors of society. After all, future generations of researchers must have an early and broad introduction to science to prepare them for their work in a rapidly changing world increasingly dominated by technological and global issues.

Promoting excellence in research and education

### *Investing in education, research and innovation*

Lack of necessary investment in education, research and innovation

In stark contrast to the importance of scientific knowledge for well-being and prosperity, our knowledge-driven society is gradually being eroded by a lack of investment in education, research and innovation. In *Sustainable Science*, the Academy observed that Dutch scientific and technological research has come under increasing pressure and that there is no proper basis for funding this type of research. Until now, the extra investment needed to maintain the Netherlands' quality position in scientific research has not been forthcoming. If we consider the percentage of gross domestic product that the Netherlands spends on R&D, then our country must be categorised as one of the stragglers in the international rankings.<sup>2</sup>

The fact that Dutch research is still of excellent quality is due to past investment, and camouflages how vulnerable our current position actually is. For example, the Netherlands gets exceptionally poor marks when it comes to numbers of researchers. The declining numbers are a direct result of the lack of investment.

<sup>2</sup> Science and Technology Indicators 2010, Netherlands Observatory of Science and Technology NOWT.

Greater focus on  
maintaining the  
quality posi-  
tion of science

Encouraging socially  
relevant research

The Academy believes that all efforts in the period ahead should be directed towards maintaining the quality position of Dutch science and scholarship and, by extension, towards preserving our knowledge-driven society and prosperity. In addition to urging extra funding for knowledge acquisition and to improve the quality of education, this also means pursuing an active policy of promoting knowledge utilisation. In the next decade, publicly financed research organisations will have to clarify when and how their research contributes to the vitality and quality of society. Science and scholarship do, after all, touch on many socially relevant issues, for example ‘good governance’ in both public and private sectors, economic clout in a competitive and dynamic world economy, the energy problem, and nutrition and public health. There must be a clear indication in the years ahead of how research in these specific areas is to be encouraged and set up, with a particular focus on Dutch research groups that, owing to an outstanding level of expertise or special partnerships, can make a vital contribution to these topics.

The Academy will take the above-mentioned views into account in the coming planning period. This means that it will be making clear-cut choices and setting priorities with respect to its activities in the years ahead. In its plans, it has also taken note of the results of the evaluation of the Academy conducted in 2008 at the request of the Ministry of Education, Science and Culture.

## 2. ACADEMY AIMS FOR 2015

Academy's aims  
at national level

*Aim: help the Netherlands get back into the top five knowledge-driven economies*

The Netherlands has set itself the aim of being one of the top five knowledge-driven economies in the world in terms of education, research and innovation. The Academy lends full support to this aim. There must also be demonstrable growth in the volume of new private R&D carried out by foreign companies in the Netherlands ('onshoring'). The Academy sees it as its task to collaborate with other parties in achieving these objectives, both in its tripartite partnership with the Association of Universities in the Netherlands (VSNU) and the Netherlands Organisation for Scientific Research (NWO), and within a broader context as a member of the Knowledge Investment Agenda (KIA) coalition.<sup>3</sup> The Academy intends to focus in particular on obtaining extra support and funding for scientific research.

*Aim: play a bigger role as an advisory body*

The Academy acts as an advisory body and in that capacity wishes to be more closely involved in developing the Netherlands' national science and innovation policy. In addition to advising on trends and devel-

<sup>3</sup> See Appendix 2 for a joint statement on this matter by the Academy, VSNU and NWO.

Advise on  
'science for policy'

opments in science, the Academy will also be focusing on 'science for policy'. This means producing advice that, because it is based on genuine expertise, can spearhead public debate. In order to increase the relevance of its recommendations, the Academy will be looking explicitly at the need for the advice, its purpose and timeliness, and to whom it is addressed. It will also boost the impact of its advice by giving more consideration to implementation. Finally, the Academy will make efforts to increase the number of requests for advice received from third parties, specifically the various relevant ministries. It goes without saying that the Academy will act autonomously in all its advisory work.

*Aim: increase the diversity of the Academy's membership*

Increase the diversity  
of the membership

In order to involve members more closely in Academy activities, they will be asked to help implement this strategic agenda. Efforts will also be made to increase the diversity of the membership by ensuring better representation of various scientific disciplines and of research sectors outside academia.

*Aim: draw up a Research Agenda for the Netherlands*

Publish the  
Dutch Research  
Agenda in 2011

The Academy plans to publish, on a regular basis, a review of challenging and urgent questions that are being investigated in various scientific disciplines around the world. This Dutch Research Agenda, the first edition of which will appear in 2011, will identify those questions to which Dutch research groups can make a significant contribution. Publication of the agenda will improve public awareness of science and research, and enable the Academy to influence decision making by funding bodies.

*Aim: get young people interested in research*

Get young people in-  
terested in research

By 2015, pupils in Dutch primary and secondary schools should be demonstrably more interested in scientific research than they are now, in 2010, in part owing to the efforts of the Academy and other organisations. The Academy will base its activities within this context on the action points described in the 2011-2016 Master Plan 'Room for Talent, Room for Science and Technology'.

*Aim: more focus on knowledge utilisation*

Promote  
knowledge utilisation

In addition to knowledge acquisition, knowledge utilisation will come in for greater attention in the years ahead. The Academy will develop a number of specific actions in this respect within its own institutes. It is the Academy's aim to promote knowledge utilisation in both the life sciences and the humanities and social sciences.

*Aim: promote the role of the Academy as an organisation for national research institutes*

The Academy wishes to promote its role as an organisation for national research institutes. The institutes must set themselves apart as authoritative expertise and knowledge centres, and in a number of cases as the custodians of unique infrastructural facilities, including collections. By 2015 they should be leading in their fields in the Netherlands and a key point of contact in the international science community.

# 3. LEARNED SOCIETY

## 3.1 The Trippenhuis Building par & pour excellence

The Academy is the only research organisation in the Netherlands that unites scientists and scholars working in all disciplines in a learned society. The members of this society are selected exclusively on the basis of their scientific and scholarly achievements. The membership currently consists of two hundred and twenty ‘ordinary’ members and almost three hundred emeritus members. That is exclusive company indeed. It is the Academy’s intention that in the third century of its existence, membership should continue to be regarded as a mark of honour for scientific/scholarly careers in the Netherlands.

Academy membership as mark of honour

The Academy would also like membership to entail a certain degree of active involvement in scientific practice in general and in the Academy’s activities in particular. For example, the society provides a sound basis for the Academy’s role as an advisory body: its members participate in the Academy’s committees, advisory councils and juries. They meet at the Trippenhuis Building, where they participate in scientific and scholarly discourse, share their expertise, and discuss topics of relevance to science and society.

Active members

It is precisely its bringing together various disciplines that makes the Academy the ideal institution to emphasise the unity and diversity of science, while at the same time helping to blur disciplinary boundaries. It is naturally important for the society to offer an accurate reflection of the current state of Dutch scientific research. This means that it should also have members representing new, often interdisciplinary fields of science. The Young Academy ensures that the society represents different generations, each with its own viewpoints and issues. By advancing the views of the ‘working scientist’ (in every discipline), the society can offer a counterbalance to the more administrative and financial approach that can all too easily gain the upper hand in science policy.

With respect to its role as a forum and learned society, the Academy will be addressing the following issues in the period ahead:

- continuing to innovate as a forum;
- increasing the participation of young members in particular in Academy-related activities;
- monitoring the representativeness of the membership and bringing in more young members.

Society: issues to be addressed

### *Role as forum*

In innovating its role as a forum – an aim already identified in the previous strategic plan – the Academy wishes to position the Trippenhuys Building as the Netherlands’ main centre for dialogue about scientific/scholarly affairs, in other words as a ‘House of Science’. Its elegant setting should offer scientists and scholars a forum for presenting new trends in science, one where discussion of current issues helps build bridges between various disciplines. The theme meetings and debate evenings already represent important steps in this direction.

The Trippenhuys Building: ‘The House of Science’

### *Involving the members*

In the first instance, the Academy will increase members’ participation in its activities by involving them in implementing this new strategic agenda. This applies in particular to drawing up the Dutch Research Agenda and preparing advice. Members will also be encouraged to play an active role in other ways, for example by organising symposia or other meetings.

Member participation in implementing strategic agenda

### *Membership*

To improve the representativeness of its membership, the Academy intends to introduce a new election system with broader scope for nominating members and a fixed number of new members every year.

New election system

The new procedure will not only bring more young members into the fold, but also ensure better representation within the society of new, interdisciplinary fields of science and research sectors. The Academy's mission also extends beyond the practice of science in academia. Because some research sectors do not find their way to the Academy as a matter of course, it is important to actively encourage the nomination of outstanding researchers working at technological institutes (the Large Technological Institutes and TNO) and enterprises. These innovations will naturally have no impact on the most important selection criterion for Academy membership: outstanding scientific or scholarly achievement.

## 3.2 Prizes, grants and funds

One important aspect of the activities related to the Academy's role as a learned society consists of its prizes, grants and funds.

### *Science prizes*

Maximising the impact of prizes

In addition to the conferral of membership, the Academy believes that awarding science prizes is an important means of honouring outstanding scientists. It is also a way of throwing the spotlight on a specific discipline. The Academy will therefore continue to award prizes in the years ahead, including a number of new prizes such as the Young Scientist Award and the Merian Prize. It will also look specifically at how it can maximise the impact of the prizes it awards.

### *Grants*

Reassessing grants policy

Another method of encouraging excellence in scientific research is to award grants. The Academy acknowledges the importance of this activity, but wishes to note that it does not regard itself primarily as a funding organisation. It therefore intends to look critically at its activities in this area in the years ahead.

### *Funds*

Improving fund management efficiency

The Academy is proud that various individuals and/or families have entrusted it with the management of their assets. The Academy believes that its primary task in this regard is to use the funds made available as effectively as possible for the benefit of science and scholarship. In order to optimise the deployment of such funds in the years ahead, the Academy will be giving more consideration to how these funds are managed.

### 3.3 The Young Academy

The Young Academy:  
an independent unit  
within the Academy

In 2005, the Academy took steps to set up the Young Academy, consisting of young scientists and scholars who received their doctorates less than ten years before. The Young Academy operates independently within the Academy. It has its own working plan, organises its own events and is responsible for its own viewpoints. Its scope of activity includes science policy, the interaction between science and society, and interdisciplinarity in science. The Young Academy was set up to bring young researchers into contact with disciplines beyond their own and to encourage them to develop their own views on science policy. It is an independent body and should not be regarded as a gateway to Academy membership. The Young Academy and the Academy interact mainly in providing joint advice and cooperating on joint projects.

Encouraging and  
supporting the  
Young Academy

The Academy is very pleased that there is a Young Academy. It provides the younger generation of scientists and scholars with a unique, authentic channel for expressing their views. It is important for that channel to be effective, especially with science relying so heavily on innovation. The Academy wishes to involve the Young Academy as closely as possible in all its activities in the years ahead, and give it sufficient encouragement and funding to achieve its aims and expand its own scope of activity.

#### SUMMARY:

Agenda points for Academy's role as a learned society 2010-2015:

- Become a more dynamic forum
- Improve the representativeness of the membership and bring in more young members
- Have members take more active part in Academy activities
- Maximise the impact of prizes
- Reassess grants and fund management policy
- Encourage cooperation between Academy and Young Academy

# 4. ORGANISATION FOR NATIONAL RESEARCH INSTITUTES

Besides acting as a learned society and advisory body, the Academy is also responsible for the policy and management of nineteen research institutes, the majority of which work in the humanities, social sciences and life sciences. In addition, there are a number of institutes working at the interface of science and policy. The Academy institutes play a key role in the Dutch scientific community. They function as national expertise centres and/or are responsible for national facilities that are also accessible at international level. These facilities consist of unique infrastructures and world-class collections that the institutes manage and make available to external parties. The institutes should distinguish themselves as agenda-setting institutions at national level and leading in their specific fields of research. They should also serve as international points of contact.

Institutes:  
national expertise centres with  
unique collections

Excellence is an absolute and obvious requirement. The institutes are assessed regularly by independent, international peer reviews, with the aim being an assessment of 'excellent'. Institutes that do not receive at least a 'very good' assessment will be subject to a further review of their performance. Ultimately, they may even be closed down or lose the status of Academy institute.

Strict quality  
requirements

The Academy will continue to keep a critical eye on its portfolio of institutes, and in the period ahead will consider whether it would not be better to position certain institutes (or parts thereof) outside the Academy.

With pressure on fundamental research growing, the Academy considers it vital to contribute to long-term research in the Netherlands via its institutes. Because of their relatively large measure of flexibility, autonomy and focus, institutes can set priorities in research. In the view of the Academy, the institutes must themselves devote sufficient attention to knowledge utilisation in the period ahead.

## 4.1 Encouraging technology in the humanities

Research carried out by the Academy's social science and humanities institutes focuses on the impact of globalisation and technology on society and culture at all relevant levels. This ranges from research into demographic changes, migration processes and shifts in the international division of labour – including the increasingly urgent issues of war and violence – to change processes in Dutch language and culture in an international context.

### *Encouraging technology in the humanities*

One key aim in the years ahead is to modernise the humanities institutes, specifically by deploying new information technologies, with the institutes working closely with one another in this regard. For example, several institutes are collaborating in the Alfalab programme, which focuses on enriching, linking and integrating digital databases and making them accessible by means of innovative technologies. Alfalab has links to such ESFRI projects as CLARIN and DARIAH.

The unique collections and databases of the humanities institutes form the basis for developing an advanced technological infrastructure (computational humanities) that should lead to methodological and theoretical innovation in humanities research. The decision to encourage technology in the humanities was inspired by the Academy's desire to join its institutes in playing an initiating and guiding role in creating and maintaining infrastructural ICT facilities and utilising them in research. The aim in the period ahead is to make the collections available (digitally) to the research community and the public. With respect to the computational humanities incentives programme, the Academy will seek to collaborate with top university research groups in this field. The programme should set an international exam-

ple and ultimately put the Academy in the vanguard with respect to the development and use of technology in the humanities.

Aims of the humanities institutes

The methodological innovation envisaged will make it possible to discover patterns and connections between databases (regarded as relatively separate entities until now) that will lead to crucial new insights into the nature and direction of social processes. This will allow the relevant Academy institutes to offer new solutions to social problems related to migration and other demographic trends, social cohesion and dynamism, cultural diversity and mass violence. It is the intention of the institutes to make a vital contribution to the political and social policy agenda for such issues, based on outstanding scientific and scholarly research.

## 4.2 Trends in the life sciences

Life sciences research themes

Research conducted by the Academy's life sciences institutes integrates various levels of biological organisation. It extends from the molecular level to complete organisms (Hubrecht Institute), including behaviour and cognition (Netherlands Institute for Neuroscience, NIN). This systematic approach also applies to ecological research focusing on entire ecosystems (Netherlands Institute for Ecology, NIOO). The aim of the life sciences institutes is to use their advanced technological infrastructure and unique data collections to achieve a position in the vanguard of international research within their own fields.

### *Trends in the coming years*

Aims of the life sciences institutes

The institutes all focus on the single unifying theme of regenerative processes. Within this context, the NIN expects to effectuate a breakthrough in the field of neurogeneration in the next few years by developing new therapies. The Hubrecht Institute will extend its pioneering stem cell research in order to maintain its leading international position. It also aims to achieve enough critical mass to become the undisputed world leader in developmental biology. For the NIOO, the focus will be on the recovery and preservation of ecosystems. Given the Netherlands' close relationship with water and the potential effect of climate change on the sea level, research into the interaction between land and water will become highly important, in addition to coastal and marine research. The NIOO will be studying 'the future of land and water' in the upcoming planning period, in addition to climate change. It will be working closely with the Wadden Academy,

which has a network structure ideally suited to regulating and encouraging knowledge-sharing about the Wadden Sea Region between research institutions, government, the private sector and civil-society organisations. The Academy's other network structure, the Interuniversity Cardiology Institute of the Netherlands, must redevelop and expand its functional role within Dutch cardiovascular research.

Optimising access to collections

The life sciences will also be seeking to optimise the accessibility and availability of their collections in the years ahead, both for researchers and the public. This is specifically the case for the Fungal Biodiversity Centre.

### 4.3 Cooperation

More strategic cooperation with universities

Science benefits from close cooperation between researchers and research institutions. The Academy cooperates with universities in joint research programmes. Its researchers are also appointed to endowed chairs or have part-time appointments as professors at universities. It is furthermore the Academy's policy to house its institutes close to a university. This encourages interaction with university researchers without detracting from the unique character of the institute.

#### *Cooperation in the humanities*

Clustering of humanities institutes

The Academy's humanities institutes are spread throughout the Netherlands, work in different areas of research and have different disciplinary traditions. In order to achieve greater harmony in their research and generate more mass and focus, the Academy is seeking to intensify cooperation between the institutes and between them and the universities by encouraging joint research programmes. Where feasible, institutes will be clustered on a university campus.

#### *Cooperation in the life sciences*

Trends in neuroscience

The focus in the life science institutes in the years ahead will be on the rapidly expanding and increasingly important field of neuroscience. One aim is to create a partnership in Amsterdam between the Academy, the University of Amsterdam, VU University Amsterdam, and the city's two medical centres (AMC and VUmc), leading to a concentration of research in a 'neuroscience cluster'.

Construction of the NIOO's new headquarters on the grounds of Wageningen University and Research Centre is well under way. The new building is meant to set an example of sustainable building. Locating the NIOO on campus will intensify collaboration between its

researchers and researchers at Wageningen UR. The Hubrecht Institute is growing rapidly thanks to its formal cooperation with Utrecht University Medical Centre. As a result, it will soon need much larger accommodation, a project that will be carried out in the years ahead.

## 4.4 Other trends within the research organisation

### *Knowledge utilisation and dissemination*

More focus on  
knowledge utilisation

As an organisation for national research institutes, the Academy will be looking more closely at the topic of knowledge utilisation in the period ahead. A preliminary foresight study will explore how knowledge utilisation can be encouraged. A further aspect is the dissemination of knowledge. The Academy aims to encourage 'open access' to its institutes' research data and publications.

### *Career policy*

Importance of per-  
sonal development

Achieving the aim of outstanding quality within the national institutes will require a personnel policy that encourages the Academy's research organisation to be flexible and dynamic. The focus for the period ahead will be on personal development and a career policy that promotes the professional development of both research and support staff.

### SUMMARY:

Agenda points for the Academy's role as an organisation for national research institutes, 2010-2015

- Promote the role of the Academy as an organisation for national research institutes
- Take a leading role in drafting the national (and international) research agenda in the various fields of research
- Encourage cooperation with university research groups
- Promote methodological innovation in the humanities
- Encourage the neurosciences
- Optimise the availability and accessibility of the collections
- Promote knowledge utilisation
- Achieve open access to research data and publications.

## 5. ADVISORY BODY

Academy as an advisory body: based on scientific expertise

The Academy takes its statutory role as an advisory body very seriously. That role is based on its ability to organise and utilise available scientific knowledge, in part provided by the members of the society. The Academy's assessments and recommendations are based on expertise, a fact that gives it its scientific authority and allows it to serve as an authoritative voice in social and political debate.

### *Advisory councils*

Overall advisory agenda

With their broadly representative membership and responsibilities, the advisory councils are one of the factors that enable the Academy to serve as an advisory body. The Academy's Board and the chairpersons of the councils meet regularly to establish an annual overall advisory agenda. In addition to requests for advice, the agenda also covers subjects on which the Academy wishes to make recommendations. The Academy also wishes to consider requests for advice from other parties, for example the relevant ministries.

### *Playing a bigger role as an advisory body*

The Academy will be making efforts to improve the relevance, quality and impact of its advice in the time ahead. It will be producing more recommendations that can offer a context for scientific and scholarly research or spearhead public debate. This means that when drawing up the advisory agenda, it will be looking explicitly at the need for a particular advisory report, its purpose and timeliness, and to whom it is addressed. With respect to quality assurance, the Academy will consider setting up a peer review system similar to that used by the National Academy of Sciences' National Research Council (USA). To improve not only the quality and relevance of the advice but also its impact, it will look more carefully at implementation and communication. The Academy will also align its advisory process more closely with the work of foreign sister academies and inter-academy organisations.

Improving the relevance, quality and impact of its advice

The subjects of future advisory reports will not be described in detail in this strategic agenda, but in the following sections the Academy identifies various issues that it intends to investigate on its own initiative in the coming period. Conceptually, a distinction has been made between advice focusing on more effective national science and innovation policy and advice explaining the current state of knowledge in a particular field. The Academy will naturally not issue advice concerning its own institutes.

## 5.1 Science and innovation policy

The Academy finds it more important than ever to make a vital contribution to national science and innovation policy making, given that future prosperity and well-being in the Netherlands are at stake. Although politicians have set the goal of lifting the Netherlands into the top five knowledge-driven economies in the world<sup>4</sup> the Academy believes that this is basically an empty statement unless it results in political action. The first step towards actually achieving this goal is to use the direct and indirect funding mechanisms to invest more in the broad knowledge base, as advised by the Research Funding Committee [Commissie Dynamisering].

Extra investment in broad knowledge base and reallocation of innovation budgets

National innovation agenda

In addition, close integration of innovation and science policy will require the reallocation of many government innovation budgets (including funding earmarked from the Economic Structure Enhancement Fund, FES). Once a national innovation agenda has been established, it becomes possible to target a limited number of themes

that will receive extra long-term research funding. This will improve efficiency without claiming extra resources. The Academy intends to actively communicate the above view in political circles.

Generating research plans for economic or social themes

The Academy will also encourage the scientific community to generate research plans proactively, in partnership with private or civil-society parties. Relevant criteria for such plans are scientific quality and the economic and/or social relevance of the research. Plans are already being developed in the Netherlands in a number of fields (for example water management, energy and climate), but they have yet to be initiated in others. Attention should also go to specific areas in which the Netherlands earns its money in the world market. The Academy will discuss the importance of research planning within areas of national importance in its consultations with its KIA partners, for example. It will encourage the universities to draw up sector-specific research plans.

The Academy's role will not be equally important in all of the above fields. It does, however, intend to initiate its own research planning processes in the humanities (under the theme 'Culture and Identity'), the social sciences (under the theme 'Vulnerability and Resilience of Social Systems'), and the biosciences (under the theme 'From Biomolecule to Biosphere'). The Academy institutes' research programmes will be linked to these initiatives where possible. As an independent organisation, the Academy is also prepared to offer parties who intend to develop research plans facilities and support.

### *Long-range agenda for large-scale research infrastructures*

A long-term agenda for investing in science will take Dutch science and innovation policy to a higher level. The Academy will consider the subject of large-scale research facilities in this area. Working at the forefront of science requires access to state-of-the-art 'tools for science', and the process of identifying those tools and participating in the relevant decision making will improve if top scientists are involved. It is for these reasons that the Ministry of Education, Culture and Science is supporting the first Netherlands' Roadmap for Large-Scale Research Facilities. The Academy will be proactive in pursuing follow-up activities. The topic also has an international dimension, of course; as a result, it will also be discussed in the section on internationalisation (ESFRI activities).

The Netherlands' Roadmap for Large-Scale Research Facilities

## 5.2 Education

Concerning the education sector, government has already allocated numerous formal advisory tasks to bodies other than the Academy. Nevertheless, the Academy believes that science can play a greater role in the field of education. It therefore wishes to consider a number of related topics in the period ahead:

- improving the quality of teachers;
- getting young people excited about research;
- training programmes for researchers.

### *Improving the quality of teachers*

In order to boost progress across the entire spectrum of society, the Netherlands must upgrade the quality of its educational system. Among other things, that will mean improving the skills and competencies of teachers in secondary education, an aim that can be achieved by deploying more university graduates in teaching and providing teachers with proper in-service training opportunities. The Academy will argue in favour of:

- facilitating combined appointments for PhD students, post-docs and instructor-researchers who work part time in research and part time in secondary education;
- developing university ‘season schools’ where teachers can be brought up to date on the current state of knowledge in their field.

Having more teachers with university degrees in the classroom is in the interests of education. To make it possible for university graduates at Academy institutes to consider a second job in teaching, the Academy will encourage combined appointments: if the graduates accept a part-time appointment in teaching (for a limited number of years), the Academy will offer them a part-time appointment as a post-doc during the same period.

### *Interesting young people interested in research*

Getting primary and secondary school pupils excited about research will be one of the Academy’s action points. The establishment of the Education Prize [Onderwijsprijs] in honour of the Academy’s 200th anniversary has highlighted its commitment to secondary education. In the same context, the Academy will also be promoting the ‘Science Nodes’ programme, a joint venture between universities, teacher-training colleges and primary schools that organises activities for

<sup>4</sup> See Appendix 2 for a joint statement on this matter by the Academy, VSNU and NWO.

Improving the quality of teachers

Combined appointments for post-docs in teaching and their own institutes

Getting young people interested research

talented, motivated pupils. The Academy also supports the aims of the 2011-2016 Master Plan 'Room for Talent, Room for Science and Technology', which encourages the teaching of science and technology in primary schools.

### *Training programmes for researchers*

In higher education, the Academy's role is to promote collaboration and harmony between institutions. In particular, there are various Master's and graduate programmes that offer good opportunities to boost the international position and reputation of the Netherlands. The Academy recognises the enormous value of inter-university research schools in providing satisfactory training for PhD students. It is an advocate of these schools and is also prepared to make an active contribution to maintaining these inter-university partnerships. It also recognises the importance of accreditation by the Research School Accreditation Committee (ECOS). In the period ahead, it will be considering how to streamline the accreditation procedures, with the necessary protocols being aligned more closely to the Standard Evaluation Protocol.

More collaboration  
in higher education

## 5.3 Knowledge utilisation and dissemination

Valorisation is a hot topic at national level. It is very important for the Academy that scientists and scholars from every discipline – including the humanities and the social sciences – should participate in the relevant debate. Valorisation is about more than knowledge utilisation for economic purposes. A change in mentality is also required. For example, young people must be encouraged to adopt a more entrepreneurial attitude. In order to arrive at a realistic picture of the actual opportunities for valorisation, the Academy will try to provide firmer guidance in the debate, including by participating in the National Valorisation Committee. One important point in this regard is that the relevant parties have differing positions in the national R&D system. Institutions that focus on fundamental research must naturally be open to valorisation opportunities, but it is not their primary task to market research results and such work should be left to others.

Guiding the  
national debate  
about valorisation

As an organisation for national research institutes, the Academy will also be looking at the issue of valorisation within its own ranks. It will draw up a policy document ('Valorisation for the Academy research institutes') describing the valorisation activities that it plans to undertake as well as what it does not plan to do. The document will

Drafting a valorisa-  
tion policy document  
for its own institutes

also cover a pilot project investigating how the institutes can improve knowledge utilisation internally.

### *Knowledge dissemination*

With respect to knowledge dissemination, the Academy recognises the need for open access to research information, especially when the research is publicly funded. This not only covers open access to research data and publications but also open access publishing. Wherever possible, the Academy intends to promote open access within its own research organisations. It will also participate in the nation-wide debate on digital sustainability and provide information on research and research institutions in the Netherlands.

Importance of open access

## 5.4 Scientific integrity and quality

With respect to the quality and integrity of science and scholarship, the Academy must remain vigilant. This means that it will take action when necessary on matters of vital importance to science, such as the freedom of scientific practice, scientific integrity and the reliability of quality assessments. Part of its efforts will be spent on developing a code of conduct for researchers (including at European level) and procedures for identifying and preventing violations of scientific ethics.

Safeguarding scientific quality and integrity

### *Assessing the quality of scientific research*

With respect to the quality of scientific research, the Academy considers it important for the Netherlands to have a national evaluation system that suits all publicly funded research units but is broad enough to encompass all disciplines. In terms of the present evaluation methodology, the Academy would like to see more capacity to differentiate and even less bureaucracy. Quality assurance must continue to be based on trust. The Academy has collaborated with the VSNU and NWO in developing a Standard Evaluation Protocol (SEP), and it and these partners will remain responsible for the SEP evaluation process, which will itself be subject to evaluation in 2013. The capacity to differentiate can be increased by reintroducing the national system of external research reviews. It is precisely such mutual quality assessments that are crucial to promoting the relevant field of research.

Reintroducing a national system of external research reviews

### *Quality indicators*

Every two years, the Netherlands Observatory of Science and Technology (NOWT) publishes a report on Science and Technology Indicators, commissioned by the Ministry of Education, Culture and

Science. The report provides citation impact factor rankings for the various disciplines practised in the Netherlands. There is evidence that such quality indicators are becoming less relevant at the far ends of the spectrum of disciplines covered in the report, making them less suitable for determining scientific quality. Following publication of Sustainable Humanities, a report by the Committee on the National Plan for the Future of the Humanities, the Academy was asked to advise on practical assessment criteria within the humanities. It will also publish a separate advisory report on the practical relevance of quality indicators within the field of engineering (design, construction sciences, etc.).

## 5.5 Foresight studies

The Netherlands can be proud of its international reputation for quality in scientific research. The Academy believes, however, that the research community could improve its standing within civil society by issuing its own agenda at regular intervals. It is for this reason that the Academy intends asking its members to work with it on publishing a Dutch Research Agenda and updating it regularly – an initiative inspired in part by a publication in honour of the 125th anniversary of Science (July 2005) outlining 125 urgent and unanswered research questions. It will be counting on the society's various sections and advisory councils to assist it in this endeavour. The research agenda, which will be published for the first time in 2011, will include challenging and urgent international research questions in a variety of different disciplines to which the Academy believes Dutch research groups can make a prominent or even decisive contribution, thanks to unique partnerships or an outstanding level of expertise. It is also possible that a well-grounded research agenda published by the Academy will influence decision makers within the national bodies that distribute research and innovation funding, especially now that the idea of 'focus and mass' is attracting so much attention in policy making.

## SUMMARY:

Agenda points concerning the Academy's advisory role, 2010-2015

- Draft a Dutch Research Agenda
- Play a greater role as an advisory body for national science and innovation policy
- Improve the quality, relevance and impact of the advice
- Become more closely involved in primary and secondary education
- Guide the debate on knowledge utilisation and dissemination

## 6. COMMUNICATION

Improve public engagement with education and research

Given the need to generate broad public support for scientific research, it is important for the Academy to collaborate with such parties as the VSNU and NWO on raising awareness of the importance of research and education/higher education for society. Public engagement with science is a long-term investment that should improve the social context for scientific practice. Conversely, however, scientists must themselves become more aware of public issues related to science, and of the public's need for more information about science. Some foreign sister organisations, such as the Royal Society (UK), have already shown that academies of science can play an important role in this regard. The Academy intends to open the doors of the Trippenhuis Building to a wider audience in the years ahead, an initiative that also entails promoting itself more with the public.

Be more open to the public

It goes without saying that as the 'voice of science' in encouraging national advances in science and scholarship and representing the interests of science in politics and society, the Academy requires a communication action plan. A plan of this kind would focus primarily on communication related to the topics covered in this strategic agenda, in particular the advisory reports and foresight studies, which must not only be timely in nature but also require implementation efforts.

The action plan should also focus on the Academy's activities for pupils in primary and secondary education. Communication can help draw attention to the Academy's views and activities and their impact. Providing information on science will be inherent to implementing the main points of the communication action plan.

**SUMMARY:**

**Agenda points with respect to communication, 2010-2015**

- Work on public engagement with science
- Open up activities at the Trippenhuis Building to a wider audience
- Focus more on the Academy's core activities in its communication action plan

## 7. INTERNATIONALISATION

Scientists and scholars increasingly work within an international context. As an organisation for national research institutes, the Academy wants its institutes to serve as the first point of contact in the Netherlands for international scientists and scholars. In terms of internationalisation, the Academy will join the VSNU and NWO in recommending and advocating a number of viewpoints that the Netherlands should put forward for the EU's Framework Programme for R&D. With respect to major research infrastructures, the ESFRI Roadmap for Research Infrastructures has acquired priority status with the governments of the EU Member States. The Academy intends to focus explicitly on the Netherlands' contribution to ESFRI projects in the activities it undertakes in connection with the Dutch Roadmap for Large-scale Research Facilities, in consultation with NWO and the Ministry of Education, Culture and Science.

### *Network organisations*

The national academies of arts and sciences have set up network organisations at various levels: European (All European Academies/ALLEA and the European Academies Science Advisory Council/EASAC) and worldwide (the Inter Academy Council/IAC and the Inter Academy Panel/IAP). In the Academy's view, the added value of these

networks is demonstrated primarily in their 'science for policy' advisory function: mobilising knowledge as input for major social issues.

Publication of  
IAC report

The Academy has observed that IAC reports can have a worldwide impact, and its contribution to the various network organisations will therefore focus on the publication of such reports. The issues involved are those in which the Netherlands can provide considerable expertise, such as water and water management. The Academy wishes to join the Chinese Academy of Science as a 'lead academy' in this area. It is, after all, vital for private and public parties in the Netherlands to gain international recognition of Dutch expertise in this field.

## 7.1 Bilateral and multilateral levels

Intensify existing co-  
operation with China

In cooperation with the Ministry of Education, Culture and Science, the Academy has played a leading role in the Netherlands in various research programmes carried out in cooperation with China and Indonesia. In addition to being the 'world's factory', China aims to become one of the most innovative countries in the world by 2020. That means that Dutch and/or European cooperation with China will grow increasingly important. The Academy has played a pioneering role in scientific cooperation for thirty years. In addition, it coordinates a multilateral network between Europe and China (FP6 CO-REACH project). The Academy intends to integrate and intensify both forms of cooperation with China, with closer coordination with NWO being necessary. In addition, cooperation between the Academy institutes and the institutes of the Chinese Academy/Academies will be intensified in a number of different areas.

### *Indonesia*

Supporting coopera-  
tion with Indonesia

The Netherlands has special historical ties with Indonesia. Cooperation in science gives Dutch researchers access to a rich and varied field of research. Thanks in part to the Academy institutes, the Netherlands also has the world's largest archive on Indonesia. The Scientific Programme Indonesia-Netherlands has led to scientific capacity-building in Indonesia. Given the international importance of research on green raw materials and biodiversity, infectious diseases and socio-economic development, cooperation in these areas will be supported. The Academy will also ask the Ministry to consolidate such cooperation.

The Academy and the Network of African Science Academies (NASAC) have developed a cooperation programme for capacity-building

(2010-2012). After this programme has ended, the Academy will consider whether and how it can continue its cooperation with the African science academies.

**SUMMARY:**

**Agenda points concerning internationalisation, 2010-2015**

- Participate selectively and actively in international network organisations
- Publish an IAC report on the topic of 'water'
- Advise on ESFRI projects on the basis of the Dutch Roadmap for Large-scale Research Facilities
- Reinforce existing cooperation with China
- Support relations with Indonesia

# 8. CONSEQUENCES FOR THE ORGANISATION

## 8.1 Organisation

Modernising the governance structure

Implementing this strategic agenda will make organisational changes necessary. The aims specified in this agenda require more decisive and efficient decision making from the Academy. This implies clearly separating the forum activities of the society from the powers of the various management levels. The Academy's governance structure will therefore need to be modernised in the years ahead.

Reorganisa-  
tion of Bureau

The new strategic agenda means that the Academy Bureau will be organised, with, for example, the units involved in advisory reports, foresight studies, quality assessments and evaluations undergoing a reshuffle. A distinction will be made between primary duties and secondary support tasks. The Bureau's work for the society's departments and sections will also be specified in more detail. These changes will have to be combined with the economy measures imposed by the Ministry of Education, Culture and Science, and all of the Bureau's departments will feel the consequences.

## 8.2 Review of budget allocation

The change in course and new activities described in this strategic agenda must be paid for with existing funds. In view of the economy measures imposed by the Ministry, this implies considerable changes to the internal budget.

There is no avoiding budget cuts with respect to society activities, the Bureau and the institutes. As several new and generous sources of funding for individual researchers have been established in recent years (the NWO's Innovational Research Incentives Scheme and Spinoza Awards, and the European Research Council's investigator grants), the Academy will reduce its own individual grants in order to free up funding for new activities.

The Academy has also been paying fixed membership fees to international associations and organisations for a number of years. In addition to reviewing other budget items (for example, Prizes, Grants and Funds), the Academy will also be taking a critical look at these fees.

### SUMMARY:

#### Agenda points concerning the organisation, 2010-2015

- Modernise the governance structure
- Reorganise and downsize the Bureau
- Review various budget items

## APPENDIX 1: Performance checklist, *Sustainable Science* Administrative Agenda, 2007-2010 Strategic Plan

### LEARNED SOCIETY

- Set up an internal committee in mid-2006 to present proposals in spring 2007 for revitalising the Academy's role as a forum. After decision making, start implementing proposals in 2008.  
*Achieved.*
- Review options and issues leading to a new internal investigation of the election system for the 2009 process.  
*Achieved. New election system will be implemented in the forthcoming planning period; see section 3 of this strategic report.*
- Evaluate the Academy Professorships Programme during the 2006-2007 academic year.  
*Achieved. Recommendations were adopted for the 2008/2009 round.*
- Evaluate the Academy Muller Professorships in the Humanities; report due in early 2007.  
*Achieved. The regulations and charter have been amended.*
- Feasibility study on developing and implementing an Academy Assistantships Programme. Report on feasibility due in early 2007.  
*Achieved. The Academy Assistantships Programme commenced in 2009.*

### ACADEMY ADVISORY REPORTS AND FORESIGHT STUDIES

- Ask the Advisory Function Committee to develop proposals for reorganising the structure and evaluating the working methods of the advisory councils and committees and improving coordination between them. Report due in spring 2007.  
*Achieved. Recommendations implemented in 2008.*
- In consultation with the VSNU, NWO and the National Board for Scientific Integrity (LOWI), define the LOWI's tasks in safeguarding the autonomy of researchers working on contract (implementation early 2007).  
*Not achieved.*
- Mid-2006, introduce the permanent Quality Assurance Committee to advise management on relevant policy outlines.  
*Achieved. The Quality Assurance Committee operated for three years.*

### RESEARCH ORGANISATION

- Improve strategic cooperation with Dutch and foreign universities and research organisations; determine strategy for selecting and intensifying such relationships. Plan to be ready in early 2008.

*Still under development; see section 4 of this strategic plan.*

- Starting in early 2007, explore the possibility of and develop a National Centre for Dutch Language, Culture and History, in which relevant Academy institutes and external parties participate. The Academy institutes are working on this particular development, but they are not focusing on a National Centre of Dutch Language, Culture and History; see section 4 of this strategic plan.

## **INTERNATIONAL COLLABORATION**

- Develop a guest researcher programme. Plan due in spring 2007 for introduction in 2008.

*Achieved.*

- Mid-2006, introduce the permanent International Policy Committee to advise management on relevant policy outlines.

*Achieved.*

## **INTERNAL AND EXTERNAL COMMUNICATION**

- Develop a communication policy and associated plan that has the Academy playing an active role in the public debate about science and technology and focuses on improving public engagement with research.

*Still under development; see section 6 of this strategic plan.*

## APPENDIX 2: Joint statement of aims by Academy, NWO and VSNU

### **Getting the Netherlands into the top five: how science can help**

How can the Netherlands achieve the aim set by Parliament and once more rank as one of the top five knowledge-driven economies in the world by 2020? The role of research on the road to success according to the three Dutch science organisations: the Royal Academy, the NWO, and the VSNU.

#### **STARTING POINTS**

1. Our modern knowledge-driven society cannot survive without outstanding education and a successful research sector, both public and private. That sector must be able to contribute to a robust knowledge-driven economy and cooperate on socially relevant issues.
2. The growing level of international competition is putting increasing pressure on the Netherlands' standing in the international rankings (see the 2008 advisory report by the Social and Economic Council of the Netherlands, *Duurzame Globalisering*).
3. The best researchers are increasingly mobile, and the international competition for outstanding talent is won by countries that are most appealing and can offer the best living and working conditions.
4. Funding for research and innovation is often spread too thin, and there are many different parallel - and often ad hoc - procedures for distributing research monies. That makes it difficult to achieve the necessary order of scale, harmony and continuity in research.
5. Innovation depends on our ability to go beyond the boundaries of our knowledge. There must therefore be scope for both fundamental and applied research.
6. Large-scale research facilities are crucial; they attract talent, excellence and innovative enterprises.
7. The number of students enrolled in higher education will increase by almost 40% up to 2020. Universities are working hard to reduce the number of drop-outs and to educate a new generation of scientists and other professionals.

#### **WHAT?**

1. Collaboration and economies of scale – closer cooperation at both national and international level between university groups and research institutes. In order to achieve the necessary economies of

- scale, decisions will be made and alliances formed in selected core areas, where relevant in cooperation with private partners.
2. Customisation and a high-performance culture – in higher education, and certainly at the universities, customisation and a high-performance culture will be encouraged.
  3. Curiosity and engagement – there should be scope for research driven by the researcher’s curiosity, and for research inspired by the challenges facing society. Both drivers are crucial to scientific and social progress.
  4. Harmony and transparency – we must harmonise our research expenditure and focus on scientific and social challenges by coordinating research evaluation and funding mechanisms more closely at national level and by making the procedures more transparent.
  5. Public support – education and science are crucial to our knowledge-driven society. Together with the public authorities, we – the representatives of the scientific community – will work on achieving broader and firmer support for higher education and science among the Dutch public.

## HOW?

1. Develop an investment plan that will take the Netherlands into the top five most competitive economies in the world. Make sure there is more research ‘mass’ and more ‘focus’ on scientifically and socially relevant fields.
2. Join universities, research organisations and enterprises in exploring which themes we should concentrate on to boost our international competitiveness and make the maximum contribution to solving social issues. Look closely at the way large-scale research facilities can be used and at the basic infrastructure needed to train talented young researchers.
3. Coordinate and organise funding for research aimed both at expanding our knowledge and making better use of it. Reduce the number of ‘intermediaries’ and make the procedures more transparent.
4. The universities, NWO and the Academy must account for the way research funding is spent, the results they achieve and the way in which they assess research.
5. The authorities, the Academy, NWO and the VSNU should encourage open access and in doing so make research results available to the public at large and to innovative enterprises.
6. Together with the public authorities, the Academy, NWO and the VSNU should work to increase public support for science and technology. They must highlight the contribution of fundamental and

applied research to important social issues. They must encourage discussion of the effects of research and what it can and cannot achieve, specifically research with certain ethical or health implications.

7. Aims can only be achieved if we invest. The road to the top five will involve catching up with competitive countries and creating the necessary focus and mass to engage in international competition. That will require extra investment, rising to a sum of EUR 1.5 billion a year. The extra funding can be applied towards:
  - improving the quality and basic infrastructure of scientific research;
  - helping to resolve social issues;
  - building large-scale research facilities.

To achieve these ambitions, a larger fixed percentage of the Economic Structure Enhancement Fund (FES) should be set aside to invest in knowledge and innovation.





