

SUMMARY

Introduction

This Academy advisory report is based on a motion of the Dutch House of Representatives from 2018 on the 'reevaluation of open competition'. 'Open competition' refers to the part of NWO's budget that is available to finance research proposals by scientists based on their personal academic curiosity. The motion implicitly suggests that NWO has relatively little money available for this purpose. 'Open research' will be juxtaposed with and next to 'thematic research' and 'talent-oriented research'. In the case of 'thematic research', a research theme is determined by, for example, the government or the business community, in consultation with NWO and the academic field. NWO's 'talent-oriented research' programmes offer financial support to outstanding scientific talents.

In this advisory report, the Academy uses the terms 'unfettered' and 'strategic' instead of 'open' and 'thematic'. These terms fit in well with the perception of scientists.

The Dutch Minister of Education, Culture and Science asked the Academy for advice in response to the motion in the House of Representatives. To this end, the following questions are addressed in this report:

1. *What is the desired relationship between unfettered and strategic research in competitive research funding?*
2. *What is the role of competitive funding compared with basic funding?*
3. *What lessons can the Netherlands learn from the above two relationships in foreign countries?*

4. *How does the development of academic talent relate to unfettered and strategic research and to funding flows?*

Unfettered and strategic research

Unfettered research is aimed at pushing the boundaries of scientific knowledge. This may take decades, a fact just like that it takes dedication, patience and perseverance. It is based on the curiosity and creativity of scientists and therefore requires a high degree of freedom. This involves not only thematic freedom, but also procedural freedom. In order to be able to make scientific discoveries, scientists must be able to determine both the 'what' and the 'how'. This requires trust on the part of society and is at odds with detailed management of academic research. The term 'unfettered' is a good reflection of these aspects.

Strategic research combines forces in the form of new or innovative combinations of academic research to address urgent challenges and developments. In doing so, participants have a shorter term in mind than what is sometimes needed to push scientific boundaries. The joining of forces and the combinations require the development of a strategy. In order to be able to carry out strategic research, the parties involved must make agreements about both the 'what' and the 'how'. In their experience, scientists are sometimes strongly bound by these agreements, as a result of which strategic research in their practice and perception is opposed to unfettered research.

Both unfettered and strategic research are very important for scientific, technological and societal breakthroughs. They are not mutually exclusive, on the contrary. Both types of research can place and keep the Netherlands at the forefront of academia. It also acts as a magnet for academic talent. This is of great importance for academic institutions and companies in the Netherlands, and for the establishment of new and growing companies in our knowledge society.

Knowledge society

Society is being faced by difficult societal challenges and at the same time by economic opportunities in the field of, for example, sustainable development, food security, safety, and the availability of public services. Scientific knowledge is essential to meet these challenges and to help develop new economic activities needed to compete in international markets. The future society must remain a knowledge society. Science has three important tasks to fulfil in this respect. The first is to develop new knowledge through scientific discoveries. The second is to act as a partner for companies, public authorities and civil society organisations to contribute

knowledge and insights for prosperity and welfare and social developments in research and innovation projects and as an advisor. The third is to train academics who are responsible for further knowledge absorption, production and application in companies, knowledge institutions and the government.

Working method

The Academy raised the above four questions mainly against the background of what should be done *now* for the knowledge society in one or two decades' time. Partly for this reason, the Academy's perspective was broader than NWO alone, and the focus is also on the role of the entire academic system.

The Academy has worked with NWO in order to obtain the best possible picture of the programming and funding of research and related aspects, such as success rates, the extent to which NWO can act as an independent administrative body (ZBO), and the relationship between unfettered and strategic programming. The Academy owes a debt of gratitude to NWO for this collaboration.

During the preparation of the advisory report, it became clear that NWO is in a transition process. On the one hand, this presented a challenge during the analysis of dynamic data, on the other hand, it also showed that NWO is moving with ambition in the directions that the Academy also advocates.

In addition to the quantitative analysis of programming and funding by NWO – the second flow of funds – the Academy carried out a qualitative analysis of programming and core funding of research at universities and institutes – the first flow of funds. The focus is also on several European countries and, in particular, the European Framework Programme for Research and Innovation. In all this, the Academy has consulted the field widely and in various ways. In this way, successive interactions could take place in which the direction and content of the advice were tested and formulated step by step.

Results

The current relationship between unfettered and strategic research

The majority of NWO's budget is laid down in running programmes. This limits NWO's flexibility to specifically fund new developments. As a result, NWO cannot quickly change the relationship between unfettered and strategic research.

Gradually, NWO started focusing increasingly on strategic rather than on unfettered

research. Although NWO's budget for unfettered research has increased slightly, the budget for strategic research has increased more sharply. The relative shares of unfettered and strategic research within NWO research funding are currently approximately one third and two third. The ratio between unfettered research and strategic research is therefore approximately one to two. The field experiences, however, that a smaller share of NWO's budget is available for unfettered research. This is because there are conditions attached to all forms of funding – there is no such thing as unconditional research funding. Scientists, particularly in strategic research, put a great deal of effort into meeting all the conditions for funding, and the trend that the field is experiencing as a result is that more and more conditions are being attached to forms of funding for both types of research. This is undesirable, a view shared by NWO, which has now set in motion a transition to limiting and simplifying conditions, as well as to reducing the number of programmes. The Academy is of the opinion that further simplification of the conditions for NWO funding is possible and desirable and expresses the hope that the field will soon be experiencing this.

The Netherlands wants to remain a knowledge society and science actively contributes to this with scientific discoveries, societal solutions, and highly trained academics. As the relationship between unfettered and strategic research narrows, the likelihood that science can continue to make a strong long-term contribution to the knowledge society through scientific discoveries decreases.

The role of competitive research funding in the academic system

The decreasing leeway for research at universities as a result of matching and the increasing number of students means that scientists are turning *en masse* to the funding programmes that NWO is making available. As a result, the success rates are too low. Competitive research funding currently has a strong steering effect on the use of the research part of the core funding of universities and there is high pressure on the academic system as a whole. A fundamental reappraisal by the universities is needed of the role of competitive research funding, both for strategic and for unfettered research.

Learning from foreign academic systems

The Netherlands can learn only limited lessons from relevant relationships in programming and funding and from development systems for scientific talent in other countries, because national academic systems vary widely and are determined according to national culture. In the United Kingdom, for example, the second flow of funds (UKRI – *United Kingdom Research and Innovation*) is approximately equal

to the first flow, while in the Netherlands and several other countries the ratio is approximately one to three. In addition, UKRI funds mostly strategic research, making British universities highly dependent on the ERC or other research resources for unfettered research. Due to the fierce competition in both the second and first flow of funds, the British system is also turbulent – the opposite of what the Academy considers necessary for a reliable and strongly performing system in the Netherlands in the short and long term.

European countries whose academic systems are more comparable to those of the Netherlands and which perform well or better are, for example, Germany and Switzerland. The German *research excellence strategy* programme offers more budget and budget security to universities and research schools selected on the basis of quality, including for scientists who are at the beginning of their scientific careers. The programme creates space at the basis of the German academic system and increases the possibilities for research. In Switzerland, the first and second flows of funds in terms of gross domestic product (GDP) are larger than in the Netherlands, and the share of strategic research in both funding flows is relatively small. Moreover, unlike the Netherlands, the increase in research funding in Switzerland is higher than the increase in the number of students. Although the academic systems of Germany and Switzerland are very different in design, they still provide excellent performance. What these countries have in common is relatively larger academic budgets than the Netherlands.

According to the Academy, the European Framework Programme for Research and Innovation is an inspiring example of research programming and funding. This programme is also better documented than many national programmes and allows for comparisons. What is particularly striking in the context of this advice is that the EU programme is based on three separate pillars. The first for unfettered research, the second for strategic research, and the third for industrial research and innovation. Moreover, in the current programme, *Horizon 2020*, the pillars for unfettered research and strategic research are approximately the same size. This arrangement and the unfettered research / strategic research ratio has established and proven itself in recent years and therefore forms the basis for the Academy, in conjunction with the qualitative analysis of a number of European countries, for advising NWO to continue the transition towards such an arrangement and ratio, i.e. towards two independent pillars, one pillar for unfettered research and the other pillar for strategic research, both of which are comparable in size. Because strategic research is as important as unfettered research, the budget for strategic research should not decrease and the budget for unfettered research at NWO should therefore at least be doubled compared with the current situation. Extra investments in unfettered research are highly needed. The Academy also notes that better and more sharply defined choices can be made within the strategic pillar, for example by seeking more synergy between programmes, e.g. between the NWA and the

KIC where possible. NWO can play a coordinating role in this in consultation with the field. More sharply defined strategic choices are essential in the realisation of convincing narratives regarding science and society as well as answering the question what kind of country the Netherlands wants to be. How can we translate our ambitions into a limited amount of large program areas connecting various scientific disciplines?

The development of academic talent

The careers of talented starting scientists suffer from 'projectification'. They try to progress from funding project to funding project in talent programmes of NWO (Veni, Vidi, Vici: the Talent Scheme) and the ERC (*European Research Council: starting, consolidator and advanced grants*) and recognition of their talent by the university depends on it, as if obtaining funding is the only or most important measure for talent. Universities confirm this projectification by often making appointments only after allocations in talent programmes, whether or not in the form of a *tenure track appointment*. Because of the low success rates, academic careers sometimes reach an impasse, which can result in a personal tragedy. As a result, the academic system and Dutch society are missing out on the academic and social returns on investments in academic talent.

Success in the talent programmes of NWO and ERC is very important and has brought the Netherlands a great deal, including attracting and retaining academic talent from abroad. Other countries often look at these programmes with admiration. The ERC's talent programmes are even inspired by the Talent Scheme. Nevertheless, the development of academic talent takes place primarily in interactions on the work floor of the university. That is where the first responsibility lies, and not with NWO. Nevertheless, universities often base their talent policy on successes in the NWO and ERC talent programmes. The talent scheme should be retained, but it is not a substitute for university talent policies. The Academy emphasises that many talented scientists have built up fine research groups through NWO and ERC talent programmes, but after they have finished, they have difficulties in continuing with their research line on the same scale and impact. This problem becomes more acute as the success rates of regular NWO rounds for unfettered research decrease.

With more stability and continuity in the Dutch research landscape, projectification can be combated and scientists can actively contribute to scientific discoveries and social developments at various stages of their scientific careers, with both greater job satisfaction and greater returns. The scope for this in the core funding should increase considerably compared with the competitive funding. This can be achieved in a way that is comparable with the *research excellence strategy* programme in Germany, adjusted according to Swiss principles of encouraging unfettered research

and, where necessary, adapted to Dutch culture. Preferably, a fund will be set up to support scientists through *rolling grants* throughout their research careers. Such a fund, while staying away from heavy competitive characteristics, would combat projectification, increase the scope for unfettered research and reduce the pressure on the academic system, including the success rates. An additional advantage is that this makes the Netherlands more attractive for domestic and foreign academic talent.

Conclusions

NWO has a key role in the balance between unfettered and strategic research

NWO can play a key role in the unfettered and strategic research ratio because the research that NWO funds has a steering effect on the research carried out at universities. NWO can use its position as an independent administrative body to monitor the balance between unfettered and strategic research in consultation with the academic sector, government and social parties.

Universities have a key role to play in talent policy

The university is and remains the first designated party in the selection and supervision of academic talent. The development of academic talent takes place in both unfettered and strategic academic practice. More important than the source of funding for this research is that talented young scientists do not get bogged down in projectification of research. A comprehensive vision of talent policy and of the different forms of funding for research throughout the academic career is required.

The government has a key role to play in obtaining the supplementary budget

The status quo cannot be improved on the basis of current research funding or by shifting existing resources. According to the Academy, this is possible only with a supplementary budget. In order to realise an equal pillar for unfettered research at NWO alongside that for strategic research, an additional structural budget in the second flow of funds is required. In addition, more budget is needed for unfettered research in the first flow of funds in order for universities to support scientists during their entire scientific career. The calculation of the actual size of a new and permanent *rolling grant* fund in the first flow of funds falls outside the scope of this advice. Moreover, additional research should first be carried out into the actual functioning and implementation of *rolling grant funds*.

Recommendations

To NWO

- In consultation with the funders, simplify the current conditions attached to the current research programmes, and bring new conditions more closely into line. Make further reductions in the number of research programmes. This will lead to a clearer research landscape.
- NWO should as an independent administrative body, together with the entire academic field and the ministries, focus on research programming in two equal and identical pillars: one for unfettered research and one for strategic research. For this purpose, the budget for unfettered research must be increased, which must not be at the expense of the strategic research pillar. This will require substantial additional investments in NWO.
- Identify the transition area between strategic and unfettered research programmes and preferably phase it out, or reduce it by providing clear explanations of programmes where appropriate. This will eliminate the perception of imbalance between the two pillars among scientists.
- In consultation with the field, bring about a combination of forces for strategic research programmes. A striking example is the Knowledge and Innovation Covenant (KIC) and part of the National Research Agenda (NWA). These are strategic programmes that tend to gradually gain budgetary ground over unfettered research, eroding the important foundation for major scientific discoveries. If they are used in conjunction, they can provide even more strength to the strategic pillar and they can lead to large program areas with an internationally attractive character.

To the universities

- Develop an integrated vision of talent policy and the various forms of research funding throughout the entire academic career.
- Carry out a fundamental analysis of the role of competitive research funding in academic research, both for unfettered and strategic research.

To the minister of Education, Culture and Science

- Based on further research, establish a new and permanent *rolling grant fund* in the first flow of funds to combat projectification, promote unfettered research, reduce pressure on the academic system, and ensure continuity. This investment will serve as an important driving force for the Dutch knowledge society in one or two decades' time.
- Give NWO more space to function as an independent administrative body (ZBO).