

What motivates researchers?

Research excellence is still a priority



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Foreword

Regardless of the circumstances, researchers remain researchers. Their main motivation is to conduct research of outstanding quality. But opinions differ as to what that actually means. For researchers affiliated with a university or an NWO or Academy institute, quality is defined largely by peers, who decide whether they can publish their findings in a journal. For researchers at a university of applied sciences or at a public knowledge organisation such as RIVM or TNO, quality depends on the social relevance of their work and how satisfied their clients are. Finally, researchers at university hospitals care about peer review *and* about the social relevance of their work.

For this report, we repeated a survey that we conducted in 2013 among the staff at Dutch knowledge institutions. We did this at the request of the Dutch Ministry of Education, Culture and Science and in cooperation with the Association of Universities in the Netherlands (VSNU) and the institutions themselves. Our main conclusion is the same as in 2013: researchers identify with their research task. Researchers' time allocation has scarcely changed in four years' time. The survey shows, once again, that researchers work very hard. Overtime is the rule rather than the exception. In particular, assistant, associate and full professors at universities feel there is a gap between their wishes and reality. They feel they spend too little time on research, but they would also like to make a better job of their other tasks, such as teaching.

We would like to thank all the respondents for their time. As in 2013, they find it important for their research to be utilised in socially relevant applications but they also feel that it should really not be up to them but up to their organisation to arrange this. Because we also included researchers at universities of applied sciences and public knowledge organisations this year, we can provide a more nuanced picture of the results concerning knowledge transfer. We see differences between the more science-driven quality criteria at research universities and NWO/Academy institutes and the more outward-looking quality criteria at public knowledge organisations and universities of applied sciences. In the latter case, there is also a greater focus on knowledge transfer to external parties.

There is a discrepancy between the way researchers want to divide their time over their different responsibilities and their actual time allocation, and between their own

knowledge transfer objectives and those of their organisation. Researchers recognise society's demand for knowledge valorisation. Meeting that demand will require knowledge institutions to marshal their forces internally.

Dr Melanie Peters

Director, Rathenau Instituut

Summary

This report discusses the results of a survey conducted among researchers working at one of the Dutch research universities, university hospitals or universities of applied sciences, at one of the NWO¹ or Academy institutes,² or at one of the Dutch public knowledge organisations.³ It was carried out at the request of the Dutch Ministry of Education, Culture and Science and builds on a survey conducted in 2013. The conclusions below reveal what motivates researchers.

Research of outstanding quality is a priority

Regardless of their institute's mission, researchers derive much of their motivation from their ability to conduct research of outstanding quality. Every institution pursues objectives related to the quality of research. Researchers working at universities, university hospitals and NWO and Academy institutes identified 'being able to conduct research of outstanding quality' as their most important objective. For researchers at universities of applied sciences and public knowledge organisations, that is 'conducting socially relevant research'.

Research excellence is also one of the most important drivers of international mobility. That is true for both foreign researchers who currently work in the Netherlands and for Dutch researchers who have spent time working abroad.

Overtime and less time for research than agreed

On average, researchers work overtime by more than a quarter of the hours they are contracted to work. By their own account, they spend less time on research than agreed internally and more time on teaching and on management and organisational tasks, regardless of their employing organisation. Women are more likely than men to indicate that they spend more time on teaching and less time on research than agreed. The discrepancy between actual and agreed time is greatest among assistant, associate and full professors at the universities. Assistant professors mainly spend more time on teaching, and full professors on management and organisational tasks. Associate professors say that both tasks take up more of their time than agreed.

1 See Appendix 2 for a list of the eight institutes funded and managed by the Netherlands Organisation for Scientific Research (NWO).

2 See Appendix 2 for a list of the 15 institutes belonging to the Royal Netherlands Academy of Arts and Sciences.

3 See Appendix 2 for a list of the 29 public knowledge organisations (PKOs), and see <https://www.rathenau.nl/en/knowledge-policy/public-knowledge-organisations-netherlands>.

Little time for knowledge transfer

Researchers consider teaching and knowledge transfer⁴ as less important personal objectives. In their eyes, knowledge transfer to external parties is an organisational objective. They spend only a small proportion of their time on knowledge transfer, i.e. an average of 8% for researchers at universities of applied sciences and public knowledge organisations, and an average of 4% for researchers at the other organisations. Nevertheless, they themselves see the social relevance of their work as important. Forty-two percent regard 'conducting socially relevant research' as an important objective. Sixty-eight percent think it is important for businesses and public institutions to make good use of their research results.

The focus on knowledge transfer and on the social relevance of research is greater at universities of applied sciences and public knowledge organisations than at the other institutions. When asked to describe their motives, researchers at these institutions are more likely to choose knowledge-transfer objectives, and they are also more likely to indicate that they involve non-research parties in their work. These parties, they claim, also make more use of research results.

Similarities and differences between surveys

These results differ very little from those of the previous survey in 2013. The ability to conduct research of outstanding quality remains the most important objective for researchers working at research universities, university hospitals and NWO and Academy institutes, and they still feel that they devote too little time to it. Neither has there been much change with regard to knowledge transfer; researchers continue to consider the social relevance of their research important, but they also still spend little time (about 4%) on it.

We see that small changes have occurred in university researchers' time commitments and the criteria against which they believe employers appraise their performance. Full and assistant professors spend a bit more time on management and organisational tasks than before (3.5% more). The proportion of time that assistant professors devote to teaching increased by an average of 5% in 2017, while among doctoral candidates there was a 2% increase. There was also a 5% increase in the frequency with which researchers at universities chose 'teaching' as one of their most important objectives. University researchers also cited 'teaching' more often as a performance indicator, as well as the amount of applied knowledge that they produce.

4 See page 9 for the definition of knowledge transfer used by the Dutch Ministry of Education, Culture and Science.

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Introduction

This report is meant to help researchers, administrators and policymakers understand the motives of researchers working in the Netherlands. It discusses the results of a survey conducted among 2,613 researchers employed at one of the research universities, university hospitals or universities of applied sciences (hereafter: UAS) in the Netherlands, at one of the NWO⁵ or Academy⁶ institutes, or at one of the Dutch public knowledge organisations (hereafter: PKO).⁷ They are members of the academic staff at these institutions and, in addition to conducting research, they also have other tasks, such as teaching. They filled in the questionnaire in November and December 2017. The questions concerned their time commitment, their objectives, their involvement in knowledge transfer, and their international mobility.

A similar survey was held in 2013 among 4,243 researchers. This survey was part of the Scientific Research Interdepartmental Policy Study (hereafter: 'IBO Study'), an inter-ministerial study concerning academic research (Rijksoverheid 2014). The Rathenau Instituut analysed the outcomes of the 2013 survey and published a report (in Dutch) about it in 2014 (De Goede and Hessels 2014).⁸ The Dutch Ministry of Education, Culture and Science asked us to repeat the survey.

Additions to the 2013 survey

The 2013 survey did not include researchers at UAS or PKOs, nor did it cover the topics of knowledge transfer (see box on the following page) or international mobility. These have now been added.

Researchers working for a UAS or a PKO have been added on the assumption that, because their employers focus on applied knowledge, their motives will differ from those of their counterparts at research universities, university hospitals and the NWO and Academy institutes. By adding them, we can see whether our assumption is correct and whether the tasks of UAS and PKOs translate into differences in researchers' time commitment and in their involvement in knowledge transfer.

5 See Appendix 2 for a list of the institutes funded and managed by the Netherlands Organisation for Scientific Research (NWO).

6 See Appendix 2 for a list of the institutes belonging to the Royal Netherlands Academy of Arts and Sciences.

7 See Appendix 2 for more information about PKOs as well as <https://www.rathenau.nl/nl/kennisecosysteem/publieke-kennisorganisaties>.

8 See also <https://www.rathenau.nl/nl/kennisecosysteem/drijfveren-van-onderzoekers> (Dutch only).

The topics ‘knowledge transfer’ (see box) and ‘international mobility’ were added to the survey because they have generated considerable interest over the past four years. For example, ‘Science with maximum impact’ is one of the aims of the government, as written in the policy document *2025; Vision for Science* (Ministry of Education, Culture and Science 2014). The government doubled down on this aim by developing the Dutch National Research Agenda, while valorisation itself became a topic of growing interest within the Dutch science community (see e.g. Dekker 2017). Government, the European Union and universities have also been keen to encourage international mobility (Koier et al. 2017).⁹

Knowledge transfer: valorising knowledge

Knowledge transfer is also referred to as knowledge utilisation or valorisation. In this study and the associated survey, we have chosen to use the term ‘knowledge transfer’ based on the definition given by the Dutch Ministry of Education, Culture and Science (2014):

‘Knowledge transfer is the process of using knowledge to create value by making it suitable and/or available for economic and/or societal purposes and by converting it into products, services, processes and new business activities. Knowledge transfer involves the economic valorisation of knowledge and the utilisation of knowledge to solve societal problems or to contribute to public debate.’

Questions omitted in 2017

We also omitted certain questions that featured in 2013. These concerned the allocation of research funding and performance pay. The report *Spinning plates* (Koier et al. 2016)¹⁰ provides details about the allocation of research funding. Questions about performance pay were omitted because the results of the 2013 survey showed that it plays only a minor role for researchers.

⁹ See also <https://www.rathenau.nl/en/knowledge-ecosystem/international-mobility-researchers>.

¹⁰ See also <https://www.rathenau.nl/en/knowledge-ecosystem/spinning-plates>.

Reader's guide

This report is divided into four sections, each focusing on a different topic: researchers' time commitment (section 1), researchers' and organisational objectives (section 2), knowledge transfer (section 3) and international mobility (section 4). For each topic, we discuss differences and similarities between the five types of organisations, and differences between the various job categories at the research universities (which employ the largest group of researchers).

Appendix 1 describes our research methodology. It also provides more details about the study, how we processed the data, and the sample population. A total of 2,629 respondents completed the questionnaire. Of these, 16 were excluded from analysis because they work less than four hours a week for one of the institutions covered in our survey. That left us with 2,613 valid questionnaires.

This report presents the questionnaire results by type of institution and (in the case of the research universities) by respondents' jobs. Table 1 shows that the responses are not always evenly distributed across the individual institutions. It is only within the group of research universities that all 14 institutions responded. The responses from the PKOs came mainly from the policy assessment agencies and government laboratories (such as NFI, KNMI, RIVM). Within the group of PKOs, only one applied research institute (or 'TO2 institute', such as Deltares and TNO) produced more than ten respondents.

Table 1 Responses by institution

Type of institution	Total number of institutions approached	Institutions >10 responses
Universities	14	14
University hospitals	8	4
NWO or Academy institutes	27 ¹¹	6
UAS	32	9
PKOs	31 ¹²	9

11 In addition to the 25 NWO and Academy institutes, we also approached Naturalis and BPRC. Not a single researcher at either institute completed the questionnaire. For the complete list, see Appendix 2.

12 Besides the 29 PKOs identified by the Rathenau Instituut, we also approached the RIKD and the Cultural Heritage Agency of the Netherlands as members of the network of government agencies. Not a single researcher at either institute completed the questionnaire. For the complete list, see Appendix 2.

To facilitate discussion of the results by job category, we reshuffled the job groups slightly. The job categories ‘postdoctoral fellow’ and ‘researcher’ have been merged into a single category: postdoc/researcher.

To check the figures in this report against the 2013 figures, please see the above-mentioned report *Drijfveren van onderzoekers* (De Goede and Hessels 2014).¹³ In 2013, we did not break down researchers’ motives by gender; in 2017, we did. Where gender differences are meaningful, we point this out to readers.

13 See also <https://www.rathenau.nl/nl/kenniseecosysteem/drijfveren-van-onderzoekers> (in Dutch only).

1 Time commitment

The topic of this first section is researchers' time commitment. We first consider how researchers divide their time between various tasks (1.1), how that compares with the relevant agreements made (1.2), and whether they are happy with that (1.3). We then look at gender differences (1.4) and, finally, at the amount of overtime devoted to all these tasks (1.5).

Researchers work a lot of overtime. By their own account, they regularly spend upwards of 30% more time on their work than their employment contract indicates. It is mainly their research that suffers. Although research occupies the largest percentage of their time, they in fact spend less time on it than agreed internally. This was also the case in 2013. Conversely, they spend more time on teaching and on management and organisational tasks than agreed. Women working for research universities are more likely than men to perceive an imbalance between teaching and research. As in 2013, researchers spend little time on valorisation: an average of 4% to 8% of their time.

Although they put in a lot of overtime and there is a discrepancy between the agreements made and the reality of their work, many researchers are happy with the amount of time that they spend on research, teaching and knowledge transfer. It is only at the research universities that assistant, associate and full professors are dissatisfied with the amount of time that they are able to spend on research.

1.1 Time allocation

Researchers devote most of their time to research, but also have other tasks, such as teaching, management, knowledge transfer and supervising other researchers. They divide their time between all these activities; see Figure 1.1.

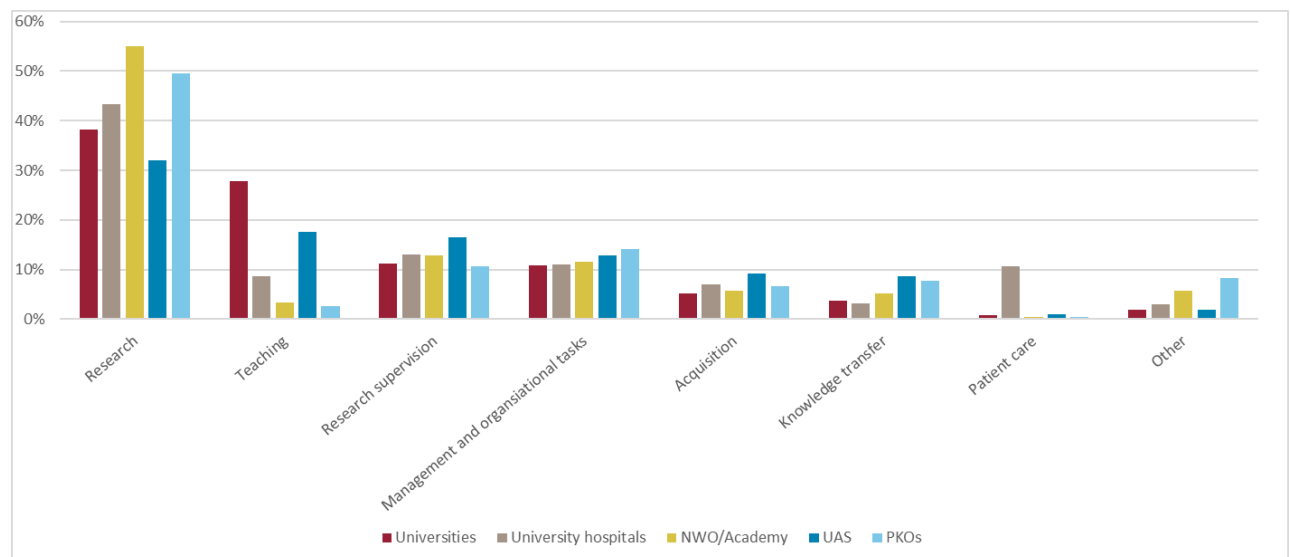
Researchers at all five types of institutions devote most of their time to research.¹⁴ Teaching plays an important role at the universities and UAS. Researchers at universities spend an average of 28% of their time on teaching, while those at UAS spend 18% of their time on it. Researchers at university hospitals also teach, but

14 The question was: 'The next question concerns the percentage of time that you spend on average on research and on other tasks (generally speaking, based on your own estimate). Fill in the percentages for the categories below, with your answers adding up to 100%.'

they spend only an average of 9% of their time doing so. They also spend an average of 11% of their time on patient care.

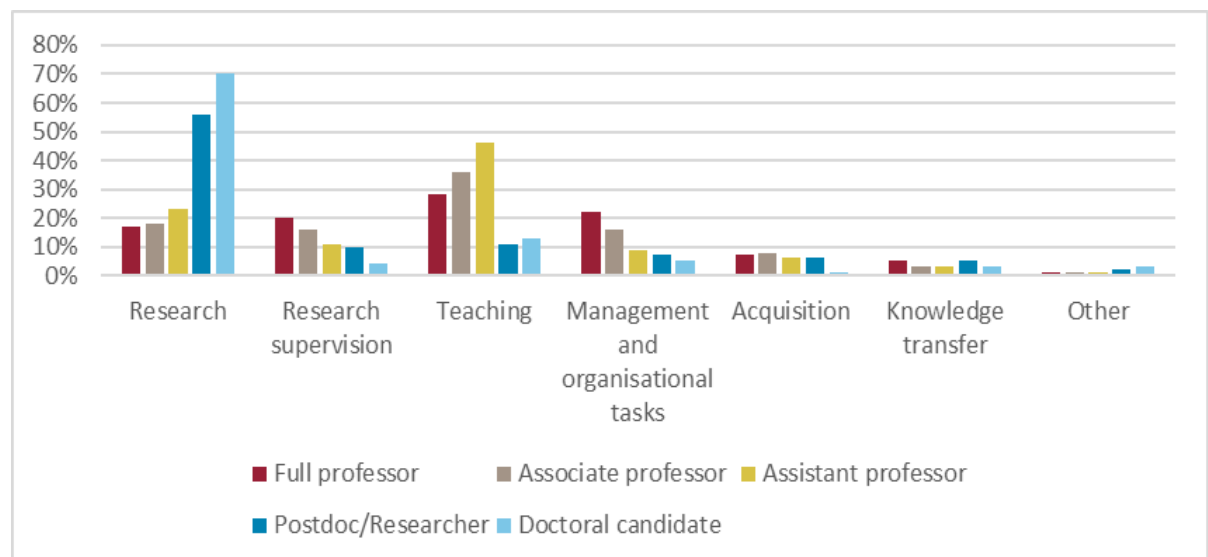
Although knowledge transfer is one of the three core tasks of the research universities, on average university researchers spend only 4% of their time on this task. By comparison, researchers at UAS and PKOs spend about 8% of their time on knowledge transfer. Almost half of all researchers, however, do not spend any time whatsoever on knowledge transfer, and 55% spend less than 5% of their time on it. At research universities, the percentage of researchers who do not spend time on knowledge transfer is 52% (the highest); at UAS it is 31% (the lowest).

Figure 1.1 Time commitment of researchers as a percentage of total working time (average, by organisation)



The set of tasks that university researchers are assigned clearly differs from one job category to the next. The more senior the position, the less time spent on research; see Figure 1.2. Doctoral candidates spend 70% of their time on research and postdocs/researchers spend more than half their time on it. Full professors devote 17% of their time to their own research. Both they and associate professors spend the rest of their time teaching, supervising research and carrying out management and organisational tasks. Full professors devote 28% of their time to teaching, 22% to management and organisational tasks, and 20% to research supervision. Assistant professors have the heaviest teaching load (46% of their time), followed by associate professors (36%).

Figure 1.2 Time commitment of researchers as a percentage of total working time (average, by organisation)



Comparing 2013 and 2017

If we compare 2017 and 2013, we see a few changes in researchers' time commitment and their level of satisfaction over the past four years. Researchers at university hospitals now devote a little less time to research supervision, down from 16% in 2013 to 13% in 2017. At the universities, we see that full and associate professors have come to spend more time on management and organisation, with the amount of time devoted to these tasks increasing by 3.5%. Assistant professors and doctoral candidates now spend somewhat more of their time teaching. Assistant professors devoted 42% of their time to teaching in 2013 and 46% in 2017; doctoral candidates saw their teaching time increase from 11% to 13%. Assistant professors now spend less time on research (2% less than in 2013), and so do associate professors (3% less). Postdocs/researchers spend a little less of their time on research supervision than in 2013 (-3%), but a little more on knowledge transfer (+2%).

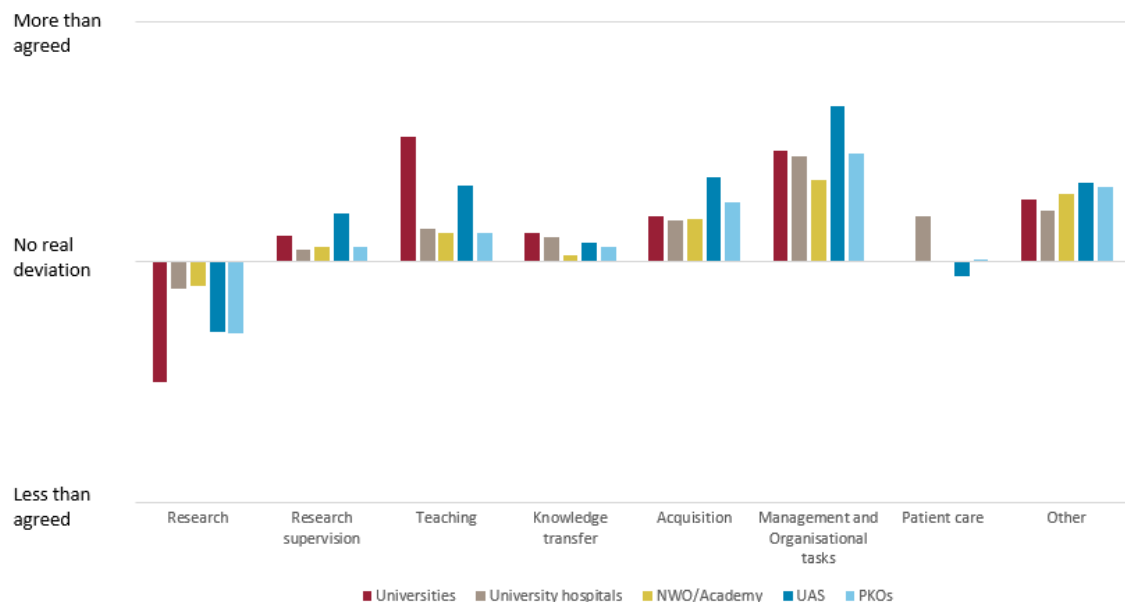
1.2 Actual versus agreed time commitment

The questionnaire also asked respondents to compare their actual time commitment with the relevant internal agreements with their supervisor or organisation; see Figure 1.3.¹⁵

Researchers spend less or much less time on research than agreed internally. That is the case for 49% of the researchers working at research universities, 38% working at UAS, about 30% at university hospitals and PKOs, and 24% at NWO and Academy institutes, even though, as their objectives indicate, they consider research more important than all their other tasks.

Researchers spend more time than agreed on management and organisational tasks; that is the case for half of all respondents working at UAS, and between 29% and 38% at other the institutions. Researchers at research universities spend more or much more time on teaching than agreed.

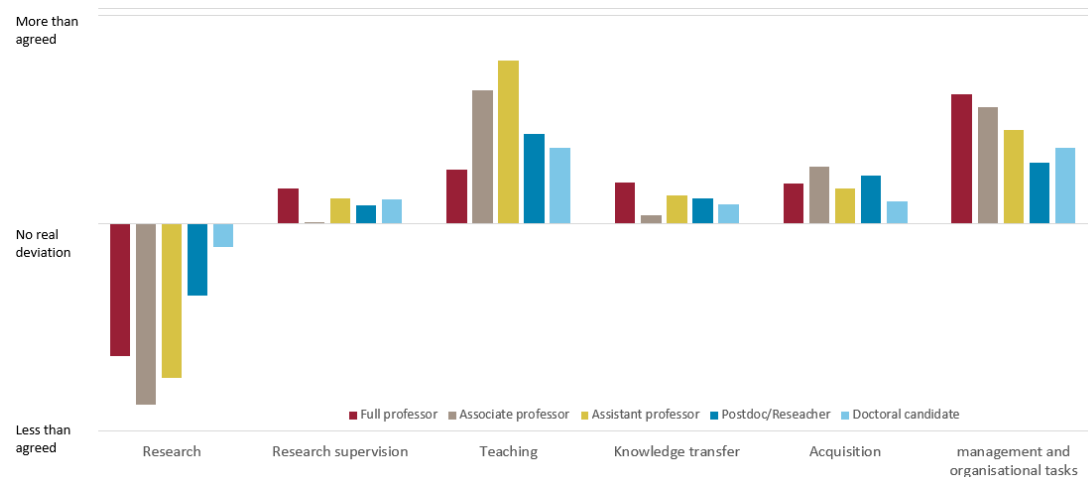
Figure 1.3 Time commitment compared with internal agreements: average scores by organisation



Note: the graph indicates the extent to which researchers spend more or less time than agreed on specific tasks. These are average scores for type of institution and type of task. The responses were measured on the scale -2, -1, 0, 1, 2. The vertical axis runs from -1 to 1.

¹⁵ The question was: 'To what extent does the average amount of time that you spend on the following tasks deviate from the amount of time you are meant to spend on them, based on your appointment or internal agreements?'

Figure 1.4 Time commitment compared with internal agreements: average scores by job category (universities only)



Note: the graph shows the average score for how much more time researchers spend on a task than agreed. The responses were measured on the scale -2, -1, 0, 1, 2. The vertical axis runs from -1 to 1.

At the universities, there are also differences from one job category to the next. Specifically, assistant and associate professors tend to spend more time on teaching than agreed; see Figure 1.4. The discrepancy between agreed time and actual time is not as sharp in the other job categories. Associate, assistant and full professors in particular spend less time doing research than agreed. In addition, all three job categories also spend more time than agreed on management tasks.

1.3 Level of satisfaction with time commitment

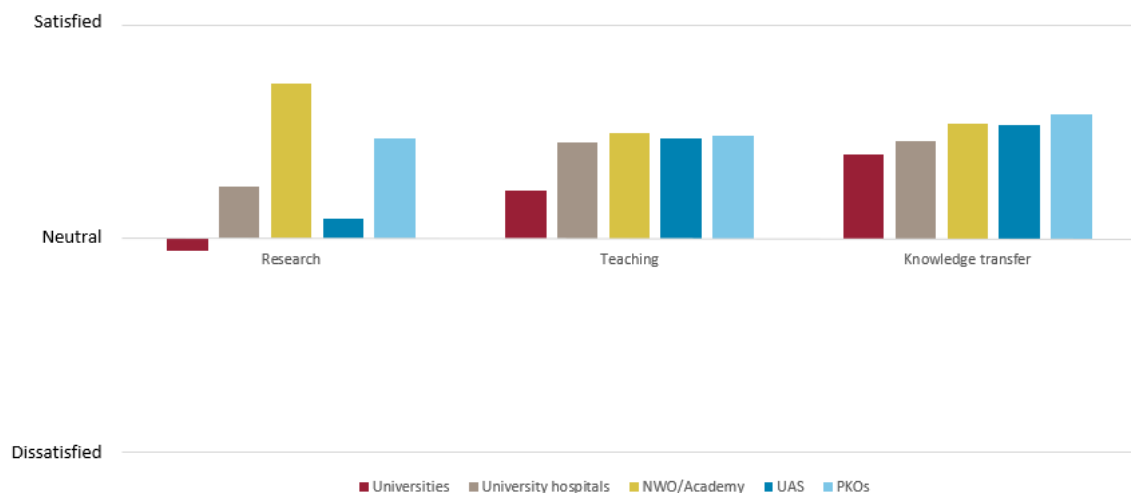
Although researchers' time commitment does not correspond with the agreements made, many researchers are nevertheless happy with the amount of time that they are able to spend on research, teaching and knowledge transfer.¹⁶

Only researchers at research universities are somewhat dissatisfied with the percentage of time that they are able to devote to research. On average, they are fairly neutral about their research time (see Figure 1.5), but if we examine the dissatisfaction distribution, we see that 44% are either dissatisfied or very dissatisfied. Researchers at NWO and Academy institutes are the most satisfied with the time that they devote to research. Although researchers at all the

¹⁶ The question was: 'To what extent are you satisfied with the percentage of time that you spend on research/teaching/ knowledge transfer on average?'

institutions spend little time on knowledge transfer, most of them are happy with that amount of time.

Figure 1.5 Level of satisfaction with time commitment, by organisation

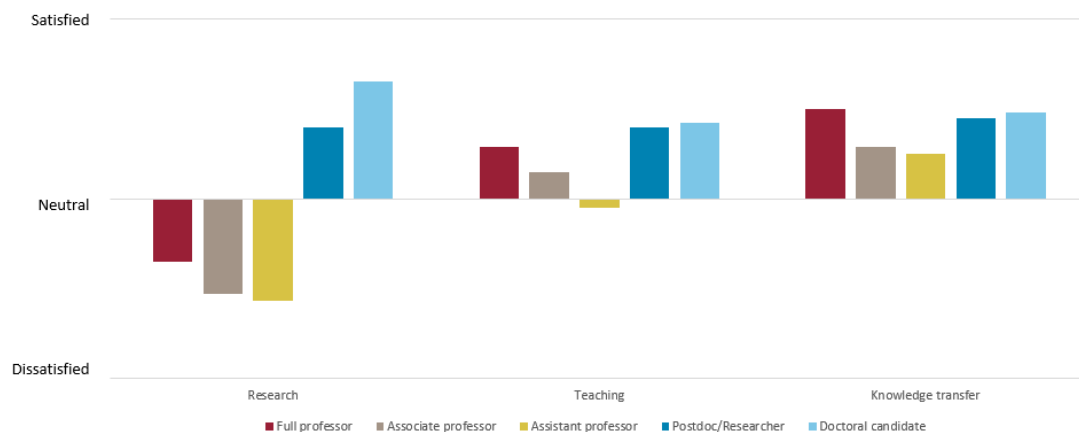


Note: the graph shows the average score indicating the level of researcher satisfaction with their time commitment. The responses were measured on the scale -2, -1, 0, 1, 2. The vertical axis runs from -1 to 1.

Although university researchers are, on average, neutral about the time they spend on research, the distribution within the various job categories reveals a different picture; see Figure 1.6. Full, associate and assistant professors in particular are dissatisfied or very dissatisfied with the percentage of time that they can devote to research (55% of full professors, 60% of associate professors and 64% of assistant professors). Dissatisfaction among associate professors has increased from 47% in 2013 to 60% in 2017.

Eighteen to 27% of assistant, associate and full professors are satisfied with their research time. Most of the university researchers who say they are dissatisfied spend less time on research than agreed (80%). The responses to the open questions bear this out; 78% of the researchers who are dissatisfied (n=478) state that they do not have enough research time, or that it is crowded out by other tasks, i.e. management and organisational tasks (within their own organisation and related to research projects) and teaching.

Figure 1.6 Level of satisfaction about time spent on research, teaching and knowledge transfer, by job category (universities only)



Note: the graph shows the average score indicating the level of researcher satisfaction with their time commitment. The responses were measured on the scale -2, -1, 0, 1, 2. The vertical axis runs from -1 to 2.

University researchers are more satisfied with the time that they devote to teaching than with the time they spend on research. Most associate and full professors are either neutral or satisfied, even if they indicate that they spend more time on teaching than agreed. A quarter of associate professors and 37% of assistant professors are dissatisfied with the amount of time they devote to teaching. Of those university researchers who are dissatisfied with their teaching time, 78% indicate that they devote more time to teaching than agreed. This is also true for 30% of the researchers who *do* express satisfaction with the amount of time spent on teaching. The reason for the dissatisfaction was neatly summed up in one of the responses to the open questions: ‘The time designated for teaching is unrealistic and requires me to either give up my leisure time or my research time, or do a poor job of teaching and minimal testing.’

1.4 Men and women

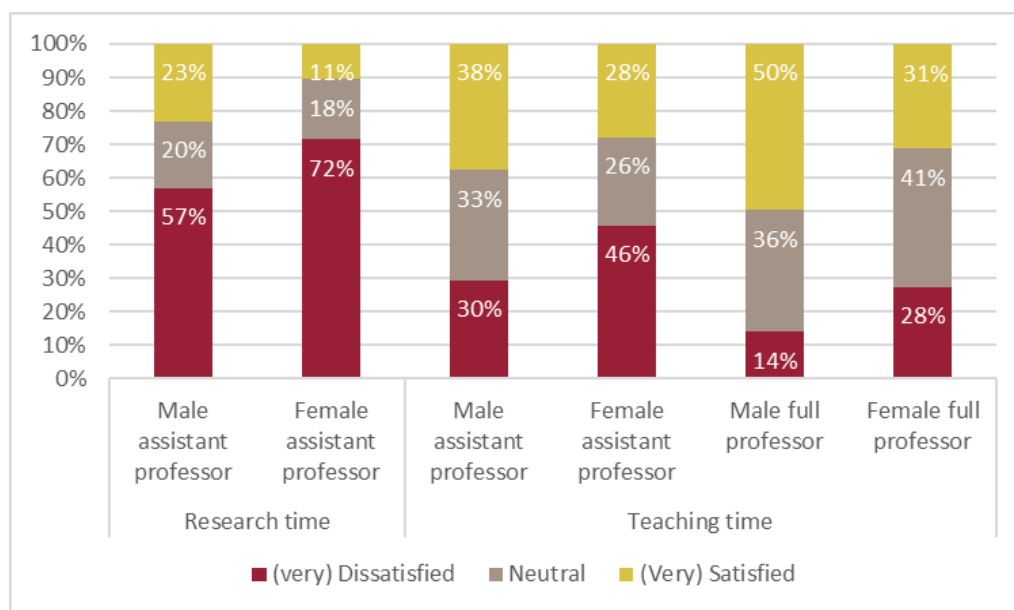
With regard to research universities, we explored whether there are differences in the time commitments of male and female researchers.¹⁷ Men and women spend the same amount of time on research and teaching, but the discrepancy between the time spent on these two tasks and the internal agreements made was larger for women than for men. Women are more likely to indicate that they spend more or

¹⁷ We cannot compare these figures with the earlier study; the 2013 survey did not ask the respondents to identify their gender.

much more time on teaching and less or much less time on research than agreed. Fifty-one percent of women spend more or much more time on teaching than agreed, compared with 39% of men.

That is especially true among postdocs/researchers and doctoral candidates. For example, 47% of female postdocs/researchers spend more or much more time than agreed on teaching; among their male counterparts, that is 33%. Fifty-three percent of women indicate that they spend less or much less time on research than agreed, compared with 46% of men. The difference is largest among full professors. Seventy-six percent of female full professors say that they spend less or much less time on research than agreed. Among their male counterparts, that is 50%.

Figure 1.7 Level of satisfaction with research and teaching time by gender (assistant and full professors)



There are also differences between the sexes in level of satisfaction. Women are more likely than men to be dissatisfied with the amount of time they devote to teaching (29% versus 19%). The difference is greatest among assistant and full professors; see Figure 1.7. Forty-six percent of female assistant professors are dissatisfied or very dissatisfied with the amount of time they devote to teaching. Only 30% of their male counterparts are. Among female full professors, 28% are dissatisfied or very dissatisfied with their teaching time; among their male colleagues, that is 14%. There is no gender difference in level of satisfaction with research time, with the exception of assistant professors: 72% of female assistant professors are dissatisfied or very dissatisfied with the amount of time they devote to research, whereas 57% of their male counterparts are.

1.5 Overtime

Researchers are satisfied with their time commitment to varying degrees, but they do work a lot of overtime. We asked researchers how many hours a week they actually work and how many hours they should be working according to their employment contract (measured in full-time equivalents or FTEs).¹⁸ Based on actual hours and contracted hours, we were able to determine whether researchers work more hours than they were hired to work. Appendix 1 explains how we went about calculating overtime. The outcome shows that researchers in fact work a considerable amount of overtime.

Table 2 Average overtime by organisation

	Weekly overtime ¹⁹
Research university	28%
University hospital	34%
PKO	19%
NWO or Academy institute	22%
UAS	33%

On average, researchers work overtime by more than a quarter of their contracted hours. Average overtime is highest at organisations that are clearly geared towards teaching (universities, university hospitals and UAS). At university hospitals, 44% of researchers work overtime by more than a third of their contracted hours, which in the case of full-time employment means 12 extra hours per week.

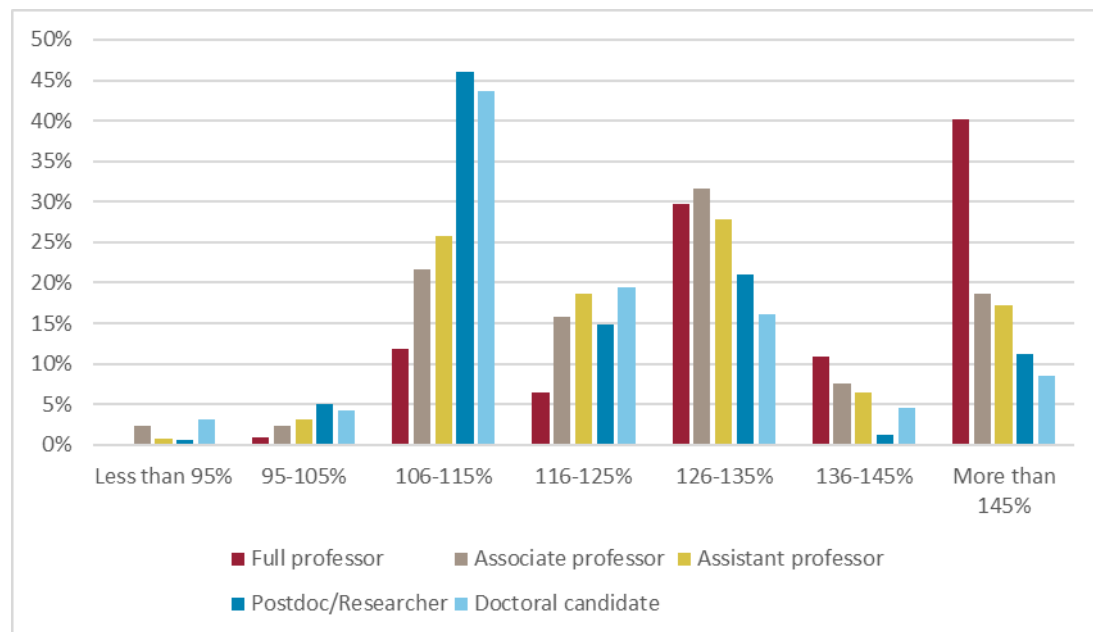
At universities, the amount of overtime differs from one job category to the next. Generally speaking, the more senior the position, the more overtime the employee works. For example, full professors work overtime by an average of 45% of their contracted hours, and doctoral candidates by an average of 19%. Associate and assistant professors work overtime by about 29% of their contracted hours. There is little difference between men and women in this regard. On average, men work

18 We are unable to compare the overtime data with the 2013 results because the questions concerning this topic are worded differently.

19 The percentages indicate the percentage by which an average employee in the institution concerned worked overtime compared with his or her appointed hours. If that percentage is 25% and the person concerned has been appointed to work four days a week, then this researcher in fact works a full day more than the four days of his or her appointment.

slightly more overtime than women, i.e. 30% versus 24%. These differences are greatest among doctoral candidates.

Figure 1.8 Percentage of contracted hours worked, by week and by job category (universities only)



University researchers with a permanent employment contract work more overtime on average than those on temporary contract (32% overtime versus 21%). This difference is even greater among researchers at university hospitals. There, researchers with a permanent job work overtime by an average of 44% of their contracted hours, as opposed to 26% among researchers whose job is temporary.

In conclusion

- In many cases, a researcher's time commitment does not comply with the internal agreements made. In particular, researchers devote more time to teaching and management than agreed.
- Researchers feel satisfied with their actual time commitment, except those who are on the permanent staff of a university (assistant, associate and full professors). They also work the most overtime.
- There is a gender difference. Women are more likely than men to be dissatisfied with the amount of time they devote to teaching, especially female assistant and full professors.

2 Objectives and appraisal

This section focuses on researchers' objectives, i.e. their personal objectives (2.1) and the objectives that they ascribe to their organisation (2.2). Sections 2.3 and 2.4 discuss performance indicators. Our analysis of the data shows that researchers themselves attach great importance to the quality of the research that they carry out, regardless of their institution's mission. All the institutions highlight research objectives, and all regard the quality of peer-reviewed publications as an important performance indicator.

Although all researchers value research above all else, the results in this section also reflect important differences between the core values of their employing institutions. Conducting research of outstanding quality comes first at universities and the NWO and Academy institutes; it is the most-chosen objective by far and the researchers themselves feel that it should be their organisation's main job performance indicator. At the UAS and PKOs, on the other hand, socially relevant research has top priority. Researchers at these institutions value this objective above all others and identify it as their organisation's main job performance indicator.

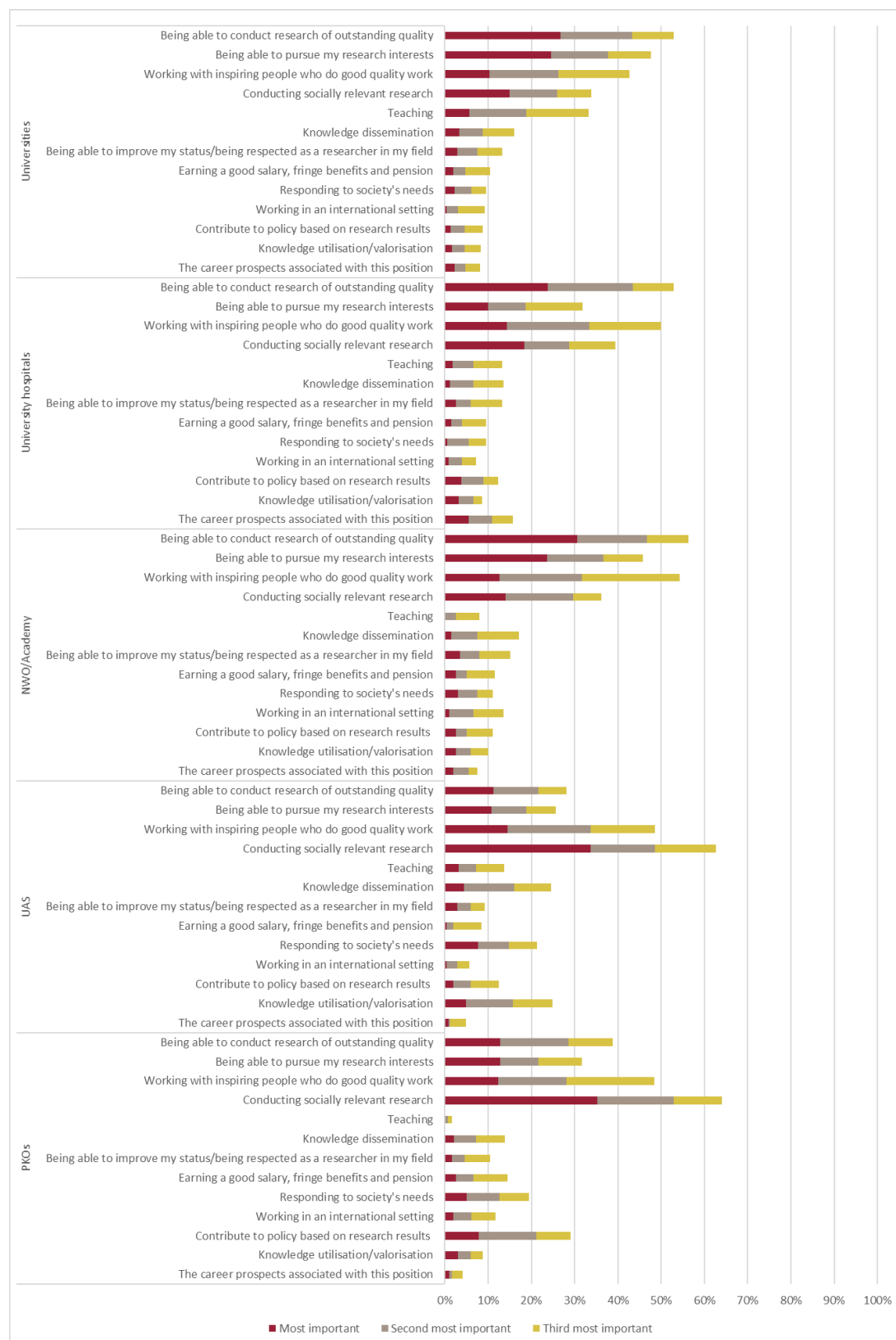
Researchers choose objectives associated with teaching and knowledge transfer less often than they choose research. Teaching is mentioned regularly by university staff, but less frequently by staff at the other institutions. That is striking, since teaching is also an important task at university hospitals and UAS. Researchers at UAS devote almost a fifth of their time on average to teaching. Researchers tend to see knowledge transfer as an institutional objective (62%) rather than as a personal one (27%).

2.1 Personal objectives

We asked researchers which objectives they find important in their work.²⁰ In all five categories of organisation, four objectives were chosen most often (see Figure 2.1): 'being able to conduct research of outstanding quality'; 'being able to pursue my research interests'; 'working with inspiring people who do good quality work'; 'conducting socially relevant research'.

20 The question was: 'Which of the following objectives do you consider important in your work? Choose three and rank them (1, 2 and 3), with 1 = most important.'

Figure 2.1 Researcher objectives (by organisation)



There are some differences between organisations, and these differences reflect core organisational values. 'Being able to conduct research of outstanding quality' is important across the board, but gets the highest scores by far at the universities, university hospitals, and NWO and Academy institutes. At these institutions, 27%, 24% and 31% of researchers respectively choose this as the most important objective. A quarter of university staff choose 'being able to pursue my research interests' as the most important objective. At the UAS and PKOs, 'conducting socially relevant research' is chosen most. More than a third of researchers there choose this as their most important objective.

Objectives related to valorisation and teaching are chosen less often. Most striking is the small percentage of researchers at university hospitals and UAS who choose teaching as an objective. Only 6% of researchers at universities, 2% at university hospitals, and 3% at UAS choose 'teaching' as the most important objective. A further 28%, 12% and 10% respectively rank it as their second or third objective. Teaching is an important task at the latter two institutions. Researchers at UAS devote almost a fifth of their time on average to teaching.

'Knowledge utilisation/valorisation' is the most important objective for 5% of researchers at UAS (20% choose it as their second or third objective). At the other institutions, only 9% of researchers regard 'knowledge utilisation/valorisation' as one of the three most important objectives. Their time commitment reflects this: researchers at UAS spend more time on knowledge transfer than their counterparts at the other institutions. There are two other objectives that also encompass a form of valorisation, however: 'seeing my findings contribute to policymaking' and 'offering good patient care' (not shown in the figure). If we merge these three objectives, we see that 19% of researchers at universities, 22% at NWO and Academy institutes, 40% at university hospitals, 38% at PKOs and 42% at UAS have knowledge valorisation as one of their three most important objectives.

The objectives ranked as most important have not changed much since 2013. The objective 'knowledge utilisation/valorisation' is chosen slightly more often as one of the three main objectives (9% versus 6% in 2013). One notable difference is the importance of employment terms, such as salary. In 2013, 27% of university researchers chose 'earning a good salary, fringe benefits and pension' as their first, second or third most important objective; in 2017, only 10% did.

2.2 Organisational objectives

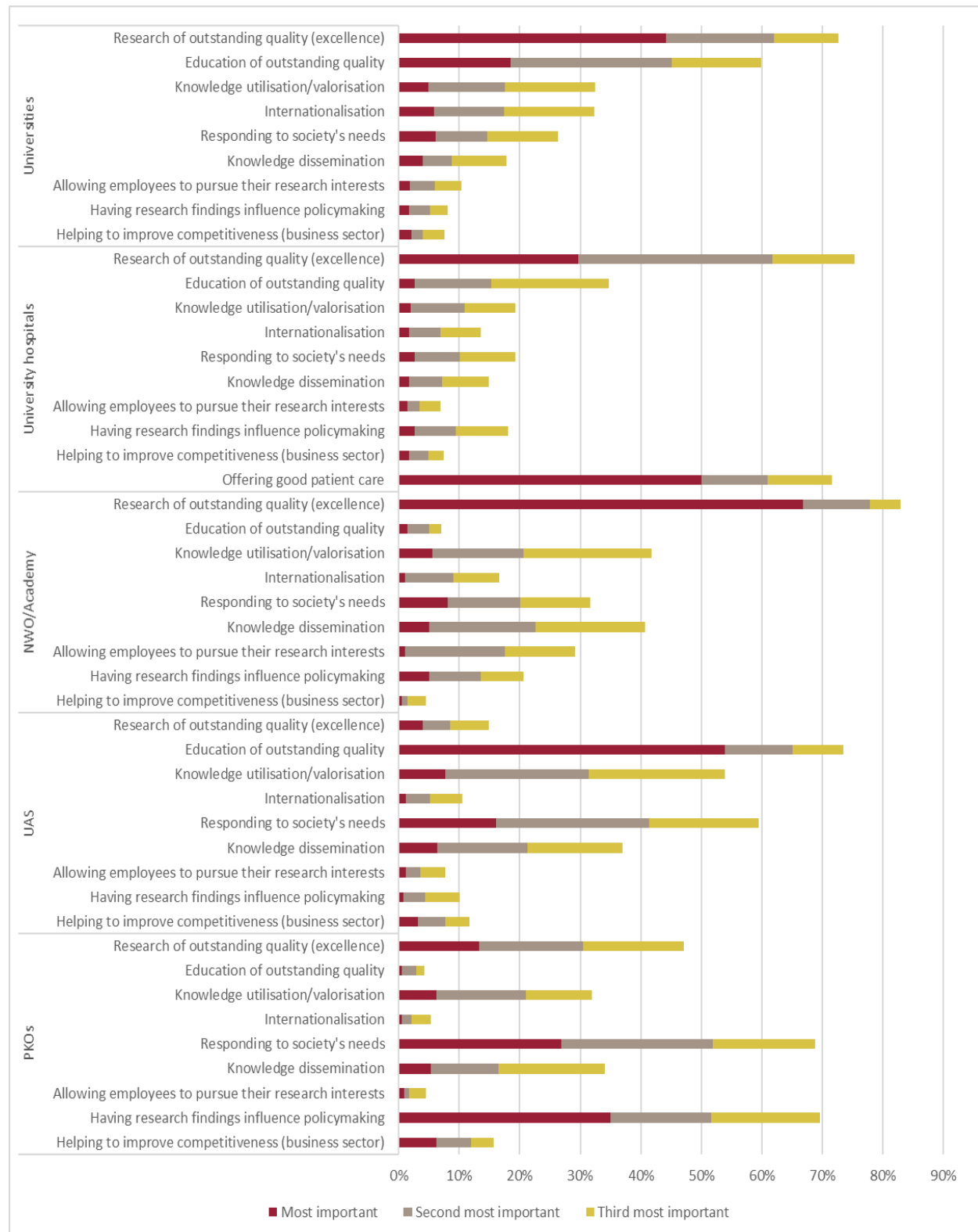
Asked which objectives are central to their organisation, researchers at universities and NWO and Academy institutes mention 'research of outstanding quality (excellence)' first; see Figure 2.2.²¹

At other organisations, researchers also mention other objectives, although research remains their most important personal objective. At university hospitals, half of the researchers see 'offering good patient care' as their organisation's most important objective, and a third choose 'research of outstanding quality (excellence)' as most important. At the UAS, 54% select 'education of outstanding quality' as the organisation's main objective. 'Having research findings contribute to policymaking' (35%) and 'responding to society's needs' (27%) score highest at the PKOs.

Researchers are more likely to see knowledge transfer as an organisational objective than as a personal one. More than a quarter of all researchers cite knowledge transfer as one of their top three personal objectives, but 62% regard it as one of the main objectives of their employing organisation. That figure is highest at PKOs, where it is 90% (70% choosing 'having research findings contribute to policymaking'), followed by 80% at university hospitals (72% choosing 'offering good patient care'). The universities have the smallest number of researchers ascribing a knowledge transfer objective to their organisation (47%).

21 The question was: 'Which of the following objectives are important within your organisation?' Choose three and rank them (1, 2 and 3), with 1 = most important.'

Figure 2.2 Organisational objectives (according to researchers)



2.3 Performance indicators

In addition to questions about objectives, we asked researchers about the main performance indicators used in their job performance appraisals (see Figure 2.3).²²

In the eyes of researchers, the most important performance indicators at universities, university hospitals and the NWO and Academy institutes are the number and quality of peer-reviewed scientific publications. When we analyse the responses in terms of gender, we see that among university staff, more female than male researchers (especially assistant, associate and full professors) believe that number of publications plays a major role in their job performance appraisals. At university hospitals, 24% of researchers indicate that patient care plays a major or fairly major role in job performance appraisals.

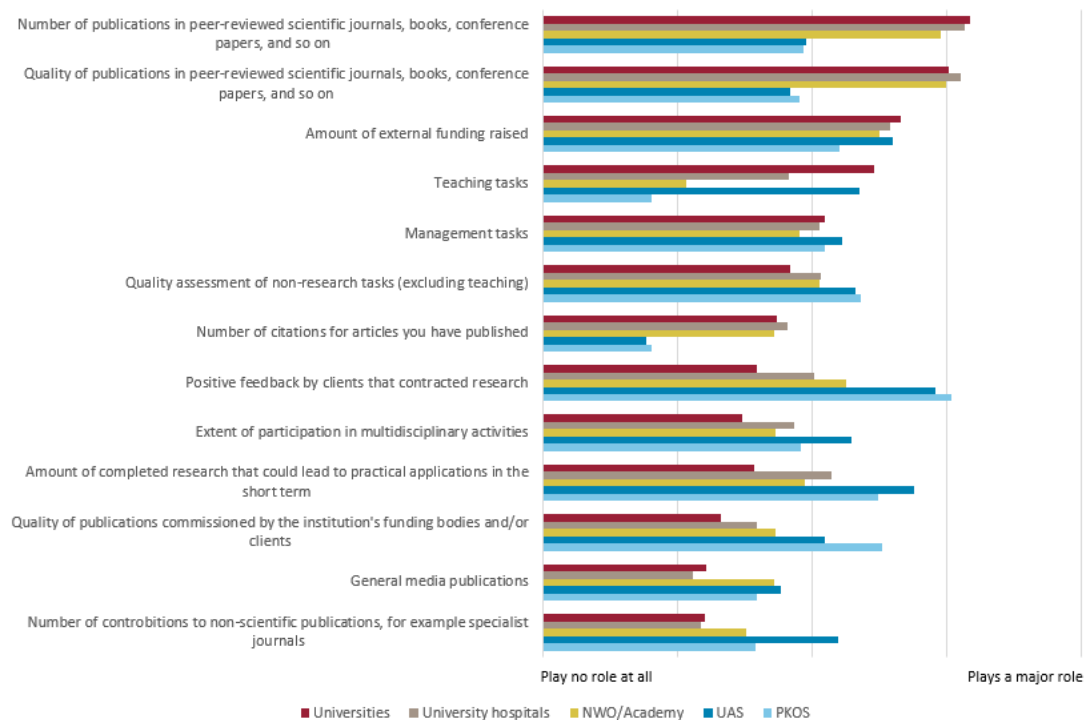
At PKOs and UAS, there is clearly less emphasis on peer-reviewed publications. An important indicator at these institutions is positive feedback by clients that contracted research. About 70% of researchers at these organisations indicate that this plays a major or fairly major role in job performance appraisals. Another important indicator is the amount of completed research that could lead to practical applications in the short term: 67% of researchers at UAS and 53% at PKOs indicate that this indicator plays a major or fairly major role in their job performance appraisals.

The amount of external funding raised is a fairly important performance indicator at all organisations. The proportion of researchers who ascribe a major to fairly major role to these performance indicators varies from 55% at universities to 43% at the PKOs. Teaching is an important performance indicator at the universities (49%) and UAS (46%).

The results also reveal differences in the types of publication regarded as important. At the universities, NWO and Academy institutes and university hospitals, peer-reviewed publications are important. At the UAS, contributions to non-scientific publications, for example specialist journals, are most important, and at the PKOs, researchers ascribe the most importance to the quality of publications commissioned by the institution's funding bodies and/or clients.

²² The question was: 'To what extent do the performance indicators below play a role in your supervisor's appraisal of your job performance?' Choose three and rank them (1, 2 and 3), with 1 = most important.'

Figure 2.3 Performance indicators for job performance appraisal, average scores by organisation

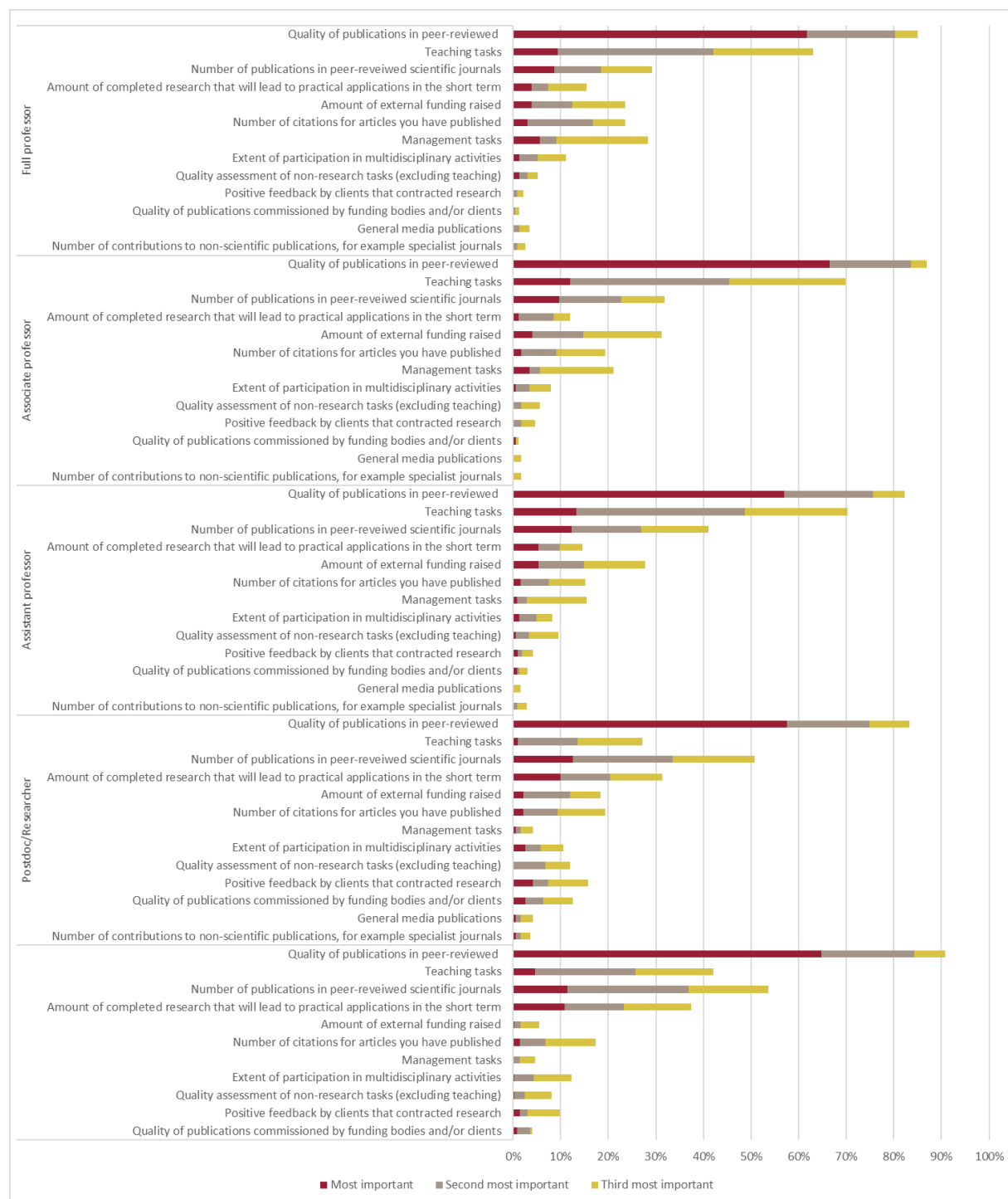


2.4 Personal opinion of performance indicators

While researchers say that their organisations consider the quality and number of publications to be equally important, the researchers themselves consider quality more important than number. No less than 85% of researchers at universities choose 'quality of publications' as one of their three most important objectives. However, 42% place 'number of publications' in the top three.

The figure below sheds light on researcher opinions across the various job levels. It only covers the universities because we were able to identify the researchers' job titles there. The text discusses our observations at the other institutions.

Figure 2.4 Personal opinion of performance indicators by job title (in percentage of researchers choosing the relevant option, universities only)



Researchers at universities, university hospitals and the NWO and Academy institutes also consider publications in peer-reviewed journals to be an important performance indicator.²³ Indeed, the quality of such publications is a very important performance indicator for the university researchers. The second most-chosen performance indicator, the choice of 55%, is teaching. Researchers believe that their employer attaches as much importance to teaching as they themselves do. That was otherwise in 2013. Then, researchers believed that their employer attached less importance to teaching than they themselves did. In 2013, researchers also thought that their employer placed less value on 'amount of completed research that could lead to practical applications in the short term'. That too has changed; now, researchers believe that their employers have more appreciation for applied knowledge.

Researchers at UAS and PKOs rate other performance indicators as important than do researchers at university hospitals, universities and NWO and Academy institutes. At the former organisations, researchers regard 'amount of completed research that could lead to practical applications in the short term' and 'positive feedback by clients that contracted research' as the most important performance indicators. In their eyes, the same two performance indicators play the most important role in their job performance appraisal.

Regardless of the organisation, researchers themselves attach less importance to the amount of external funding raised than they believe their employer does. Men appear to see the amount of external funding acquired as slightly more important than women do. Men also attach greater importance to number of citations.

Full and associate professors differ slightly from assistant professors, postdocs/researchers and doctorate candidates in how they rate the various performance indicators. They attach less importance to number of publications.

In conclusion

- In this section, we see a clear difference between researcher objectives at UAS and PKOs on the one hand and at universities, university hospitals and NWO and Academy institutes on the other.
- The organisational objectives also differ, and researcher appraisal is based on different performance indicators. At PKOs and UAS, client satisfaction and applied knowledge are emphasised. At the NWO and Academy institutes, university hospitals and universities, the quality and number of peer-reviewed publications are the most important yardsticks.

23 The question was: 'Which of the performance indicators below do you consider the most important? Choose three and rank them (1, 2 and 3), with 1 = most important.'

3 Knowledge transfer

This section looks more closely at knowledge transfer, also referred to as ‘valorisation’ or ‘knowledge utilisation’,²⁴ an important task at all of the organisations discussed in this study.

- Knowledge transfer is one of the tasks allocated to the universities, university hospitals and UAS under the Dutch Higher Education and Research Act [*Wet op het hoger onderwijs en wetenschappelijk onderzoek*, WHW].
- That is not the case for the NWO and Academy institutes, but both parent organisations nevertheless regard it as one of their institutes’ tasks.²⁵
- The mission of the PKOs is to work on resolving societal issues, inform policymakers and/or support businesses. Knowledge transfer is part of that mission.

Researchers themselves consider the social relevance of their work important. More than half of the researchers surveyed at all the institutions (with the exception of the NWO and Academy institutes) say they are inspired by the issues raised by businesses and public institutions.²⁶ As many as 92% of researchers at UAS say that they draw inspiration from such issues. Two thirds of all researchers agree with the statement ‘I think it’s important for businesses and public institutions to make good use of my expertise’. Once again, this percentage is highest at the UAS (93%), followed by the PKOs (81%). Around 60% of researchers at the universities and NWO and Academy institutes think it is important for businesses and public institutions to make good use of their expertise.

Although researchers value the social relevance of their work, on average they spend only 4% to 8% of their time on knowledge transfer, as we saw earlier.²⁷ To round out our picture of what researchers think about knowledge transfer, we asked them how they interact with stakeholders during and after research, and if they know how their research results were being used. Their responses show that UAS and PKOs not only spend more time on knowledge transfer, but also attach greater importance to it. The researchers at these institutions experience more influence of

24 See page 9 for the definition of knowledge transfer used in this study.

25 See NWO (2015), *NWO Strategie 2015-2018, uitwerking*. The Hague: NWO; and KNAW (2016), *Science and scholarship connect. Strategic Agenda for 2016-2020*. Amsterdam: KNAW.

26 The question was: ‘I enjoy listening to the issues that businesses and public institutions raise because they inspire me in my research’: percentage agree/agree entirely.

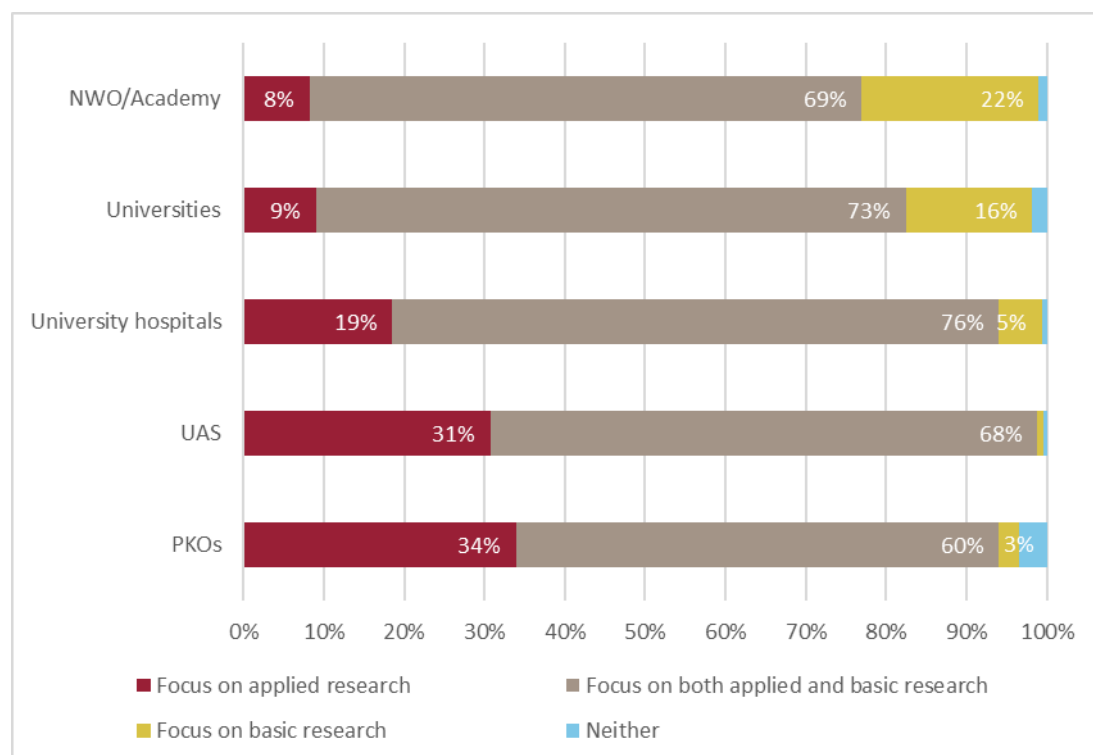
27 In the survey, the response option was: ‘knowledge utilisation/valorisation’.

non-research parties on their choice of research topic, and they are more likely to involve these parties in their research projects. More of them also say that these parties make use of their research results. The survey also shows that, according to the researchers, non-research parties are more likely to make use of research results if they have influenced the choice of research topic. Monitoring of knowledge transfer is far from consistent: most researchers say that they only find out how their results are being used through personal contacts.

3.1 Applied or basic research

We asked researchers how best to describe the research carried out within their department/group; see Figure 3.1.

Figure 3.1 Balance between basic and applied research (according to researchers working at the relevant organisations)



The putative distinction between universities and NWO and Academy institutes on the one hand, which are thought to mainly conduct basic research, and the other institutes, which place more emphasis on applied research, is not reflected in the

responses of the researchers themselves.²⁸ They do not find the distinction between the two types of research all that important, and the differences between the types of institution are largely gradual ones and by no means utter and complete. What unites the different organisations in this figure is that a majority of researchers, across all organisations, believe that their own institution focuses on both basic *and* applied research.

3.2 Involvement in choosing research topic

One important indicator of knowledge transfer is the interaction between researchers and stakeholders before, during and after a study.²⁹ The more interaction there is between researchers and potential users, the more impact the research can be expected to have. We therefore asked which parties researchers involve in setting up and carrying out their research.

When asked how much other parties influence their choice of research topic, researchers said that they themselves and their employing organisation (or parts of that organisation) exercise the most influence.³⁰ Across the board, all researchers say that, on average, the party that influences their choice of research topic most is their faculty, department or section; see Figure 3.2. Eighty-one percent of researchers at university hospitals, approximately 70% of researchers at NWO and Academy institutes, UAS and PKOs, and 54% of researchers at universities indicate that their faculty/department exercises a large to very large influence.

Researchers at universities, UAS and the NWO and KNAW institutes feel considerable freedom to decide what they would like to research. Sixty-seven percent of researchers at universities, 64% at UAS and 58% at NWO or Academy institutes indicate that they have a large or very large measure of freedom to determine their own research.³¹ That percentage is 45% at university hospitals, and 27% at PKOs.

28 We asked the researchers to rate the following statements on a scale of 1 to 5, with 1 = 'does not apply at all' and 5 = 'absolutely applies': 'We seek to gain a fundamental understanding of our research topic' and 'We are guided by the possibility of applying the knowledge that we produce'. A score of ≥ 3 for one statement combined with a score of ≤ 2 for the other indicates that one objective dominates within the organisation. A score of ≥ 3 for both statements indicates that both objectives are important.

29 Spaapen, J. & L. Van Drooge (2011). *Introducing 'productive interactions' in social impact assessment*. Research Evaluation. Vol. 20:3. pp. 211-218.

30 The question was: 'How much influence do the following parties have on the research topics that you choose and their content?'

31 The response option was: 'I'm free to choose my research topics myself.'

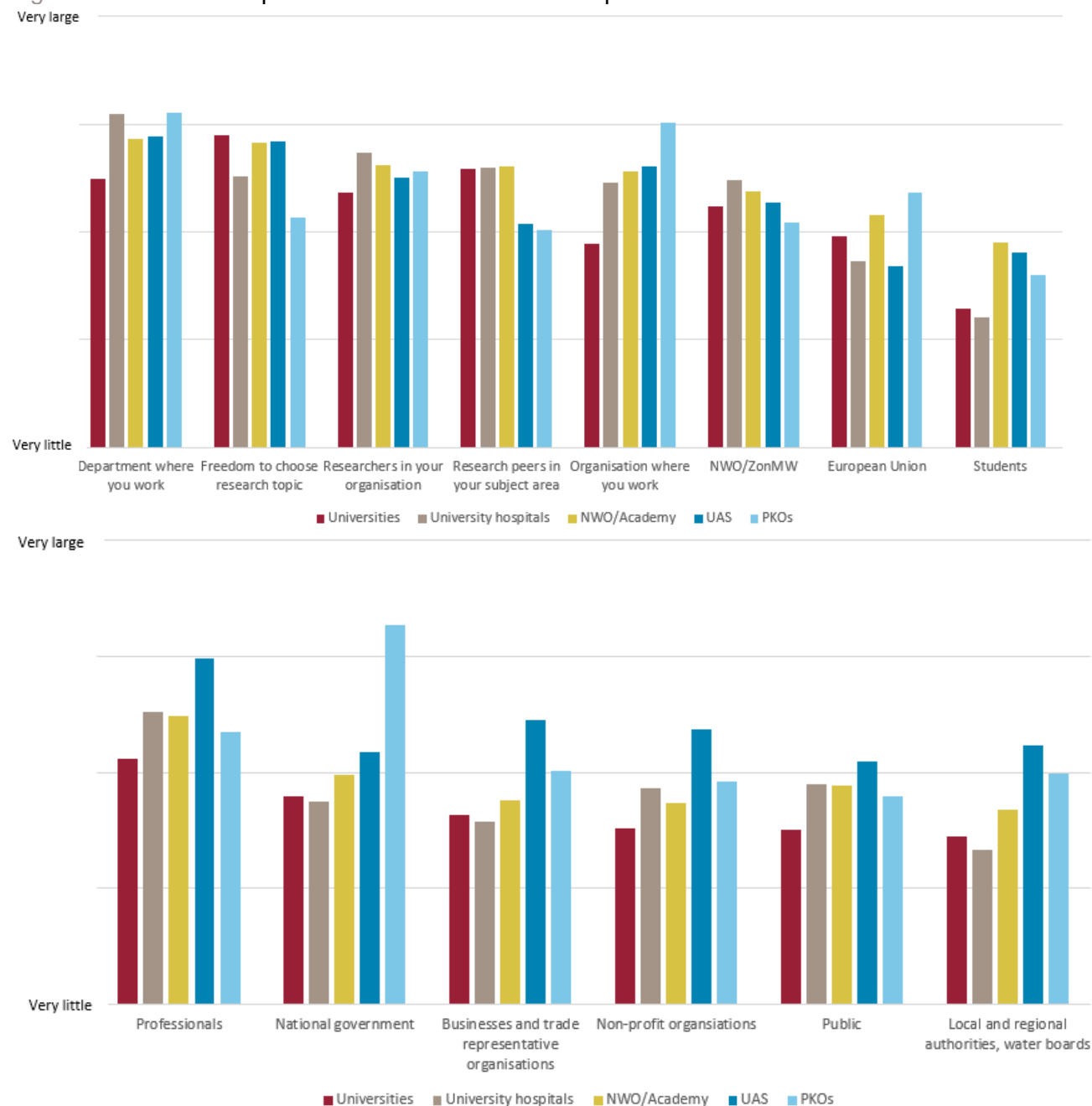
Whereas the research topics at universities, university hospitals and NWO and Academy institutes are determined primarily by the researchers themselves and by their internal and external peers, non-research parties such as governments, businesses and non-profit organisations play a greater role at UAS and PKOs. In fact, the most influential party at UAS and PKOs is a non-research one. For the PKOs, the strongest influence comes from the national government (83% indicate that its influence is large or very large), while at the UAS it is professionals in the field (79% attribute a large or very large influence to them).³² Other non-research parties, such as businesses and trade representative associations, also play a role in determining research topics at the UAS.

More than half the researchers at universities, university hospitals and NWO and Academy institutes indicate that the national government, businesses and trade representative associations, non-profit organisations, local authorities, regional authorities and water boards, and students exercise little to very little influence. The public, including patients, also exercise little to very little influence at universities and the NWO and Academy institutes, although slightly more at university hospitals. Professionals are the only non-research party to exercise a somewhat greater influence on the research topic at these organisations as well.

Finally, Figure 3.2 shows that the research funding bodies, and specifically ZonMW and NWO, also influence the choice of research topic. Their influence is regarded as large to very large by 50% of researchers at university hospitals and approximately 40% of researchers at universities and NWO and Academy institutes. That is not surprising, since they make funding available for designated research topics.

32 Examples of professionals in the field are engineers, agents, nurses and physicians.

Figure 3.2 Influence of parties on choice of research topics



The picture is similar for the parties involved in carrying out research.³³

33 The question was: 'How often do you involve the following parties in your research, for example in a supervisory committee?'

Influence of non-research parties on postdocs/researchers

Comparing the various job titles at the universities reveals that researchers in more senior positions feel they have more freedom to determine their own research topics than postdocs and doctoral candidates. 83% of full professors indicate that they have a large or very large measure of freedom to determine their own research. Among doctoral candidates, that is a little more than half.

Non-research parties exercise more influence on postdocs/researchers than on other job categories with regard to choosing a research topic.³⁴ Postdocs/researchers' topics are also more influenced by non-research parties, such as businesses and professionals in the field. The latter's influence is regarded as large to very large by 50% of postdocs/researchers whereas only 30% to 35% of researchers in the other job categories feel this way. Twenty-two percent of postdocs/researchers feel that local and regional authorities and water boards have a large or very large influence on their choice, compared with 5% to 8% in the other job categories. The other non-research parties also exercise more influence on postdocs/researchers.

None of this is reflected in the responses to questions about parties' involvement in the research itself, however. As is true for the other job categories, postdocs/researchers only involve non-research parties in their research to a limited extent, the sole exception being professionals in the field.

Postdocs/researchers are also more inclined than researchers in other job categories to agree with the statements 'I think it's important for businesses and public institutions to make good use of my expertise' and 'I enjoy listening to the issues that businesses and public institutions raise because they inspire me in my research'.

³⁴ It should be noted, however, that more postdocs/researchers and doctoral candidates chose the option 'I don't know'; 12-16% of postdocs/researchers and 16-22% of doctoral candidates. For assistant professors, that was about 10% and for full professors around 5%. The percentage of associate professors lies in between those of assistant and full professors.

3.3 Utilisation of research results

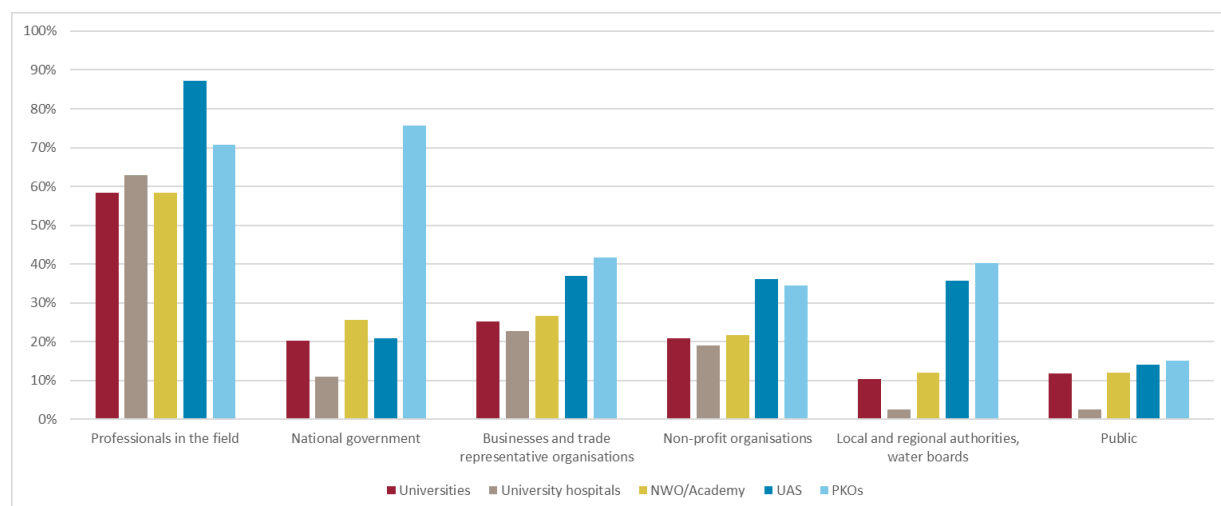
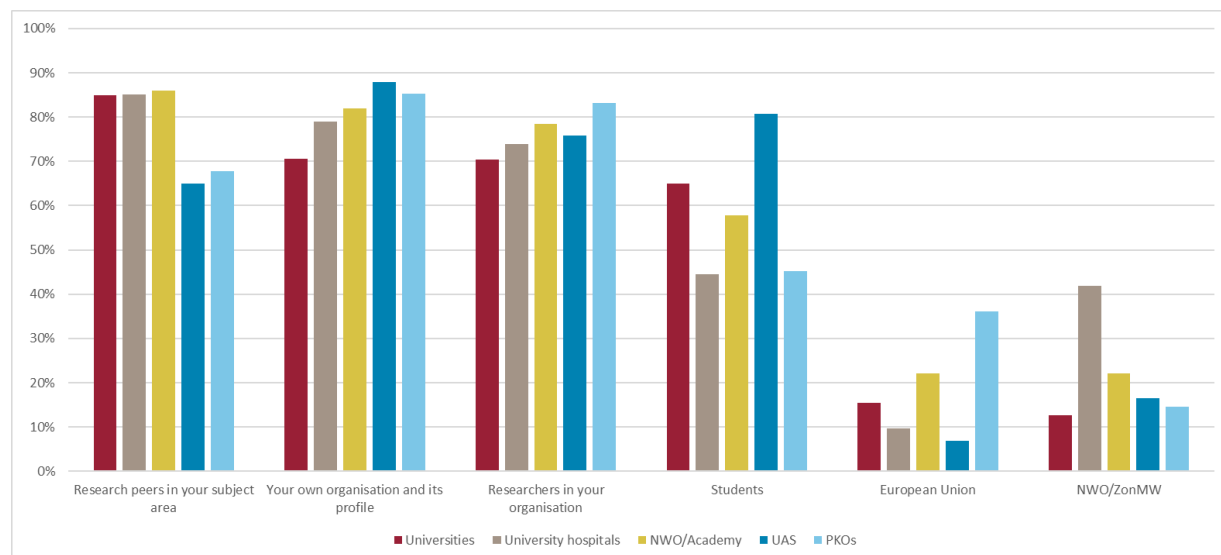
We also asked researchers if they knew how their research results were being utilised.³⁵ Once again, the employing organisation and its own researchers turn out to be important users. In each and every organisation, 70% or more of the researchers are aware that their own organisation and researchers within their organisation are utilising their research results; see Figure 3.3.

At universities, university hospitals and the NWO and Academy institutes, peers are important users. We see that, in addition to researchers themselves, professionals in the field are the main users of research carried out at these three types of organisations. About 60% of researchers working at research universities, NWO and Academy institutes and university hospitals say that professionals utilise their research results.

Professionals are also important to the UAS and PKOs; 87% of researchers at UAS and 71% of researchers at PKOs indicate that their research results are utilised by this target group. These two types of organisation name non-research parties significantly more often than universities, university hospitals and the NWO and Academy institutes do. Students are important to UAS (81%), and the national government to PKOs (76%).

35 The question was: 'Which of the following parties do you know make use of the results of your research?'

Figure 3.3 Utilisation of research results by parties, according to researchers (percentage of researchers who state that they know that the relevant party utilises their research results)



Although businesses and trade representative associations have little influence on the research topics undertaken at universities, university hospitals and the NWO and Academy institutes, the business world does utilise the results of that research. About a quarter of researchers at these institutions cite businesses as users. At UAS and PKOs, that is about 40%. At universities, full professors are most likely to say that their research results are being used, and doctoral candidates the least likely.

3.4 Monitoring utilisation

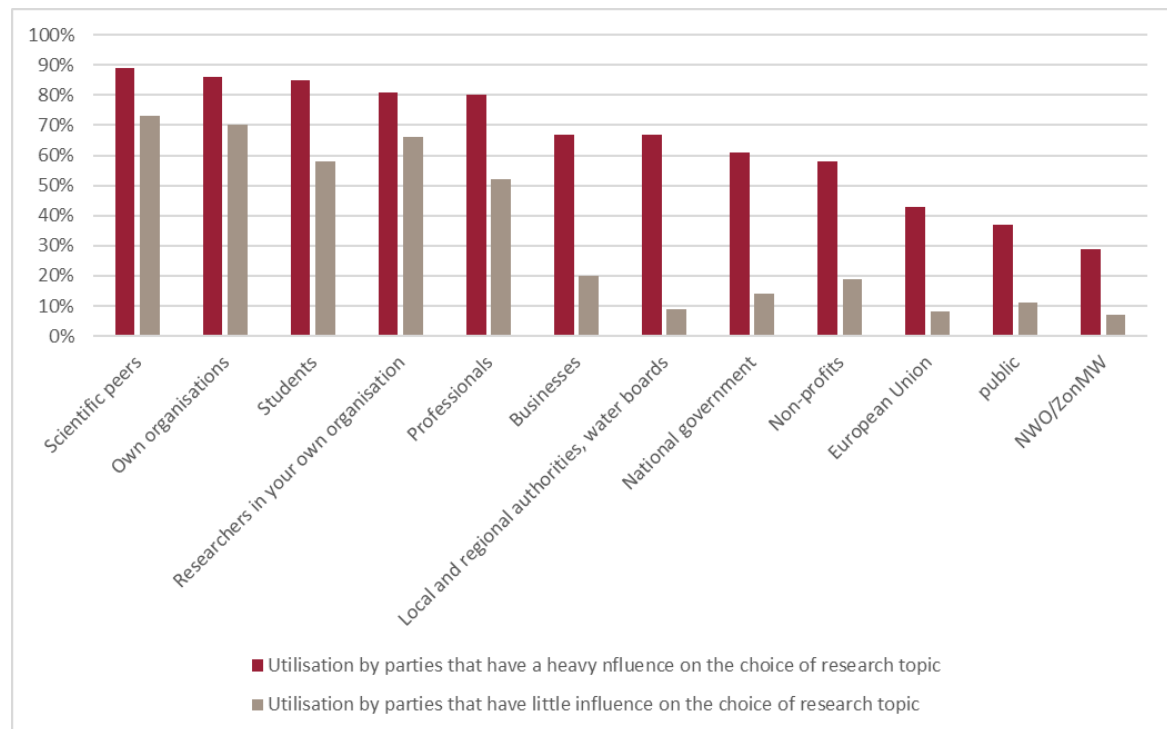
Researchers hear that their research results are being used mainly through informal channels³⁶: they heard it second-hand (68%), someone mentioned it to them (71%) or they have seen the application with their own eyes (64%). About 30% of researchers say that they themselves keep track of the use being made of their results. This percentage is somewhat higher at the universities (33%), NWO and Academy institutes (35%) and UAS (29%) than at the university hospitals (24%) and PKOs (21%).

Formal mechanisms are mentioned less often. A little less than a quarter of researchers working at NWO and Academy institutes and PKOs indicate that their organisation monitors utilisation of their research results (compared with 13% at UAS and less than 10% at universities and university hospitals). Seven percent of researchers say they found out how their results were being used during an organisational review (ranging from 3% at universities and university hospitals to a little more than 17% at UAS and PKOs).

Finally, Figure 3.4 shows that the parties that are able to influence the choice of research topic are also more likely to utilise the results of that research. Researchers who indicate that a certain party exercises a large to very large influence on the choice of research topic are more likely to refer to this party as a user than researchers who indicate that a certain party has little or no influence. This supports the idea that close interaction between researchers and external parties increases the impact of research. There is one exception to this, at the universities. The influence of the national government on the choice of research topic has little impact on government's use of the results, according to researchers.

³⁶ The question was: 'How do you know that these parties make use of your research results? (multiple answers possible)'

Figure 3.4 Parties' utilisation of research results in percentages, broken down by amount of influence on research topic (according to researchers).



In conclusion

- The difference between personal and organisational objectives is not reflected in any focus on either basic or applied research. Researchers in most organisations consider their work mainly as a combination of basic and applied research.
- The differences between organisations are, however, apparent when it comes to the influence other parties exercise on the research and how much they utilise the results. It is clear that stakeholders are closely involved in research at all the institutions. The influence of the national government is most obvious at the PKOs, however, and the influence of professionals in the field is strongest at the UAS.

4 International mobility

Both national and EU authorities and Dutch universities attach great importance to researchers' international mobility. Public authorities see it as an opportunity to get knowledge circulating. The universities, on the other hand, see having an international staff as an indicator of research excellence (Koier et al. 2017).³⁷

As this section shows, the researchers who participated in our survey also acknowledge the importance of international experience. Half of them agree or agree completely with the statement 'International experience is crucial to a research career'. A quarter are neutral, and another quarter disagree or disagree completely.

Many of the researchers have themselves been or are now internationally mobile. Researchers are regarded as internationally mobile if they have spent at least three consecutive months or longer doing research in a country other than the one in which they resided on their 18th birthday. A large proportion of the researchers working at the universities and at NWO and Academy institutes is mobile. In this survey, we distinguished between foreign researchers who currently work in the Netherlands and Dutch researchers who have spent a period of their research career working abroad.³⁸ At the universities and NWO and Academy institutes, these two groups account for more than half of the researchers surveyed. That percentage is somewhat smaller at the university hospitals, UAS and PKOs.

Career opportunities and the chance to work with top researchers are important motives for both groups of mobile researchers to go 'abroad'. In the case of Dutch researchers, another major factor is the opportunity to gain international experience. Personal or family reasons are by far the most important reason to return.

³⁷ See also <https://www.rathenau.nl/en/knowledge-ecosystem/international-mobility-researchers>.

³⁸ The questionnaire was available in Dutch and English. We asked the researchers to identify themselves. Researchers had to have spent a minimum of three consecutive months abroad to be considered internationally mobile.

4.1 Researcher mobility

Twenty-four percent of all respondents worked abroad for a period of time during their research careers.³⁹ Eighteen percent of the researchers surveyed were foreign researchers currently working in the Netherlands.⁴⁰ Researchers at universities and NWO and Academy institutes are more internationally mobile than researchers at university hospitals, UAS and PKOs; see Figure 4.1. Twenty-five percent of the university researchers surveyed identify themselves as foreign researchers.⁴¹ This is 5% at UAS and 6% at PKOs. Nine percent of the researchers working at university hospitals identify themselves as foreign.

Figure 4.1 Mobility of researchers in the dataset



The proportion of Dutch researchers who have been abroad for three consecutive months or more varies from 14% at UAS to approximately 20% at PKOs and university hospitals, 27% at universities, and 34% at NWO and Academy institutes.

International mobility is a mark of quality at universities. The share of internationally mobile researchers there is thus the largest. International mobility is less prevalent at the UAS and PKOs. In keeping with their tasks, these organisations focus on addressing national and/or regional societal challenges. The smaller proportion of internationally mobile researchers at university hospitals can probably be explained

³⁹ Thirty percent of the Dutch researchers in the dataset have worked abroad.

⁴⁰ Response to the question 'To which group of researchers do you think you belong?'

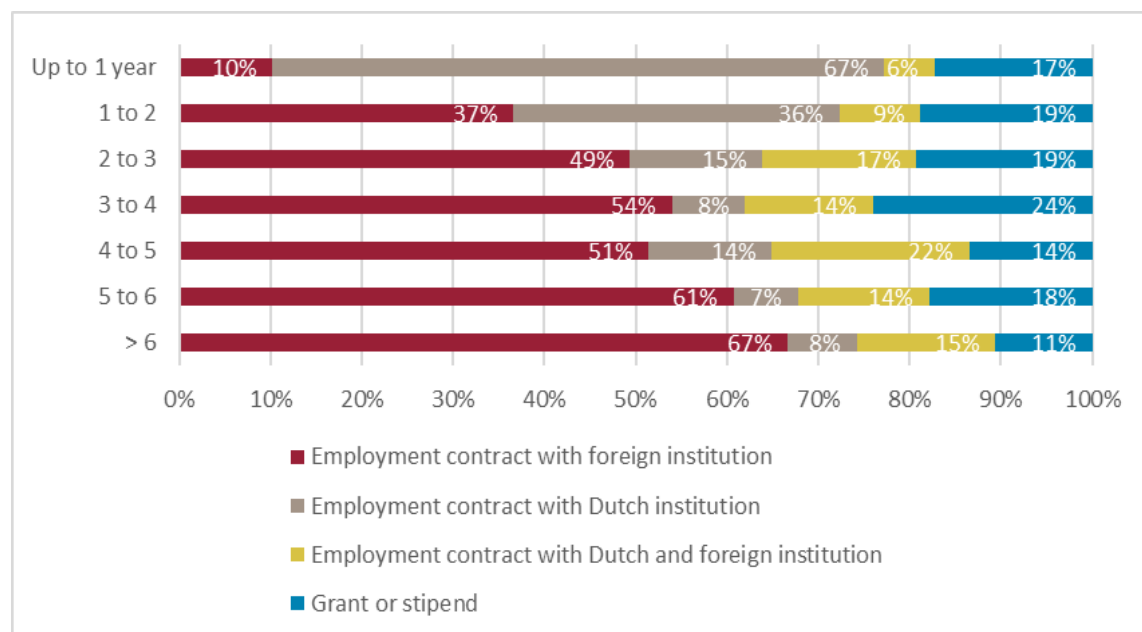
⁴¹ The actual percentage at universities is somewhat larger: in 2015, 33% of academic staff were foreign nationals (source: WOPI-flex 2015, in Koier et al. 2017).

by the fact that many researchers there also have contact with patients and must be able to speak to them in Dutch.

At the universities, assistant professors are the most mobile (62%), followed by professors (59%) and associate professors (57%). Less than half of doctoral candidates and postdocs/researchers are mobile (37% of doctoral candidates and 48% of postdocs/researchers). It makes sense that researchers in senior positions are more likely to be internationally mobile, as they have had longer careers.

Looking at researcher mobility in these senior positions, we see that here too, researchers at universities and NWO and Academy institutes are more mobile. More than 60% of full, associate and assistant professors (and research coordinators or 'lectors') at universities and NWO and Academy institutes are internationally mobile. At university hospitals, that is 48%. These percentages are lower at PKOs and UAS (38% and 37% respectively).

Figure 4.2 Employment relationship of Dutch researchers while working abroad



Of the Dutch researchers who have been abroad, 40% were there for a year or less.⁴² Ten percent have spent six years or more abroad. The most popular destinations were the United States and the United Kingdom.

42 The question was: 'How long did you live outside the Netherlands? (If you spent multiple periods of three months or more abroad, please give us the sum total of all these periods.)'

Of the Dutch researchers who spent time abroad, 38% were employed by a foreign institution, while 35% continued their employment relationship with their Dutch institution. The longer people remain abroad, the more likely they are to have a job with a foreign institution; see Figure 4.2.

Of the foreign researchers working in the Netherlands, the vast majority (90%) have a contract with a Dutch institution. There are about the same number of permanent and temporary contracts: 47% of the foreign researchers have a permanent contract (or one under proviso), and 43% a temporary contract. The remaining 10% are working on a stipend or under another type of contract. The majority (83%) of the foreign researchers are considering remaining in the Netherlands after their current contract expires.

4.2 Motives of Dutch researchers for international mobility

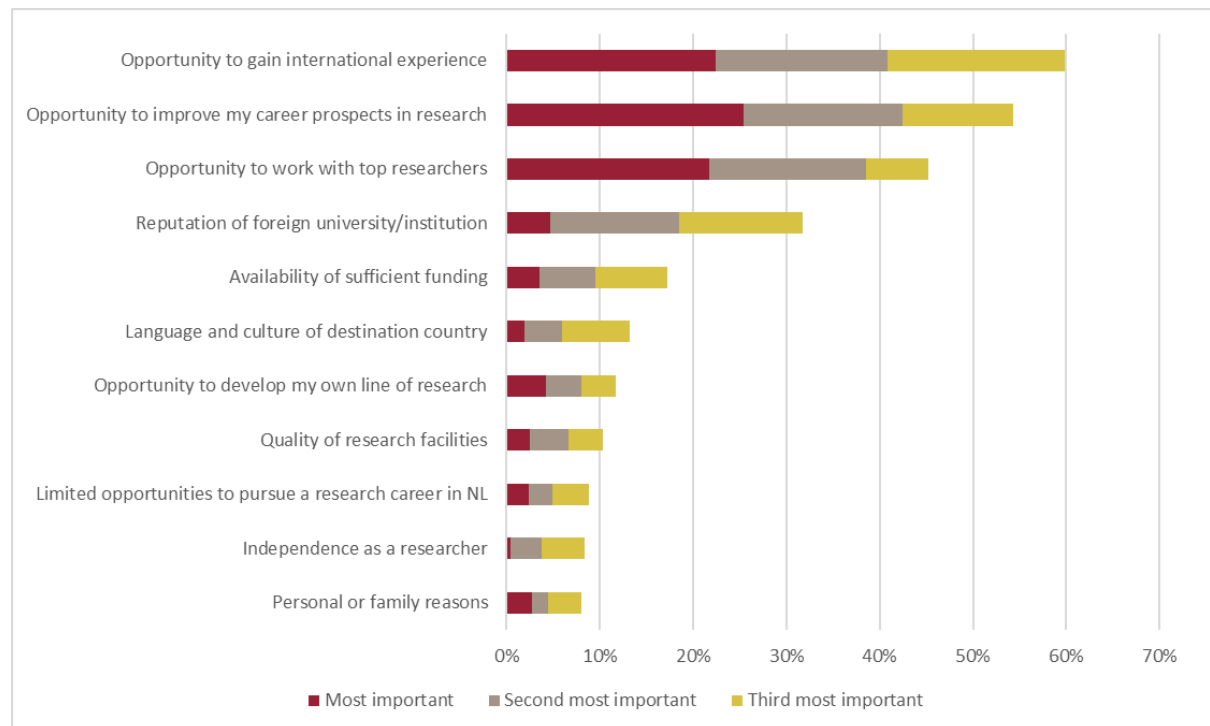
Dutch researchers have different motives for going abroad than for returning to the Netherlands. They⁴³ go (whether or not temporarily) because they are attracted by the quality of research abroad and by the career opportunities offered by international mobility. Personal or family reasons are by far the most important reason for their return.

If we consider why Dutch researchers go abroad for a shorter or longer period (n=637, Figure 4.3),⁴⁴ we see that they do so mainly to improve their career prospects in research (25% say this is their most important motive), to gain international experience (22%) and to work with top researchers (22%). The reputation of the host institution is also an important motive, but it does not feature as often as the others as the primary motive. Very few researchers identified motives such as working conditions and the possibility of continuing one's career in the private or non-profit sector, and we have therefore excluded them from Figure 4.3.

43 Population of Dutch researchers in study who had worked abroad: n=637.

44 The question was: 'What were the most important reasons for your choosing to leave the Netherlands? Choose 3 reasons, with 1 = most important reason.'

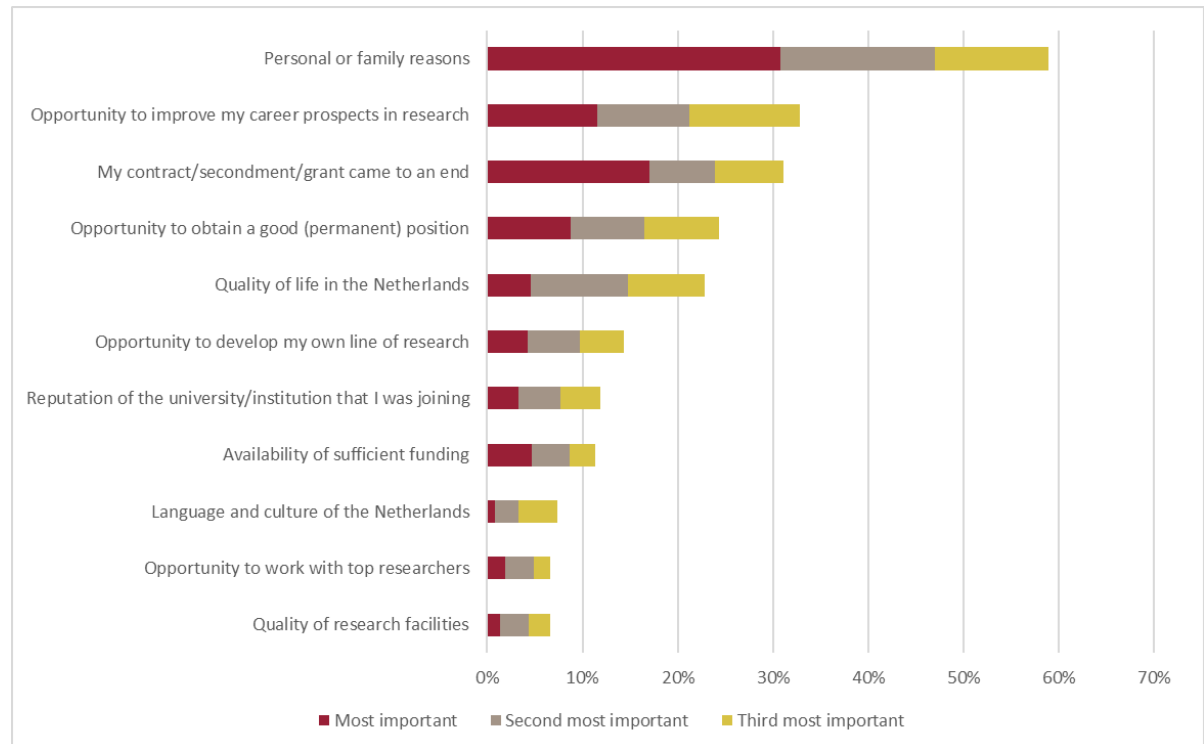
Figure 4.3 Dutch researchers' motives for going abroad (%)



Career prospects also play an important role in the decision to return to the Netherlands; see Figure 4.4. Twelve percent cite this as their primary reason for returning. A further 21% say that it was their second or third most-important reason. Personal or family reasons are by far the most important motive for returning, cited by 31% as their main motive, and by 28% as their second or third most-important motive. Another important reason is simply that their employment contract abroad came to an end (17% identify this as their primary reason for returning).

Personal or family reasons are also the most important motive for Dutch researchers to *remain* in the Netherlands. Of the Dutch researchers who have considered moving abroad but did not do so (n=800), 48% give 'personal or family reasons' as their primary motive. Another quarter rank this as their second or third most-important motive.

Figure 4.4 Dutch researchers' motives for returning to the Netherlands (%)



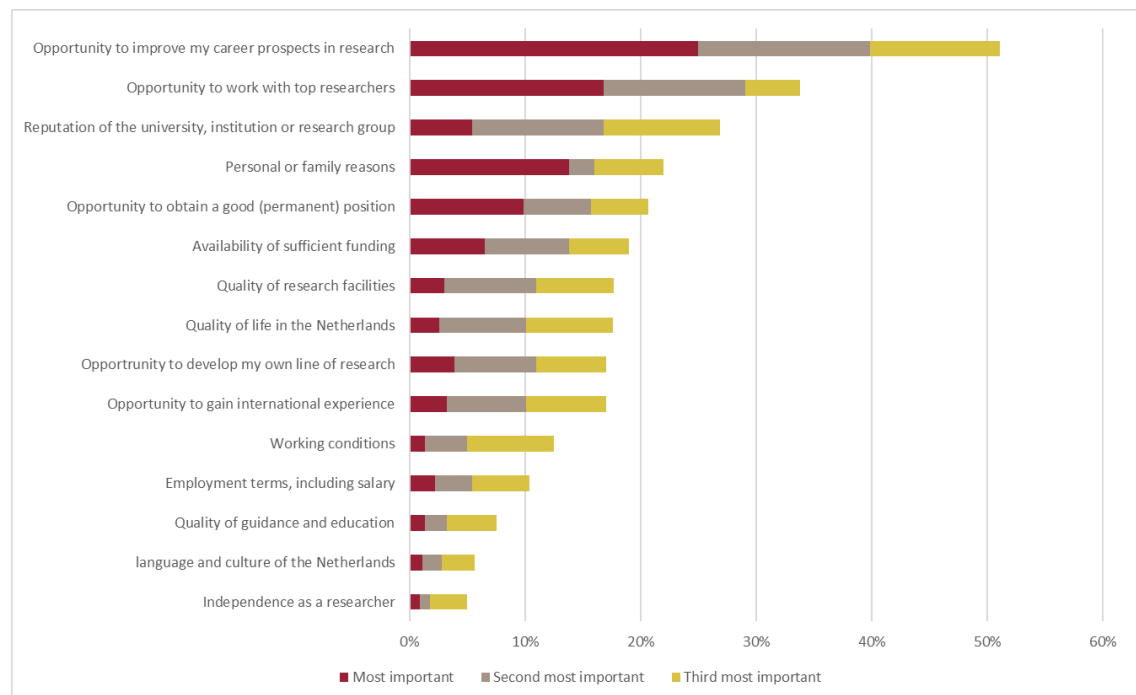
4.3 Motives of foreign researchers in the Netherlands

Future career prospects and the quality of research are also important reasons for foreign researchers to be mobile. Of the foreign researchers surveyed (n=464), 25% mention future career prospects in research as their main motive for coming to the Netherlands; see Figure 4.5. A further 26% cite it as one of their three most-important motives.

Foreign researchers differ notably from Dutch researchers who go abroad in that far fewer of them cite the possibility of gaining international experience (3% as most important motive, 14% as second or third most-important motive). On the other hand, personal or family reasons are much more important to foreign researchers

working in the Netherlands than to Dutch researchers who go abroad (22% cite this as an important motive, compared with 8% of Dutch researchers who have had foreign experience).

Figure 4.5 Motives of foreign researchers to come to the Netherlands



In conclusion

- There are researchers with international experience in every type of institution, but the universities and the NWO and Academy institutes employ far more mobile researchers than the other organisations.
- Researchers consider it important to gain international experience.
- The relatively large number of assistant professors who have gained international experience (compared with associate and full professors) indicates that international mobility is increasing.
- The main reasons for going abroad are international experience, career opportunities and being able to work with top researchers. These are also the reasons that bring foreign researchers to the Netherlands.
- Personal or family reasons are by far the most important reason to return to the Netherlands.

Appendix 1: Explanation

Context

In 2013, a survey was conducted among researchers at universities, university hospitals and NWO and Academy institutes as part of the 'IBO Study', an inter-ministerial study concerning academic research. The Rathenau Instituut analysed the outcomes of this survey and published a report (in Dutch) about it in 2014 (De Goede and Hessels 2014).⁴⁵ In 2017, at the request of the then Minister and State Secretary for Education, Culture and Science (OCW), we adapted and repeated this survey among researchers at universities, university hospitals and the NWO and Academy institutes, and also among researchers at university of applied sciences (UAS) and public knowledge institutes (PKOs).

Our aim in repeating the survey is to investigate whether any shifts have occurred in the perceived balance between researchers' core tasks at universities, university hospitals and the NWO and Academy institutes. We have also taken a greater interest in valorisation. Valorisation is, after all, a core element of the Minister's *Vision for Science*;⁴⁶ it features in the indicators that researchers submit to NWO to quality for project funding and grants; and it is also highlighted in the Dutch National Research Agenda (NRA). The responses provided by researchers at universities, the NWO and Academy institutes and university hospitals are thrown into sharper relief when we compare them systematically with the responses of researchers at the PKOs and UAS.

In extending the survey, we sought in particular to investigate the process of valorisation, which starts by generating research questions, involving those asking the questions in the research itself, identifying opportunities for knowledge utilisation, and finally, monitoring that utilisation. We further included questions that allowed us to measure international mobility and explore why Dutch researchers go abroad or foreign researchers come to the Netherlands. International mobility is an important mark of quality, with 'brain drain' being unfavourable and 'brain gain' favourable for Dutch research. As research grows increasingly international, it is important to understand what motivates researchers to be mobile.

⁴⁵ See also <https://www.rathenau.nl/nl/kenniseecosysteem/drijfveren-van-onderzoekers> (in Dutch only).

⁴⁶ 2025 *Vision for Science, Choices for the Future*. November 2014

Survey

Some of the questions are taken from the 2014 IBO Study, while others, concerning valorisation and internationalisation, are new. A supervisory committee whose members represent the overarching organisations of universities, UAS, university hospitals and PKOs advised on the survey content. Research agency Panteia e-mailed the questionnaire to all deans, research coordinators ('lectors') at UAS, and the directors of the various NWO and Academy institutes and the PKOs. They were asked to distribute the questionnaire to all researchers in their organisation. We also drew attention to the study on social media.

The questionnaire was made available from 31 October to 23 December 2017. It took approximately 15 minutes to fill in and a total of 2,629 respondents completed it.

Data processing

To facilitate systematic comparisons, we selected respondents who are contracted to work at least four hours a week. This meant excluding 16 respondents from the analysis; 2,613 respondents remained.

We also reshuffled the job groups slightly. By merging the jobs 'researcher' and 'postdoctoral fellow' into a single job, postdoc/researcher, we reduced the number of jobs at the university.

Calculating overtime

It was not the purpose of the survey to measure overtime, and we therefore did not do so explicitly. Because overtime is a topical issue, however, we have tried to clarify it based on available data: the number of hours that people themselves say they work each week, and the number of hours they are contracted to work. Based on these two questions, we have estimated how many hours researchers work above or below their contracted hours (hereafter: 'overtime'). We first converted FTEs to hours per week in line with the collective agreement in their sector. We assumed that a full-time job at a university, UAS and NWO or Academy institute would be 38 hours a week. A contract for 0.8 FTEs, for example, would then be equal to 30.4 hours a week. For the university hospitals and PKOs, we assumed that a full-time job would be 36 hours a week (in line with the collective agreement covering these institutions). To calculate how many hours above or below their contracted hours people work, we divided the number of hours that a researcher actually works by the number of hours that he or she should be working according to their contract. For example, someone who works 50 hours a week and has a 38-hour contract works $50/38=1.32$, or 32% more each week.

Some of the values derived in this manner are extremely low and others are extremely high. In other words, there are researchers who work only 20% of their contracted hours and researchers who work 7x their contracted hours. These outliers mainly consist of employees whose contracts are for less than 0.6 FTEs. It may be that the researchers concerned misunderstood the questions. In the introduction to the questionnaire, the researchers are asked to answer the questions from the perspective of the research institution where they actually spend the largest percentage of their time working. The questions about their contract (FTE) and the number of hours that they work require them to add up the contracts/hours at multiple research institutions. Respondents on a contract for fewer than 0.6 FTEs were therefore excluded (n=209). Additionally, respondents who work fewer than 76% of their contracted hours were also excluded (n=32). It is unlikely, for example, that someone with a contract for 0.8 FTEs would have almost a whole day off every week (but still be paid for it). After these exclusions, 2,378 respondents remained.

Sample population characteristics

The number of respondents varies considerably from one institution to the next. For example, four of the university hospitals produced fewer than ten respondents but the other four gave us between 29 and 117 respondents. The 14 universities produced an average of 100 respondents, ranging from 12 to 196 per university.

The number of respondents at NWO or Academy institutes varied from one to 23 (an average of eight per institute). Of the 31/29 PKO's⁴⁷ that we approached, 22 responded. Here too, the number of respondents per PKO varied considerably (from 1 to 78, an average of 17 per PKO). Of the 36 UAS, 32 participated, with an average of eight respondents per UAS (ranging from 1 to 43 per institution). It should be noted, however, that the number of researchers employed by the NWO and Academy institutes, PKOs and UAS also varies considerably.

The various job categories are not evenly distributed across the institutions. For example, 40% of the university respondents are assistant or associate professors, whereas only 15% at university hospitals are. More doctoral candidates at university hospitals completed the questionnaire than at universities, however (44% versus 26%).

47 See footnote 11.

Table 3 Respondents' characteristics, by institution

	Research university	University hospital	NWO/Academy institute	UAS	PKO	Total
Institutions (n)	14	8	25	32	31	
Respondents (n)	1397	348	199	249	420	2613
Women (%)	42.2	65.5	40.2	53.8	45	46.7
<i>Place of residence 18th birthday, % (n)</i>						
Netherlands	72.2 (1009)	89.9 (313)	72.9 (145)	94.4 (235)	92.4 (388)	80 (2090)
OECD-EU	16.8 (235)	6.3 (22)	17.1 (34)	4 (10)	3.8 (16)	11.5 (301)
EU, non-OECD	0.7 (10)	0.3 (1)	1 (2)	0	-	0.4 (10)
OECD, non-EU	4.2 (58)	0.9 (3)	4 (8)	0.8 (2)	1.4 (6)	2.6 (67)
Other/world	5.5 (77)	2.3 (8)	5 (10)	0.8 (2)	2.1 (9)	3.4 (88)
<i>Doctorate holder or not</i>						
Doctorate holder (%)	69.1	50.6	64.8	62.2	61.7	64.4
Working on PhD (%)	28.8	48.6	27.1	21.7	11.9	27.9
Total PhDs (%)	97.9	99.2	91.9	83.9	73.6	92.3
<i>Field (%)</i>						
Agriculture / Applied Life Sciences	2.1		3.5	3.2	14.5	4
Natural and Life Sciences	22.5	14.9	43.2	3.6	18.3	20.6
Engineering and Technology	13.4	1.1	4	9.2	6.7	9.6
Medical and Health Sciences	7	81.3	2	14.1	20.7	19.4
Economics	9.2	0	1	9.2	10	7.5
Law	5.4	0	1.5	0.8	0.5	3.2
Behavioural & Social Sc.	22.8	0.9	23.6	24.9	18.3	19.4

	Research university	University hospital	NWO/Academy institute	UAS	PKO	Total
Language, the Arts and Culture	7.5	0	11.1	5.6	0.2	5.4
Education	2.2	0.6	-	21.7	0.2	3.4
Other	7.9	1.1	10.1	7.6	10.2	7.5
<i>Job title (%)</i>						
professor	15	11.2	10.6	2.4	2.1	10.9
endowed professor	1.7	1.4	3.5	0.8	2.4	1.8
associate professor	12.6	4.9	-	2	0.5	7.7
assistant professor	27.9	10.1	1	0.4	0.7	16.5
medical specialist	0.2	6	-	0.4	0.5	1
clinical researcher	0.5	1.4	-	-	-	0.5
postdoctoral fellow	8.2	12.6	17.6	0.4	3.3	8
doctoral candidate/teaching assistant (AIO) / research assistant (OIO)	26.4	43.7	26.6	12.4	6.9	24.3
director/manager	0.6	0.6	3	0.8	4	1.3
coordinator/project manager	0.6	2.3	6.5	3.2	11	3.2
research coordinator ('lector')	0.6	0	0.5	51	1	5.4
researcher	4.9	4.3	26.1	22.1	65.5	17.8
instructor	0.5	0		2.4	-	0.5
other	0.2	1.4	4.5	1.6	2.1	1.1

It is impossible to determine the presence of selectivity in the responses provided by researchers at the university hospitals, the NWO and Academy institutes, the UAS and the PKOs, simply because we have no population data on any of these organisations. We were able to test the representativeness/selectivity of the university responses on a limited number of criteria by comparing the data to the

2016 WOPI, the Netherlands' university staff information database (the 2017 WOPI is not yet available).

In terms of gender, the population dataset and the response dataset differ slightly, with our response dataset having 1.6% more women than the population. There are also small differences in terms of age category. There are fewer young researchers in the response dataset (< 30: 24.4% versus 29.6%) and a somewhat larger number of researchers in the age categories 40-50 (19.9% versus 16.1%) and 50-60 (16.3% versus 14.5%). This is because the questionnaires were completed by or distributed more often to the permanent staff made up of assistant, associate and full professors. We allowed for this in our analyses by job category.

With almost 1,400 respondents in a population of more than 30,000 individuals, even small differences quickly become statistically significant. We have nevertheless chosen to report the outcomes without weighting them.

Appendix 2: Terms and abbreviations/acronyms

EU	European Union
Full professor	Most senior academic position in the academic job structure at universities and university hospitals
IBO	Inter-ministerial policy study
Academy	The Royal Netherlands Academy of Arts and Sciences Its institutes are: <ul style="list-style-type: none"> • Data Archiving & Networked Services (DANS) • Fryske Academy (FA) • Huygens ING • International Institute of Social History (IISH) • Royal Netherlands Institute of Southeast Asian and Caribbean Studies (KITLV) • Meertens Institute • NIOD Institute for War, Holocaust and Genocide Studies • Netherlands Interdisciplinary Demographic Institute (NIDI) • Netherlands Institute for Advanced Study in the Humanities and Social Sciences (NIAS) • Hubrecht Institute for Developmental Biology and Stem Cell Research • Netherlands Institute for Neuroscience • Netherlands Institute of Ecology (NIOO) • Spinoza Centre for Neuroimaging • Westerdijk Fungal Biodiversity Institute • Rathenau Instituut The group of Academy and NWO institutes also includes: <ul style="list-style-type: none"> • Biomedical Primate Research Centre (BPRC) • Naturalis
Research coordinator ('lector')	Staff member at a university of applied sciences who coordinates practical research on a specific, defined topic
NFU	Netherlands Federation of University Medical Centres
NRA	Dutch National Research Agenda
NWO	Netherlands Organisation for Scientific Research NWO funds and manages eight research institutes: <ul style="list-style-type: none"> • ASTRON: Netherlands Institute for Radio Astronomy

- CWI: National Research Institute for Mathematics and Computer Science
- AMOLF: Institute for Physics of Functional Complex Matter
- DIFFER: Dutch Institute for Fundamental Energy Research
- Nikhef: Institute for Subatomic Physics
- NIOZ: Royal Netherlands Institute for Sea Research
- NSCR: Netherlands Institute for the Study of Crime and Law Enforcement
- SRON: Netherlands Institute for Space Research

NWO also co-finances:

- Netherlands e-Science Centre (in cooperation with SURF, the higher education and research partnership for ICT in the Netherlands)
- DANS (Data Archiving Networking Services) for sustainable storage and access to digital research data (in cooperation with the Academy)
- Advanced Research Centre for NanoLithography, a public-private partnership with ASML, the University of Amsterdam and VU Amsterdam

OECD Organisation for Economic Co-operation and Development
 Researcher Employee charged with carrying out research, usually combined with other tasks such as teaching, patient care and knowledge transfer
 PKO Public knowledge organisation. There are 29 such organisations in the Netherlands:

- KNMI: Royal Netherlands Meteorological Institute
- CBS: Statistics Netherlands
- RIVM: National Institute for Public Health and the Environment
- NLR: Netherlands Aerospace Centre
- MARIN: Maritime Research Institute Netherlands
- TNO: Netherlands Organisation for Applied Scientific Research
- DLO: Agricultural Research Service
- CPB: Netherlands Bureau for Economic Policy Analysis
- ECN: Energy Research Centre of the Netherlands (as of 1 April 2018 part of TNO)
- SWOV: Institute for Road Safety Research
- Boekman Foundation: Study centre for the arts and culture in both policy and practice
- WODC: Research and Documentation Centre
- SCP: Netherlands Institute for Social Research

- Clingendael: Netherlands Institute of International Relations Clingendael
- NIVEL: Netherlands Institute for Health Services Research
- VeiligheidNL: Organisation that encourages safety practices
- Police Academy
- Trimbos-instituut: Netherlands Institute of Mental Health and Addiction
- NFI: Netherlands Forensic Institute
- Mulier Institute, Centre for Research on Sports in Society
- SWOON-NLDA: Foundation for Scientific Education and Research at the Netherlands Defence Academy
- KiM: Netherlands Institute for Transport Policy Analysis
- Geonovum: government foundation for geo-information
- Movisie – Centre for social issues
- NJI: Netherlands Youth Institute
- Vilans: Research on long-term care
- Deltares: Research focusing on water, subsurface and infrastructure matters in delta regions
- PBL: Netherlands Environmental Assessment Agency
- (N)IFV: (Netherlands) Institute for Physical Safety

The following have also been included in this group:

- RKD: Netherlands Institute for Art History
- RCE: Cultural Heritage Agency

These two institutions are part of a network of national expertise centres that also includes some of the PKOs.

Postdoc	A postdoctoral fellow, a doctorate holder employed by a university or university hospital
TO2	Organisations for applied scientific research. A PKO subgroup (Deltares, ECN, NLR, MARIN, TNO and Wageningen Research) whose task is to develop, apply and disseminate knowledge in support of government tasks and policymaking, to address societal issues, and to improve the Netherlands' innovativeness and competitiveness.
UAS	Universities of applied sciences
WOPI	University Staff Information System
ZonMW	Netherlands Organisation for Health Research and Development

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