

Excellence is extra-ordinary

Thirty years of focus on excellence in Dutch science policy



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Cover photograph

Spinoza Prizes waiting to be presented. Photograph ANP

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Foreword

What is excellence in science? We all have our own picture of what it means. A remarkably brilliant researcher who discovers things that others would miss. And as a result helps add to our thinking about human beings and the world we live in.

For thirty years, we in the Netherlands have sought to encourage research talent and excellence. Additional resources, initially from Dutch sources of science funding and subsequently also from European funding organisations, have been awarded. The best brains are peer assessed, in competition. When I was still working at the university, I saw for myself how this system boosted dynamic development and created space for young researchers.

Thirty years later, according to the various stakeholders, the system is starting to reveal its downside. These observations have led the Rathenau Instituut to investigate the mechanisms behind this form of funding. We have carefully gone through all the figures, undertaken desk research and held interviews with the 'winners' and 'losers' of excellence grants. We have also examined the operation of the selection instrument and its effect across the board, on the work undertaken by universities.

At the end of this investigation, little is left of the picture of the unique, brilliant individual. In fact, what our study shows is that the additional funding is used by successful groups to secure their own continuity. Together they work to ensure that someone from their group also achieves success in the next round. The way in which the funding is allocated is not beneficial for all types of research. The emphasis on excellence has also led to less appreciation for education and knowledge sharing with other disciplines, and with parties outside the university. The interviews also show that groups that have not received this form of funding can also be successful. They obtain their funds from Brussels, or by carrying out projects on behalf of third parties. On the other hand, they are required to go along more with the wishes of their financial backers and have less autonomy in respect of university policy.

The system of funding excellence has proven extremely successful. However, the effects of thinking in terms of excellence and non-excellence are due for an overhaul. 'Team science', smaller groups, co-creation, interdisciplinary processes and research that arises outside the mainstream and that is perhaps not yet valued by peers also demand attention. As do education and the utilisation of knowledge. Alongside excellent and extraordinary, the ordinary still continues to exist. And we in the Netherlands need that, too.

Dr. Melanie Peters
Director Rathenau Instituut

Summary

In everyday usage, excellence means ‘very good indeed’. In the academic world and in science policy, the term has a more specific meaning. In those fields, it refers to the pushing of boundaries and achieving breakthroughs in research. Excellence refers to research that comes out as the winner in the competition for money and attention. Excellence also refers to those researchers who stand head and shoulders above all others, in that competition.

Background to this report

For thirty years, fostering excellence in science has been a key objective of Dutch science policy. Over the years, ever more policy instruments have been added, in the form of grants and prizes.

Today, excellence has become an essential core value – after all, no one can object to excellence. At the same time, many people see this focus on excellence as the cause of a development within science that they do object to: increased competition, the pressure to publish, and the ever greater discrepancies in the allocation of research funding among research groups.

These developments form the background for this report.

Purpose, questions and approach

In this report, the Rathenau Instituut describes the effects of a set of policy instruments that encourage excellence in science, such as the Innovational Research Incentives Scheme, or Talent Scheme, (with the Veni, Vidi and Vici Grants) and the ERC Grants from the European Research Council. The aims of this report are to give an insight into the effects of the excellence policy on research practice, and to offer perspectives for adjusting that policy.

We address two questions. The first relates to the way in which excellence in research is fostered: does it deliver the intended result, and is it effective? The second considers the various tasks of the universities: does this one-sided focus on excellent research upset the balance at universities?

The results and conclusions of this report are based on an analysis of quantitative and qualitative data. We have used the following sources:

- policy texts and political debates;
- figures collected systematically by the research funding bodies;
- more than fifty interviews with researchers;
- discussions with other stakeholders; and
- scientific literature and previously published reports.

Effective excellence policy: big impact with limited budget

This analysis shows that the policy for scientific excellence has been effective, over the past thirty years. Despite their limited budget, the grants and prizes exercise a strong guiding influence on the science system and the performance of research groups. This impact is in line with the objectives of the excellence policy. The policy has resulted in:

- the selection of a relatively small number of researchers;
- the concentration of resources within this group; and
- differentiation between research groups with ample funding and those with a restricted budget.

It has emerged that excellence funding gives researchers and research groups a relatively considerable degree of freedom to set their own course and lay down their own research lines. Furthermore, success breeds success, thereby creating opportunities for acquiring new excellence funding and ensuring continuity.

Unintended effects of the excellence policy

In addition to the intended effects, the policy has revealed three negative consequences:

1. The system of allocation of research budgets on a competitive basis is becoming increasingly costly and time-consuming. The quality differences between many grant applications are so minimal that coincidence and luck are becoming important factors in the awarding of grants. Furthermore, the reputation of a grant applicant starts to play a role: a previous winner has a greater likelihood of receiving a new grant or prize. Together this raises the question of whether the selection process is still effective and efficient, and whether it truly selects on the basis of innovation and talent.
2. The focus on excellent research leads to less attention and appreciation for the other core tasks of the university: education and knowledge exchange. It is also at the expense of other valuable research that fails to satisfy the dominant ideas on what is excellent, and as such also fails to satisfy the criteria of the excellence programmes. As a result, for example, individual, interdisciplinary, interactive and non-mainstream research easily becomes disadvantaged.
3. Research groups without excellence funding feel constant pressure to acquire precisely that form of funding, which in turn only further increases their pressure of work. This not only relates to financial necessity, but also the status furnished by such grants and prizes.

Options for adjustment of the excellence policy

Where should we go from here? One possibility is to continue on the present course. In that case, disadvantages such as constant pressure from competition and the lower status of education and knowledge exchange are simply the price that has to be

accepted in return for a leading position in the academic rankings. It is highly questionable whether this option is in fact tenable. The unintended side effects are broadly recognised as clear obstacles, and represent sound reasons for investigating possible alternatives.

One alternative option is to no longer employ excellence as a general standard but to (once again) reserve its use for the truly exceptional; for what stands out above all others. This would require universities to concentrate on ‘sound scientific research’: sound research is good while excellent research is truly exceptional – and as such not the standard that everyone should be expected to meet. It would also call upon the funding bodies to give excellence programmes a truly exclusive character, for example by considerably reducing the budget for the Talent Scheme, thereby freeing up funds for spending elsewhere.

Another possibility is to introduce differentiation into the term excellence rather than restricting its scope. Instead of applying the designation ‘excellent’ exclusively to excellent fundamental research, which is published in leading scientific journals, making sure it is also applied to excellent education, remarkable forms of cooperation, exceptional valorisation activities, etc. After all, a university that meets a variety of societal needs can certainly stand out in more than one dimension. Introducing differentiation to the term excellence could help re-establish the balance between the tasks of the universities. Such an approach does however engender the risk that a number of bottlenecks, such as the high costs of budget allocation and the emphasis on performance measurement, will also start to emerge with regard to the other tasks of the universities.

This report in no way calls to scrap policies aimed at research excellence. There are many good reasons to create space for excellent research and talent development. However, it does call upon all stakeholders – researchers, administrators, managers, funders and policymakers – to reconsider the meaning of excellence in today’s academic context, and to reconsider how to foster excellence. The challenge is to arrive at a vision of a balanced relationship between the various tasks of the university, and then translate that vision into appropriate forms of funding.

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Introduction

'In order to promote the desired international reputation and excellence, task distribution and the creation of spearheads within university research are essential.' This quote from 1989 is still current today. It is taken from the *Policy document on science for the nineteen nineties* [*Nota wetenschapsbeleid voor de jaren negentig*] of the then Minister of Education and Sciences, Wim Deetman (Dutch House of Representatives, 1989: page 22). Still today, excellence is of vital importance in Dutch science policy. However, this policy document was one of the first occasions on which excellence was referred to as a specific policy objective in a political context.

Naturally, improving the quality of scientific research had been an element of science policy for far longer. However, around 1990, excellence as the superlative form of quality achieved full prominence on the political agenda. The Netherlands had to compete with top scientists from other countries, such as the United Kingdom and the United States. From that time onwards, there was an ever greater focus on excellence in Dutch science policy. That in turn led to the introduction of a series of policy instruments aimed at encouraging scientific excellence. It was however not always referred to in precisely those terms. The *2025 Vision for Science: choices for the future* [*Wetenschapsvisie 2025*] published in 2014, referred to 'world-class science' as one of the three key objectives of the policy.

A focus on excellence also emerged in other western countries. Scandinavian countries, for example, saw the establishment of Centres of Excellence, in which collaborative groups of the best researchers were financed over longer periods. Germany established the *Exzellenzinitiative* (and later the *Exzellenzstrategie*), according to which a select group of excellent research clusters, research schools and institutions received additional financial support. Excellent science is one of the three pillars of the science policy of the European Commission. Since 2007, the European Research Council (ERC) has been funding excellent research across the whole of Europe.

Excellence: a specific term in the academic world

In everyday usage, the word excellence means little more than 'very good indeed'. In the academic world, however, it has acquired a very specific meaning, determined by a combination of university culture and science policy. Our research confirms that in that context, the term excellence is determined by the following seven points.

1. **Excellence is a term that mainly refers to research and researchers.**
In principle, education, knowledge exchange and management can also be deemed excellent, as can the people who provide them, but in practice they are rarely referred to by the term.
2. **Excellence is associated with fundamental and innovative research, with the pushing of boundaries and achieving breakthroughs.**
Applied research or replication research can also be excellent, but in practice the term is far less often associated with these forms of research.
3. **Research and researchers who stand out above all others are excellent.**
For that reason, excellence can only be determined by comparison – and therefore via competition (for research funding, for publications). A focus on excellence is intrinsically linked to competition, in the academic world.
4. **Competition here mainly means competition between individual researchers.**
At issue is the ground-breaking research programme or research project that helps scientists achieve major steps forward; it is the talented individual researcher who rises above ground level.
5. **Competition above all refers to national and European competition for research funding.**
The (direct) funding available at the level of faculties and institutions is mainly used for buildings and salary costs for tenured staff.
6. **To compare research and researchers, excellence must be observable and measurable.**
Otherwise there is no competition. A focus on excellence in the academic world has therefore led to huge attention for the registration and measurement of performance (both delivered and to be delivered).
7. **To be able to measure excellence, uniform yardsticks are required.**
These are essential for comparing ‘apples with oranges’ – after all, no two studies are exactly the same. More or less uniform yardsticks have been found in publication and citation indexes for past performance and in checklists and points systems for the assessment of research proposals.

In short, whereas in everyday usage excellence has a relatively broad meaning, in the academic world the term is extremely specific. Furthermore, in the world of academia, excellence is perceived as being very important, as a result of the university culture, strengthened by the process of internationalisation in the academic world and backed up by science policy.

The implication is that research is important above all else. More specifically fundamental research. That in turn makes competition between researchers at national and European level important, and that explains the importance of measurable and comparable performance.

Between core value and criticism

Research excellence is a core value in the academic world. For almost thirty years, it has played a central role in Dutch science policy. Researchers seize the opportunities offered by this type of funding for fundamental and innovative research. Furthermore, the Dutch excellence policy serves as an example for the European Commission. And – perhaps for that very reason – researchers from the Netherlands also perform well in European competitions such as the ERC. However, over the past few years, the interpretation of excellence and the operationalisation of the term in both policy and practice have started to become problematic. Many comments regarding science in the Netherlands are related to the focus on excellence.

In 2013, academics in the Netherlands call for action. The Platform for the Reform of Dutch Universities [*Platform Hervorming Nederlandse Universiteiten*] (H.NU) published a petition entitled *Naar een andere universiteit* [Towards a different university] (H.NU, 2013). There is unrest among academics in particular regarding the level of mutual competition and the high workload. Furthermore H.NU expresses concerns regarding the overemphasis on quantitative output criteria and the related increased pressure to publish. It argues that these developments are to the detriment of attention and appreciation for the content of research and the contribution of researchers to society. The initiators of *Science in Transition* publish a position paper entitled *Why science does not work as it should and what to do about it* [*Waarom de wetenschap niet werkt zoals het moet, and wat daar aan te doen is*] (Science in Transition, 2013). In this paper, they argue that researchers have become economically dependent on publications, that time, money and talent are being wasted and that there is insufficient attention for the societal relevance of research. They suggest that education is the victim of the pressure to above all excel in the field of research.

Shortly afterwards, the newspaper NRC Handelsblad headlines, '*Overspannen hoogleraren door publicatiedruk*' [Professors stressed out by publication pressure] (Aan de Brugh, 2014). Psychiatrist and PhD candidate Joeri Tjeldink investigates the mental wellbeing of professors of medicine, and concludes that many of them are highly driven, eminently competent and extremely ambitious, and that approximately one quarter of them shows symptoms of burnout. The primary cause is excessive publication pressure. Later, in a somewhat facetious article, Tjeldink and his colleagues suggest a new syndrome: *Publiphilia Impactfactorius* (Tjeldink et al., 2017). Studies into psychological problems among PhD candidates are published more recently (Van der Weijden et al. 2017).

The idea that the focus on publication has become disproportionate is nothing new. The term 'to publish or to perish' is widespread at least since the middle of the last century (Garfield, 1996). However, the pressure to publish has become ever greater, partly because it ties in so perfectly with the New Public Management (NPM) philosophy that made its way into higher education from the 1980s onwards. NPM is typified by management on the basis of a limited set of quantitative performance measures, such as number of publications, number of citations or numbers and total amount of grants obtained - this to the detriment of attention for the content or the process.

Members of the Dutch House of Representatives share the concerns of academics, and regularly ask parliamentary questions of the Minister. The Association of Universities in the Netherlands (VSNU), as representative of employers in the academic sector, has focused its attention on work pressure (SoFoKleS, 2017). The subject is also covered within the sector collective labour agreement. It is clearly on the agenda.

The allocation of the budget

There is not only dissatisfaction with the increase in competition pressure and the focus on research to the detriment of education and knowledge exchange, but also with the way in which the research council, Netherlands Organisation for Scientific Research (NWO), apportions the scarce resource funding. NWO manages a large number of funding instruments and programmes and for most if not all of them, NWO receives more applications than it can honour. In 2017, NWO organises a series of meetings about application pressure and publishes a report (NWO, 2017b). According to NWO, the balance has swung too far (ibid: p.5). There are advantages to competition, above all with regard to the quality and quantity of scientific output, but if the pressure becomes too high it has negative consequences. NWO is forced to reject large numbers of good research proposals, but NWO above all mentions the Talent Scheme. For years, the award percentages have been far below the 25% that NWO considers desirable. Another concern, according to NWO, is that a relatively large proportion of projects that receive funding are expected to deliver results with a reasonable degree of certainty. This is to the detriment of truly innovative – and hence inherently risky – projects.

There are also concerns about the selection of proposals. Both NWO and the ERC use peer review to assess proposals. It is up to scientific experts and disciplinary committees to formulate a judgement of the proposals. As a rule, peer review is seen as the best selection method, if not the only option. However there are also indications that luck plays a major role.

That is most certainly the case with regard to the Talent Scheme and the ERC grants. Reviewers often agree on a limited number of proposals, namely those proposals that are remarkably good (and should be financed) and those that are absolutely no good (and should not be financed). The decisions on the ranking of the proposals in between – all of which are good and which demonstrate only minimal differences in quality between them – appear arbitrary. The composition of the committee, personal preferences of committee members and the dynamics within the committee itself are some of the chance factors that play a role (Van Arensbergen et al, 2013). This means that there are barely any differences in quality between applicants who are and those who are not selected for funding. This is confirmed in two studies into applicants who were or were not selected for funding from the Talent Scheme. In both studies, the quality was determined according to the CVs and publications of the applicants, similar to the formal selection procedure (Van den Besselaar & Leydesdorff, 2009; Bol et al., 2018). In neither study is a difference identified in terms of quality between the two groups of applicants.

A final point about which concerns have been raised, and that regularly features on the pages of national newspapers, is the Matthew effect of accumulating advantage, or, as described by the Volkskrant newspaper, the Prof Scrooge McDuck effect (Van Calmthout & Huisman, 2015). It refers to the gospel according to Matthew and the parable of the talents, 'For to every person who has something, even more will be given, and he will have more than enough; but the person who has nothing, even the little that he has will be taken away from him' (Good News Bible, Matthew 25, verse 29). In the 1960s, sociologist Robert Merton (1968) observed that eminent scientists have a disproportional advantage on the basis of their reputation, in many different ways. For example, they get more credit for their contribution to joint work, even if their contribution is equal to that of the other researchers. And the contributions by those other researchers appear less visible. Eminent researchers also have an advantage with regard to the granting of funds and attracting staff.

This study

Excellence is a core value in science, but one that raises considerable debate. This was the reason for us to investigate excellence policy, and its consequences. In this report, we examine the effects of that policy for researchers and research groups. What are the effects of fostering research excellence on research practices of research groups and what changes can we see within the scientific landscape? What impact does this policy have on university practice? To what extent does it truly serve the interests of society?

One question that we do not answer is whether university research in the Netherlands has become 'more excellent' or 'most excellent' as a consequence of the implementation of this policy. The essence for us is the relationship between the policy (in combination with international trends and environmental influences) and the practice of academic research.

At first glance, the striving for excellence appears to be the natural course of events in the competitive world of science; a world in which everything revolves around shifting 'the boundaries of knowledge', in order to be the first and in order to publish. Ground-breaking research is of course a key task for academic research institutions. However, the way in which this currently takes place raises two questions.

1. The first question relates to the way in which the striving for ground-breaking research is organised.

In the current situation, in many cases, striving for excellence means: participating in competitions for the above-mentioned grants and prizes from NWO and the ERC. Is this the only and the best way to go about it? Would it be possible –perhaps even better – to foster excellent research (in the meaning of very good indeed) by encouraging and funding the best research group rather than the best researcher, and by rewarding not only competition but also cooperation?

Currently, science policy is aimed at encouraging ground-breaking research by further raising the level of the scientific elite (the 'peaks'). One possible alternative would be to raise the level of the entire field (the 'high plain'), for example by investing in a more diverse quality policy. One possible consequence would be less focus on specialisation and monodisciplinarity, and more on integration and multidisciplinarity and interdisciplinarity.

2. The second question relates to ground-breaking research as one of the tasks of the university.

Research is not only of value to society if it is ground-breaking, but also if it is impactful. Doing research is not only important for generating new knowledge ('knowledge as a product') but also for developing expertise and causing talents to blossom ('knowledge as a capacity'). Furthermore, research is not the sole task of the university; the tasks of universities also include education and knowledge exchange. The university has more tasks than merely undertaking ground-breaking research. Is an excessive focus on excellent research not a threat to the balance of the university?

To answer these questions, we collected data and insights in a number of different ways. For this report, we refer to debates in the Dutch House of Representatives and policy documents to analyse the development of the policies. We also analysed data from research funding bodies about the various policy instruments, as a means of investigating the allocation of excellence funding. We held a meeting in order to initiate discussion with young researchers about their perspectives on and position in the professional academic field. Finally, we held more than fifty interviews with representatives of sixteen research groups at Dutch universities and research institutes. A number of these groups do have access to plentiful excellence funding, while others do not, or only to a far limited extent.

Reader's guide

In chapter 1 we describe how excellence in research has been a recurring objective in a series of policy instruments, together with the intentions of those instruments. We provide a brief summary of these instruments, and consider their historical development.

In chapter 2, we take a step back and place the policy efforts in a broader framework. We focus on the apparent intentions of the policy, the way in which the term excellence is interpreted and we consider the policies in the countries around us, as compared with those in the Netherlands.

In chapter 3 we describe the effects of the policy at system level. In doing so, we refer back to the information we reported on previously (Scholten & Koier, 2018).¹

In chapter 4 our attention shifts to research practice. We use four cases that have been extremely successful in obtaining research funding on the basis of excellence. We have also previously reported on this subject (Hessels et al., 2016).² In the present report, the four top research groups from these cases are compared and contrasted with groups that have obtained their research funding from other sources, either by necessity (because they have proved less successful in obtaining excellence funding) or because they follow a different strategy.

In chapter 5 we formulate our findings. We have observed a whole range of developments in academic practice as a result of the excellence policy. Some of these consequences were intended; the policy certainly has had its successes. There are however side effects. These form the basis for a series of conclusions in which we concentrate on the question whether the policy requires adjustment.

¹ See also <https://www.rathenau.nl/en/vitale-kennisecosystemen/dutch-policy-promoting-scientific-excellence>.

² See also <https://www.rathenau.nl/nl/kennisecosystem/excellent-geld>.

1 Policy for excellent research

Over the past thirty years, the encouragement of scientific excellence and excellent scientists has occupied an increasingly prominent position in Dutch science policy. Since 2007, the European Union (EU) has also been deploying instruments aimed at encouraging research excellence. Policy efforts of this kind differ from the previous forms of policy aimed at encouraging quality:

- **Quality policy** is aimed at increasing the quality of research in general and increasing quality at the lower end of the spectrum in particular.
- **Excellence policy**, however, aims to increase quality at the (potential) top end.

The focus on research excellence relies above all on funding instruments. These are targeted at selectively identifying and rewarding excellent scientists and excellent proposals.

The first section of this chapter describes the most important objective of encouraging excellence. The second section discusses the policy instruments in which this focus on excellence is most explicitly expressed.

1.1 Focus on excellence

The various funding instruments for encouraging excellence were introduced in order to enable excellent scientists to undertake free and innovative research. In this way, policymakers attempted to make scientific research more effective and more efficient. According to Maria van der Hoeven, member of the Dutch House of Representatives for the Christian Democratic CDA (and subsequently Minister of Education, Culture and Sciences – OCW), in the Parliamentary Debate on the science budget for 1995 (Dutch House of Representatives, 1994: p.5), ‘Concentration and selectivity are the key words’. She argued that the more effective allocation of Dutch research funding would require:

1. clearer choices;
2. increased focus; and
3. less distribution of resources across a whole range of topics and researchers.

The Dutch liberal party VVD supported this policy focus because ‘the Netherlands has an egalitarian culture, but to improve the quality of research, it is essential that the differences be revealed’ (according to member of Parliament Sam Cherribi, Dutch House of Representatives, 1994: p.10).

Even earlier, in 1989, the then Minister of Education and Sciences Wim Deetman (CDA) argued that 'we continue to work in a wide range of fields and excel in certain areas, and as a result have something to offer others, in scientific terms. This implies making choices; choices that other countries in Europe will also have to make, quite simply because almost no country in the world is any longer able to occupy a leading role in all fields of science' (Dutch House of Representatives, 1989: p.2).

Since that time, the idea that the Netherlands must make substantive choices with regard to scientific research has gradually acquired greater support, under the influence of the internationalisation of science. At the same time, the idea was embraced that these choices should not be imposed by administrators and policymakers. It would in fact be better to focus on top scientific talent. As a result, the substantive choices would effectively emerge by themselves, from the bottom up. This represented a turnaround in policy thinking, whereby funding instruments should be deployed in such a way that the choices would naturally emerge from a process of organised competition.

It also meant a turnaround for policymakers in providing additional support to topflight scientists, rather than promoting a policy aimed at strengthening the weak points in the academic landscape. A similar turnaround had previously been achieved in other fields, too. Via its industrial policy, for example, for some time the government supported struggling sectors (such as shipbuilding and the textile industry). That policy was replaced by an innovation policy according to which the government instead focused its support on businesses wishing to modernise.

The underlying assumption behind any such policy is that the interests of society are best served by encouraging a select number of frontrunners who are thereby automatically able to draw the following group in their wake. A similar assumption has been applied to sports policy. The government and sports organisations have opted to invest extensively in elite sport, above all in those sports in which the Netherlands performs well, assuming that achievements in those sports will inspire a general involvement in sport, thereby benefiting grassroots sport, too.

This focus on excellence has remained. A series of funding instruments for excellent research were introduced and received a great deal of attention in debates and vision documents, such as the *Vision for Science 2025* [*Wetenschapsvisie 2025*] (2014).

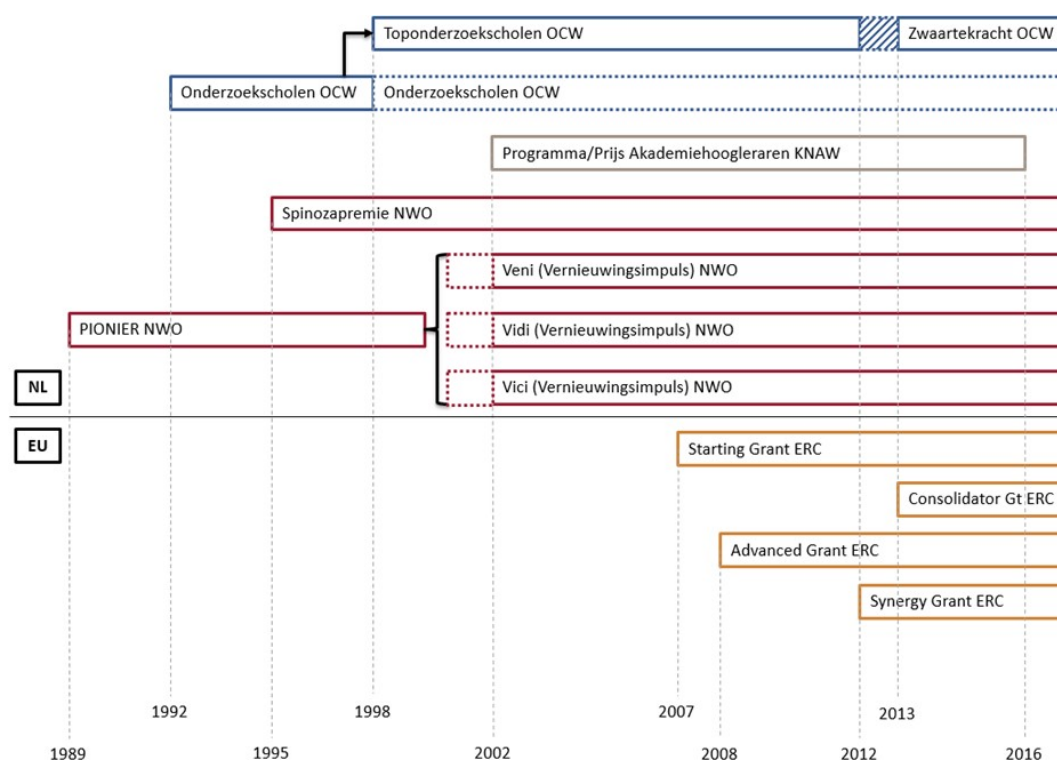
1.2 Instruments for scientific excellence

Over the past few decades, there has been clear growth in the number of instruments and in the budget explicitly intended to encourage scientific excellence. These instruments consist of programmes for individual researchers and programmes for research consortia. They include grants and prizes, and Dutch and European instruments.

Our overview in this chapter lists all the programmes aimed primarily at identifying and encouraging excellent researchers and excellent research. Our review therefore does not include thematic or other programmes which of course also take quality as a selection criterion, but not as an exclusive or primary criterion. The review also only considers programmes open to all disciplines. This means that a number of prizes are not covered; for example the Nobel prizes and national prizes such as the Heineken prizes and the Christiaan Huygens Science Prize.

Figure 1 shows the development and above all the rise in the number of instruments for scientific excellence over the past few decades. It also shows how a number of programmes are interrelated, overlapping or similar. For example, the first excellence programme identified by us, the individual PIONIER Grants from NWO, was itself followed up by the individual Talent Scheme also from NWO. The Dutch Talent Scheme and the grants from the European Research Council (ERC) both comprise different elements, that are linked to the seniority of the researcher making the application (section 1.2.1). The two lifetime prizes for excellent researchers, the Spinoza Prize and the Academy Professors Prize are also similar (section 1.2.2). The programmes aimed at excellent consortia or groups of researchers, the research schools, the Incentives Strategy / Top Research Schools and the Gravitation Programme are all related; they are intertwined (section 1.2.3). Funding for these programmes is provided by the Ministry of Education, Culture and Science.

Figure 1 Dutch and European instruments for research excellence.



1.2.1 Individual grants

PIONIER

The oldest excellence instrument in this review is the PIONIER programme (Individual grants for research groups with New Ideas for Excellent Research). NWO introduced this programme in 1989.³ The aim was to enable a limited number of promising researchers up to the age of 40 to establish new lines for research.⁴ The programme was implemented by NWO.

Talent Scheme / Veni, Vidi and Vici Grants

In 2000, the Ministry of Education, Culture and Sciences asked NWO, the Association of Universities in the Netherlands (VSNU) and the Royal Netherlands Academy of Arts and Sciences (KNAW) to submit a proposal for a funding instrument that would serve two objectives:

³ Comparable grants such as the KNAW Fellowships and the Huygens Grants existed during this period. Although they were similar to the grants described in the chapter, their objectives were more diverse, as a result of which they are not further mentioned in this review.

⁴ Information about the PIONIER programme can be found in the old annual reports of NWO (e.g. 1989) and elsewhere, and on archived webpages such as <https://web.archive.org/web/20000511120925/http://www.nwo.nl:80/>.

1. To create more leeway within the science system and provide a strong boost for innovative, high-risk research of outstanding scientific quality (Ministry of Education, Culture and Sciences, 2000: p.27).
2. To promote the advancement of talented researchers at research institutions by offering them opportunities for development and clear career prospects.

The instrument that emerged was the Talent Scheme, officially launched in 2000. It acquired its present form in 2002, with the Veni, Vidi and Vici Grants. The PIONIER Grants, which bore the most resemblance to a Vidi Grant, were absorbed into the Talent Scheme.

Initially, the Talent Scheme was a joint instrument from NWO, VSNU and KNAW, with a fixed share of the projects paid for by the research institutions. Today, NWO is the sole administrator of the Talent Scheme, and institutions are no longer required to pay for a fixed share of the project. Instead, they are requested to cover the indirect costs (for example for office space or laboratory facilities) in what is known as matching. The selection procedure is organised for each NWO domain. The three grants share the same format. Since 2012, the assessment criteria have been:

1. the quality of the researcher (40%);
2. the quality, innovative character and scientific impact of the research proposal (40%);
3. the intended knowledge utilisation (20%).⁵

An individual researcher submits a proposal. Researchers based abroad or from abroad are also eligible for a grant; the key is that the research must take place in the Netherlands. The selection of proposals starts with anonymous and individual peer reviews of the submitted proposals. The selection committee invites the highest scoring applicants to give a personal presentation. On the basis of the proposal, the presentation and the earlier review, the selection committee determines the ranking. A researcher may not submit an application for the same grant on more than two occasions; for a Vici Grant, the maximum is three applications.

The Veni, the Vidi and the Vici Grants are intended for different phases in a researcher's career:

- The Veni Grant is only available to researchers who obtained their PhD not more than three years ago. The maximum amount of the grant is 250,000 euros and the aim is to enable young researchers to further develop their ideas. The person to whom the grant or prize is awarded can take three years to spend this funding.

5 All information about the Talent Scheme was obtained from the annual reports of NWO and <https://www.nwo.nl/en/research-and-results/programmes/Talent+Scheme>.

- The Vidi Grant is available to researchers who obtained their PhD up to eight years ago. The maximum amount is 800,000 euros. The grant is intended to help the winner to set up their own ground-breaking research programme, and to appoint a number of PhD candidates or postdocs. The budget must be spent within five years.
- More experienced researchers can apply for a Vici Grant up to fifteen years after obtaining their PhD. The grant enables researchers to set up or expand their own research group, thereby giving the research programme a more permanent footing at a Dutch research institution. The maximum grant amount is 1.5 million euros. This budget must be spent within five years. The Vici Grant involves an application procedure with advance registration and possible invitation to submit a full proposal.

To help tackle the growing number of applications for Talent Scheme Grants, NWO has announced its intention to experiment with advance registration for Veni Grants, too. Moreover, NWO now requires an embedding guarantee for its Veni and Vidi Grants from the relevant research institution.

ERC Grants

Since 2007, grants have been available from the EU for researchers at Dutch universities and centres of excellence. The EU introduced the European Research Council Grants (ERC grants) for individual researchers in its Seventh Framework Programme (2007-2013) for research and technical development (FP7). Unlike for the other elements of FP7, the content of the project is determined entirely bottom-up, by the researchers. Other requirements are that the ERC:

- promotes frontier research;
- promotes radically different, high-risk and 'transformative' research;
- supports the very best;
- encourages excellence, dynamism and creativity in the science system across the entire EU.

Proposals are assessed via a procedure comparable to that for the Talent Scheme. In every case, the assessment includes an individual review followed by a selection by a committee. For a number of components, the applicant is invited for a personal presentation; for other components, a stepped application procedure applies.

As is the case with the Talent Scheme, each component of the ERC grant system is aimed at a different target group.⁶

- The ERC *Starting Grant* is intended for young researchers (2 to 7 years following their PhD) to help them independently set up their research programme and research group. The maximum amount of the grant is 1.5 million euros over a five-year period.
- The *Consolidator Grant* is aimed at further establishing the independent career of a researcher and the position of a young research group. The applicant must have 7 to 12 years post-PhD research experience. The maximum budget is 2 million euros, also to be spent over a five-year period. This grant was introduced in 2013.
- The *Advanced Grant* is intended for excellent and eminent researchers who have demonstrated the 'transformative', ground-breaking nature of their research. The maximum amount of this grant is 2.5 million euros, over a five-year period.

1.2.2 Individual prizes

In addition to individual grants, there are a number of individual scientific prizes in the Netherlands, namely the Spinoza Prizes and, up to and including 2016, the Academy Professors Prizes.⁷ In both cases, only candidates working at a Dutch research institution are eligible. Candidacy is entirely on a nomination basis, and nominations for candidates are by invitation only. Formally, the rectors of Dutch universities, the president of the KNAW and the chairpersons of the Netherlands Academy of Technology and Innovation and the Dutch Network of Women Professors (LNVH) are entitled to nominate candidates for the Spinoza Prize.

The Spinoza Prize

The Spinoza Prize has been awarded annually by NWO, since 1995, to between two and four professors who rank as the absolute best in their fields, according to international standards (NWO, 2018). The prize is a recognition of excellent scientists 'the highest category in the research pyramid' (NWO, 2017a) and its purpose is to encourage further topflight research. The prize is only open to researchers who have not only established a superb scientific career, but who are also in a position to initiate new research. At present, laureates receive 2.5 million euros. This budget

6 The ERC instruments also include the *Proof of Concept*, which was established in 2011 with the aim of determining the innovation potential of an idea from a previous ERC project. Applicants receive a maximum budget of 150,000 euros over a period of 18 months. Because this is a different type of grant, it is not included in our list of excellence instruments. We report in section 1.2.3 about the Synergy Grant, another part of the ERC.

7 Since 2018, NWO will also award two annual prizes for particular success in the field of knowledge utilisation by society, under the name Stevin Prize. This prize is worth 2.5 million euros.

is intended for science-related activities, but there is considerable leeway in the spending of the amount, over a five-year period; the laureate can request an extension of that period.

The Spinoza Prize was also initially intended as an extra boost for research schools: 'NWO has opted to encourage excellent research groups, preferably within the research schools, by means of an individual programme. The Spinoza Prize will deliver a tangible impulse to the research schools and reveal the peaks in the landscape' (Dutch House of Representatives, 1994b: p33).

Each year, a maximum of two Spinoza Prizes are awarded within the same domain (natural sciences, life sciences/medicine, humanities/social sciences). Three or four prizes may only be awarded if one of them is awarded to a researcher in the humanities/social sciences domain. The board of NWO selects the winners of the Spinoza Prize, based on advice from an international committee of scientists. The committee is asked to base its selection on

1. Internationally recognised top quality (weighting 70%);
2. Attractiveness for young researchers (20%);
3. Knowledge utilisation (10%).

The Academy Professors Prize

Between 2002 and 2016, the KNAW awarded annual prizes to at least two excellent professors in the framework of the Academy Professors Programme, which subsequently became known as the Academy Professors Prize (KNAW, 2008; 2018).

With this prize, the KNAW honoured excellent researchers who through their career had demonstrated their position at the absolute top of their field. It was a lifetime prize that enabled the laureate to focus entirely on research, for a period of five years. This meant that the professor was released from administrative and other tasks. The KNAW also expected the employer of Academy Professors to use the budget thus released to appoint talented group leaders and professors.

During the first few years of the programme, between three and five prizes were awarded each year; this was later reduced to two, one for a professor in the humanities and social sciences and one for a professor in the natural sciences, life sciences or engineering sciences. Two international committees of scientists selected candidates on the basis of two main criteria:

1. the unique contribution by the researcher to advancement in his or her specialist subject area;
2. the (inter)national recognition enjoyed by the candidate.

On the basis of these criteria, the board of the KNAW determined who would receive the prize.

Table 1 shows a list of the various grants and prizes.

Table 1 Excellence instruments in 2017

Instrument	Max. years	Max. amount (million euros)	Awarding percentage ^a	Max. # applicants	Amount/ year (million euros)	Amount/ year per applicant
Veni	3	0.25	15	1	0.08	0.08
Vidi	5	0.8	15	1	0.16	0.16
Vici	5	1.5	15	1	0.30	0.30
Spinoza	5	2.5	X	1	0.50	0.50
Academy Professor ^d	5	1	X	1	0.20	0.20
Gravitation	10	18.8 ^b	X	6	1.88	0.31
Starting Grant	5	1.5	11 ^c	1	0.30	0.30
Consolidator Grant	5	2	14 ^c	1	0.40	0.40
Advanced Grant	5	2.5	10 ^c	1	0.50	0.50
Synergy Grant	6	15	3 ^c	4	2.50	0.63

Source: NWO, ERC and KNAW. Adapted by Rathenau Instituut.

a. All awarding percentages are from 2016, except the percentage for the Synergy Grant, which was last awarded in 2013.

b. This amount is the total amount per consortium for a period of ten years in the last allocation round. In other years, the amounts differed.

c. These are the general awarding percentages. On average, Dutch applications score higher, approx. 18 to 20% for all programmes together.

d. The Academy Professors Prize was last awarded in 2016.

1.2.3 Excellence instruments for groups

A number of excellence instruments are intended for excellent groups or consortia. Funding is allocated through the 'first funding stream': the funding provided by central government. The introduction of research schools in 1992 was aimed at encouraging excellence. The intention was that they should develop into 'centres for high-quality research, from which structured training could be offered to young researchers' (Dutch House of Representatives, 1991: 3). In 1998, the portion of the instrument that was aimed at the best research schools – the Incentives Strategy – was divided off and would continue in the form of the Top Research Schools. The remaining portion, the Broad-based Strategy, continued to focus on education and coordination within the remaining research schools. In 2012, funding from the Incentives Strategy for Top Research Schools was transferred to the Gravitation Programme.

Research schools

The idea behind the introduction of the research schools was to promote the international reputation and excellence of Dutch science. 'High-quality research, researchers and research training call for selectivity. The existing administrative arrangements are insufficient to guarantee that selectivity' (Bartelse et al., 1999: p.74; Dutch House of Representatives, 1991: p.5). The intention therefore was to whittle the numbers down to one or a small number of research schools for each research domain. The number of research schools grew rapidly from 19 in 1992, to 107 in 1997.

On the back of this research schools Incentives Strategy (BIS), a new round of selectivity was proposed, by 'transforming a small number of research schools into top-quality international research centres' (Dutch House of Representatives, 1997: p.55-57; KNAW, 2010: p.15). Existing research schools or new consortia were able to submit a proposal for a grant to develop into a top-quality international research centre. Of the 34 proposals submitted in the first (and, as it would later emerge, only) round, six were selected. They received a ten-year grant, with an interim evaluation after five years. On the basis of this interim evaluation, the Minister of Education, Culture and Science decided in 2003 to continue funding for all six Top Research Schools. During the second and final five-year period, the Minister decided to also award a third five-year grant to the six research schools, through to 2013. In an assessment in 2010, four of the Top Research Schools came out as 'excellent'. Two of them in fact received an even better assessment, and came out as 'exemplary'. This assessment resulted in a continuation of the grant to these two Top Research Schools beyond 2013.

For the first five years, the estimated total amount of funding was slightly less than 100 million euros. For the period 2004-2008, the total amount was just above 100 million euros for the six Top Research Schools. The Outline Agreement between the Ministry of Education, Culture and Sciences and the VSNU (2011) revealed that the annual amount for the subsequent period would remain practically unchanged, at 20 million euros per year. Following recommendations from the KNAW, the Ministry called upon NWO to rethink the programme of grants for Top Research Schools, in 2009. The outcome was the current Gravitation Grant programme, which is therefore effectively a further elaboration of the Incentives.

Gravitation Programme grants

Gravitation Grants are meant for consortia of researchers that bring together the best researchers in a particular domain. They number among the best in the world in their field or, with the backing of a Gravitation Grant, show the potential to join that top group. The grants are awarded for a maximum of ten years. This makes the Gravitation Programme an important addition to the other instruments for research excellence, which are aimed at competition between individual researchers and shorter research projects. Gravitation is focused specifically on the longer term and cooperation between researchers.

As is the case for the Top Research Schools, NWO organises the selection of the best applications, and this funding too is allocated through the first funding stream. Applications for Gravitation funding pass via the Executive Boards of the Dutch universities. Each may be budget holder for a maximum of four applications. The consortia submit their applications for personnel, material costs, investments in equipment or infrastructure and the related operating costs, and management costs for the consortium.

NWO has each application assessed by at least four referees. A selection committee then divides the applications across three domains: humanities and social sciences, physical and engineering sciences and biomedical and life sciences. The selection committee then holds interviews with the applicants. The selection committee assesses the applications on the basis of five criteria:

1. the quality of the researchers in the consortium (30%);
2. the quality of the research programme (35%);
3. the proposed management of the consortium (25%);
4. knowledge utilisation (10%);
5. relevance to the National Science Agenda (no weighting).

The selection committee advises the Executive Board of NWO on the quality of the applications, after which the Executive Board submits a proposal to the Ministry of Education, Culture and Science.

An annual amount of 50 million euros has been budgeted for Gravitation. The first grants were awarded in 2012; the programme is planned to run through to 2026. There have been three rounds of grants, in 2012, 2013 and 2017; the next is set for 2018. The budgets for the three rounds amounted to 167 million euros (six consortia), 153 million euros (six consortia) and 113 million euros (six consortia). In the most recent round, for the first time the condition was imposed that at least two of the winning consortia had to represent the humanities and social sciences.

Synergy Grant

The *Synergy Grant* from the ERC is another example of a programme aimed at promoting cooperation between researchers. It funds consortia of between two and four chief researchers and their research groups. The aim of the grant is to offer opportunities to researchers who wish to answer a particular research question jointly, on the basis of complementary qualities. In other words, it is an individual form of group funding. The maximum value of the grant is 15 million euros to be spent over a period of six years. This grant was introduced in 2012.

1.2.4 Excellence policy and research careers

The Dutch system of excellence instruments has a multifaceted character:

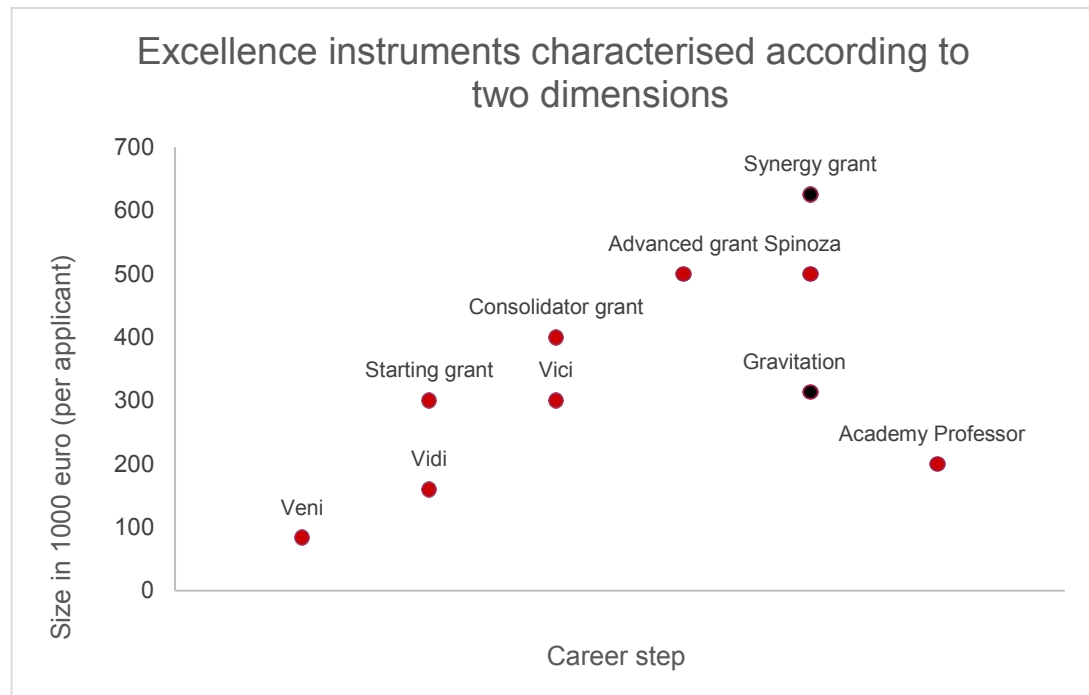
- There are grants mainly awarded on the basis of the academic quality of research proposals, whereby the reputation of the researcher plays a more or less dominant role in the assessment.
- There are prizes awarded exclusively for past performance.
- There are grants awarded to individual researchers, sometimes with the aim of enabling them to develop and maintain a research group.
- And there are grants for consortia of researchers.

Figure 2 shows two dimensions of the current excellence instruments. The horizontal axis shows the various grants and prizes, in order of (approximate) phase of the research career. The vertical axis shows the grants and prizes ranked according to the maximum amount available per year and per applicant. The Gravitation Grant and the Synergy Grant are shown in grey because both are awarded to consortia of researchers.

The figure shows that an 'excellent research career' can be followed on the basis of the excellence policy and the individual grants. During such a research career, researchers are awarded their first grants for their own research, then for their research group and subsequently for cooperation with other excellent researchers,

or, when they reach the status of Academy Professor, to 'give them free rein'. During this process, the size of the grant grows, but the number of grants available falls, so competition appears to become ever tougher.

Figure 2 Two dimensions of excellence instruments.



Explanation: The red bullet points represent individual grants; the black bullet points represent grants for groups.

This figure shows that Dutch grants as a rule are slightly smaller in size than their European counterparts. Individual ERC grants offer a laureate more research funding for appointing staff and developing a research group than similar grants from the Talent Scheme (the Starting Grant generates the same level of funding as a Vici Grant; the Consolidator Grant and the Advanced Grant are worth more). In the same way, Synergy Grants offer higher levels of funding per applicant than the Gravitation Programme.

2 Policy for excellence in context

The idea that the objectives of science policy are best served by encouraging excellent research has become increasingly widely accepted since the nineteen nineties. Encouraging excellence has been reflected in a series of policy instruments, as described above. It fulfils the idea that priorities must be set and choices must be made within science in the Netherlands, without their being imposed from above.

In this chapter, we consider the context of this development. First we discuss the assumptions on which the striving for excellence is based in greater depth. We then focus more specifically on the use of the term excellence by policymakers. Finally, we broaden our view across national borders, and compare policy development in the Netherlands with its counterpart in various other European countries.

2.1 Five assumptions behind the striving for excellence

The instruments aimed at encouraging excellence in research are based on a number of implicit assumptions. These can be derived from the design of those instruments, and the related debates and policy documents. Here we refer to five specific assumptions.

1. **The first assumption is that leeway for free and unfettered research is of considerable value to society, but that value cannot be estimated in advance.**

The value lies not only in satisfying scientific curiosity but also in the possible application of knowledge. It is often not possible to predict in advance which fundamental research will eventually lead to useful applications or insights usable in practice. Many technological developments are the result of scientific research that was initiated for completely different reasons and with completely different expectations. In that sense, it is meaningful to operate a series of policy instruments within science policy that focus exclusively on excellence rather than on content.

2. **A second assumption is that greater freedom for the best researchers leads to more ground-breaking research.**

The best researchers stand out not only due to the excellent mastery of their specialist field but also their creativity and originality. They are the best positioned to determine what needs to be done in order to push boundaries and advance their discipline. It is therefore essential that they be offered

sufficient leeway to obtain funding for research proposals they have developed themselves. In that way, the likelihood of achieving original, radical advances is greater than if they are required to respond to programme-based calls in which research is required to answer a whole series of pre-formulated questions.

The instruments discussed above deliver that leeway. They also encourage the taking of risks, which is less likely with other forms of funding. Individual prizes are better at creating this freedom than grants.

3. A third assumption is that encouraging top scientists – and in that way promoting vertical differentiation – has a positive effect on the environment in which these eminent scientists operate.

People who perform at an excellent level inspire their environment and attract other excellent researchers. The development of an excellent research group and an excellent research institute often starts with an exceptional, individual scientist. In other words, excellent research has spill-over effects (Cremonini & Jongbloed 2017). The implication is that dynamic developments can be achieved more effectively by supporting excellent researchers than by supporting science across the board or encouraging areas of science that lag behind.

4. A fourth assumption is that it is possible to distinguish between a proposal for excellent research and a proposal for non-excellent research.

Excellence can be defined, recognised and assessed. Focusing on excellence implicitly contains the assumption that it is possible to select the best proposals and best researchers in competition.

5. A fifth assumption is that organising a competition is the most suitable means of identifying the best performing and most promising researchers.

As a consequence, government funding for scientific research automatically ends up with the most excellent research. This works best if the instruments focused on excellence are not based on content. Only if scientists from all fields are able to compete with one another can those who stand out above the rest be identified.

There is much to be said in favour of these five assumptions. In the remainder of this report, however, it will become clear that we have identified clear question marks with regard to each assumption, and that it is not possible to back all of them with conclusive arguments. They can be more or less valid in certain specific circumstances than in others; they also contribute to the structure according to which excellence is encouraged. As a consequence, in certain cases, they in fact restrict innovation.

2.2 A further interpretation of the term excellence

Excellence stands for the highest quality, and in that sense is similar to such terms as superb, outstanding and extraordinarily (good). In more formal terms, however, and with reference to the Latin origins of the words, to excel means 'to stand out'. The Oxford English Dictionary in its definition refers to 'extremely good; outstanding'. These definitions show that there is a relationship between what is excellent and what is not excellent. If something stands out, there must be something for it to stand out against. Excellent is therefore a relative term; it only has meaning in comparison with something else (D'Este et al. 2016).

2.2.1 Excellence as an absolute and as a relative term

Two perspectives on excellence help us to understand and determine what excellence means: excellence as a threshold value – an absolute term – and excellence as *zero-sum game* – a relative term (Young, 2015).

1. Above a certain threshold, everyone can be excellent

If we use a threshold value, then there is an immutable lower limit that divides the excellent from the not excellent. In theory, everything and everyone can be placed above the threshold value, and therefore be excellent. This perspective can be compared with the driving licence: everyone who – in the opinion of an examiner – can drive a vehicle safely and skilfully receives a driving licence. There is no maximum to the number above the threshold value.

2. Zero sum: one man's gain is another man's loss

Based on the zero-sum approach, if one thing is excellent, then something else cannot be excellent. One man's gain is the other man's loss. This view ties in with the relative character of excellence. Not everything and everyone can be excellent. The boundary between what is and what is not excellent can be pictured as a specified percentage of all researchers or of all research. The best 10%, 5% or 1% receive the predicate excellent.

In both perspectives, what is and what is not included in the assessment is of vital importance. If we consider all the research undertaken in the world, then it is entirely possible that all research in the Netherlands will be scored as excellent, from both a zero-sum and from a threshold value perspective. If we look only at Dutch research, it is still possible for all research to come out above a specific threshold, but it is not possible for all research to end up in the best 20 or 10%.

In current Dutch practice, in selecting excellent proposals, both views on excellence are used. A proposal must at least satisfy a specific threshold value, for example it must achieve an A+ score, in order to be considered for excellence funding. However, the instruments used are not open-ended grant schemes. As a rule, there are far more proposals that score above the threshold value than can be funded with the budget available. At the end of the day, the total budget determines which proposals receive funding and as a consequence who or what qualifies as excellent, and who does not. In other words, zero sum. Here and in other discussions about excellence, the different perspectives on excellence become entangled, and as a result the relative boundary of what is viewed as excellent sometimes acquires an absolute significance.

2.2.2 Excellent at all levels

Then there is the question of the level to which excellence refers. There are four levels. It can refer to:

- a national science system;
- a research institution;
- a research group;
- a researcher.

In practice, the term is applied to all of these levels. In the Netherlands, the instruments discussed are aimed mainly at individual researchers, while in other countries they are intended specifically for groups or institutions (see section 2.3).

Excellence can also refer to:

- the persons undertaking research; in that sense, it often refers to such character traits as analytical capacity, creativity and perseverance;
- the organisations carrying out research; this often relates to the characteristics of an organisation such as international, open and dynamic;
- the scientific research itself; this refers to such aspects as: innovative, ground-breaking or with a high social and/or scientific impact.

Many policy instruments call for a judgement about both the applicant (past performance) and the research proposal.

2.2.3 Recognition and measurement

At the end of the day, promoting excellence will depend on the ability to identify excellence. For administrators, policymakers and selection committees, this often proves a difficult exercise. Ferretti et al. (2018) described the European Commission's search for an indicator for excellence. The complexity and multidimensionality of the term made it practically impossible for the Commission to come up with a usable indicator. Added to that, there is no consensus about its meaning. As a consequence, according to Ferretti et al., researchers come up with a completely different indicator from policymakers. Finally, the defining of an indicator for excellence inevitably leads to simplification and the loss of a great deal of information.

2.3 Focus on excellence in the Netherlands and elsewhere

Encouraging research excellence is certainly not something typically and exclusively Dutch. Practically all 36 countries of the Organisation for Economic Cooperation and Development (OECD) have introduced funding instruments over the past few decades aimed at encouraging topflight science (OECD, 2014).⁸ In this section, we present a number of excellence instruments from other countries, so that we can compare these initiatives with the various instruments in use in the Netherlands. In this section we use an inventory of excellence instruments in Denmark, Germany, the United Kingdom (UK) and Switzerland, as analysed by Cremonini & Jongbloed (2017).

2.3.1 Excellence policy in four other countries

In terms of the reputation of their science system, these four European countries are comparable to the Netherlands. However, there are also differences, for example in the organisation of the science system. In the UK and in Switzerland, the universities – and their reputations – traditionally differ more widely than in the Netherlands. Moreover, in Germany, much topflight research is carried out at institutions such as the *Max-Planck-Gesellschaft*. The role and value of policy instruments for encouraging excellence should therefore be considered within the characteristic context of the various science systems. Nonetheless, information about excellence systems in these countries does provide an insight into alternative choices and options.

8 For the full list see: <http://www.oecd.org/about/membersandpartners/list-oecd-member-countries.htm>

These are the most important characteristics of the excellence instruments in the four countries investigated:

- In **Denmark**, the Danish National Research Foundation finances the Centres of Excellence (CoE). A CoE is a collaborative venture between top researchers focusing on frontier research that is headed by a scientist of international eminence. There are no regulations governing the organisational form of a CoE. This long-term funding is awarded for a period of ten years. A peer review committee selects the best proposals. The programme is worth more than 40 million euros a year. The Danish Ministry for Science decided to extend the programme in 2017.
- In **Germany**, the *Exzellenzinitiative* of the *Deutsche Forschungsgemeinschaft* [German Research Foundation] is supposed to distinguish and differentiate. It is a funding instrument with a budget of 4.6 billion euros for the period 2006-2017. This amount is paid over and above the already existing public funding for scientific research. The instrument is intended exclusively for universities, and not institutes. Funding is available for excellence clusters, research schools and for university-wide excellence strategies. With a number of changes, the policy has been continued in 2018 under the heading *Exzellenzstrategie*.
- The Research Excellence Framework (REF) in the **United Kingdom** differs from the other programmes in the sense that the research results are evaluated afterwards. The central assumption is that past results predict future success. The results of the REF serve as the calculation basis for direct funding of scientific research at universities. Within this framework, more funding is available for research with the highest score. In other words, the REF is a mechanism for budget allocation; it does not provide additional budget.
- In **Switzerland**, the Swiss National Science Foundation manages the programme for National Centres of Competence in Research (NCCR). Funding is provided to networks of researchers who come together to study specific subjects or research domains for a period of more than 10 years. The NCCR centres have been in existence since 2000. As in Germany, extra money was set aside for this programme. For the period 2001-2013, the total budget was 2.1 billion euros.

The operating principles behind the excellence instruments in these countries are similar to those employed in the Netherlands. The underlying idea is that the policy will result in research of exceptional quality and that it will create higher 'peaks'. As such, it will have positive effects also on the remainder of the science system.

In these countries, too, excellence instruments are funding instruments. To obtain excellence funding, a system of competition and selection is required. Cremonini and Jongbloed (2017) identified financial capital as an essential precondition for designing and implementing excellence policy.

2.3.2 Differences

The excellence instruments in these four countries show that there are different ways of achieving objectives comparable to those in the Netherlands, such as topflight research and differentiation. Below we identify three of those variables, and for each we show the choice made in the Netherlands.

1. Resources for excellent research

- a. In the UK, the Research Excellence Framework determines the allocation of the direct government funding for research (known in the Netherlands as 'first funding stream'). Universities with research groups judged as more excellent receive more research funding than universities with less positive assessments.
- b. In Germany, the funding of excellent research via the *Exzellenzinitiative* has more the character of additional funding over and above 'regular' basic funding.
- c. In Switzerland, the funding regimes for the institutions are varied; a number of traditionally excellent institutions such as ETH and EPFL are financed more generously than others, while a number of National Centres of Competence in Research are jointly funded by the Swiss National Science Foundation and the research institutions.
- d. In the Netherlands, the resources for excellence instruments consist of both additional funding from government, and a transfer from direct funding to competitive funding.

2. Moment of selection

- a. In a number of the investigated instruments, selection and funding of excellence take place in advance, on the basis of a research proposal for the future. Interim evaluation can influence the continuation of the funding. Selection is often based on the CVs of one or a selection of researchers.

- b. The REF in the UK is the only instrument to select after the event. The assumption here is that excellent results in the past are a good indicator for excellent results in the future.
- c. In the Netherlands, for prizes, not a research proposal but a nomination with reference to past achievements must be submitted. For the remaining programmes, proposals for the future must be submitted together with the CV of one or a limited number of researchers (for the Talent Scheme and the Gravitation Programme respectively).

3. Funding units

- a. The excellence instruments in Denmark and Switzerland encourage the development of new collaborative ventures (centres). Some of these are physical centres, while others are virtual networks. The instruments in Germany and the UK, on the other hand, fund specifically existing institutions, research clusters and research schools.
- b. There is also a distinction between the funding of an individual, a group of individuals or an organisational unit (department, centre, faculty, university). Moreover there are differences between encouraging a new generation of researchers by offering them an opportunity to develop further, or rewarding already established researchers.
- c. In comparison with the instruments in the four other countries, it is clear that in the Netherlands, a relatively high level of emphasis is placed on promoting the career of young researchers, who to a certain degree are able to elaborate and implement their plans independently. The Dutch Gravitation Programme, aimed at collaboration between established researchers, is comparable in terms of scope with the excellence programme in Denmark, but less extensive than the programme in Switzerland.

In other words, these four countries operate their excellence policy differently from the Netherlands. In relative terms, policy in the Netherlands is strongly focused on a proposal-based competition between individuals. Furthermore, the Netherlands wishes to offer young researchers an opportunity to develop a scientific career.

2.3.3 Similarities

Nonetheless, there are also similarities between the Dutch instruments and the excellence instruments in these four countries. In all countries, science policy encompasses far more than instruments that attempt to encourage excellence.

Everywhere, there is a **mix of policy instruments** for funding both established researchers and their 'challengers' and both larger and smaller units. Decisive with regard to the overall effect is the allocation of the available budget across the various instruments.

In all countries there is '**vertical differentiation**' in the sense of groups of scientific frontrunners who are ahead of the crowd. However, a policy focus on excellence is not the primary cause of this phenomenon, according to the conclusions of Cremonini & Jongbloed (2017). In their opinion, the policy in fact ensures that existing differences are amplified and made more visible.

One effect of this vertical differentiation is that selection is less based on the proposed research, and more on the reputation of the grant applicant, in turn fed by past success in grant applications. This leads to what is known as the Matthew effect (Merton, 1968).

In other countries, too, just as in the Netherlands, the intention of excellence instruments is **to encourage ground-breaking research** and to make major steps forward in research work. However, the conditions of the programmes and the selection methods do not always invite these outcomes. The programmes do not appear to offer a solid stimulus for risk-taking (Cremonini & Jongbloed, 2017).

Finally, in all countries, there are **concerns about the continuity** and long-term organisation of excellent research. These concerns have been raised in Germany and Denmark, where questions have been asked about what happens to the groups, institutions or centres at the end of the funding period. What could be lost in the end, and if there is a threat of losing a great deal, to what extent is there still leeway for the funding parties to arrive at alternative choices? In all of the countries investigated, the question about how researchers, institutions and their financiers anticipate the end of the grant period remains a tricky issue.

3 Effects at system level: selection and concentration

Over the past few decades, the focus on excellence has been translated into a number of funding programmes at national and European level. By means of competition, the best proposals and researchers are selected and funded. The number of programmes and their funding have risen in both scope and importance. What have been the effects of this funding? In this chapter and in chapter 4, we concentrate on the consequences for researchers, institutions and the system.

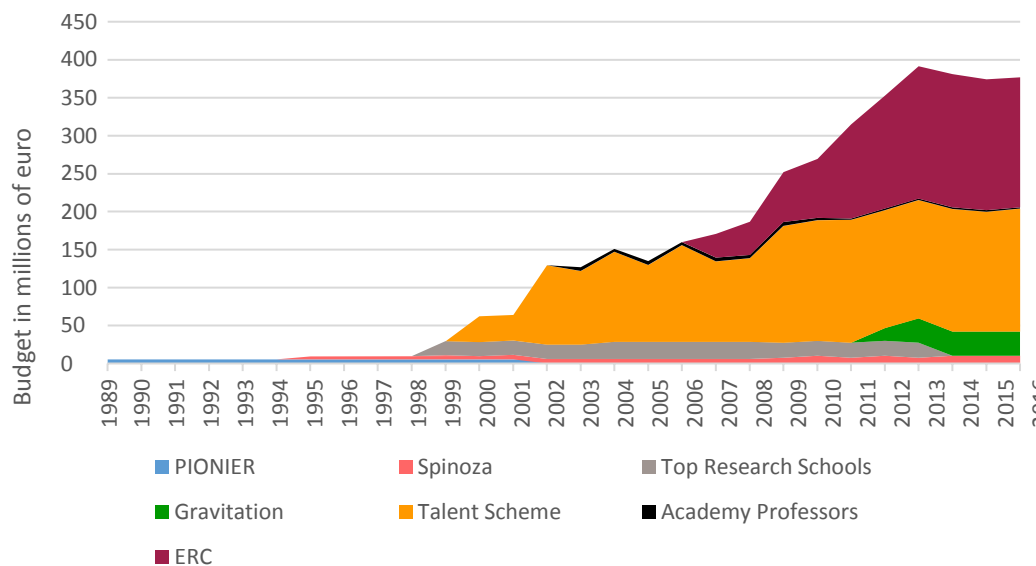
In chapter 4, we show the effects of excellence policy for research groups. Firstly, however, we sketch out a picture of the effects at system level. We use figures and financial information from the funding parties such as NWO. These figures show that the excellence instruments have led to a high degree of selection among researchers and concentration of resources. We also look at the importance of international rankings. What are they and what role do they play? For much of this chapter, we rely on figures from a previous analysis by the Rathenau Instituut (Scholten & Koier 2018).

3.1 Growth in excellence funding

Chapter 1 contains a summary of the excellence instruments. This paragraph describes how the budget for those instruments has developed over a longer period. Since around the turn of the century, the budget has grown to approx. 375 million euros in 2016 (see figure 3). There are three clear phases of development:

1. the phase up to 1998/1999 was above all hallmarked by political debate and the establishment of consensus on future science policy;
2. between 1999 and 2007, large national excellence programmes were implemented and developed; and
3. the phase between 2007 and at least 2014 saw a huge rise in the budget for excellent research, caused by the introduction of the ERC. The plans for the new European research budget will determine whether the overall budget available will rise or stabilise over the next few years.

Figure 3 Trends in the total budget allocation for excellence instruments.



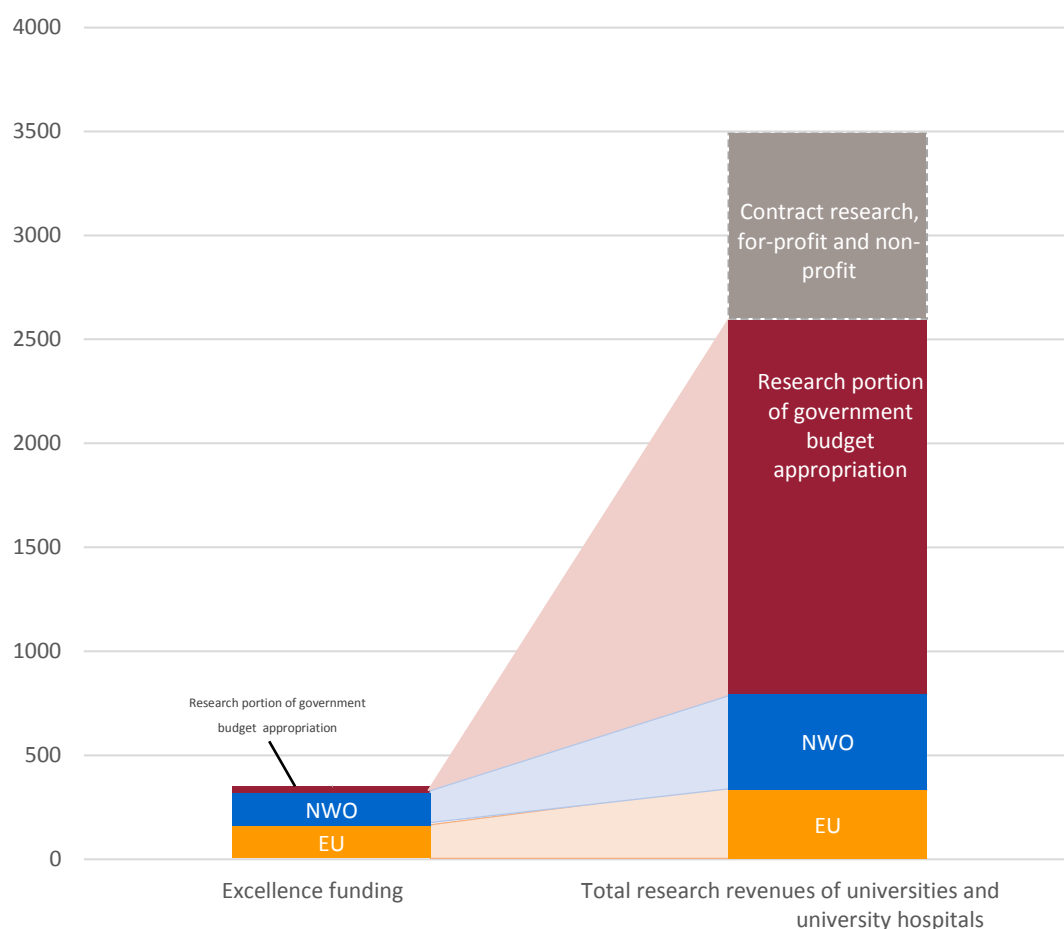
Sources: OCW, NWO, ERC and KNAW. Adapted by the Rathenau Instituut.

Explanation: The total amounts calculated for the individual grants and prizes are based on the year of the award. The larger amounts for consortia are divided over the award period (ten years for Gravitation; six years for the ERC Synergy Grant) to avoid major fluctuations.

For Dutch universities and university hospitals, we also looked at this excellence component as compared with their total research revenue.

- Excellence funding accounts for 10% of total research-related revenue and 14% of research-related revenue drawn from public sources (excluding publically funded contract research and including European funding).
- Of the public research revenue acquired through competitive programmes run by the EU and NWO, 40% counts as excellence funding (see figure 4).
- The proportion of excellence funding as compared with total research-related revenue has risen slightly over the past few years.

Figure 4 The ratio between excellence funding and total research income of universities and university hospitals (in millions of euro)



Sources: OCW, NWO, ERC and KNAW. Adapted and supplemented by the Rathenau Instituut.

Explanation: The research portion of the government budget appropriation is not necessarily spent on research. The budget appropriation for universities is divided into a research portion and a teaching portion, but the universities ultimately receive the total appropriation as a block grant. They can decide for themselves how to spend the research portion. The same goes for the teaching portion.

Most excellence programmes reimburse a portion of the costs incurred for a research project. In many cases, the funding body stipulates that research institutions must provide matching funds to cover the indirect costs of the project from their own basic funding (matching). Consultants EY (2014) calculated that, viewed across all categories of research funding, institutions match every euro received in funding with 74 eurocents of their own. Because the matching requirement differs from one grant to the next, we do not know precisely how much match funding institutions are obliged to provide in order to receive the total amount in excellence funding. The matching criterion makes the impact of excellence funding on the system larger than the percentages suggest.

We must also not forget the previously mentioned Matthew effect: if a researcher succeeds in acquiring an excellence grant, the probability of receiving additional external research funding grows, and the contribution from the institution for the work of this researcher will also rise.

3.2 Selection and concentration

Two key terms in excellence-related policy are selection and concentration.

- **Selection** refers to choosing a limited number of researchers and research plans. Selection is all about distinguishing between excellent and not excellent (or less excellent).
- **Concentration** relates to the research funds dependent on selection. The greater the extent to which the resources end up in a limited number of locations or with a limited number of researchers, the higher the concentration.

Given these meanings, the combination of selection and concentration appears closely related to the more commonly used 'focus' and 'mass'. The only difference is that in the excellence instruments, the focus is not determined in advance. The quality of the researchers and their applications determines where the focus is placed.

According to policymakers in government, financiers and research institutions, selection and concentration are essential preconditions for excellent research. In this paragraph we show that the various excellence programmes have indeed resulted in a high degree of selection among researchers and concentration of resources.

3.2.1 Selection of researchers

Who does and who does not receive funding from excellence instruments? If we compare the number of grants with the number of researchers, it turns out that every year around 1 in every 70 to 80 researchers at Dutch universities receives an excellence grant. At any given moment, on average, around 5% of all academic researchers in the Netherlands have their own excellence grant.

There are three mechanisms that ensure this degree of selectivity:

1. Low award percentages

For some time now, the award percentages for the Talent Scheme have fluctuated at around 15%. The percentages for the various ERC grants are consistently several percentage points lower. The award percentages for Dutch applications within ERC programmes, however, are slightly higher, averaging around 20%. For certain excellence programmes, the award figures are unknown because there is no information about how many applications were submitted (Gravitation) or how many nominations were made (Spinoza Prize and Academy Professors Prize).

NWO and the ERC recognise these low award percentages as a problem. In 2018, NWO announced a series of measures for countering this application pressure, such as advance registration and an embedding guarantee at a Dutch research institution. This latter measure means that institutions gain greater authority over which researchers are able to submit an application.

2. Self-selection among researchers

There is a process of self-selection: only a small proportion of researchers who could submit an application actually do so. A rough estimate on the basis of numbers of researchers that are permitted to apply and the number of researchers that actually submit an application suggests that between 65% and 90% of all researchers in the Netherlands submit no application for a Veni grant, although they are permitted to do so. For Vidi and Vici grants, the percentages are between 90% and 99%.

A study by Bol et al. (2018) also shows that researchers who just failed to receive a grant in response to their Veni application were more likely not to submit a Vidi application than researchers who were just above the award threshold for a Veni grant. They may have become disheartened by the previous non-awarded application, focused on other forms of funding, or followed a career pathway outside the academic world. This form of self-selection is particularly notable given that Bol et al. argue that there is no significant discrepancy in terms of quality between these two groups of researchers.⁹

3. Reselection of previous grant recipients

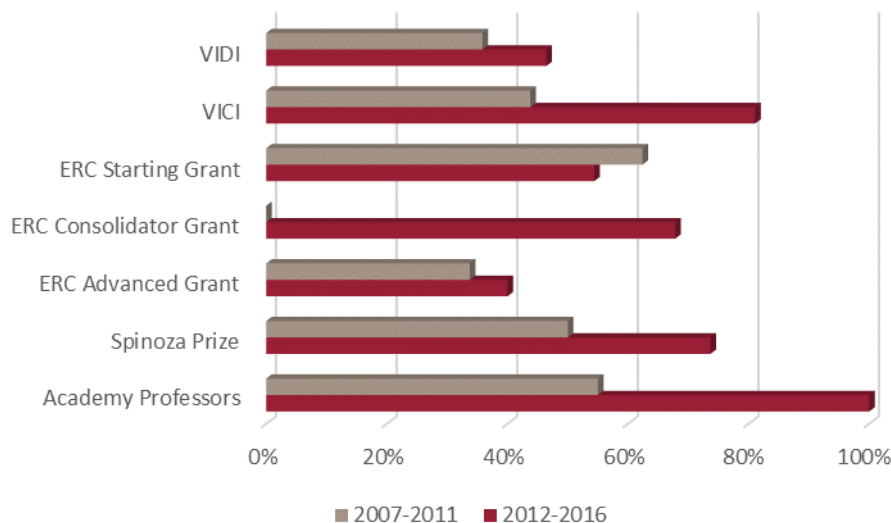
The probability of receiving an excellence grant is higher if a researcher already received a grant in the past. The same study by Bol et al. shows that the group of researchers who did just receive a Veni grant are 2.5 times more

9 In the article by Bol et al., quality is measured according to both numbers of publications and citation impact of those publications.

likely to subsequently obtain a Vidi grant than researchers who just failed to obtain a Veni grant. Here, too, there is still no significant discrepancy in terms of quality between the researchers who just were and who were just not awarded the Veni grant. Besides the self-selection referred to above, according to Bol and his colleagues, a status effect also comes into play: the previously awarded grant contributes to the probability of success in a new selection round.

Our own studies also show that more and more researchers who receive an excellence grant have already received an earlier excellence grant. For example, 46% of Vidi laureates over the past few years had received an earlier individual excellence grant. For the most recent Vici laureates, the percentage is in fact 80% (see figure 5). The further along researchers are in their career, the more difficult it seems to be to obtain excellence funding without having been successful previously. In other words, selection is so concentrated because the same researchers are selected more and more often.

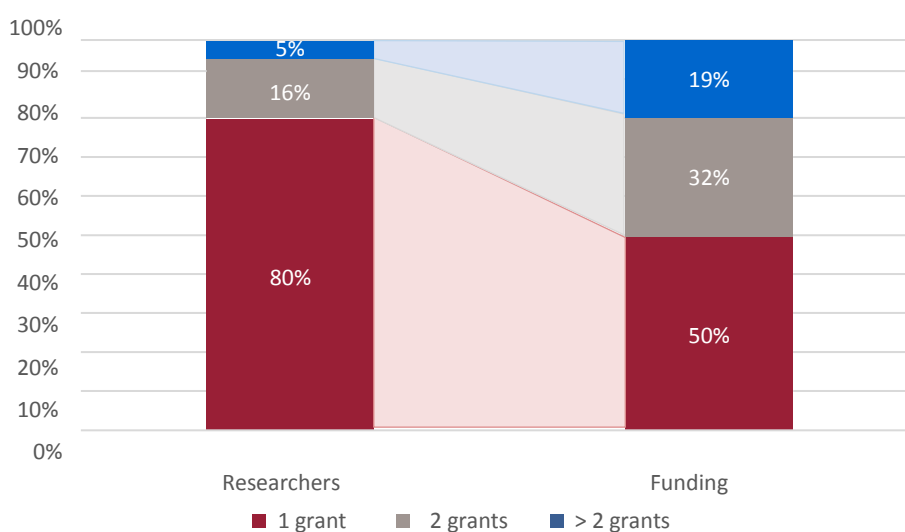
Figure 5 Percentages of grant recipients who had received an earlier excellence grant



Source: NWO, ERC and KNAW. Adapted by the Rathenau Instituut.
 Explanation: the Consolidator Grant was not introduced until 2013.

3.2.2 Concentration of resources

Figurer 6 Percentages of researchers with a single grant, two grants and more than two excellence grants (left) and the share of excellence funding that they received (right).



Source: NWO, ERC and KNAW. Adapted by the Rathenau Instituut.

For excellence instruments, selection is mainly at individual level because the instruments themselves are intended for individual researchers. The resultant concentration of resources, however, can be viewed in three different ways:

1. Concentration of resources with individuals

Of the individual researchers who have received at least one individual excellence grant, 20% have received two or more individual excellence grants. In relative terms, these are often larger grants, such that this small group has received approximately 50% of the individual excellence funding (see figure 6).

2. Concentration of resources with research institutions

There is also a concentration in the allocation of excellence funding between the Dutch universities. In calculating this we considered the university where the applicant for a grant was working, according to the data provided

by the funding body.¹⁰ It would seem logical for the largest universities with the most researchers to receive more excellence grants and funding than the smaller universities. However, following correction for the size of the universities, there are still considerable discrepancies. Certain universities receive relatively more excellence subsidies and funding than others. The university that received the most excellence funding in the period 2003-2016, received almost four times more than the university with the least excellence funding.¹¹

The general pattern for this period is that broad, general universities receive large numbers of excellence grants. The technical universities score around average and other specialist universities receive relatively the least.

We did not investigate how these discrepancies arise. On the basis of the interviews and meetings with researchers and (university) policymakers, we can put forward a number of possible explanations for the concentration of excellence resources at a given university:

- a. A university focuses heavily on obtaining excellence grants, encourages researchers keenly to apply for grants and views this source of funding as being very important. Other universities rely less on this form of funding and are more focused on acquiring other forms of funding.
- b. A university is larger in a research domain in which a relatively large proportion of excellence funding is available. Other universities are smaller in that field, or do not carry out any research in that field.
- c. A large university is able to profit from its size (scale advantage). It has more researchers with the same research focus and this *mass* has a clear effect. A smaller university has less mass with regard to the same research focus.
- d. A university employs researchers that are better than researchers at other universities. As a result, they receive more excellence grants. This university is better able to attract the best researchers.
- e. The quality of support for grant applications via grant support officers and offices is better.

10 In all cases we stuck with the information from the funding body. It is possible that researchers change employer in the meantime. Normally speaking, the grant moves with the researcher but we did not include this possibility in the analysis.

11 This refers only to individual excellence programmes. Top Research Schools, Gravitation and the ERC Synergy Grant are not included because their allocation across institutions is not known.

One notable difference is that the technical universities receive in particular large excellence grants. They receive a relatively high number of Vici grants and ERC Advanced Grants.

Although the differences between universities are considerable, there are no universities that receive no or a very minimal number of excellence grants. The figures show that all universities do ‘participate’ in excellence programmes. Over the years, this concentration in excellence funding has not risen further. The differences between the universities in terms of the amount of excellence funding they receive are therefore not growing, but are not shrinking either.

3. Concentration of resources across research domains

Finally, there also appears to be a concentration of resources across research domains. This takes place via three mechanisms:

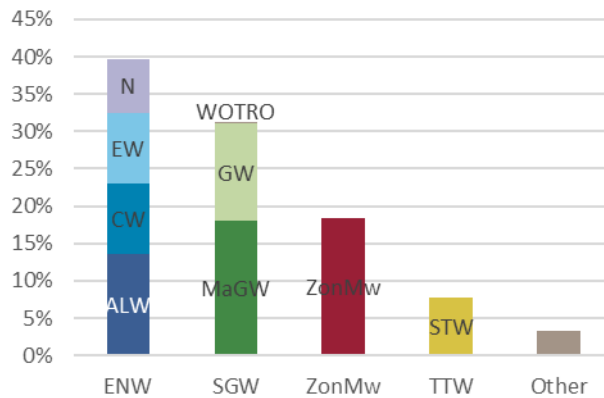
- a. Funding bodies make a choice in advance and determine a set allocation across the research domains. This for example applies to the Talent Scheme.
- b. Selection committees select proposals or nominations from certain research domains more often than from others. This is the case in particular at the Top Research Schools and in the Gravitation programme.
- c. Certain Dutch research domains perform well in the competition for funding from abroad, for example the ERC.

It is not easily possible to identify domains that are significantly ‘more successful’ in profiting from these funding instruments. It is after all not unequivocally clear how many researchers are working in a particular research domain, and therefore whether these researchers receive relatively many or few excellence grants.

Nonetheless, within the various excellence instruments, there would appear to be a preference for physical and engineering sciences and life sciences as compared with social sciences and humanities. This is also reflected in other studies.¹² It is visible in the choices made by the funding bodies in advance, in the allocation of their funding (figure 7) and in the choices made by selection committees (figure 8).

12 See also <https://www.economist.com/international/2018/05/19/how-global-university-rankings-are-changing-higher-education> and Salmi (2015), in which the authors state that excellence programmes in other countries show a preference for *STEM* disciplines (science, technology, engineering and mathematics). Bol (2018) also suggests a concentration of NWO research funding in the physical sciences rather than the social sciences and humanities.

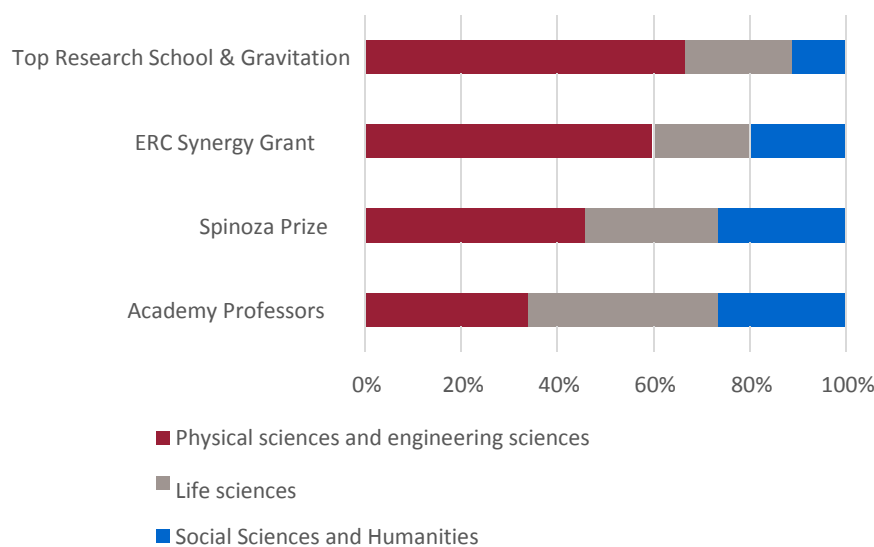
Figure 7 Share of total amount awarded by NWO through the Talent Scheme, by former NWO division and current NWO domain.



Source: NWO. Adapted by Rathenau Instituut.

Explanation: Abbreviations for current domains: ENW = Science; ZonMw = Health Research and Development; SGW = Social Sciences and Humanities; TTW = Applied and Engineering Sciences. The 'Other' category applies to grant awards about which, for whatever reason, we do not know the relevant division, as well as cross-divisional awards. In the old system, WOTRO (Science for Global Development) was classified under Other. In the new system it comes under Social Sciences and Humanities (SGW). Abbreviations for old divisions: ALW = Earth and Life Sciences; CW = Chemical Sciences; GW = Humanities; EW = Physical Sciences; N = Physics; MaGW = Social Sciences; WOTRO = Science for Global Development; STW = Technology Foundation; ZonMw = Netherlands Organisation for Health Research and Development.

Figure 8 Distribution of grants (number) for the Top Research Schools, and Gravitation programmes, the ERC Synergy Grant, Spinoza Prize and the Academy Professors Prize across three research domains



Source: NWO and KNAW. Adapted by Rathenau Instituut.

In the European competition, specifically the social scientists and humanities researchers from the Netherlands are above averagely successful. Since 2014, they submitted 10% of the total number of applications for ERC grants, and received 16% of all awards. In other domains, the figures are far closer together (table 2).

Table 2 Percentage of ERC applications and awards for researchers at Dutch institutions as a proportion of the total number of ERC Grants awarded in Europe, per research domain for the period 2014-2017.

ERC domain	Proportion of applications from the Netherlands	Proportion of awards to the Netherlands	Award percentage Netherlands	Award percentage ERC total
Life Sciences	6.6%	7.2%	14.6%	13.3%
Physical Sciences & Engineering	4.6%	6.9%	18.6%	12.5%
Social Sciences & Humanities	10.3%	16.0%	17.9%	11.5%

Source: Netherlands Enterprise Agency (RVO) – National Contact Point ERC.
Explanation: exclusive data for the Advanced Grant 2017.

In other words, there is clear financial concentration among individuals and universities but it is not easily possible to identify focal points among specific subject areas or research groups. If specific examples did stand out that were particularly successful in obtaining excellence funding, this would be evidence that the policy also results in a certain degree of profiling ('peaks' in the landscape).

However, it is not possible to compare groups and (sub) disciplines with one another on a large scale. The greatest obstacle is the absence of data on the size of groups and domains. As a result, we cannot take any account of (or correct for) the size of a group or domain, in the way we are able to do for universities.

3.3 Excellence of the system

How excellent is Dutch science? And to what extent is that excellence the result of the above-described measures aimed at encouraging excellence? This section discusses these questions. However, there are no complete answers.

3.3.1 Rankings

One commonly used method of passing judgement on the quality of science systems is using international rankings. The organisations behind these rankings collect a wide range of data about countries and institutions and prepare a ranking every one or two years. Rankings are popular because they offer users a quick and easy picture of the position of countries or institutions.¹³

There are many different rankings. The best known and most widely used relate to the performance of countries or research institutions, as a rule universities. The rankings vary because they all measure something slightly different.

- **Rankings that compare countries** often consider the innovative character of a country, in which business and industry also play an important role. Examples are the EU Innovation Scoreboard and the Global Innovation Index.

Other rankings consider the system of higher education in general, thereby not only considering research but also teaching. Examples are the Universitas21 Higher Education Systems Ranking and the QS Higher Education System Strength Ranking.

- **Rankings of universities** are equally diverse. Firstly there is a position on the Academic Ranking of World Universities (ARWU), also known as the Shanghai Ranking. This is determined according to indicators that above all relate to research, such as the number of Nobel Prize winners, articles published in *Nature* and *Science*, and the citation index of articles.

The QS World University Ranking and the Times Higher Education Ranking use a broader range of indicators, which also relate for example to education and internationalisation. They are above all distinguished by including the

¹³ A detailed listing of the various rankings, their limitations and their use is available in a factsheet on the website of the Rathenau Instituut: <https://www.rathenau.nl/en/science-figures/process/excellence/rankings>. This section is broadly based on that factsheet.

results of surveys in their rankings. In those surveys, they ask respondents about their judgement of universities. As a consequence, these rankings are more heavily oriented towards international reputation rather than purely research performance.

The Leiden Ranking uses only bibliometric data (publications and citations) to rank universities. It is an interactive ranking in which the user sets his or her own parameters.

The Netherlands scores well in the various rankings and the Dutch universities (both individually and above all jointly) feature high on the international rankings referred to above. Based on the various rankings, we must therefore conclude that Dutch universities perform stably in the international sub-top (between positions 50 and 500). When it comes to innovative capacity or the national higher education system, in 2016/2017, in all of the rankings referred to, the Netherlands achieved a position in the top 10.

However, there are a number of important reservations to be made when it comes to relying on rankings. These make it difficult to see how the effects of policy aimed at encouraging excellence are reflected in the rankings.

1. Rankings refer to the relative position of a country or university as compared with other countries or universities. It is therefore possible in theory that even if a university performs better than in a previous year, its position on the ranking will be lower, because other universities performed even better. A ranking says something about the relationship with other universities or countries, but not about the absolute quality/status of a university or country. Moreover, other countries have also introduced excellence instruments, so it is extremely difficult to see the effect of this policy in respect of other countries reflected in the rankings.
2. Secondly, in particular the university rankings regularly adjust their set of indicators, based on a wish to shift the focus or to obtain better data. This means that shifts in the rankings can mainly be the consequence of focus shifts, and have little to do with better or worse performance. It is therefore not possible to link the introduction of excellence instruments to multi-year positions in the rankings.
3. Thirdly, almost every indicator involves comments and questions, as a result of which it is difficult to determine precisely what a ranking means or measures. If a ranking analyses exclusively bibliometric data, then the ranking automatically says more about the physical and life sciences, in which there is a tradition of publication in scientific journals, and less about the humanities.

The composition of other rankings takes no account of the profile of individual universities. Tilburg University, for example, is highly focused on research and education in social sciences and humanities, and that focus has clear consequences for their position on certain rankings. This does not necessarily say anything about actual quality.¹⁴

Despite these limitations, it can still be useful to take a closer look at the Leiden Ranking. The Leiden Ranking exclusively uses bibliographic data from the Web of Science, a database containing innumerable scientific articles from a large number of international scientific journals. If we restrict excellence to that which is measured by citation scores, using this ranking, we can answer the question whether the Netherlands has in fact become more excellent over the past few years.¹⁵ Even if that is the case, however, it does not necessarily mean that this development can be attributed to the deployment of policy instruments aimed at excellence.

Our approach is as follows:

- We assume that research excellence can be measured according to the citation impact of a published article: the number of times that articles are cited in other articles. The more citations, the more excellent the research.
- We measure excellence at Dutch level. To do that, we add up the figures for the 13 Dutch universities. We then answer the question whether, over the course of time, more papers have been published in the Netherlands that fall into the category most cited articles. By that category we refer to articles that belong to the 50%, 10%, 5% or even 1% of most cited articles.

We then look at a comparison over time of the total of articles published at Dutch universities and show the developments for the top 50%, the top 10%, the top 5% and the top 1%. The figures show how the Dutch science system performs in relation to that in other countries.

14 In among others the Leiden Manifesto (Hicks et al., 2015) and the San Francisco Declaration on Research Assessment (DORA) from 2012, researchers call for the responsible use of bibliometric data and the rankings based on that data.

15 The most important point for discussion with regard to bibliometric methods is the significance of the different publication cultures. In disciplines in which it is common to publish in international journals, bibliometrics works better than in domains in which books are written or publication takes place in Dutch journals, for example in certain humanities. These methods therefore primarily say something about a select number of domains. In addition, the quality of other tasks and activities of researchers and universities is not measured by examining publications.

Table 3 shows what percentage of the total of articles published at Dutch universities belongs in the top most cited articles worldwide. By way of illustration: if Dutch publications were to be cited at an average level, then half (50%) of the total number of Dutch publications would also belong to the half (50%) most cited publications worldwide. This is not the case, because approximately 60% of Dutch articles belong to the 50% most cited articles worldwide. In other words, articles from the Netherlands are cited with above average regularity. This not only applies to the top 50% but also the 10%, top 5% and top 1%. For all other categories, too, articles published at Dutch universities are cited with above average regularity.

Table 3 Proportion of Dutch publications in the global top-x of publications.

	2006-2009	2007-2010	2008-2011	2009-2012	2010-2013	2011-2014	2012-2015	2013-2016
Top 1%	1.34%	1.40%	1.40%	1.45%	1.43%	1.43%	1.45%	1.50%
Top 5%	6.60%	6.94%	6.99%	6.97%	7.04%	7.04%	7.11%	7.13%
Top 10%	13.08%	13.48%	13.57%	13.85%	13.87%	13.91%	13.94%	13.95%
Top 50%	58.55%	59.29%	59.75%	59.98%	60.04%	60.06%	59.96%	59.90%

Source: CWTS Leiden Ranking 2018. <http://www.leidenranking.com/>.

We can draw two conclusions from the table above. As already stated, Dutch research performs at an above average level in all categories. Furthermore, over the course of time, Dutch articles have been cited slightly more frequently, and that growth is highest in the absolute top; the top 1% of most cited articles.

3.3.2 Other approaches to excellent systems

Other indicators also suggest that the Dutch science system performs excellently.¹⁶

- Dutch academic research groups are assessed every six years for their quality, according to the Standard Evaluation Protocol (SEP). The scores of these research reviews have risen between 1994 and 2015 from on average 3.5 to 4.5 (on a scale of 1 to 5). The international review committees therefore assess large portions of the Dutch science system as ‘very good’ or ‘excellent’.

¹⁶ See also AWTI, KNAW and Rathenau Instituut, *Balans van de Wetenschap 2016* [Balance of Science 2016], The Hague, Rathenau Instituut, 2017.

- On the basis of how often publications are cited (citation impact), practically all domains in the Netherlands score higher than the worldwide average. Certain domains are among the best in the world, on the basis of this indicator.
- Since 2014, researchers at Dutch research institutions have submitted approximately 7% of all ERC applications, and have received approximately 9% of all ERC grants.¹⁷

The developments over time suggest that science policy has contributed to the positive performance by Dutch science, but like in the case of rankings, here too, a whole range of other factors play a role.

In a quantitative international comparison of national science systems, the Netherlands emerges as the most efficient system (Sandström & Van den Besselaar, 2018). In this case, efficiency means scientific output (number of cited publications) set against investments in scientific research.

To investigate potential factors that influence the efficiency at system level, Sandström & Van den Besselaar investigated changes in output in the event of changes in investments. They discovered that approximately two thirds of the rise in output in commonly cited articles can be explained 'quite simply' by an increase in investments.

Another important factor identified by Sandström & Van den Besselaar is the proportion of competitive funding in total research funding. In the Netherlands, at almost 30%, this is relatively low (for the period 2000-2009). The proportion is in fact only lower in Denmark and Switzerland. The analysis shows that efficiency falls slightly as the emphasis on competition rises. A third factor is that countries with a national evaluation system of scientific research are on average more efficient than countries with no such system. If the evaluation does not have any financial consequences (as in the Netherlands with the Standard Evaluation Protocol), the efficiency score of those countries is even better.

¹⁷ These data are available at <https://webgate.ec.europa.eu/dashboard/sense/app/e02e4fad-3333-421f-a12a-874ac2d9f0db/sheet/941d3afe-da24-4c2e-99eb-b7fcbd8529ee/state/analysis>.

4 Effects on research groups

In the previous chapter, we clearly saw the effects of funding instruments aimed at excellence at system level. The outcome is a selection of researchers and a concentration of excellence funding. In this chapter, we show the effects of excellence policy among research groups. What influence has funding had on the research process? How do research groups deal with the availability (or absence) of excellence funding?

Our most important findings are the result of a qualitative study into four research groups that have received multiple excellence grants. We compare those results with the interviews held with the leaders of twelve research groups that have received little or no excellence funding. Our case studies reveal that no research group can operate entirely free of the excellence policy. Everyone must relate to it in some way.

It becomes clear in this chapter that individual researchers and groups adapt their behaviour as a consequence of the focus on excellence. The striving for excellence indeed acquires such an important role that it is reflected in numerous different ways. In addition to selection and concentration, excellence funding also creates differentiation between research groups. At the same time, the policy has a levelling effect since the striving for excellence – and the desire to obtain research funding on the basis of excellence – is a dominant element in the behaviour of research groups and institutions.

In section 4.1 we describe the way in which the competition for excellence grants works in practice. Not everyone is successful in obtaining excellence funding. A limited number of groups succeeds in obtaining these resources, but a large number do not. Section 4.2 describes the consequences of success. Section 4.3 deals with the downside of the funding system, while section 4.4. describes how the emphasis on excellence funding engenders risks for groups that give a different focus to their research task.

Approach

To chart out the consequences for research practice of a policy aimed at excellence, we studied sixteen groups: four groups with high levels of excellence funding and twelve groups with little or no excellence funding. We analysed the practice of research: funding, staff and facilities, data gathering, the way in which

groups arrive at arguments and publications, and the way in which the groups receive recognition from both scientific peers and administrators within their own organisation. In preparing this analysis, we borrowed ideas from the credibility cycle as first described by Latour & Woolgar (1986). We also used the various phases of a research cycle to analyse the interviews.

The nature of a group differs depending on the discipline. The way in which research is carried out is also heavily dependent on the standards, cultures and practices in the discipline concerned. We therefore selected four domains, that differ from one another in two dimensions.

1. The first dimension is the extent to which (large-scale) collaboration is necessary and/or common. This for example influences the number of publications of which a researcher is (co-)author, a commonly used measurement in determining excellence.
2. The second dimension relates to the degree of consensus in the domain about the intellectual priorities (what should we be researching?) and the definition of quality. This is essential in the joint identification of excellent researchers via peer review. In this process we use the work of Whitley (2000).

We selected four broadly defined domains:

1. Humanities (little cooperation needed & limited consensus on intellectual priorities);
2. (Quantitative) social sciences (high levels of cooperation & limited consensus on intellectual priorities);
3. Lab sciences (high levels of cooperation & high degree of consensus on intellectual priorities);
4. Theoretical physical sciences (limited cooperation needed & high levels of consensus on intellectual priorities).

For each of these domains, we spoke with one group in receipt of high levels of excellence funding and three research leaders of groups with little or no excellence funding. For each of the groups with high levels of excellence funding, we held around ten interviews with various respondents within and outside the groups. For the remaining twelve groups, we spoke only to the leader of the research group. This resulted in more than 50 interviews, on which this analysis is based.

We use quotations from the interviews to illustrate the results.¹⁸

¹⁸ Each quotation is followed by a code that refers to the respondent. The first letters relate to the domain (HU=humanities, SS=social sciences, LS=lab sciences, TPS=theoretical physical sciences), the second section refers to the group (With=group with excellence funding, Without=group without excellence funding) and the third section shows who is speaking (GL=group leader/professor, P=(other) professor).

4.1 Competition for excellence funding

Although the funding for encouraging excellence represents a limited – but growing – proportion of the total research funding budget, it still exercises a considerable mobilising effect. This not only relates to matching (excellence funding ‘attracts other funding’) and the Matthew effect (‘To every person who has something more will be given’) but also relates to the status of these funds within the organisation. Researchers, group leaders and university administrators all attach huge importance to excellence in research and consequently its financial recognition. The entire academic world responds uniformly to the stimulus that is generated by the competition for excellence funding: every research group feels the pressure to compete and to submit proposals. The striving for excellence in research has become a universal standard at universities. Excellence is the new normal.

4.1.1 A competitive academic context

The fact that the competition for excellence funding has acquired such a dominant position at universities is not only reflected in the day-to-day operation of research groups, but also in more structural aspects. Here we identify two: staffing and publication.

Staffing

Excellence plays an important role in the staffing policy of academic research institutions. Among researchers and group leaders there is a clearly felt sense that excellence grants are essential for the continuation of an academic career. Leaders of research groups and younger researchers agree on this point. From the perspective of both groups, obtaining excellence grants is of vital importance. For young researchers, a grant of this kind delivers a boost to their career opportunities. For the leader of the research group it means increased research capacity and more ammunition in encouraging the faculty to perhaps offer tenure to the younger researcher. Many group leaders also view it as their task (as good managers) to ensure that younger researchers are given the best possible opportunity to continue their academic career. If not in this group then perhaps elsewhere. In their judgement, a strong research profile, with excellent publications and proven ‘earn-back talent’ is inescapable. It also weighs most heavily in evaluations and promotions.

Research excellence as a dominant factor in personnel policy has consequences at both individual and group level. At individual level, it represents a dilemma for employees of academic knowledge institutions. They recognise the value and importance of a multiplicity of tasks: providing good education, broad use of

knowledge in society, administrative tasks, service to the domain (such as reviewing, organising conferences, committee work). At the same time, they see the dominant importance of research performance for the continuation of their career. There is a clear area of tension between what they intrinsically view as good academic work and what is needed for their next career step.

‘If I allow my postdocs to help develop teaching material, because it is something they consider enjoyable and important, and they then apply for a Veni Grant, they may end up with just two publications. Their competitors may have far more publications, not having been responsible for developing teaching material. There is a real probability that the candidates with more articles will be selected for a grant, rather than my postdocs. I find that troublesome.’

‘Thanks to the position I have acquired, I can choose more clearly: what is it I really want, what do I view as interesting and in which areas do I wish to continue? However, if I encourage younger researchers to work alongside me on these projects, for them it means a poorer academic CV, when they are in competition with others. For me that is one of the most difficult areas of tension’

SS-Without-GL

At group level, a dominant focus on research excellence results in a one-sided staffing structure. To be successful, most time and attention must be focused on one's research and drawing up one's own research agenda, large numbers of articles must be published in journals with the highest journal impact factors, and excellence grants must be obtained. Those are the points on which everyone is evaluated.

Time and again the result is the selection of the same type of researcher: a superb researcher who is outstandingly capable of 'selling' his own research, both in journals and to selection committees, and as a result is perfectly capable of funding his own research. Other important skills and qualities disappear into the background; there is less diversity.

'In that sense, excellence means that there is only room for a certain type of people in science. That saddens me because in my judgement a little more diversity is very important, with people who specifically feel passionately about teaching or university administration. Their publication level may not be excellent but they can still be excellent in other ways. [...]

'If you want to survive you have little choice but to follow the programme: from Veni to Vidi to Vici. And by the age of 35 you are a professor. Certainly in our field, I consider it extremely healthy if someone has also done something completely different. One of my postdocs was a social worker, and as a result is able to deliver insights no one else can provide. That is perhaps not something you expect from someone within an excellence programme, but thanks to her work she can contribute an enormous amount that is of huge value to others within the group.'

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Publication

The focus on research excellence leads to a very strong focus on publication, right across the academic community. The way in which researchers and research groups publish may differ from domain to domain, but the pressure to publish in academic journals is very clearly felt, across the board.

In particular in those fields where high levels of cooperation are common, such as quantitative social sciences and lab sciences, research groups develop a clear publication strategy. At a very early stage, that publication strategy includes considering such issues as: what should we investigate (what is publishable); in what debate should we position the research (what journals); what should we do with negative outcomes, unconfirmed hypotheses, statistically not-significant results?

Leaders of the research groups are often closely involved in the writing process of their younger researchers. The aim is to publish in the most eminent journals, with the highest journal impact factors. There is little priority for publication in journals aimed at a broader public.

4.1.2 Competition in practice

The pressure on researchers to ensure that they are eligible for excellence funding is considerable. Great efforts are expended in participating in the competition for these funds.¹⁹ Nonetheless, there is a notable difference between the way in which this competition is designed, and the way in which the game is played in practice. We have identified three points in respect of which the system functions in a slightly different way than assumed in the policy instrument:

1. The system was intended for ground-breaking and high-risk research. As a rule, however, applicants submit relatively conservative and low-risk proposals.
2. The system is intended to fund new research. Applicants, however, 'work in advance'; often they have already completed part of the proposed research, so they have a picture of its expected outcome. In part, they also use the acquired funds to develop a proposal for follow-up funding.
3. The system is individual; in other words it is intended to support individual excellent researchers. However, the more successful applicants are often backed up by a research group, and the more successful research groups coordinate internally who will apply when and for what.

Below we discuss each of these points individually.

Risk-avoiding or high-risk research

One goal of excellence programmes is to encourage frontier, innovative and high-risk research, based on the idea that research of this kind can result in important scientific breakthroughs that may not be immediately recognised by direct colleagues. In formal terms, the various programmes invite the submission of high-risk proposals. In practice, however, researchers tend to submit relatively conservative research proposals. And there are three reasons for this.

¹⁹ Research suggests that the transaction costs amount to around one quarter of the size of a call (Van Arensbergen et al., 2013). It is only to be expected that transaction costs are high given that a competition for research funding has the character of an all-pay auction. In other words an auction whereby all participants pay their bid on the auction item (the prize), including those whose bid is not awarded. In an auction of this kind, in Nash equilibrium the expected payoff for the participants is zero, and the sum of the bids is equal to the value of the prize. See Herings, J.-J. (2002), 'Perverse prikkels', ESB, 28 June.

Firstly: to a certain extent, researchers perceive selection committees as risk avoiding. If large numbers of good proposals are submitted, the committees will select those proposals in which there is a high probability that the proposal will deliver the planned outcome.

‘The truth of the matter is that a proposal does not always exclusively describe innovative research. If it were only to include innovative research, then effectively all you are proposing is what you plan to do, but you are not sure of whether or not it will actually work. That indeed is truly ground-breaking research, but a proposal of that kind can never succeed because you will always be asked: ‘yes, but how do you know it will work?’

‘The other extreme is that you only put things in your proposal that have already been tried and tested. That kind of proposal will also not make it. In other words you have to find the middle ground. You have to have a certain amount of things you already know will be successful, and then talk about where you want to go from there. In other words, you have to be partly speculative but part of your proposal must already have a clear foundation.’

LS-With-P

Although the proposals themselves are worded relatively conservatively, the excellence grants still offer considerable freedom to subsequently deviate from the initially submitted plan. As a result, more high-risk strategies are sometimes followed during implementation.

Secondly: for young researchers, successfully completing an excellence project is of vital importance for their future career. They want to achieve positive results and publications, from their project. A high-risk proposal inherently engenders a relatively high risk that the research will not deliver the necessary outcomes. For that reason they prefer to work on a ‘safer’ proposal with a more certain prospect of publication.

Thirdly: experienced applicants are often responsible for the continuity of a group. The grants they obtain are primarily used for appointing PhD candidates; for them it is important that the PhD programmes are successful. They therefore experience also a clear stimulus to avoid high risks.

Funding of participation in the competition

According to researchers, many grant applications consist partly of work that has already been carried out. On the one hand this is the result of the above-described observation that applicants do not wish to submit overly risky proposals. If they have already elaborated part of their research proposal, then they can say with greater certainty that the project will succeed. On the other hand, in certain cases, researchers use a grant award to prepare for a new application. In this way they can ensure that the research group receives continued research funding, and therefore is not first forced to shrink before being able to re-expand when the next grant is awarded. In this case they use an already awarded grant for work that was not initially described in the application, and they indeed have the freedom to do just that.

Individual effort or group effort

The vast majority of excellence grants and prizes are individual, but the activities undertaken by groups to acquire excellence funding are often part of a group process, in particular in groups where research requires much mutual cooperation. This may involve determining who submits the application, writing the application and undertaking the research work.

Practically all group leaders are heavily involved in the entire application process by researchers in their group. That involvement is translated into co-reading and co-writing, advising on the positioning of an application and overall supervision. Group leaders carry out these tasks with two clear motives, namely based on their responsibility towards an individual employee and in the interests of the entire group.

'We hold strategy meetings where experienced people consider what are good subjects for grant applications. In principle, everyone of course decides for themselves but during the strategy meetings we discuss possible subjects together.'

'We noticed that in the past, applications in particular for Vidi or Vici Grants or ERC Grants were not ideally formulated from a strategic viewpoint. What we now therefore say is: very well, we understand you are working on this particular subject but then try and formulate it differently.'

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Inversely, individual funding serves the interests of the group. In a number of cases the individual amount ‘disappears’ into the collective kitty, belonging to the entire unit. On paper, the different funding streams are separate, but in practice they become intermingled. Some groups, for example, use a variety of excellence grants to ensure that the group grows evenly. In other words, they average out the different funding streams.

‘Although it is not an explicit policy, it happens automatically. In our case a subgroup receives serious funding from the third funding stream so there is plenty of money to appoint new people. That means the other funding streams need not necessarily be used for investing in that subgroup [...] In my judgement that is the best way to ensure that all parts of the school remain healthy. It prevents a sort of imbalance occurring, having one successful group while the rest is slowly wasting away.’

TPS-With-GL

In this way, in practice, the entire group (or school) benefits from the excellence funding and not only the researcher who received the grant.

4.2 The significance of an excellence grant

Many are keen to obtain an excellence grant, but very few are successful. However, when such a prize is obtained, the consequences are considerable. The awarding of an excellence grant is above all internally recognised as a mark of excellence. As such, there is nothing strange about this phenomenon; in a strict selection process, the research proposal came out as one of the best. It is however notable that the recognition actually precedes the implementation of the research work itself.

‘In terms of my stature in the scientific world, it would do no harm to have an ERC Advanced Grant on my CV. It is a sort of mark that separates the men from the boys. Within our university, ERC Advanced Grant winners are held in high esteem. The same applies for Spinoza laureates. It is in

fact so extreme that here, it is practically impossible to achieve a position as Senior Professor [the highest category of university professor] if you have not received a Spinoza Prize or ERC Advanced Grant.'

LS-Without-GL

If a research group leader has access to one or more excellence grants, he can spend it on a whole range of attractive options, for example:

- developing a new, personal research programme (with a longer time horizon);
- implementing a specific personnel policy;
- to a certain extent, reallocating and re-appropriating the funds received;
- responding flexibly to opportunities that come his way;
- concentrating on (fundamental) research with less attention for knowledge valorisation and education; or
- freeing up resources for investing in acquiring follow-up grants (the process that leads to the Matthew effect).

Below we discuss each of these six possibilities.

New, personal research programmes

Because of the limited substantive conditions imposed on excellence grants, they offer huge advantages in comparison with other forms of funding. Excellence funding offers the opportunity to develop new research programmes.

We observed in particular investments in new data collections, which in turn contribute to the further development of a new research programme and the continuity of the group. One group created the opportunity for a postdoc to spend two years on a large-scale data-gathering operation. The data were then used by a number of group members and colleagues from outside the group for analysis work. Another group leader invested in an international network of researchers who then contributed to the research by the professor and who were able to meet on a regular basis, thanks to the excellence funding.

Excellence funding, and most certainly a series of consecutive grants and prizes, guarantees more opportunities for developing individual multi-year plans than other forms of funding. Other funding is often insufficient to allow major expenditure on frontier research. Other funding forms are also often intended for the short to medium term, and aimed at specific deliverables. In practice, the subjects covered by smaller research projects are often less closely related.

Autonomy: 'individual' personnel policy

Research groups with higher levels of excellence funding enjoy greater autonomy within their institution. They are able to arrange matters for themselves without external involvement by the department, faculty and/or university board. Excellent research groups derive their autonomy on the one hand from the fact that they have access to their own research funds earmarked for the group, and on the other hand from the status that is generated in the academic world on the basis of the recognition of excellence.

Excellence funding changes the relationship between research leaders and the governing boards. We discovered one instance in which the Executive Board wanted a group to focus its research in a specific direction that reflected one of the university's spearheads. A former leader of the research group told us that they had ignored this 'executive babble' and directed the research as they saw fit.

The fact that groups with external research funding enjoy greater autonomy was confirmed by a number of university policymakers. They confirmed that it is far more difficult and indeed not always desirable for them to try to direct these groups.

On the other hand, university administrators show a clearly lower tendency to try to control excellent groups. After all, these groups have already proven that their approach is successful. As one group leader put it:

'If a footballer scores a goal, it is difficult to say that his strategic decisions were poor.'

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One area in which autonomy is important is personnel policy: the appointment of staff, the granting of tenure and investing in capacity and expertise.

‘At a given point it became clear to me that we needed to put much more effort into another field of research. That was when I decided: we need to appoint a tenured researcher in that domain. I of course tried to convince the management of my arguments. But they were not willing to listen. I then decided to use my Spinoza Prize to appoint a researcher. I agreed with the management that I would pay his salary for the first five years, at which point they would take over. This is a typical example of the situation: we need more knowledge in that particular field so it is now essential that we bring someone on board who can contribute that knowledge.’

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One professor told us that having greater financial capacity on occasion means that if at a given moment there are a number of interesting job applicants, they can appoint an additional researcher. In that way, better than other research groups, they are able to attract the best researchers. Vacancies are therefore not the only underlying principles behind a personnel policy; they are in a better position to respond flexibly to current supply on the market.

Reallocating and re-appropriating awarded funds

Researchers have considerable freedom in the actual spending of excellence funding. In practice, for group leaders, the application for excellence funding is a group process but they also use the funds to manage at group level. This sometimes takes the form of internal reallocation of excellence funding. We came across one case where following awarding, the grant was simply added to the group’s general budget:

‘The grant streams are of course clearly separated, but as soon as the money finds its way onto our accounts, it ends up in the general kitty. The people we take on know what project they are working on, but in terms of funding, the streams become so intertwined that it is a nightmare for the accountants.’

LS-With-P

Flexible response to opportunities and disappointments

Another advantage of an excellence grant is that it enables a response to unexpected developments in the research, be it a disappointment or a new opportunity. A prize, without a predetermined research plan, offers particular flexibility. If for example more funds are needed than expected for a particular research project, a prize forms a buffer from which additional resources can be extracted – a sort of lubricant that can keep the wheels of the organisation moving.

The same applies to a lucky break in research, for example if someone makes an accidental discovery or comes up with a particularly good idea. In that case, abundant excellence funding offers the flexibility to continue along that new research line.

Concentration on (fundamental) research

In our study, the research groups with excellence funding focused less attention on the value of their research for society. In groups with excellence funding, the field of tension between generating fundamental new insights and the valorisation of knowledge is less emphatically perceived because funded groups have the resources to focus on fundamental questions. The pressure to demonstrate the value of their research for society is relatively limited.

For almost all the groups in our study, education is a permanent and important component of their package of tasks. Research groups with excellence funding often use those funds to 'buy off' education tasks, allowing them to spend more time on research.

Investment of resources in acquiring follow-up grants

Last but not least: excellence funds offer the possibility to invest in applications for further excellence funding. This is common practice. Excellence grants are available for a limited time. Midway through the grant period, it is already time to start looking for opportunities for follow-up funding. The fact that the prior awarding of excellence funding provides just those opportunities contributes to the Matthew effect.

4.3 The downsides of the system

The previous section shows that excellence funding offers space and leeway for undertaking good (excellent) research, in line with the aim of the instruments. In the view of the researchers we spoke to, however, the use of the term excellence, the way in which the term is employed in practice and the funding instruments themselves with their inherent competitive aspects have a series of consequences that hinder and frustrate them in their work. This applies particularly, but not exclusively, to groups without excellence funding.

It starts with the fact that this form of funding focuses heavily on excellent research (and therefore not excellent education, excellent valorisation or excellent administration). As we demonstrated previously, this can influence the selection and evaluation of researchers.

‘We impose tremendous, one-sided emphasis on what excellence is. Today we define excellence in terms of Veni, Vidi or Vici. There are colleagues whose research may not be of such high quality but who provide really excellent education. People may say they are just as important, but the truth of the matter is they are not as important, because we do not treat them accordingly.’

LS-Without-GL

The next aspect is the practical application and operationalisation of what excellent research is. According to many group leaders, the scope is too narrow. Two main characteristics are of particular importance when it comes to demonstrating to the faculty board that someone is excellent: the capacity to acquire (excellence) grants and the capacity to publish a great deal in eminent journals. Research group leaders encourage their younger group members to focus specifically on these activities.

According to many group leaders, funding programmes aimed at encouraging excellence have acquired too much undue influence. These group leaders do not (or no longer) have the idea that they have the autonomy to recognise and select talent for their group. In formal terms, that authority lies with the faculty or department but the overall perception is that much of the influence also lies with the external research funding bodies. Faculties and departments, it seems, act to please them.

‘One consequence of the growth in the budget for the Talent Scheme for example is that the current appointments policy is focused entirely on people capable of scoring within that scheme. And that means handing over a large portion of your own policy to some random NWO committee,

partly because of the faculty funding model. That fact gives NWO too much influence which in my opinion is extremely harmful.'

TPS-Without-GL

In certain cases, the funding programmes have such a defining and restricting influence that professors are turning to the first funding stream for truly free and frontier research, despite the fact that those forms of research are the specific objective of the majority of excellence programmes.

'There is no point in submitting high-risk high-gain proposals to NWO. They are typical of the types of proposals that I would recommend entrusting to a new PhD candidate from the first funding stream. That helps generate interaction between different domains.'

TPS-Without-GL

For many domains, the uniform nature of the various funding programmes causes difficulties. According to them, the programmes are focused too much on large grants and quality standards that cannot be applied to every field of research. Representatives of the Humanities and the theoretical physical sciences would like to see the introduction of more small grants, since those would better suit their approach to research. Instead, they feel obliged to organise large-scale projects in order to be eligible for excellence funding.

One item that must be included in this list of downsides of excellence instruments is the frustration among the most successful recipients of excellence funding. We heard stories of top researchers who received a Veni grant as postdocs, were then awarded a Vidi or Vici grant as young professors and went on to take up all the other possibilities offered by the set of funding instruments. At some point after the age of forty, having received all of the grants and prizes on offer, they had exhausted all the possibilities for obtaining excellence funding. For topflight researchers heading a solid, excellent research group, the key question is then how to sustain and further fund their research group's success.

Overall, the primary frustration among group leaders relates to the way in which excellence is put into practice and the fact that specific excellence instruments have too much influence in determining their day-to-day practice. For example, they heavily influence what researchers can do, who they can appoint, how they plan their research project and even what aspects of their work are appreciated. This is the result of an interaction between the funding instruments, the policy within the institutions and the standards and metrics employed within the academic community itself.

4.4 Diversity in academic research

Our conclusion is that the dominance of excellence funding and the striving for excellence are forcing all the groups in the same direction. Viewed across the groups, however, we also see huge diversity in the way in which they carry out their research. Groups that obtain little or no excellence funding still carry out research – often good and valuable research – but of another kind than the work undertaken by groups that are successful in obtaining plentiful excellence funding. This type of research runs the risk of being excluded from the narrow definition of excellent research as used in the assessment and selection procedures.

We came across a number of forms of academic research that as a rule are not considered as belonging to the category excellent research in the assessment procedures for excellence funding. We refer to four such categories below.

Interdisciplinary research

The first category of research that matches poorly with the existing instruments and structures for excellence funding is research by interdisciplinary groups. These groups opt for an interdisciplinary approach because this research method is better suited to their research tasks, for example in better responding to societal issues. However, as explained by the leader of a research group, they experience considerable difficulty in getting a foot in the door for interdisciplinary research:

‘You constantly have the feeling of being neither one thing nor the other. An interdisciplinary approach is a huge problem when it comes to funding. You are effectively invisible because NWO only looks to see whether you are within the scope of a particular discipline. At the same time, it has consequences for membership of the KNAW, and many other bodies, too. If you

are not recognised by history departments or by literature departments, then you have no chance of joining either club, although the work you are involved in includes both disciplines. The same applies to university deans; I constantly have to explain exactly what I am doing. Interdisciplinarity may be a buzzword that everyone refers to, but when push comes to shove ...'

HU-Without-GL

Non-mainstream research

A second research category that faces considerable obstacles in the competition for excellence funding is research within the minor schools and domains, or research paradigms that are not mainstream in the Netherlands. There are alternative schools and paradigms in many sciences. In a relatively small country like the Netherlands, they are often only represented on an equally limited scale.

According to a number of group leaders, this fact is reflected in selection committees that are less capable of scoring research from other schools and paradigms or show less appreciation for such research. Due to the position of their 'research niche' within selection committees, their research has little prospect of obtaining funding within the Talent Scheme. This has for some time been the experience of a professor in social sciences, but she has also observed a positive development:

'For a number of years my group has not submitted a single NWO application. In other countries, social sciences are not so dominated by a single type of sociology. This situation is unique to the Netherlands and has caused me considerable headaches. In European applications, on the other hand, we are extremely successful.'²⁰

SS-Without-GL

²⁰ Now that there is more space for interdisciplinary research, the social sciences and humanities have been grouped together and there is more space for qualitative research, the interviewee now believes she has more chance of obtaining an NWO grant.

As a result, competition for resources can cause obstacles to obtaining external funding for a wide range of research subjects, schools and paradigms. To support their research, these groups must either make do with the small portion of research funding from the first funding stream or must shift their focus to other sources of funding outside the Netherlands or that operate other selection procedures.

Interactive research

A third category of research is research undertaken in collaboration with external parties. In our study we came across a number of different groups without excellence funding that not only consider the value of their research for society but that actually collaborate with businesses and societal players. One of these groups brings together several endowed professors with a part-time task of maintaining continuous ties with the 'customer field'.²¹

When it comes to obtaining funding for excellent science, according to a number of group leaders, these forms of cooperation are not always well-received. On the other hand, such groups do often obtain external funding for their research from parties with a clear, specific interest in the further development of research, such as businesses, museums, government authorities, etc.

Individual research

The fourth affected category is research focusing on the work of an individual, and in which large-scale research programmes and large-scale infrastructure are uncommon. Group leaders particularly from the humanities and physical theoretical sciences experience difficulty in submitting an application for a single research assistant, while just that form of funding would be ideal for their approach to research. Excellence grants are often aimed at funding a number of researchers. For several research domains that is anything but ideal. After all, not all research can be embedded in large-scale programmes aimed at ground-breaking research.

'For a mathematician, an excellence grant represents a huge sum of money. Straight away it involves funding four or five research assistants and perhaps a postdoc too, and those are not numbers that are easily supervised. A mathematician perhaps supervises to or three research

21 Quotation by 'HU-Without_GL'.

assistants at any one time, but that amounts to less than one a year. And even that calls for intensive supervision. We often think in terms of smaller projects, and that leaves us feeling that we do not fit in. These funding instruments are far more suitable for experimental disciplines than for mathematics.'

TPS-Without-GL

These groups that concentrate on smaller projects sometimes do find opportunities within other funding bodies such as research funds, foreign governments that are willing to fund a PhD placement in the Netherlands and funding grants from the universities themselves, for example to fund individual placements for a research assistant.

In other words, our study shows that the funding of excellence clearly does have important positive effects for academic research groups. At the same time, not only does it have downsides, but it actually results in missed opportunities; certain types or forms of research match less ideally with the current system of excellence-based research funding, despite the fact that they are of considerable scientific and/or social value.

The fact that it is difficult for these types of research to obtain funding, in particular stable funding with a long-term horizon, needs to be considered.

5 Towards a new excellence

In this report we have examined the consequences of thirty years of fostering scientific excellence. It has become clear that in particular over the past two decades, the policy has fulfilled a powerful promotional role, through the introduction of funding programmes within which research funding is allocated via the selection of the best researchers. The introduction of the Talent Scheme in 1999 represented a boost to overall funding levels. Initially the programme was intended to be a crowbar to create space for real innovation and talent development, beyond the scope of the established research programmes at the universities. The Talent Scheme rapidly extended its budget. With the establishment of the European Research Council in 2006, basically modelled on the Dutch example, the budget for this form of research funding was doubled. Other smaller programmes were added, such as the Spinoza Prize, Gravitation and until recently the Academy Professor Prize.

This report shows that the idea of excellent research and excellent researchers has penetrated into the deepest levels of the established academic culture, and has acquired a powerful determining character for the organisation, staffing policy, funding and dynamics of research groups. The Talent Scheme is no longer the crowbar for opening the door, but has effectively become the door key.

In this final chapter, we will draw up the balance of this development. In many respects it can be viewed as a policy success, but a success that has also led to unintended and undesirable effects, and has received severe criticism. Firstly we examine the desired policy effects among research groups: selection, concentration and differentiation. We then consider the consequences for research itself. In the next section we discuss the unintended effects. These are unavoidable, no matter how successful the policy is. In the final two sections, we focus our attention on the future, and discuss options for improvement. The policy aimed at fostering excellence is in need of rethinking.

5.1 Research groups: selection, concentration and differentiation

The set of funding instruments aimed to foster scientific excellence, although relatively modest in scale, still exercises a powerful directive effect on the science

system and the functioning of research groups. This impact is in line with the thinking which emerged in the nineteen nineties, on which the policy aimed at scientific excellence is based. The above-mentioned policy instruments have together resulted in the selection of a relatively small number of researchers, the concentration of resources with those researchers, and differentiation between research groups with abundant and limited funding.

Selection and support for a limited number of promising researchers – true innovators and top talent – was a core objective of the Talent Scheme and the ERC Grants, right from the beginning. And the policy has indeed proven selective: every year just one in every 70 or 80 researchers at Dutch universities receive a grant from either scheme.

The policy concentrates research funding with a limited number of researchers. This **concentration** creates conditions that favour excellent quality research, such as autonomy for the research leaders, opportunities to develop research programmes with a long-term perspective and financial leeway to invest in expertise and facilities. Although the stacking up of research grants in the hands of individual scientists does play a role in this process, our study shows that these effects of concentration above all occur at the level of research groups.

Because the concentration of resources takes place mainly at research group level, there is also considerable **differentiation** between different groups within universities. Groups that acquire high levels of grant funding find themselves in a dynamic flow in which they are able to make choices for themselves. They have sufficient resources to find solutions to obstacles and to invest in obtaining follow-up grants. Although this research is not by definition high-risk or ground-breaking, the grants specifically create possibilities for continuing the research programme.

These groups are able to select talented young researchers who via the Talent Scheme are given the opportunity to develop a research career. Well-funded groups can operate relatively autonomously within the institution. Generic university policy, for example with regard to teaching load, research spearheads and the valorisation of research can be ignored, bought off or negotiated away, if not in line with the research group's ambitions.

Among research groups that receive no funding from the programmes for excellent research, things work differently. These groups are also dependent on external funding and are also required to write funding proposals. Sometimes by necessity they make different choices. For example, they participate in collaborative European research projects, undertake contract research work for third parties or carry out smaller-scale research projects. Within these research groups,

valorisation and education are far more relevant in setting the agenda, even if only to ensure funding and to finance appointments. There are groups that prefer this development strategy, for example because they attach more importance to the interwoven nature of education and research, or the societal relevance of their work, but this is not a pathway that is heavily encouraged.

Our study has revealed that research groups that are not awarded Talent Scheme grants and ERC grants nonetheless often and intensively compete for these funding opportunities. Even though they often achieve high scores in research evaluations, they still experience permanent pressure to participate in the specific system of the funding instruments for research excellence. Firstly because on the basis of the matching obligation, revenue from excellence grants has a trickle-down effect in the allocation of internal resources within the university, but also because, as confirmed in our interviews, recognition within universities and the internal position of research groups are heavily dependent on the acquisition of excellence funds. A grant awarded for excellent research is at it were directly equated to scientific excellence.

5.2 Research: excellence in the narrow sense of the word

Whereas the previous section outlined the consequences of the policy on the dynamics within research groups, this section examines the influence of the policy on research itself. Over the years, a complex interaction has arisen between national and European research policy, between university administrators and group leaders, between funders and researchers. The result is an academic culture focusing specifically on individual excellence, determined on the basis of competition.

The most eye-catching element is that as a consequence of this policy and as part of this culture, the importance of competition for research funding has grown enormously. There has always been competition at universities: for research funding, for publication space in eminent journals, and for career steps. With the growth of the funds provided by NWO and the ERC, the competition for research funding has become increasingly dominant.

Competition for publication of an article comes *after* the research; the struggle for research funds effectively *precedes* the research work. This fact brings with it specific challenges. It has proven far from simple to compare dissimilar plans and proposals. Peers and panels have noted that the differences in quality between research proposals are minimal and that the diversity of the proposals across disciplines is sometimes (too) great. This has led to greater reliance on more or less uniform

metrics such as publication and citation indices for the assessment of individual researchers and checklists and points systems for the assessment of research proposals. These measurement tools are sometimes used explicitly and sometimes implicitly, but their presence is perceived by everyone involved.

The generic use of checklists, points systems and indices has led to the idea that excellence is uniformly measureable. This in turn makes it possible to set excellence as a standard. As a result, every researcher can be expected to become excellent by publishing large amounts of articles in the right journals and ensuring a high H-index.²² As a consequence, excellence is restricted to that which is measured as excellent, thereby ignoring the fact that there are forms of excellent research the value of which is not reflected in citations and indices.

The emphasis on excellence and the specific interpretation of the term leaves little space for diversity in types of research. We have come across research that experiences difficulty in being considered within the dominant interpretation of excellence: interdisciplinary research, non-mainstream research, interactive research and individual research. This list is not exhaustive. In the same way, there is little space for diversity in academic careers. Researchers and group leaders find it difficult to advance their scientific career if they opt to establish their position other than through high levels of publication in high-impact journals and focusing on obtaining excellence funding.

There is also little space for diversity in the fulfilling of the tasks of the universities. Excellence policy means that of the three core tasks of universities, status is above all awarded to the second core task, namely research. Excellent researchers are able to 'buy out' of education with relative ease and pay less attention to knowledge exchange. The striving for research excellence has become a general standard at universities: excellent has become the new normal.

An additional consequence of the system of competition for funding for research excellence is the focus on the individual. Because publications, citations and indices are measured at individual level, excellence is viewed as an individual quality. The archetypal picture of an excellent researcher is an individual scientist who achieves a breakthrough working entirely alone in a lab or study, who then writes history and wins a Nobel Prize. The results in this report reveal a different picture: excellent research is often the result of group work, calls for perseverance and a programme-based approach – all of which are characteristics to which the metrics used here are practically blind.

22 This index measures the impact of the publications of a scientific researcher on his or her career.

5.3 Unintended side effects

Every mechanism for allocation of research funding has downsides. If money is awarded on a competitive basis, there are unavoidably losers. However, our study shows that the current system of funding for research excellence has three additional effects that are unintended and that limit the effectiveness of the policy.

The first unintended effect relates to **rising costs of the system** for selecting excellent researchers. The transaction costs inherent in the system of budget allocation are high in relation to the costs of the research itself. This refers to costs both in terms of time and energy for organising the competition and the costs for writing proposals, as well as the costs for the assessment and selection of those proposals. A study carried out a few years ago shows that the transaction costs are in the order of magnitude of around a quarter of the size of the total budget to allocate. As more researchers compete for the same resources and award percentages fall, the ratio between the transaction costs and the size of the resources that effectively go to research worsens further.

It also turns out that peer review processes themselves are not very efficient. Although they are suitable for filtering out deficient proposals, they are less effective when it comes to distinguishing between a large number of good proposals with only a limited degree of variety in terms of quality. In that situation, luck and coincidence also play a role. Furthermore, committees tend to select researchers who have already received an excellence grant. The basis for the selection is not merely a judgement of the quality of the content of the proposal. It seems that being a previous grant winner serves as an indicator for the excellence of the applicant. This means that the funding of research is not only based on the quality of the research proposals but also on the basis of the reputation of the applicants. There are arguments in favour of this approach, certainly in cases where the proposed research is accompanied by a high degree of uncertainty and the success of the project depends on the capacities of the researcher in handling those uncertainties. However, it is diametrically opposed to the idea that instruments for research excellence are in fact specifically intended to create opportunities for new ideas and emerging talent.

The efforts involved in the allocation of funds are comparatively high. The capacity of the selection method to make a distinction – the peer review – is limited and suffers from an inherent bias. All these circumstances raise the question whether the set of instruments that has been established for selecting and encouraging research excellence is still the most effective and efficient means of achieving this goal.

The second unintended effect of the system of budget allocation relates to the impact that the fixation on scientific excellence has on the **balance between the core tasks** of the university: education, research and knowledge exchange. The value of education and knowledge exchange has been downgraded, in the same way that valuable research that does not satisfy the dominant ideas of what represents excellence or that does not match well with the rules and procedures for excellence programmes has also become devalued.

The fact that excellent research is overvalued is reflected in the significance attached within the academic community to obtain a Talent Scheme grant. Over the years, the picture has emerged that a Talent Scheme grant is de facto a requirement for tenure. This picture does not match the data as shown in our calculations in *Dutch policy promoting scientific excellence [Beleid voor excellente wetenschap]* (Scholten & Koier, 2018) or the analysis in this report. Nonetheless, this picture is broadly shared and exercises a considerable influence on researchers. For many, it determines their career-making strategy within the university: maximum focus on obtaining Veni, Vidi, Vici or ERC Grant funding. In the same way, the picture exercises a powerful influence on university group leaders. They encourage their staff to participate in the race for excellence funding. As a consequence, rather than being the playground for innovative research and emerging talent, the Talent Scheme and ERC grants have become racing circuits around which the chase goes on for academic careers.

The undervaluation of education and knowledge exchange is equally undeniable. Contrary to the policy assumption, namely that excellent research is a precondition for (excellent) education and (excellent) valorisation, our study reveals that excellent researchers buy their way out of education and are less concerned about valorisation and impact. These tasks are left to researchers without excellence funding, who feel undervalued as a consequence.

The question is whether it is possible within universities to create new links between excellent research and education and valorisation. It is also questionable whether space can be created within the academic system for what is now viewed as non-standard research.

The third unintended side effect relates to the **growing workload**. In many critical reflections, researchers suggest that they – and as a result their organisation and the academic system – are reaching their natural limits. Stress, high pressure of work, high performance expectations and risks of burnout are indications that the academic culture that has emerged is too competitive, so that it is impossible for researchers to function optimally. In this report we provide no empirical evidence for the extent to which fostering excellence relates to this competitive culture and the related psychological problems. There are however indications for a

link, such as the pressure perceived by researchers to apply for a grant – even if they themselves view the likelihood of success too small to justify the effort – and the emphasis on quantitative individual performance standards. The discrepancy between policy and practice, between excellence as an individual characteristic and excellence as a group performance, also plays a role. Even if high pressure of work at universities is not exclusively attributable to the focus on ‘research excellence’, this report nonetheless raises the question whether competitive pressure has not risen unhealthily high.

5.4 Future prospects

Where do we go from here? In this section we offer a number of options for corrective action by the various stakeholders such as policymakers, administrators at research institutions, funders and researchers. We discuss the first two unintended effects, the limited effectiveness and efficiency of the system of budget allocation and the imbalance between the various tasks of the universities. Here we do not consider the question of pressure of work, because the relationship between work pressure and excellence funding is not sufficiently dealt with in this study.

Continuing along the same path

One option is to leave the policy instruments that have been developed and their effects unchanged, and to continue along the same path. Our analysis shows that excellence programmes do work. They select a small group of scientists who are then able to excel through the concentration of research funding and the autonomy they enjoy, and thanks to the additional possibilities and recognition they receive. From that perspective, the competitive academic environment is an improvement on the academic culture prevalent several decades ago. Dutch science overall performs well under these circumstances, as shown in the various rankings in which the Netherlands and Dutch universities score highly. The competitive climate contributes to the success of researchers working in the Netherlands in European competitions for research funding.

Individual excellence remains the central standard; the yardstick according to which all researchers are assessed. As such, it continues to be the primary goal of researchers. Organising excellent research that achieves high scores on the specific selection criteria of the current funding instruments aimed at excellence is therefore the most important justification for the continued existence of Dutch universities, and as such the universities are more likely to continue to strive for the same goals, than to introduce more variety in their

objectives and profile. The disadvantages of a system focused on topflight science, such as less attention for education and knowledge exchange and the constant competitive pressure, are simply the price that must be accepted for a top position in academic rankings.

The key question is whether this option is responsible and wise. Do the advantages outweigh the disadvantages? The unintended side effects we have referred to are broadly perceived as choke points, and represent sound reasons for searching for alternatives. There are a number of possibilities, all of which require the idea of excellence to be reconsidered and redefined.

Excellence as truly exceptional

One alternative is to no longer allow excellence to be the standard but instead (once again) to have it refer to the truly exceptional, that stands out head and shoulders above the rest. 'The rest' is then ordinary, sound scientific research, essential for the development of new knowledge and insight and for inspiring academic education and of huge value for a knowledge-based society. During the course of this study, we have observed that interviewees and other stakeholders are lacking the terminology to describe this 'non-excellent' (but for example interdisciplinary, non-mainstream, interactive or individual) scientific pursuit. In itself this says a great deal and underlines the unease within the academic world with regard to the broader function of universities.

If excellence once again becomes truly exceptional, and is no longer applied as a standard for all academic research, what are the implications for a policy aimed at excellence? We see consequences for all parties involved. First of all, it calls upon the universities to recognise excellence as something extraordinary, and not as the standard that the entire staff and all research must satisfy. Excellent research remains one of the objectives, but then merely as part of and in balance with the other core tasks of the university. The value of other types of research will then be seen and recognised. It calls on university administrators and group leaders to demonstrate a certain degree of reticence and to only encourage the exceptionally talented to compete for the individual grants available within the Talent Scheme and ERC. The idea that a successful application is a generic rite of passage for an academic career must be debunked.

Such an option would require NWO to once again give excellence programmes, such as the Talent Scheme, an undisputedly exclusive character. This would mean that NWO should not raise the budget for these programmes, as is currently happening in an attempt to raise award percentages, but should instead reduce it. Such a move would contribute to giving the grant a different significance: rather

than being a standard proof of quality and a ticket to an academic career, it would become a clear stimulus for exceptional and ground-breaking research. This would in turn further emphasise that a grant of this kind is not for every academic.

NWO could also focus more on cooperation rather than individual competition in excellence programmes. The Dutch Gravitation programme and various foreign excellence programmes show that the grants can be allocated in different ways; not only to individuals but for example to research schools, entire institutions or ad hoc consortia. The competition aspect would remain but the pressure of competition would no longer be imposed at individual level. This appears all the more reasonable, given our finding that the preconditions for excellent research are more effectively satisfied at the level of research groups.

Moreover, NWO could better match the instruments for fostering excellent research with the wide-ranging needs of the various disciplines. The instruments themselves are uniform. Their scale and duration appear above all to be geared to the needs of experimental engineering and physical sciences, where work is undertaken in larger groups, and with costly equipment. In various social sciences and humanities, and in subjects like mathematics, smaller grants are more than sufficient, possibly spread over a longer timeframe. These differences in need between disciplines seem to argue for greater differentiation in the set of instruments on offer.

One advantage of restricting the volume of these programmes, focusing more on group level and improving harmonisation with the specific needs of disciplines is a reduction in what we have described as the transaction costs of the system. This would in turn increase the efficiency of the system of budget allocation. The funds released as a consequence could then be spent on re-establishing the balance between the various tasks of the universities.

Excellence as a multifaceted term

Another alternative approach would be to differentiate the term excellence, rather than to restrict its scope, as described above. Not only outstanding fundamental research that appears in leading scientific journals deserves the predicate excellent; the same also applies to first-rate education, extra-special forms of collaboration, exceptional valorisation activities, etc. If a university fulfils several societal tasks, then there are clearly more fields in which it can excel.

A differentiation of the notion of excellence that does justice to a broader range of objectives implies multidimensional management; in other words management towards a series of different targets. That in turn calls for a palette of quality criteria

and a selection of management instruments. With regard to the quality of research, there is already a strong tendency towards broadening, and away from the one-dimensional metrics such as the H-index and the journal impact factor. These moves are supported by a number of initiatives, such as the San Francisco Declaration on Research Assessment (DORA), the Leiden Manifesto for Research Metrics (Hicks et al., 2015), Quality and Relevance in the Humanities (QRiH), new evaluation methods at the UMC Utrecht and the Standard Evaluation Protocol, adapted in 2015 in which 'production' is no longer identified as a separate evaluation criterion.

By going further than the indices according to which excellence is currently determined, it is possible to not only create more space for societal impact, but also for scientific renewal. After all, innovation in science calls for more than counting numbers of publications and citations. It relates to developing ways of visualising and valuing critical reflections within a field, the synthesis of insights, the establishment of new theories and the originality of contributions.

Broadening the set of quality criteria for research could also be employed in creating a link between excellence in research and excellence in education. One option would be, when awarding a Talent Scheme grant, to demand that researchers spend a significant proportion of their time on teaching rather than 'buying off' the teaching tasks. When follow-up applications come around, it would also be possible to consider previously achieved societal impact in the same way that already achieved research performance counts today.

Multidimensional objectives and quality criteria for excellence call for a set of management instruments. Take for example what is known currently by NWO as the 'Open Competition', which is intended for the funding of research projects. In the past, for this scheme too, the emphasis was often placed on 'research excellence', but quite rightly, NWO is now looking to use Open Competition to make a distinction from the Talent Scheme, Gravitation or Spinoza Prizes. Within the Open Competition, the research domains Social Sciences and Humanities have focused on experienced researchers who are not (any longer) eligible for the Talent Scheme, but who demonstrate other qualities. This approach also makes it possible to promote projects of very different sizes.

Similar opportunities are offered in the funding of research in the framework of the Dutch National Research Agenda (*Nationale Wetenschapsagenda* - NWA). With regard to the character of the challenges identified in the NWA, a focus on excellence along the lines of the Talent Scheme would be out of place. In the case of certain of the NWA challenges, the focus is specifically on interdisciplinary, non-mainstream or interactive research. Others relate to the links between different sciences and renewal in terms of paradigms.

These demand a different assessment framework; less dependence on scientific peer review and more on societal evaluation; an emphasis on cooperation, often with parties from outside the academic world; and an approach in which societal impact is achieved.

If excellence is accepted as a multifaceted term within the academic community and by the financial backers, there is space for a variety of different careers in research, education and knowledge exchange. Not every university scientist or scholar need be an excellent researcher. Groups, departments and institutions would then be able to identify and reward a portfolio of qualities and skills that they wish to bring on board. Everyone is assessed on the basis of their specific contribution to this portfolio. At the end of the day, a multifaceted definition of excellence of this kind also creates space for universities to adopt a clear profile in respect of one another.

Differentiation within the term excellence could help to re-establish the balance between the tasks of the universities. There is however a risk that high transaction costs, permanent competition pressure, constant performance measurement and run-outs and dropouts in the rat race will also start emerging in the other branches of the university. That in turn would cause work pressure to rise again and reduce the efficiency of budget allocation.

5.5 Conclusion

Ideas regarding the fostering of research excellence were developed some thirty years ago, and have not changed fundamentally since the time. However, the budget involved has grown considerably, also thanks to the addition of similar European instruments. This clear focus on research excellence, year in year out, has changed the character of our universities. Successes have been achieved: the Netherlands performs well in terms of academic research.

At the same time, the tensions caused within the universities by this system of research funding have also grown. These tensions are reflected by initiatives undertaken within the universities such as Science in Transition, Rethink UvA and WOinActie. The system of budget allocation costs a great deal of time, money and energy; the fixation on research excellence is to the detriment of education and knowledge exchange; and, as a result the perceived work pressure is threatening to skyrocket.

All of these are sufficient reasons to draw up a balance, and to pose the question whether the Netherlands is still on the right track with its current policy. In the conclusion of this report, we consider two questions:

1. Is the current policy tenable in the long term?
2. Does the policy deliver the results that society needs?

Is the current policy tenable in the long term?

The policy aimed at excellence is reaching a number of limits, which are reflected in the high costs of the system of budget allocation (transaction costs), low award percentages, high pressure of work for researchers and low job security. The funding system has resulted in a staffing structure packed with a high proportion of temporary positions. This imposes severe demands on the stability of the organisation and applies pressure on the tacit knowledge²³ basis of the tenured staff, their institutional memory and their capacity to obtain funds and offer supervision.

If more money were to be made available via NWO for excellent research, would that make the current policy more tenable in the long term? The answer is doubtful. If no changes were made to the remainder of the system, the result would be a further distortion of the balance between temporary and tenured staff; it would further accentuate the focus in research on incremental (step-by-step) – but hopefully publishable – results; and it would further increase the pressure to publish. The pressure of work that arises from application pressure, competition and the supervision of PhD candidates and postdocs would also rise further. The space for reflection and synthesis and for reflecting research in education and knowledge exchange would be further restricted.

Funding instruments with a limited time horizon that provide researchers with funds on the basis of detailed project proposals – not only the Talent Scheme and ERC Grants but also numerous other Dutch and European grant schemes – dominate research funding today. The emphasis of this funding system fails to do justice to the diversity of objectives of our universities. It also takes little account of the unpredictable character of research and the need for a long-term perspective. In many cases, research on the basis of project funding also offers professional researchers little freedom for reflection, to deviate from project plans, to integrate knowledge and insights and to follow new pathways. In this respect, excellence funding is still relatively flexible. We have seen that despite the fact that they are reliant on project funding, certain excellent groups are still able to set their own agenda.

These considerations suggest that one-sided reliance on this type of competitive funding arrangements works adversely. The funding of academic research follows a series of different channels. Each of them uses specific stimuli and mechanisms.

²³ *Tacit knowledge* is the knowledge that cannot be described in words, but which is expressed in a whole variety of practices and routines. It is more experience-based knowledge than book-based knowledge, more intuitive knowledge than analytical knowledge. A group of professionals is often characterised by a shared basis of tacit knowledge, and the practices and routines that such knowledge brings about.

It is the combination of these channels that determines the direction taken by research. It is the balance between the funding mechanisms that ensures that research agendas are geared more towards the short or the long term; that research for example aims for incremental results or breakthroughs, new knowledge or the integration of existing knowledge, empirical results or methodological or conceptual advances, research outcomes or capacity development. It can be concluded that the return on investments of policy instruments that foster excellent research could well be better served if other funding instruments were to be reinforced, rather than expanding the budget for excellent research.

Does the policy deliver the results needed by society?

At the end of the day, the extent to which academic research satisfies the needs of society determines the judgement on whether taxpayers' money has been wisely spent. In and of itself, scoring well on academic rankings fulfils no societal needs. What does society need and what does it expect of its universities? It expects new knowledge and new insights. They may be the result of research at Dutch universities, but can just as easily be the outcome of research abroad. More important is access to academic knowledge, wherever it is generated, and the capacity to understand that knowledge, to correctly assess its merits, to use it, and to integrate it into education. All those requirements mean that researchers must occupy a favourable position in international academic networks, and that in turn means they must themselves be responsible for carrying out excellent research. Furthermore, society expects its universities to be staffed by well-trained, expert researchers. For many positions on today's labour market, people with research experience are at an advantage. The fact that many postdocs eventually leave university satisfies this need. The preparation of academic researchers for a position outside university still leaves much to be desired. And of course, society looks to its universities for graduates; well-trained professionals who are conversant with the most recent developments within their field of study. With that in mind, it is crucial that good-quality researchers be actively involved in education.

We are not calling to dispose entirely with the policy aimed at research excellence. There are good reasons for consciously creating space within the Dutch knowledge ecosystem for the dynamism of excellent research. It can awake curiosity, focus the power of the imagination and result in new schools of thought, methods and theories. All are inherent in our universities. But a university is more. Excellent research is one of the components of the public mission of a university. The essence is to establish a sound balance between the different components. That in turn calls for a willingness to rethink the various goals and expectations of our universities. Policymakers, funders, institution administrators and researchers all have a contribution to make. None of them need leave the initiative to others.

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