NWO measures to reduce application pressure

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1 Introduction

The huge increase in application pressure and the low percentage of projects awarded funding has gradually become a problem, both for researchers and for funding organisations. In many countries in Western Europe, the number of research applications has grown in recent decades while the research budget has increased only slightly, if at all. The same is true in the Netherlands. The NWO budget for 2016 was €810 million, but a large proportion of this was earmarked for specific purposes such as Talent Development (€160 million), Large-scale Research and ICT Infrastructure (€55 million) and Encouraging European Research (€50 million). The non-allocated funds include basic funding for the NWO institutes (€95 million) and reserved funds for specific Top Sector programmes in a public-private partnership (PPP) context (approx. €100 million for pre-defined PPP activities in the Knowledge and Innovation Contract). The remaining funds for innovative, curiosity-driven research and for research into societal challenges, as described in the Dutch National Research Agenda, are consequently very limited[1].

To strike a reasonable balance between applications and projects awarded funding, NWO aims for an award rate of at least 25% (NB: the average award rates in Germany and Switzerland are 37% (for the DFG) and 43% (for the SNF), respectively). With the currently available NWO funds, the award rate is around half of the 25% target.

The results of the above are that researchers now have to invest much more time in order to write a successful application, while also being asked to peer-review increasing numbers of project proposals, and that funding organisations are receiving growing numbers of proposals for assessment, with ever lower award rates. The fact that this problem also affects almost all of the Netherlands' neighbouring countries suggests that, in addition to country-specific explanations, there are also certain generic factors inherent in the current trends in the international scientific field.

To understand the reasons for this growth in application pressure, NWO organised three conferences. Their purpose was a) to gain insight into the reasons why application pressure has increased in recent decades, b) to identify measures to reduce application pressure and increase the award rate, and c) to increase the efficiency of NWO procedures for assessing proposals. The conferences were:

- A national conference on 4 April 2017 to gather input from the scientific community, government ministries and knowledge institutions and to discuss underlying reasons and possible solutions. A report of this conference is available (in Dutch) via the NWO website[2].
- A meeting of NWO experts on 22 May to discuss the results of the conference on 4 April.
- An international peer review conference on 29-30 June, at which funding organisations from 25 countries met to exchange experience and discuss joint action. The conference presentations and a report of the main conclusions and recommendations are available via the NWO website[3].

[1] For a complete overview of the allocation of NWO funds, see the NWO financial statement for 2016 (assets).

[2] https://www.nwo.nl/beleid/nwo+werkconferenties+2017/nationale+werkconferentie

[3] https://www.nwo.nl/en/policies/nwo+conferences+2017/international+conference

This memorandum summarises the main results and the proposals for tackling application pressure that were adopted by the NWO executive board. These proposals were discussed with the council of university rectors of the Association of Universities in the Netherlands (VSNU) on 29 August 2017. The rectors unanimously accepted the content of this memorandum and its proposals.

General remarks

Data from the Rathenau Institute[4] show that NWO's assets and direct government funding for universities have increased in the past ten years. However, this does not mean that funding for research has also grown.

For the universities, the growth in direct government funding is the result of an increase in the number of students enrolled. This led to a net deficit in education funding, which the universities then offset through the use of research funds, at the expense of investment in research. As a result, almost all government-funded PhD students at the universities have disappeared and a major gap has opened up in the infrastructure (especially equipment for scientific research).

For NWO, the increase in assets is mainly the result of additional funds that are not freely available for research. These include the Encouraging European Research funding (funds to compensate research institutes for overheads incurred during participation in Horizon2020 and ERC). In addition, since 2011 a proportion of NWO funds has been earmarked for Top Sector policy, reducing the funding available for innovative, curiosity-driven research. The loss of the Economic Structure Enhancing Fund in 2011 and the "Plasterk discount" (transfer of €100 million from direct to indirect government funding for the benefit of the Talent Scheme) did not generate a sudden increase in application pressure at NWO. However, combined with the phasing out of the Economic Structure Enhancing Fund, it did lead to a gradual reduction in research capacity at the universities.

Regarding the Talent Scheme, the award of a Talent Scheme grant means much more than just funding to carry out research; it also brings prestige and opens many doors for the recipient. This makes the Talent Scheme even more attractive, generating a higher volume of applications. This fact, combined with the fact that the universities have been very successful in attracting funding from industry, which can only be used for temporary staff, significantly increasing the numbers of PhD students and postdocs at Dutch universities, explains the huge pressure on applications under the Talent Scheme.

Besides the trends described above, which are specific to the Netherlands, there are also several trends of international importance. More and more research is being conducted in an international context: researchers are increasingly reliant on the use of national and international research facilities where they work with colleagues from the Netherlands and beyond to address scientific and societal challenges. This has led, for example, to fierce competition for measurement time at research facilities and for funding to finance research. The effects of this increased competition include a rise in the number of research applications.

Another important factor is the introduction of the tenure-track system, which has gradually been introduced throughout Europe[5]. This system has established uniform criteria regarding the quality and quantity of publications, teaching performance and recruitment capacity. The requirements concerning both recruitment capacity and high-quality scientific output are increasingly inducing

[4] https://www.rathenau.nl/nl/page/aanvraagdruk-bij-nwo

[5] Explanation (source: VSNU website): *Researchers on a tenure-track must prove that they are good enough to be appointed to a university's permanent academic staff within a certain period of time. Researchers often move up through the ranks from assistant professor to associate professor and ultimately professor based on proven ability, although this is not always the case.*

young researchers to write research proposals. All of this has led not only to a higher volume of applications, but also to a substantial increase in the quality and quantity of scientific output. The increase in national and international competition is a key factor, which explains why the level of science in the Netherlands and beyond has risen without an accompanying growth in funding. Competition increases the quality and quantity of scientific output, but if competitive pressure becomes too high, it can also have negative consequences. Currently, the balance appears to have tipped:

- The keen competition and heavy teaching burden for university staff places them under enormous pressure, making the Netherlands less attractive to excellent researchers.
- Young researchers starting a scientific career with a Veni or Vidi project often become stuck because there is little or no funding to continue their research after the end of the Talent Scheme grant. This is a source of huge frustration.
- The high application pressure and low award rates mean that research funding is allocated almost exclusively to projects with a reasonable certainty of generating results. As a consequence, truly innovative but high-risk projects are rarely considered for funding. This is stated very explicitly in the evaluation by the Technology Foundation STW[6] (now Applied and Engineering Sciences domain), in which the evaluation committee observed that important research which currently entails too much risk for companies, but is nevertheless crucial because it lays the foundation for new applications in five to ten years' time, is no longer taking place.
- Finally, a special point of concern is the question which researchers can submit applications to NWO. As part of a tenure-track appointment, several requirements concerning recruitment capacity must be met. This requires that tenure-track staff with temporary contracts must also be able to submit applications to NWO. However, this conflicts with the NWO requirement that an applicant awarded project funding must be able to guarantee coordination of the project and be able to supervise PhD students (and/or postdocs assigned to the project throughout their appointment.

[6] https://www.rijksoverheid.nl/documenten/rapporten/2016/09/05/evaluatie-stichting-voor-de-technische-wetenschappen

2 Conclusions and measures

This overview contains the main results discussed by NWO in the working conferences and assessed in the VSNU council of university rectors. It concerns (1) measures that NWO will develop and implement, (2) measures that NWO deems to require additional research before being considered further, and (3) measures that NWO will not implement (for the time being). NWO's considerations on each measure are shown in bold type. Finally, the overview contains (4) a number of related measures regarding "selection criteria and other arrangements".

1 Measures that NWO will develop and implement

Award rates

NWO aims to ensure that award rates are no lower than 25%.

If NWO expects the award rate for a call to fall below 25% due to a lack of funds, it will postpone the call until sufficient funds are available, in accordance with the policy applied previously by Technology Foundation STW (and now by the Applied and Engineering Sciences domain). For the time being, this measure does not apply to applications under the Talent Scheme.

1.1 Experiments regarding application pressure

New model for consortia formation

Regular NWO procedure is that a call is issued and, if consortia A, B and C all emerge as excellent proposals after a review procedure, the proposal that scores highest is selected. NWO plans to experiment with a model whereby a committee enters into discussions with consortia A, B and C to try to combine the best elements of each. The benefit of this is that the best expertise, ideas and facilities are brought together. But it should be noted that an individual who is part of the consortium given the highest position in the ranking may not be included in the final allocation. This sometimes taxes the resilience and loyalty of researchers and colleagues, and requires the supervision or selection committee to proceed carefully.

NWO has decided to experiment with a new model for a limited number of funding instruments. The model is to be used mainly at the start of consortium formation. This proposal will not immediately lead to a major reduction in research applications, but it will encourage more efficient use of funds and increase the quality and impact of the research.

Connection between NWO calls and EU calls

Discussions with the executive boards of the Dutch universities revealed that a number of boards were in favour of coordinating ERC calls and Talent Scheme calls. The advantage of this is that researchers only have to write a single application instead of two (e.g. Vidi and ERC Starting Grant).

NWO reserves part of the Talent Scheme funding to fund researchers who receive an excellent assessment and score highly in ERC Starting Grant and ERC Consolidator Grant applications but, due to limited financial resources, are not awarded a grant. This applies unless a Talent Scheme application was also submitted in that year. If the latter was the case, the outcome of the Talent Scheme application assessment applies. In order to make optimum use of available funds, the deadlines and schedules for awards under Talent Scheme calls and ERC calls are coordinated. The advantage is that researchers submit either an ERC proposal or a Talent Scheme application; this leads to a reduction in applications for the Vidi round in particular.

Embedding guarantee in Veni and Vidi

The main criteria on which proposals under the Talent Scheme are assessed are the quality and past performance of the researcher and the scientific merits of the research proposal. In addition, however, the embedding of the research is a key factor that also determines the success of a project. Where research is conducted in an environment with advanced infrastructure and/or other experts who can contribute their expertise to the success of a project, the chances of success are many times higher than where research is conducted alone. The NWO assessment criteria will therefore include the scientific setting in which a project is to be carried out. Institutions can issue an embedding guarantee to confirm their commitment to carrying out a project in their organisation. Embedding guarantees are intended to ensure better alignment with the institutions' personnel policy.

NWO has decided to include the scientific embedding of a project as a criterion when assessing Talent Scheme research proposals. This is in line with NWO's view that the team is as important as the individual to the success and continuity of a research group. To this end, one institution should give a guarantee that, if the project is awarded funding, the university in question will issue an embedding guarantee by pledging a post appropriate to the career stage of the candidate, such as a tenure-track position if a Vidi project funding is awarded. The guarantee will be issued by the institution where the research is to be carried out (the current or another institution). This measure will lead to a reduction in the number of Talent Scheme applications.

1.2 Arrangements with universities

Personnel policy

Institutions should take more control of and diversify their personnel policies by valuing and supporting other career paths, such as careers in scientific education or outside the university. In addition, the universities themselves should pursue a more active policy with regard to application pressure: they should encourage their best candidates to develop proposals, and encourage researchers with fewer opportunities to develop themselves or their ideas further before submitting a proposal. This will lead to a reduction in application pressure and allow researchers to spend more time on research and less time on research applications.

For researchers seeking a permanent post, the requirement or condition of having had an application accepted by NWO should be dropped. The award of an application under the Talent Scheme is currently decisive in being appointed. Even if an application was assessed as scientifically excellent but was not awarded funding due to a lack of financial resources, a permanent appointment should nevertheless be possible if the candidate's expertise and qualities contribute to strengthening the main focus of an institution.

NWO will initiate discussions with the VSNU to make arrangements concerning the role of NWO and the universities in personnel policy, the universities' part in reducing application numbers and the role of project awards in this respect.

Feedback to knowledge institutions

NWO expects knowledge institutions to pursue a targeted personnel policy with regard to attracting young talent. It also expects them to pursue a selective approach in encouraging the best researchers and consortia to submit applications to NWO. To give knowledge institutions feedback on their success, NWO will provide them with more detailed information on research proposals submitted and the results of proposal assessments. The information will be broken down by discipline and include details of the number of applications submitted, institutions' award rates for each funding instrument, and award rates in different research fields.

NWO has decided to provide the institutions with more detailed annual information on the assessment of their submitted proposals and award rates, broken down by funding instrument and research area. To this end, NWO will first conduct an inventory of the universities' wishes regarding feedback, and then draw up a proposal to be discussed with the VSNU.

Criteria for applicants and tenure-track

As part of a tenure-track appointment, several requirements have to be met concerning recruitment capacity. This requires that tenure-track staff on temporary contracts must be able to submit applications to NWO. This conflicts with the NWO requirement that an applicant awarded project funding must be able to guarantee coordination of the project and be able to supervise PhD students and/or postdocs assigned to the project throughout their appointment.

NWO has decided that, when awarding a project to a staff member with a tenure track appointment, the university must first appoint a sponsor and/or supervisor to guarantee the continuation and supervision of the project if the staff member in question leaves the university prematurely.

2 Measures that NWO deems to require additional research

2.1 Experiments regarding application pressure

Application limit after receipt of grant

The consequence of "choosing safely" due to scarcity of funds is that excellent researchers are more likely to obtain funding for large research proposals than talented young researchers at the start of their careers. In some cases, this leads to an undesirable accumulation of grants by the same person (the "Matthew effect"). Outside the Netherlands, measures have already been taken to prevent this. In Switzerland, for example, researchers are permitted to hold only one grant from the Swiss National Science Foundation at any one time. However, the size of the grant can vary.

In consultation with the VSNU, NWO will investigate how the Matthew effect can be avoided as much as possible.

Self-Organized Fund Allocation (SOFA[7])

SOFA is based on two principles: (i) funding individuals rather than projects, and (ii) distributing financial resources based not on the opinion of a small number of reviewers but on the wisdom of the crowd. Under the SOFA model, each researcher is allocated a fixed amount but is required to donate part of it (e.g. 50%) to other researchers who are doing the most promising and important research. The basic principle here is that the researchers themselves know best who their most competent colleagues working on the most important research questions are. Experimenting with SOFA requires a substantial input of funds over several years before a proper evaluation can be carried out (at least €100 million per year over five years). Before an experiment of this extent can be carried out, several other questions need to be answered, such as:

- How to prevent and/or detect researchers giving money to their friends? How to avoid conflicts of interest when allocating funds? How to deal with the fact that some fields of science are "more expensive" than others due to costly scientific infrastructure? How, in this model, to strike a good balance between curiosity-driven research and thematic, applied research?
  - How to prevent the Matthew effect, whereby disproportionate amounts of funding go to established researchers to the detriment of unproven young talent?
- If an experiment is launched, which research fields or sub-fields are the most suitable for conducting a pilot project?

Committing a large amount of NWO funds to such an experiment over several years is currently regarded as premature. NWO is prepared to provide limited funds for the appointment of a few PhD students who would conduct a more detailed analysis of the SOFA model in order to answer the above questions and to investigate whether and/or in which circumstances the model might be useful. If the SOFA model were to be deemed suitable for specific purposes, this would significantly reduce the effort involved in writing and evaluating research proposals.

Talent Scheme preselection based on applicant's CV

At the national conference on application pressure, it emerged that researchers were positive about the introduction of preliminary proposals (i.e. brief initial applications) to limit the time investment needed to write an application. This move relates mainly to funding instruments for personal grants, such as the Talent Scheme. NWO has gained ample experience with the use of preliminary proposals, for example within the Vici and Research Talent rounds. The experience in these rounds has been that, despite the shorter application form, it still takes researchers a relatively long time to prepare a preliminary proposal. This is because even a preliminary proposal has to provide relatively detailed information about the research proposal, which requires knowledge of the full proposal. A recent internal analysis of Veni grants within the Social Sciences and Humanities domain showed that 8% of Veni awards are made to proposals from applicants in the bottom 40% as regards their CV (and 2% of awards to the "poorest" 30%). This result suggests that a significant reduction in effort can be achieved by preselecting researchers based on their CVs, and that the associated risk of excluding excellent proposals is very small.

NWO will further investigate the options for using preselection based on CVs for Veni applications and will ask the Social Sciences and Humanities board to continue the preliminary study on this topic, extending it to Veni applications in other fields. The results of this more detailed analysis will serve as a basis for further decision-making by the NWO executive board. Any decision to introduce this measure would be a first step in reducing application pressure, resulting in researchers spending less time writing applications, especially in the Vidi round.

[7] http://www.sciencemag.org/news/2017/04/new-system-scientists-never-have-write-grant-application-again The SOFA model developed in the USA is gaining attention in the Dutch academic world thanks to the advocacy of ecologist Marten Scheffer.

3 Measures that NWO will not implement (for the time being)

3.1 Experiments regarding application pressure

Drawing lots

Some countries are experimenting with the drawing of lots for research proposals. In Germany, the Volkswagen Stiftung is conducting a study of double-blind assessment, in which the regular peer-review procedure and drawing of lots take place in parallel. An initial evaluation is expected in a few years' time. A double-blind experiment with drawing of lots is also being carried out in Denmark[8], and the Health Research Council in New Zealand is experimenting with drawing of lots after a preselection process.

NWO is not convinced that the objective of funding only excellent proposals can be achieved by drawing lots. This view is widely shared within the scientific field. NWO has decided to await the results of the above-mentioned experiments before conducting its own experiment with drawing lots.

Quotas

Various parties have proposed setting a maximum number of proposals per institution that may be submitted under a Call. For example, the size of a quota may be based on the total number of successful proposals in a Call over the past four years. This assumes the ideal award rate of 25%.

Because the knowledge institutions are strongly opposed to the introduction of quotas for submitting research proposals, the executive board has decided not to proceed with such a measure for the time being.

[8] http://mbg.au.dk/en/research/international-top-research/villum-foundation

4 Related measures: selection criteria and other arrangements

Evaluation of instruments to select and encourage the best research

During the international working conference on peer review, participants concluded that funding agencies around the world use very different criteria and procedures in order to assess research proposals. Strikingly few of these criteria and procedures are evidence-based. This is partly surprising, because NWO expects all claims made in research proposals to be firmly substantiated by references. If NWO's aim is to use efficient and targeted procedures to fund the best and most challenging research proposals with major social impact, then it should also evaluate whether the intended objectives are being achieved. This will require examination of the procedures and criteria used, with regular evaluation. This should be done in an international context from the outset, as there is a significant global need for this type of research and because this will provide sufficient data for reliable analysis in shorter time. In relation to this it is important to note that the number of researchers willing to assess research proposals is diminishing rapidly, and that although peer review seems fit to establish scientific impact it is not suitable as a predictor of social impact.

NWO has decided to provide funds for research to evaluate the (internationally accepted) criteria for calls and assessment procedures; this will enable NWO to proceed in a more evidence-based manner in order to achieve its objectives. NWO will assume a coordinating role in this regard within Europe. A number of people within NWO will be entrusted with these evaluations.

Research under the Knowledge and Innovation Contract

A recent analysis by Dialogic, commissioned by the Ministry of Economic Affairs and Climate Policy[9], found that the extent to which the development of groundbreaking innovations is guided within Top Sector research has remained limited to date.

NWO has therefore decided that:

- All calls within the framework of the Top Sector policy that involve NWO funds should be realised via NWO. This is laid down in the Knowledge and Innovation Contract concluded by NWO on behalf of the Dutch Ministry of Economic Affairs and Climate Policy and the Dutch Ministry of Education, Culture and Science.
- The NWO domains will critically review the assessments of projects in Top Sector calls and ensure that scientific quality, in addition to connection with users within a consortium and the strength of a consortium, remains paramount or is included even more explicitly in the assessment.

[9] https://www.rijksoverheid.nl/ministeries/ministerie-van-economische-zaken/documenten/rapporten/2017/04/07/evaluatie-topsectorenaanpak-deel-1-hoofdrapport