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2017 Career Tracking Survey of Doctorate Holders

Project Report

UNIVERSITÉ DU LUXEMBOURG

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Acknowledgements

This career tracking survey could not have been accomplished without the financial support of the participating organisations, and active and enthusiastic involvement and support of their project representatives: Dr Michael Klimke, Dr Sarah Kersten, Laura Oster and Dr Benjamin Brast at the Technical University of Munich, Germany; Dr Hans Ouwersloot at Maastricht University, The Netherlands; Dr Sybille Küster and Anja Schenk at Goethe Graduate Academy, Goethe University Frankfurt, Germany; Professor Damir Sapunar at the University of Split, Croatia, Cassandra Mikicic at the University of Luxembourg; Dr Andreas Bladt and Dr Anke Zwetsch at the Luxembourg Institute of Science and Technology; Professor Bogdan Murgescu, Dr Stefania Matei and Dr Corina Bragaru at the University of Bucharest, Romania; Dr Saltanat Schweitzer at the Institute of Science and Technology Austria; and Julien Desfloquet at the AXA Research Fund, France. We hope that the collected data and analyses will be helpful in the quality assurance processes and strategy building for doctoral education at these organisations and beyond.

We also would like to thank our experts, Dr Barbara Brecko and Dr Nejc Berzelak, University of Ljubljana, for their tireless involvement in the project, advice on the methodological issues for survey design and implementation, as well as data analysis. We would like to extend our thanks to Professor Maresi Nerad, Center for Innovation and Research in Graduate Education (CIRGE), University of Washington, Seattle, USA for reviewing the draft questionnaire and providing useful comments and suggestions in the early stages of the project.

Above all, we would like to express our appreciation and gratitude to over 2000 doctorate holders who took part in this survey, and we hope that the resulting report reflects their contributions.

Finally, we would also like to thank our ESF colleagues who assisted the project in a number of ways, either by testing and commenting on the questionnaire, providing helpful comments and suggestions for the final report, or assisting with communications: Sigolène Côte-Rey, Dr Ildiko Ipoly, Eliana Legoux, Emily DeYoung Becker, Dr Emmanouil Detsis, Dr Ana Maria Ciubotaru, Dr Ana Helman, Dr Patricia Cabezas, and Dr Jean-Claude Worms.

Julia Boman
Science Officer,
Coordinator of the project

Foreword

In 2015 the European Science Foundation (ESF) published the report from its first career tracking pilot study. Comprising data from the doctorate holders surveyed and supported by five participating organisations, it tested the survey instrument and presented a number of findings. While these could not be extrapolated to the broader population of PhD holders, given the very small sample being surveyed, some interesting results were obtained, including the observed difference in performance and satisfaction levels between those with employment continuity and those with temporary contracts, within the sample of mainly academia-based post-doctorate researchers.

The current survey, supported by nine participating organisations, was launched in 2016 and significantly redeveloped the survey instrument to reflect a broader doctorate holder population under study, working in academia but also business, government or other sectors. We are pleased to present the findings of this survey in this report. It offers a wealth of data on the employment situation, and transition to the labour market, of the doctorate holders under study. It is gratifying that employment levels are found to be high and the vast majority deploy their skills as researchers. However, the study pointed to what seems to be a persisting structural problem in universities (the most popular job destination), where the number of permanently employed doctorate holders is much lower than in other sectors.

Another important finding is that while doctorate holders experience a rather smooth transition to the labour market, and see their doctorate as an added value, those who sought non-academic careers felt somewhat less prepared. In the wider European context, where Europe is struggling to increase its share of researchers in the business enterprise sector to the level of its competitors in US and Japan, this is to be taken seriously. It points to a need for greater preparation, either during the formation phase or through continuing professional development. We hope that these findings will be of use to the partner organisations, as they offer food for thought as regards the development of transferable skills training, career advice and orientation.

One of the most important conclusions is that the study demonstrated again the feasibility and appropriateness of the selected approach and instrument to study careers of diverse groups of doctorate holders. There is a clear benefit to continuing, and scaling up, this study in the future to enable better opportunities for participating organisations, as it offers reliable data, representative of the participating organisations, and the possibility of creating a central statistical database that can be used as benchmark for analysis at the level of individual organisations, universities or otherwise.

The question of the granularity of such a career tracking database or platform needs, of course, further discussions and refining. For instance, should the surveys and analyses be done at country or regional level? How can we involve science stakeholders in a meaningful way in the definition of the survey questions? How frequently should the survey be repeated in order to support decision-makers effectively, while avoiding "interviewees' fatigue"?

Clearly, European universities, decision-makers and science stakeholders do require this sort of career tracking instrument, and regular representative data. ESF intends to do its part in the development and setting up of such a platform in order to provide decision-makers, and those who devise funding support, with a better evidence base and better metrics in terms of research careers.

We would like to express our gratitude to the nine organisations that supported this second career-tracking project, not only for their financial contribution, but for their active shaping of the survey design.

Martin Hynes
ESF President

Jean-Claude Worms
ESF Chief Executive

Executive summary

Introduction

Universities, non-university-based research performing organisations and research funding organisations all want to better document the career trajectories of doctorate holders in order to assess the impact of investment in research career development, and to analyse practices aimed at the development of research careers, thereby providing decision-makers and science stakeholders with a better evidence base and metrics in terms of research careers.

This career tracking study of doctorate holders builds on the work of the ESF Member Organisation Forum 'European Alliance on Research Career Development' (EARCD), and specifically its report *Developing Research Careers In and Beyond Europe* (2012)[1], which articulated a need for career tracking surveys across research institutions in Europe. It also builds on its Working Group report *How to Track Researchers' Careers* (2012)[2] and an ESF pilot study *Career tracking of Doctorate Holders* (2014)[3] completed in 2015.

The aims of this career tracking survey were to:

- Build on the ESF pilot study and further develop an online post-doctoral career progression and outcome instrument for monitoring, evaluation and planning purposes;
- Understand where doctorate holders in the participating organisations moved in their careers (research vs. non-research careers);
- Help understand occupational patterns of researchers, not only in academia but also industry, education, health and public administration;
- Contribute to evidence-building regarding the challenges, bottlenecks and opportunities that arise for people pursuing research careers;
- Help universities and non-university research performing organisations to better tailor their doctoral education and career advice to meet researchers' needs;
- Explore whether doctoral training enabled respondents are able to progress towards their desired career goals within or outside academia;
- Collect evidence that helps funding organisations to evaluate the wider impact and benefit of schemes supporting research career development.

Project Partners

ESF-SCIENCE CONNECT launched a call for interested research performing and funding organisations to join a career tracking survey in April 2016. Nine organisations joined the project: University of Maastricht, The Netherlands; Technical University of Munich, Germany; Goethe Research Academy for Early Career Researchers (GRADE) at Goethe University Frankfurt, Germany; University of Bucharest, Romania; University of Split, Croatia; University of Luxembourg, Luxembourg; Institute of Science and Technology, Austria; and the AXA Research Fund, France.

Methodology

The target population of the 2017 Joint Career Tracking Survey of Doctorate Holders were doctorate holders who obtained their degree in the last seven years, that is, over the period between 2010 and 2016. Each partner organisation enumerated the doctorate holders over this period and established a list of individuals eligible to participate in the survey.

In all but one case, partner organisations were able to provide ESF-SCIENCE CONNECT with the list of available up-to-date contact details of their PhD holders/graduates (name, email and year of graduation). Where this was not possible due to data

1 European Science Foundation, *Developing Research Careers In and Beyond Europe: Enabling – Observing – Guiding and Going Global,* a report by the ESF Member Organisation Forum 'European Alliance on Research Career Development' (EARCD), 2012.

2 European Science Foundation, *How to Track Researchers' Careers,* a report by the ESF Member Organisation Forum 'European Alliance for Research Careers Development' (EARCD), 2012.

3 European Science Foundation, *Career Tracking of Doctorate Holders: Pilot Project Report,* 2014.

protection requirements, the partner organisation sent the survey link and all communication directly to their graduates, in close coordination with ESF-SCIENCE CONNECT office.

The basis for the survey was the pilot questionnaire used in the ESF pilot study, which was further developed by ESF-SCIENCE CONNECT and partner organisations. The questionnaire was in English and included five sections: 1) doctorate education, 2) transition from doctorate to the first position, 3) employment situation and related career experience, 4) physical, virtual and intersectoral mobility and 5) demographics. Items of interest to the participating organisations were also designed upon request, and were included as additional and optional organisation-specific modules.

In addition to ESF-SCIENCE CONNECT experts **Dr Nejc Berzelak** and **Dr Barbara Brečko** from the University of Ljubljana, the draft questionnaire was reviewed by **Professor Maresi Nerad** from the Center for Innovation and Research in Graduate Education (CIRGE) at the University of Washington, Seattle, US, who provided a number of suggestions on the contents of the questionnaire.

The survey was launched on 14 March 2017, and data collection was carried out for the period of four weeks. The survey collected 2046 complete responses, which represents 23 % of all those who received the survey invitation. Over 90 % of all those who started filling out the survey reached the end of the questionnaire.

Main outcomes and conclusions

Doctorate holders demonstrate high rates of employment, with a majority working on permanent contracts and an even larger proportion working as researchers

Despite the voiced concerns in the media and academic press about the overproduction of PhD graduates over the past decades, our findings report a very high employment rate of the studied cohort, with 95 % being employed. Among these employed respondents, a vast majority (80%) are working as researchers. The overall unemployment rate is 4 % and diminishes over time, reaching 2 % for those who received their degree six to seven years ago. Doctorate holders in humanities have however a significantly higher level of unemployment (9 %) which is more than two times higher than for other research domains, including social sciences (4 %). High unemployment among the humanities doctorate holders is an alarming result and it is important to understand why these doctorate holders in our sample seem to have a harder time than others finding employment.

Only slightly over half of those in the academic sector are employed on permanent contracts, compared to the vast majority of those in other sectors

When looking at the different sectors, one notices a major difference between academic and non-academic sectors in terms of permanent employment, which indicates a persistent structural problem of saturation within academia, criticised by a large body of literature in Europe and the US. We have seen that about one third of all researchers in our sample are currently employed in post-doctorate positions, and over 40 % in other positions (e.g. research fellow, senior researcher, Assistant Professor, Associate Professor, Professor, etc.) While one may argue that temporary post doctorates are beneficial in the sense that they incentivise researchers to move out of their home institutions and gain valuable experience elsewhere, the paucity of permanent contracts at universities in later career stages is more worrying.

Universities and the academic sector are the main destination for early-career doctorate holders, although the presence of doctorate holders in industry, government and other sectors is also not negligible

Despite the lack of permanent academic positions, 62 % of respondents are currently working in the academic sector (universities and RPOs and RTOs), and 40 % in non-academic sectors. It is important to keep in mind that the studied cohort are early career graduates and mostly from research universities, and this may be reflected in the seemingly high share of university-based employment, compared to countries like Germany, Luxembourg, or the EU average. With the progression of careers and the corresponding search for employment stability, many may leave academia for other sectors. One can assume that with the lack of permanent jobs within academia, and seemingly more secure job prospects in the private sector or government, the latter sectors would become increasingly attractive destinations in

the future for other fields as well.

Most doctorate holders work in jobs that are at least partly related to their doctorate

It is in the academic sector that respondents work in jobs most closely related to their PhD; still, a vast majority of respondents working in other sectors such as industry, government or hospitals have jobs that are at least partly related to their PhD. Therefore, it would appear that, even when not engaged in research, most doctorate holders still find jobs related to their study and are able to offer skills other than those related to research at their workplace.

A doctorate is most needed for jobs in the academic sector and to a lesser extent, in industry, while a Master's is the most widely required qualification in other sectors

The findings for our sample also demonstrate that, while the vast majority of jobs of respondents working in universities and RPOs/RTOs required a doctorate, or even a post-doctorate, a master's-level degree was by far the most required degree for those working in government, services or hospital (50-74 %). In industry, equally large shares (45 % each) of respondents worked in positions that required a doctorate or a master's-level degree. There is an emerging literature looking at the possible effect of over-education of doctorate holders, and their possible misallocation in the labour market, which can bear a significant societal and individual cost – especially considering the length of, and the high public and individual investment, into, doctorate education. However, educational mismatch alone may not necessarily mean that doctorate holders are working in jobs that do not sufficiently utilise their capacities and knowledge. It is important to see whether the educational mismatch is also accompanied by a mismatch in the skills usage as well as low levels of satisfaction with the salary and other aspects of the job.

Doctorate holders are mostly satisfied with their jobs, with researchers being more satisfied with the intellectual challenge of their position than non-researchers, but less so with job security, salary and work/life balance

When looking at satisfaction levels across the different employment sectors, it is encouraging to see similarly high levels of satisfaction with intellectual challenge, despite the fact that the level of engagement in research varies across sectors. At universities, doctorate holders are least satisfied with job security, which is unsurprising given the low share of permanent contracts compared to other sectors mentioned earlier. On the other hand in the industry and services/other business sectors, as well as in the government/other public sector, job security is one of the most highly rated job attributes. When comparing researchers on temporary and permanent contracts, we observe that the former are much less satisfied with job stability and proximity to family but more satisfied with research environment and research infrastructure than researchers on permanent contracts.

More researchers are planning to change to a non-research career than vice versa

Here, another noteworthy finding is that more researchers are planning to change their career to a non-research career in the next three years (39 %) than vice versa (26 %). Considering that researchers represent 80% of the total number of the employed doctorate holders in the sample, it is important to understand the underlying reasons for this willingness to change to a non-research career, especially as these reasons may be different across different sectors of employment.

Men and women are concentrated in different research fields and employment sectors, have similar levels of job satisfaction, and are similarly represented in senior academic posts and other position levels

Male doctorate holders prevail in natural sciences, engineering and agricultural sciences, while in medical and health sciences, social sciences and humanities, there are more female doctorate holders. After completion of their doctorate, men are more likely to pursue post-doctoral positions than women. As regards the current sector of employment, women work more often at universities as well as in the government and public sector, while men, on the other hand, are significantly more represented in industry and the services and other business sector. It would seem, therefore, that, although more men start out with a post-doctorate position, which is often at a university or in a RPO, they then tend to move to other sectors more often than women. Men and women have very similar levels of satisfaction with the various aspects of their job, as well as similar

levels of staff management responsibilities. In terms of engagement in research, similarly high shares of men and women work as researchers, and similar proportions of men and women work in senior academic posts and other position levels.

Among the few of those who took a career break women were twice as many as men and their reasons differed – women took a break because of childcare commitments and men mainly due to unemployment

Among employed respondents, 11 % of took a career break since their doctorate completion. Among those, there are nearly twice as many women (65 %) than men (35 %), where women mostly took a break because of childcare commitments and men mostly due to unemployment.

Most doctorate holders experienced a smooth transition into the job market, yet those who went for non-academic careers felt less prepared

Our study suggests that doctorate holders experienced a relatively smooth transition into the job market, with 40 % of them already having a job at the completion of their doctorate, and those without, on average, having found one in four months. That a large majority of doctorate holders already had a job at the completion of their doctorate may indicate that many stayed on at universities, which once again points to the attractiveness of a university career for doctorate holders, at least in early career stages. More than half of doctorate holders pursued a post-doctorate position, which is often required in order to get a research position afterwards. While respondents see their doctorate as an added value, and would do it again if they had to restart their career, the attitudes of researchers and non-researchers differ. Researchers felt more prepared for their first job compared to non-researchers, and their job prospects were clearer to them than for non-researchers. Doctorate holders obtain their qualifications through academic research, and thus it should not be surprising that they feel best prepared for a career in academia. However, doctoral education today is also expected to train doctoral students for a range of other careers, as discussed below. Our findings may indicate that a transition to a job in non-academic sectors – where non-researchers are concentrated – may be more difficult, and could suggest that doctoral education institutions should make efforts to improve training that prepares doctoral students for non-academic careers.

There is a need for better training in professional or transferable skills such as communication, networking, or project management

The reform of doctoral education has been high on European and American policy agendas for a number of years. It is now widely understood that in the context where more and more doctorate holders look for jobs outside academia, doctoral students cannot remain narrowly educated within disciplinary boundaries, with skills geared mainly towards academic teaching and research. The need for training doctoral students in professional or transferable skills such as teamwork, communication, project management, career management, and/or personal effectiveness has been mentioned in the reports by the ESF-initiated *Member Organisation Forum on Research Careers* [4] and the *European Alliance on Research Career Development* (2012)[5]. The European Commission's *Seven Principles of Innovative Doctoral Training* (2011)[6], building on the EUA's Salzburg Principles I and the Salzburg II Recommendations, encourage countries and institutions to develop training in transferable skills as part of their doctoral training provision. Looking at our findings with regard to skills acquired by doctorate holders during their studies compared to the skills they need in their work place, we can say that, in general, doctorate holders have acquired the necessary skills for their jobs. The only notable discrepancies concerned what can be defined as professional or transferable skills such as communication, networking, or project management. While some of these skills can also be learned on the job, doctoral training institutions may wish to further examine whether and how to improve training in these areas, especially since these skills were also rated as important for respondents' current position.

4 European Science Foundation, *Research Careers in Europe: Landscape and Horizons,* a report by the ESF Member Organisation Forum on Research Careers, 2010.

5 European Science Foundation, *Developing Research Careers In and Beyond Europe: Enabling – Observing – Guiding and Going Global,* a report by the ESF Member Organisation Forum 'European Alliance on Research Career Development' (EARCD), 2012.

6 European Commission, *Report of Mapping Exercise on Doctoral Training in Europe 'Towards a Common Approach',* 2011.

Institutional career orientation and support should offer doctoral candidates tools for evaluation and development of their skills, and assist their largely independent job search by raising awareness of their broader career options

Our survey explored the importance of available resources for a first job search, and university career centres were rated as the least important resource for job search, well behind search on the Internet and using one's social and professional networks. It would therefore appear that doctorate holders were not supported by career services in their job search, were not aware of such support being available or did not consider these services as relevant or adapted to the doctorate level, but looked for a job largely on their own or with the advice of their academic supervisor. It would seem appropriate that institutional career services should focus on activities supporting doctoral students in their job search through independent skills evaluation and development tools for networking with the relevant actors. That non-researchers – who are mostly concentrated in non-academic sectors – felt less aware of the various career options available for them after graduation, does suggest that there is also a need for career orientation and advice presenting a broad range of career options including those outside the traditional academic track. Students and doctoral candidates also need to be presented available data – ideally from their institution or nationally and internationally available reports and studies – as to their possible employability prospects within and outside academia.

Doctorate holders are highly geographically mobile, with the EU and North America being the most popular destinations

The level of mobility is relatively high, with 40 % of doctorate holders having lived in a foreign country for more than three months since completion of their doctorate. Researchers are significantly more mobile (44 %) than non-researchers (23 %), and respondents in natural sciences, and science and engineering are more mobile compared to respondents in social sciences, medical and health sciences, and humanities. Not surprisingly, the highest amount of mobility is within Europe, North America being the next most popular destination. A small share of respondents also lived in one or more other European, non-EU countries, while moving to other regions is relatively rare.

The level of transnational collaboration among researchers is moderately high while the level of cross-sectoral collaboration is more modest

Nearly 60 % of employed researchers conduct research with researchers based in another country/region, with the highest share of collaboration occurring at RPOs and RTOs, at universities, and in industry. The level of cross-sectoral collaboration is relatively low, in the range of 23-33 %, depending on the type of collaboration.

The study once again demonstrated the feasibility and appropriateness of the selected approach and instrument to study the careers of diverse groups of doctorate holders in a cross-sectional or longitudinal manner. There is a clear benefit in continuing and scaling up this study in the future, which would allow for the study of larger groups of organisations, and provide more possibilities for continuous benchmarking for participating organisations, especially if studies focused on a more homogenous group e.g. technical universities. The possibility of country-level studies needs to be further explored. The current survey was a retrospective cross-sectional survey providing up to seven years of career path data, and it can be repeated in the same way for new cohorts in three-four years. For organisations that wish to track their doctorate holders in a longitudinal way, it is possible to trace the same population with a follow-up survey at regular intervals of several years.

1. Introduction

Universities, non-university-based research performing organisations and research funding organisations all want to better document the career trajectories of doctorate holders in order to assess the impact of investment in research career development and to analyse practices aimed at the development of research careers, thereby providing decision-makers and science stakeholders with a better evidence base and metrics in terms of research careers. The education and training of researchers is expensive for both society and the individual. It would be useful to better understand how these highly trained individuals transition to the labour market, and whether they achieve fulfilling careers contributing to research and innovation processes in research institutions and outside the traditional academic sphere.

In Europe, one is struck with the relative paucity of data on careers of doctorate holders in contrast with the US, where a national survey of Doctorate Recipients of the National Science Foundation (NSF) has been conducted for over four decades, gathering information on career movement of US-trained doctoral holders[7], and a pilot Early Career Doctorates Survey was launched in 2015[8]. Furthermore, large-scale retrospective national surveys were conducted by the Center for Innovation and Graduate Education, University of Washington, studying doctorate holders' careers in great depth[9].While different initiatives exist in some European countries, such as VITAE's survey series "What do researchers do?"[10] in the UK, or a panel study of German doctorate holders[11], there are not many European-wide studies apart from the OECD-KnowInno project Careers of Doctorate Holders (CDH)[12] completed in 2012 and MORE 2 Study on Mobility Patterns and Career Paths of Researchers (2013)[13].

While these large-scale projects offer invaluable information and should be developed and pursued in the future to provide important indicators for European and national policy makers, many individual universities and research institutes in Europe wish to know if they are training their doctoral students with the right set of skills for their careers, and if their doctoral graduates are they able to find desired jobs with adequate levels of responsibilities and requirements after PhD completion. National-level surveys, which also provide organisational-level information, are not available in many European countries or provide only limited information as to the performance of individual institutions. Some universities, therefore, set up their own tracking studies, also due to the fact that they have significantly raised their efforts in reshaping doctoral programmes and individual support of doctoral students in recent years. The current career tracking survey initiative, launched by ESF-SCIENCE CONNECT, aims to offer a standard follow-up instrument for tracking doctorate holders pursuing a wide range of careers in and outside academia, with the main objective of inter-organisational benchmarking and comparison across participating organisations, and better economies of scale through the joint approach.

In addition to the core questionnaire, the survey accommodates optional modules, with organisation-specific questions of interest, allowing organisations to study the impact of their specific training programmes or collect other feedback.

7 https://www.nsf.gov/statistics/srvydoctoratework/
8 https://www.nsf.gov/statistics/srvyecd/#qs&sd
9 www.cirge.washington.edu
10 www.vitae.ac.uk/wdrd
11 http://www.dzhw.eu/projekte/pr_show?pr_id=514
12 www.oecd.org/sti/cdh
13 https://euraxess.ec.europa.eu/useful-information/policy-library

ESF-SCIENCE CONNECT launched a call for interested research performing and funding organisations to join a career tracking survey in April 2016. Nine organisations joined the project: University of Maastricht, The Netherlands; Technical University of Munich, Germany; Goethe Research Academy for Early Career Researchers (GRADE) at Goethe University Frankfurt, Germany; University of Bucharest, Romania; University of Split, Croatia; University of Luxembourg, Luxembourg; Institute of Science and Technology, Austria; and the AXA Research Fund, France.

This career tracking study of doctorate holders builds on the work of the ESF Member Organisation Forum 'European Alliance on Research Career Development' (EARCD), and specifically its report *Developing Research Careers In and Beyond Europe* (2012)[14], and for the Working Group report *How to Track Researchers' Careers* (2012)[15]. It also builds on a ESF pilot study completed in 2015, in which the following organisations took part: the AXA Research Fund, France; the Fonds National de la Recherche, Luxembourg; Goethe Research Academy for Early Career Researchers (GRADE) at Goethe University Frankfurt, Germany; the Paul Scherrer Institute, Switzerland; and TDR, the Special Programme for Research and Training in Tropical Diseases, a co-sponsored programme of UNICEF, UNDP, the World Bank and WHO. The pilot project report *Career tracking of Doctorate Holders* (2014)[16] demonstrated the feasibility of the approach and described its main findings, which are of considerable value for evaluation and benchmarking purposes at institutional levels.

The aims of this career tracking survey were to:

- Build on the ESF pilot study and further develop an online post-doctoral career progression and outcome instrument for monitoring, evaluation and planning purposes;
- Understand where doctorate holders in the participating organisations moved in their careers (research vs. non-research careers);
- Help understand occupational patterns of researchers, not only in academia but also industry, education, health and public administration;
- Contribute to evidence-building regarding the challenges, bottlenecks and opportunities that arise for people pursuing research careers;
- Help universities and non-university research performing organisations to better tailor their doctoral education and career advice to meet researchers' needs;
- Explore whether doctoral training enabled respondents are able to progress towards their desired career goals within or outside academia;
- Collect evidence that helps funding organisations to evaluate the wider impact and benefit of schemes supporting research career development.

The approach taken to achieving these objectives is outlined in section 3: Methodology.

14 European Science Foundation, *Developing Research Careers In and Beyond Europe: Enabling – Observing – Guiding and Going Global,* a report by the ESF Member Organisation Forum 'European Alliance on Research Career Development' (EARCD), 2012

15 European Science Foundation, *How to Track Researchers' Careers,* a report by the ESF Member Organisation Forum 'European Alliance for Research Careers Development' (EARCD), 2012.

16 European Science Foundation, *Career Tracking of Doctorate Holders: Pilot Project Report,* 2014.

2. Project partners

GRADE – Goethe Research Academy For Early Career Researchers, Goethe University Frankfurt

Established in 2009 and expanded in 2016, GRADE is the central research academy for early career researchers at Goethe University Frankfurt. GRADE offers a portfolio of multi-disciplinary qualification programs, guidance, and support. As one of the largest universities in Germany, with more than 46,000 students, Goethe University's 16 faculties (encompassing Law, Economics, Social Sciences, Humanities, Natural Sciences, Mathematics and Medicine) award around 680 doctoral degrees every year. GRADE supports doctoral students, supervisors and postdocs individually in accordance with their needs and interests by offering more than 120 workshops each year, as well as coaching sessions, networking opportunities and career events. All services are focused on opportunities for personal development, research support and funding, and career prospects inside or outside academia.

Maastricht University

Established in 1976, Maastricht University (UM) is the most international university in the Netherlands and, with more than 16,000 students (half of which are foreign students) and 4,000 employees, is still growing. The university stands out for its innovative education model, international character and multidisciplinary approach to research and education. Around 300 PhD degrees are awarded each year. Maastricht University (UM) has six faculties: Faculty of Arts and Social Sciences, Faculty of Health, Medicine and Life Sciences, Faculty of Humanities and Sciences, Faculty of Law, Faculty of Psychology and Neuroscience, and School of Business and Economics. Maastricht University is a research university where fundamental and applied research are inextricably linked with education and educational innovation. The university has defined a set of core values that serve as key principles for the conduct and attitude of staff and students: realise social impact, create value, encourage dialogue, nourish initiative and work from intrinsic curiosity.

Technical University of Munich

Technical University of Munich (TUM) was founded in 1868 and is currently the highest-ranking technical university in Germany. To date, TUM has more than 40,000 students of which 17 % are from abroad. Among its 5,000 doctoral candidates, the share of internationals is as high as 28 %. In 2016, the university has awarded 1,049 doctoral degrees. The 14 departments at TUM focus on four main research areas: Engineering & Architecture, Mathematics & Natural Sciences, Life Sciences & Health Sciences, and Social Sciences. TUM is committed to excellence in research and teaching, interdisciplinary education and the active promotion of promising young scientists. The university also forges strong links with companies and scientific institutions across the world. TUM was one of the first universities in Germany to be named a University of Excellence. A university-wide Graduate school was introduced in 2009 in order to secure the quality in the doctoral processes and to provide further training and services for doctoral candidates.

University of Bucharest

The University of Bucharest is a leading institution of higher education in Romania. Officially founded in 1864, its roots can be traced to the Academy established in Bucharest by Prince Constantin Brâncoveanu in 1694. In its over 150 years of existence, the University of Bucharest has gained solid national and international prestige. Ranked first in the last national evaluation of the Romanian universities, the University of Bucharest supports innovation in higher education, working

on European integration of the country and on the consolidation of the European Higher Education Area and the European Research Area. It has 19 faculties which offer study programmes in a large variety field, from humanities and social sciences to natural sciences and mathematics, for all cycles and forms of organised university training, as well as numerous other higher postgraduate programmes, and opportunities for professional re-conversion and enhancement. With over 30,000 students (1,476 of which are enrolled to doctoral studies), the University of Bucharest moulds its educational process by taking into consideration the needs of the knowledge society, while showing a continuous concern for ensuring quality, inter-disciplinary collaboration, leadership and excellence of academic staff and of employees' activities.

University of Luxembourg

The University of Luxembourg was established by Luxembourgish law in 2003 and is the only state-supported university in Luxembourg. In 2017, the UL was ranked as the most international university by the Times Higher Education World University rankings. The university has approximately 6500 students, of which 800 are pursuing their doctoral degrees. The university has three faculties: Faculty of Science Technology and Communication, Faculty of Language and Literature, Humanities, Arts and Education, and the Faculty of Law, Economics, and Finance. In addition, the university hosts three interdisciplinary centres: the Interdisciplinary Center for Security and Trust, The Luxembourg Center for Systems Biomedicine, and the Luxembourg Center for Contemporary and Digital History.

University of Split

The University of Split was officially established on 15 June 1974. As a predominant scientific and teaching public institution in the region, the University of Split has expanded during the course of the past 30 years to include eleven Faculties, one Academy of Arts and four University Departments. There are about 24,000 students enrolled in the University's undergraduate, graduate and post-graduate programs. The focus of the research work carried out by the University is on scientific areas, with reference to disciplines characterized by natural, biomedical, cultural, historical, social, economic and other features of the region as a part of the Croatian Adriatic and the Mediterranean region as a whole.

Luxembourg Institute of Science and Technology

The Luxembourg Institute of Science and Technology (LIST) is a mission-driven Research and Technology Organization (RTO) that develops advanced technologies and delivers innovative products and services to industry and society. Created by the merger of the Public Research Centres Gabriel Lippmann and Henri Tudor, both established in 1987, LIST started its activities on 1 January 2015. As a major engine of the diversification and growth of Luxembourg's economy through innovation, LIST supports the deployment of a number of solutions to a wide range of sectors, including energy, space, construction, agriculture & viticulture, mobility, transport & logistics, finance, manufacturing technology and cutting-edge industry at national and European level. LIST has 630 employees, ¾ of whom are researchers. In 2017, LIST has supervised together with the University of Luxembourg and foreign universities more than 80 PhD students in total in the three research departments "Environmental Research & Innovation" (ERIN), "IT for Innovative Services" (ITIS) and "Materials Research and Technology" (MRT). More than 70 % are funded by the national funding agency, the Luxembourg National Research Fund (FNR). In 2016, 20 PhD students defended their thesis.

The Institute of Science and Technology Austria

The Institute of Science and Technology Austria (IST Austria) is a young international institute dedicated to basic research and graduate education in the natural and mathematical sciences. Its campus was opened in 2009 on the outskirts of Vienna, in Klosterneuburg. Currently, the institute has over 330 researchers (including professors, PhD students and post-doctoral fellows), conducting research in the fields of life science, math, computer science, physics, and chemistry. The vast majority of these researchers are international scholars. While the IST Graduate School awarded nearly 40 doctoral degrees since its inception in 2010, the number of graduates, researchers, and faculty continues to grow. IST Austria is committed to conducting world-class research and by the year 2026, up to 90 research groups will perform research in an international state-of-the-art environment.

The AXA Research Fund

The AXA Research Fund is the scientific philanthropy initiative of global insurance leader, AXA, dedicated to boosting scientific discoveries that contribute to societal progress. It also encourages researchers to engage with the general public and feed the public debate. It was created in 2007 out of the strong belief that science plays a critical role in empowering people to face today's challenges and forge a better life for themselves. So far, the Research Fund has supported 531 research projects, carried out by leading researchers of 55 nationalities and hosted in 34 countries.

3. Methodology

3.1 Target population and sampling

The target population of the 2017 Joint Career Tracking Survey of Doctorate Holders were doctorate holders who obtained their degree in the last seven years, that is, over the period between 2010 and 2016. These included doctorate graduates from six participating universities, doctorate holders that did their Ph.D. at two participating research institutes, and doctorate holders who were supported by the AXA research fund in their post-doctoral phase. Each partner organisation enumerated the doctorate holders over this period and established a list of individuals eligible to participate in the survey.

The survey aimed to collect data from all doctorate holders in the target population and therefore used a census-like approach without any specific statistical sampling. The main advantages of this approach included the possibility of obtaining information from a larger number of respondents and the absence of statistical and technical issues related to sample selection. However, because not all doctorate holders in the target population were reached and/or responded to the survey, we can still refer to participating individuals as the sample of doctorate holders.

3.2 Questionnaire development

The basis for the survey was the pilot questionnaire used in the ESF pilot study referred to above. The pilot questionnaire was developed further by ESF-SCIENCE CONNECT and partner organisations. While the pilot questionnaire was mainly addressed to PhD holders following research career paths and mainly in academia, the current questionnaire is also well adapted to career paths of those PhD holders who are working as researchers outside academia (e.g. industry) or those PhD holders whose work is not related to research.

The questionnaire was in English and included five sections: 1) doctorate education, 2) transition from doctorate to the first position, 3) employment situation and related career experience, 4) physical, virtual and intersectoral mobility and 5) demographics. Items of interest to the participating organisations were also designed upon request, and were included as additional and optional organisation-specific modules. Up to five organisation-specific questions was included, in addition to the core questionnaire.

Several early drafts of the questionnaire were pre-tested by ESF-SCIENCE CONNECT staff members and participating organisations. In addition to ESF-SCIENCE CONNECT experts **Dr Nejc Berzelak** and **Dr Barbara Brečko** from the University of Ljubljana, the draft questionnaire was reviewed by **Professor Maresi Nerad** from the Center for Innovation and Research in Graduate Education (CIRGE) at the University of Washington, Seattle, US, who provided a number of suggestions as to the content of the questionnaire as well as fine-tuning of the questions. The questionnaire was subsequently circulated to all participating organisations, whose comments were taken into account in the final version.

The online questionnaire included skip logic, and the number of questions varied from 30 to 55 questions depending on the profile of the respondent (employed/unemployed, researcher/non-researcher, etc.) The questionnaire took from 10 to 20 min to complete. Only few of the questions were obligatory, to facilitate the collection of metadata for subsequent analysis.

3.3 Data collection and survey participation

The survey was launched on 14 March 2017 using the SurveyMonkey service for web surveying. Data collection was carried out for the period of four weeks (until 13 April). For most organisations the ESF-SCIENCE CONNECT sent e-mail invitations and reminders for non-respondents using the provided contact lists, while Technical University of Munich opted to manage invitations and reminders in-house.

Invitations to participate in the survey were sent on 14 March, following additional two reminders on 21 March and 28 March. The survey collected 2046 complete responses, which represents on average 23 % of all those who received the survey invitation. For those organisations in which response level was markedly below average, the organisation concerned was contacted to take a special measure in the form of a targeted message. The survey completion rate across all participating organisations was slightly over 90 %, i.e. about 90 % of all those who started filling out the survey, reached the end of the questionnaire. Partner organisations made an effort to obtain up-to-date contact e-mail addresses of their graduates.

GRADE – Goethe Research Academy for Early Career Researchers, Goethe University Frankfurt

The Goethe University provided e-mail contacts of 524 graduates who were members of Goethe Research Academy for Early Career Researchers at the time of completion of their doctorate, corresponding to 76 % of the target population members. Of 524 e-mail contacts provided, 11 e-mail addresses bounced due to invalid address or other technical reason, for example a full mailbox. An additional six individuals opted-out from receiving further e-mail messages. Those were regarded as explicit refusals to participate in the survey and were sent no further reminders. A total of 96 doctorate holders from GRADE participated in the survey, which represents 18 % of graduates with obtainable contact information and 14 % of all graduates in the organisation's target population. The end of the questionnaire was reached by 89 respondents, corresponding to 93 % of all who participated in the survey.

Maastricht University

Maastricht University provided e-mail contacts of 1800 graduates, corresponding to 96 % of the target population members. Of 1800 e-mail contacts provided, 69 e-mail addresses bounced due to invalid address or other technical reason, for example a full mailbox. An additional 35 individuals opted-out from receiving further e-mail messages. Those were regarded as explicit refusals to participate in the survey and were sent no further reminders. A total of 493 doctorate holders from the Maastricht University participated in the survey, which represents 27 % of graduates with obtainable contact information and 26 % of all graduates in the organisation's target population. The end of the questionnaire was reached by 438 respondents, corresponding to 89 % of all who participated in the survey.

Technical University of Munich

Technical University of Munich obtained e-mail contacts of 5980 graduates, corresponding to 97 % of the target population members. Of 5980 e-mail contacts, 1454 e-mail addresses bounced due to invalid address or other technical reason, for example a full mailbox. An additional 28 individuals opted-out from receiving further e-mail messages. A total of 1078 doctorate holders from Technical University of Munich participated in the survey, which presents 18 % of graduates with obtainable contact information and 17 % of all graduates in the organisation's target population. The end of the questionnaire was reached by 942 respondents, corresponding to 87 % of all who participated in the survey.

University of Luxembourg

The University of Luxembourg provided e-mail contacts of 543 graduates, corresponding to 93 % of the target population members. Of 543 e-mail

Table 1: Participating institutions

	E-mails sent	Responses	Participation % of contacts	Participation % of all graduates
Goethe University Frankfurt	518	96	18 %	14 %
Maastricht University	1731	493	27 %	26 %
Technical University of Munich	4526	1078	18 %	17 %
University of Bucharest	435	221	51 %	8 %
University of Luxembourg	540	159	29 %	27 %
University of Split	455	132	28 %	27 %
Institute of Science and Technology Austria	30	25	83 %	83 %
Luxembourg Institute of Science and Technology	50	36	72 %	26 %
AXA Research Fund	119	59	49 %	49 %
Total	8404	2299	23 %	18 %

In total out of 8404 emails sent, 2299 graduates responded, which represents 23 % graduates with obtainable contact information and 18 % of all graduates of target population.

contacts provided, three e-mail addresses bounced due to invalid address or other technical reason, for example a full mailbox. An additional 14 individuals opted-out from receiving further e-mail messages. Those were regarded as explicit refusals to participate in the survey and were sent no further reminders. A total of 159 doctorate holders from the University of Luxembourg participated in the survey, which represents 29 % of graduates with obtainable contact information and 27 % of all graduates in the organisation's target population. The end of the questionnaire was reached by 139 respondents, corresponding to 87 % of all who participated in the survey.

University of Bucharest

The University of Bucharest provided e-mail contacts of 435 graduates, corresponding to 17 % of the target population members. Of 435 e-mail contacts provided, three e-mail addresses bounced due to invalid address or other technical reason, for example a full mailbox. An additional 8 individuals opted-out from receiving further e-mail messages. Those were regarded as explicit refusals to participate in the survey and were sent no further reminders. A total of 221 doctorate holders from the University of Bucharest participated in the survey, which represents 50 % of graduates with obtainable contact information and 8 % of all graduates in the organisation's target population. The end of the questionnaire was reached by 205 respondents, corresponding to 93 % of all who participated in the survey.

University of Split

The University of Split provided e-mail contacts of 469 graduates, corresponding to 97 % of the target population members. Of 469 e-mail contacts provided, 14 e-mail addresses bounced due to invalid address or other technical reason, for example a full mailbox. An additional six individuals opted-out from receiving further e-mail messages. Those were regarded as explicit refusals to participate in the survey and were sent no further reminders. A total of 132 doctorate holders from the University of Split participated in the survey, which represents 28 % of graduates with obtainable contact information and 27 % of all graduates in the organisation's target population. The end of the questionnaire was reached by 120 respondents, corresponding to 91 %

of all who participated in the survey.

Institute of Science and Technology Austria

A total of 25 doctorate holders participated in the survey, which represents 83 % of all graduates in the organisational target population. The end of the questionnaire was reached by 22 respondents, corresponding to 88 % of all who participated in the survey.

Luxembourg Institute of Science and Technology

LIST provided e-mail contacts of 50 graduates, corresponding to 36 % of the target population members. A total of 36 doctorate holders participated in the survey, which represents 72 % of graduates with obtainable contact information and 26 % of all graduates in the organisation's target population.

AXA Research Fund

The AXA Research Fund provided e-mail contacts of all 120 graduates. Of these, one e-mail address bounced due to invalid address or other technical reason, for example a full mailbox. An additional two individuals opted-out from receiving further e-mail messages. Those were regarded as explicit refusals to participate in the survey and were sent no further reminders. A total of 59 doctorate holders from the AXA Research Fund participated in the survey, which represents 49 % of graduates in the organisation's target population. According to the software used for data collection, the end of the questionnaire was reached by 55 respondents, corresponding to 93 % of all who participated in the survey.

3.4 Data protection arrangements

An important prerequisite for participating in the survey for participating organisations was the availability of up-to-date contact information on doctorate holders (or at least a large share of them) and the possibility of providing it to ESF-SCIENCE CONNECT. This implied that each partner organisation had to comply with the data protection obligations of their jurisdiction before handing over their contact lists to ESF-SCIENCE CONNECT.

In all but one case, partner organisations were able to provide ESF-SCIENCE CONNECT with the list of available up-to-date contact details of their PhD holders/graduates up to seven years after PhD completion (name, email and year of graduation). Where this was not possible due to data protection requirements, the partner organisation sent the survey link and all communication directly to their graduates, in close coordination with ESF-SCIENCE CONNECT office. The data protection standards were detailed in the contracts between ESF-SCIENCE CONNECT and the participating organisations.

The survey participants were informed about the data protection and confidentiality arrangements in place, which included destroying all contact details before conducting any survey analysis and ensuring that any potentially identifying personal data collected by the survey such as the year of birth, gender or citizenship would be used for the purposes of statistical analysis of aggregate trends only.

3.5 Notes on analyses and the survey dataset

While each partner organisation received their own report and data for their cohort of doctorate holders, this report provides a general overview of survey results across all participating organisations. When interpreting the results throughout this report, it is important to bear in mind that, due to significant differences in the sizes of organisations, weighted data was used for the current analysis. The weights were set for each organisation to contribute an equal number of total graduates (253 responses). Such an approach gives more emphasis to the specifics of individual organisations, which would be otherwise largely masked by the overwhelming influence of the largest participating universities. Allowing organisational specifics to be reflected in the presented results is especially important because the participating organisations vary greatly in characteristics that may influence the career paths of doctorate holders, such as organisation type, study fields offered, and varying socio-economic and cultural contexts of the country in which the organisation is based.

3.5.1 Questions not answered by all respondents

Many questions were not applicable to all respondents and some respondents did not answer all the questions. The number of respondents included in analyses therefore varies between questions. When interpreting the results, it is important to consider to which respondents the question applies. This is particularly true for interpretation of percentages, which are always calculated relative to the number of applicable respondents. It is therefore recommended to check the notes below the tables in this report in order to avoid misinterpretation.

It should be also noted that some questions were answered by a very low number of respondents. The analyses of such questions should be interpreted with caution, as the results may be unreliable. This is especially the case with segmentations of data by various groups of respondents.

3.5.2 Specific cases and questions excluded from analyses

The report summarises descriptive analyses for most survey questions, except for the questions related to previous employment of currently not employed respondents. These questions were applicable to a very small number of respondents and the reasons for not being employed vary substantially (i.e. unemployment, full-time study, career break, or retirement). Because of this, the analyses of these questions would provide very little added value and would be unreliable. However, the corresponding variables are kept in the survey dataset for potential future analysis.

3.5.3 Derived and recoded variables in the dataset

The survey dataset contains some variables that were derived or recoded from original survey questions to allow performing specific analyses. Examples include age (calculated from the reported year of birth) and broader groups of doctorate fields (recoded from the detailed classification used in the questionnaire). In addition, some survey questions that were asked separately for different groups of respondents, like researchers and non-researchers, were merged to simplify comparisons between groups.

4. Results

This section provides the most important results related to the profile of doctorate holders from all participating institutions - their employment situation, job transition, doctorate training and mobility. The findings are then discussed in section 5: Discussion and Conclusions. Univariate analyses of all variables are provided in Annex 1.

4.1 Profile of doctorate holders

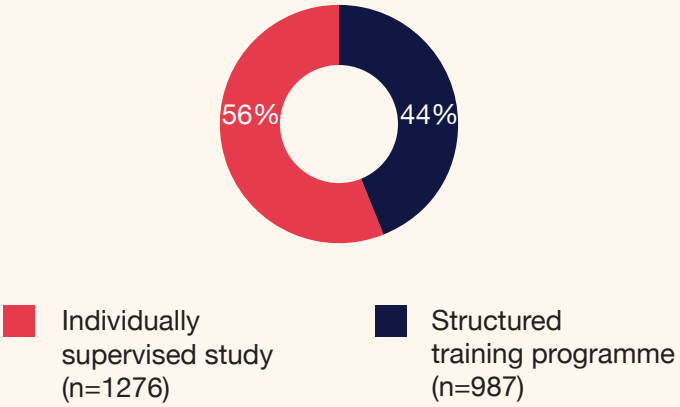
Among respondents participating in the survey, 56 % were men and 44 % women (five respondents described their gender as "other"). The average age of respondents was 36.3 years.

Table 2: Demographic profile of respondents

	n	%
gender		
male	1167	56 %
female	917	44 %
age		
Less than 30 years	128	6.1
30-34 years	852	40.8
35-39 years	671	32.1
40-44 years	253	12.1
45-49 years	85	4.1
50 years or more	101	4.8

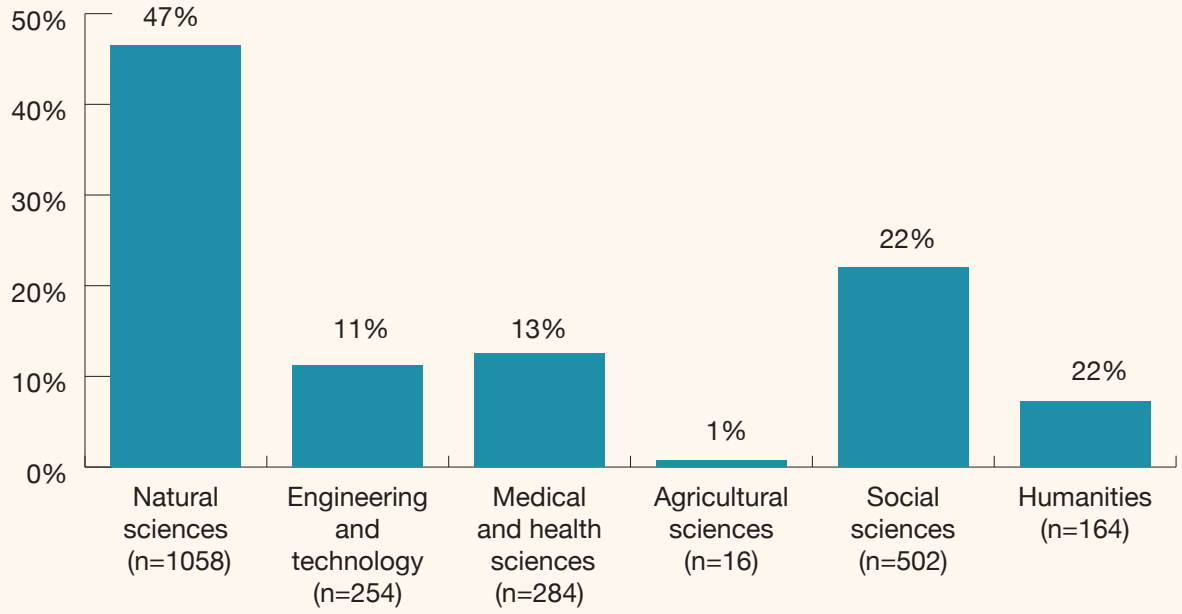
Most of the respondents (39 %) graduated in the last two years (2015 or 2016), 27 % graduated in 2013 or 2014, and 35 % between 2010 and 2012. More than half of the respondents followed an individually supervised study, i.e. achieved through independent research in an apprenticeship type relationship with supervisor (56 %) and 44 % followed a structured training programme, i.e. achieved through a mix of defined course of study/training and independent research, e.g. graduate school/doctoral programme.

Figure 1: Doctorate training programme type



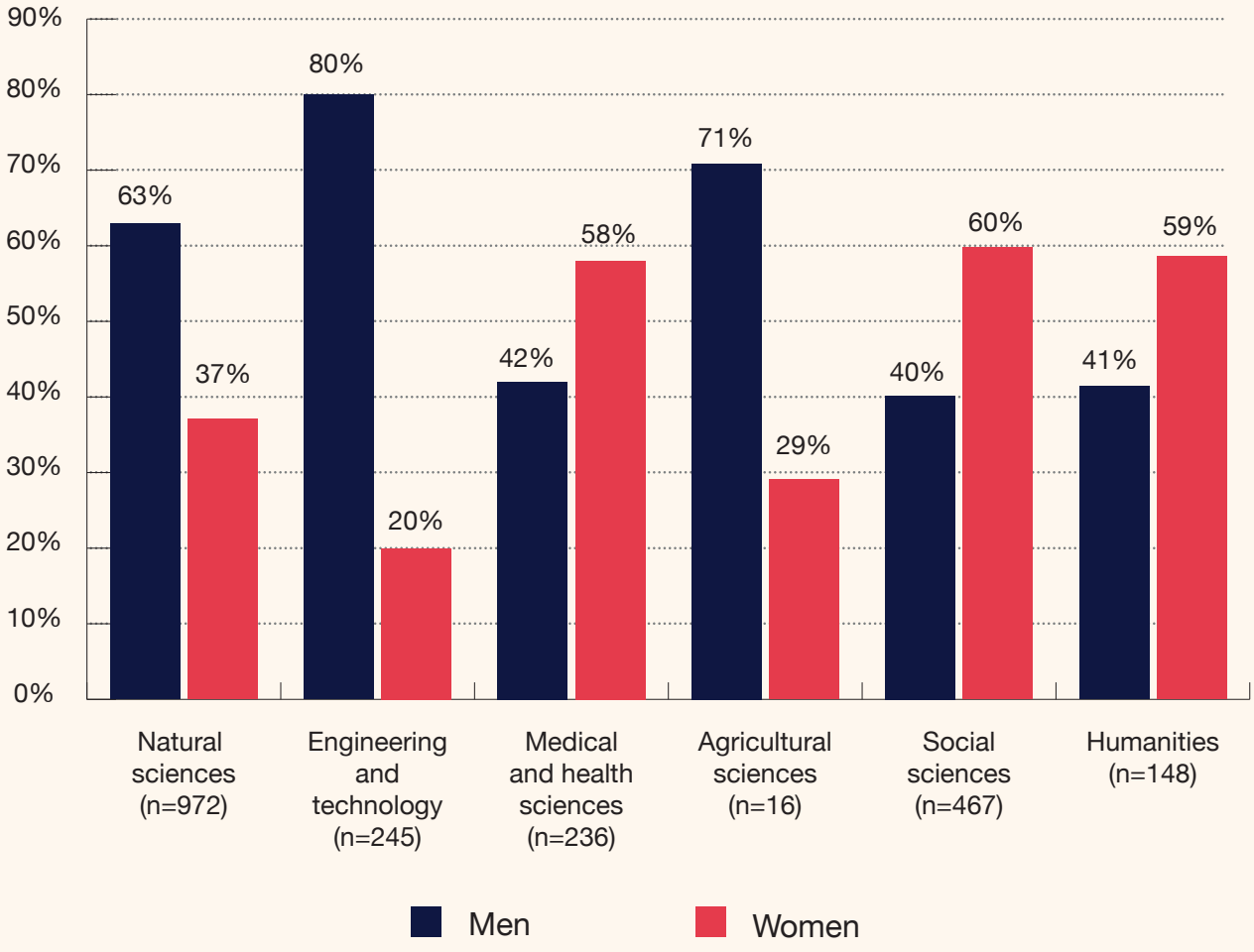
The majority of respondents (47 %) obtained their degree in natural sciences (Figure 2). There was also a considerable proportion of respondents who graduated in social sciences (22 %), medical and health sciences (13 %), engineering and technology (11 %) and humanities (7 %). Agricultural sciences represent only 1 % of respondents, and therefore we do not interpret any of their results in this report.

Figure 2: Respondents by doctorate field



In natural sciences, engineering and agricultural sciences, male doctorate holders prevail, while in medical and health sciences, social sciences and humanities, there are more female doctorate holders (Figure 3).

Figure 3: Doctorate field by gender



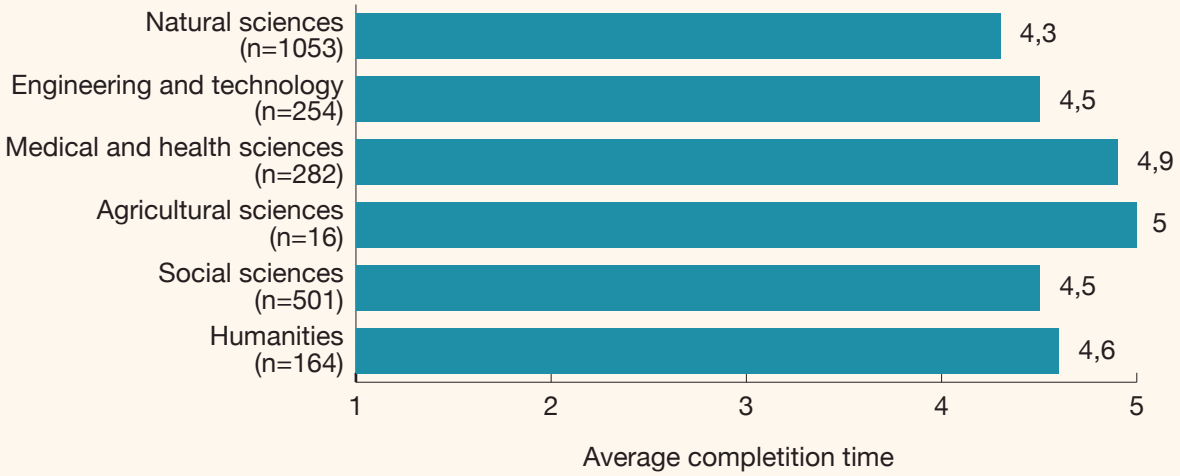
4.2 Doctorate training and transition to first position

4.2.1 Doctorate completion time

There are diverse factors influencing doctoral completion time, such as duration of the programme, the field of study, funding during education and personal factors.

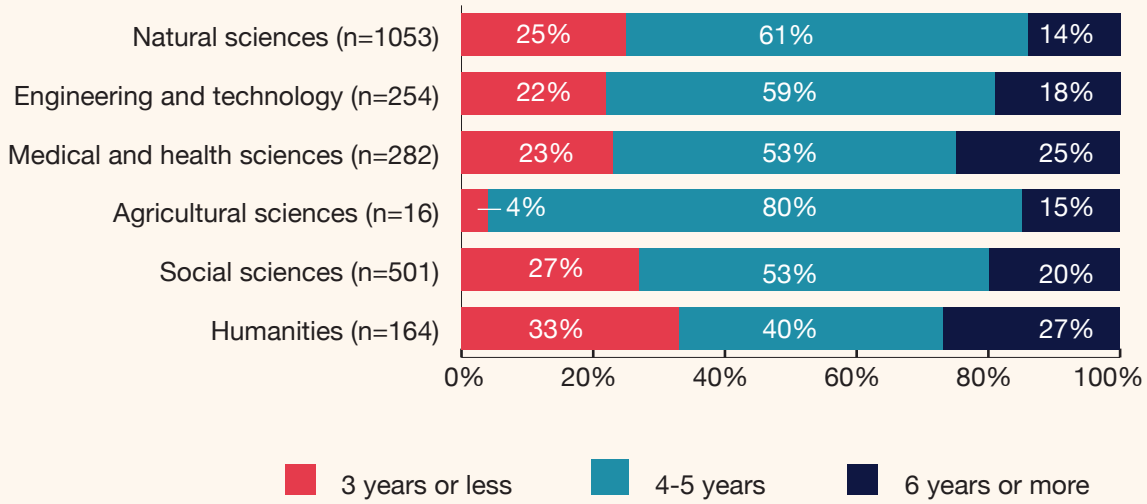
On average, as can be seen from Figure 4, respondents needed 4.4 years to finish their doctoral project, with doctorate holders in natural sciences having the shortest average completion time (4.3), and doctorate holders in medical and health sciences the longest average completion time (4.9). Doctorate holders in natural sciences also had the lowest mean age at graduation (31 years) while doctorate holders in medical and health sciences had the highest mean age at graduation (37 years).

Figure 4: Average completion time by doctorate field (years)



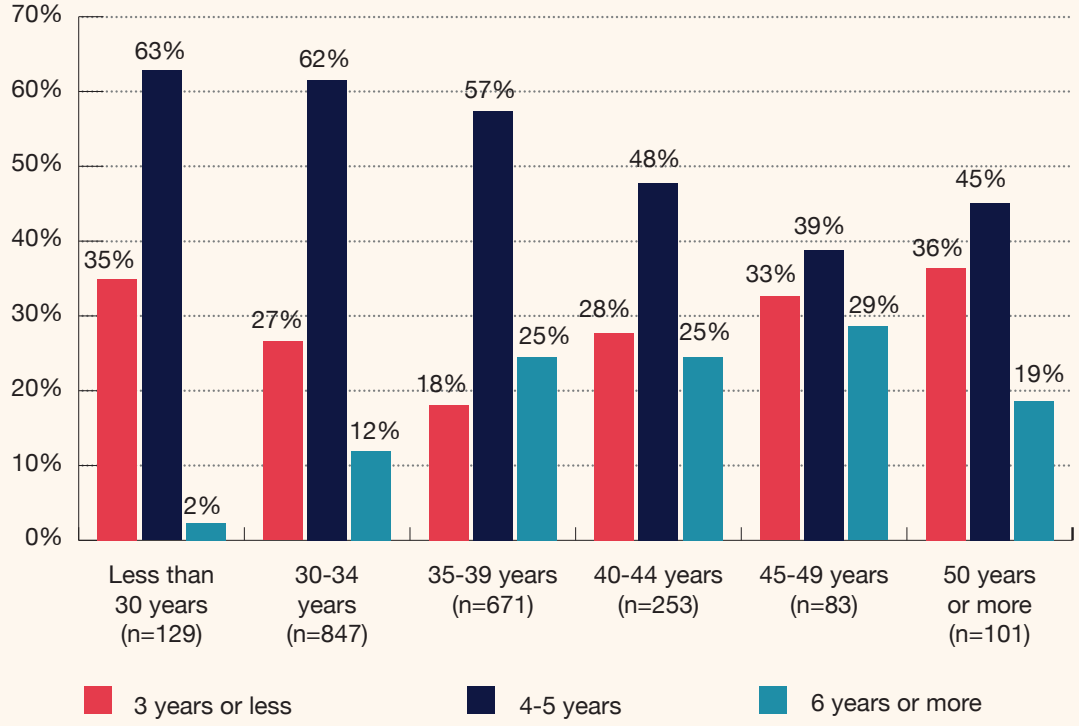
Among all the respondents, the majority (57 %) needed four to five years to finish their doctorate; one quarter of them took three years or less, and 18 % needed six years or more. Completion time differed by research field. Among doctorate holders in humanities, one 33 % took three years or less to finish their project, but also 27 % of needed six years or more. In the group of respondents with the doctorate in engineering and technology, 22 % took three years or less to complete their research project but also just 18 % needed six years or more. Among doctorate holders in natural sciences just 14 % had a time to degree of six years or more (Figure 5).

Figure 5: Years between admission and thesis defense by doctorate field



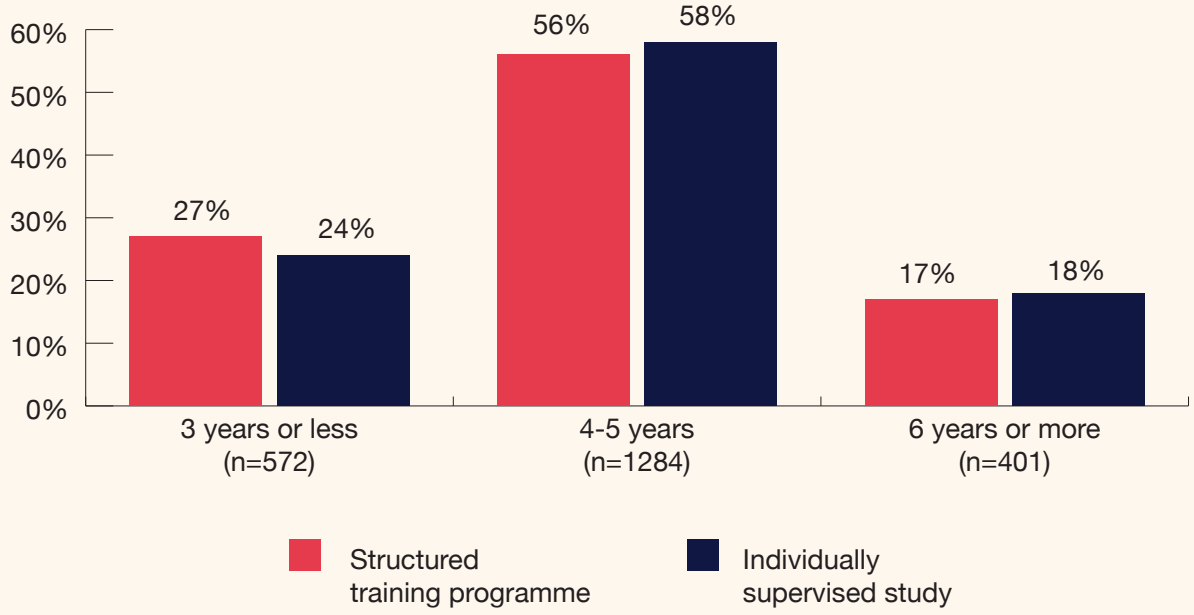
When we compare completion time among the different age groups (Figure 6) we observe, that the youngest respondents needed the least time to finish their doctorate – in the group of respondents younger than 30 years, there were 35 % who finished in three years or less and just 2 % who did it in six years or more. In the group of respondents aged between 35-39 years, the share of respondents who finished in three years or less is the lowest (18 %), while the share of those who finished in six years or more is high (25 %). This group aged between 35 and 39 years is the group that was likely to be employed and have dependent children during their studies. Respondents aged 40-44 years mainly (48 %) needed four to five years to finish their doctorate. In the group of respondents aged 50 years or more, 36 % of respondents finished in three years or less, 45 % finished in four to five years and 19 % finished in six years or more.

Figure 6: Doctorate completion time by age of the respondent



Looking at the completion time (Figure 7) and the type of doctoral training programme, we observe there are no statistically significant differences between those who followed a structured training programme and an individually supervised study (χ^2=4.08, df=2, sig > .05).

Figure 7: Years between admission and thesis defense, by doctorate training programme type



4.2.2 Competences

During their training, doctorate holders gained a wide range of competences but once a doctorate holder is on the employment market, some competences may be more relevant, or needed, than others. Respondents were asked to rate their competences at the time they completed their doctorate, as well as the importance of the same competences in their current job. The list of competences and personal attributes from the OECD survey *Career of Doctorate Holders* was used as the basis for creating a (non-exhaustive) list of 17 items and their definitions for this survey:

- **methodology** (applying research methodologies, tools and techniques appropriately),
- **registered innovation** (developing new ideas, processes or products, which are rooted in research),
- **critical-analytical thinking** (critically analysing and evaluating findings and results),
- **career management** (taking ownership for and actively managing my own professional development),
- **employment context** (understanding how organisations, institutions or businesses work),
- **problem solving** (formulating and applying appropriate solutions to problems and challenges),
- **effective communication** (communicating information effectively and confidently to different audiences),
- **creativity** (being imaginative, thinking out of the box and developing new insights),
- **flexibility** (responding quickly to changes and adapting easily to new situations),
- **networking** (developing, maintaining or using networks or collaborations),
- **subject knowledge** (demonstrating a theoretical and practical understanding of my subject area and its wider research context),
- **project management** (effectively planning, managing and delivering projects in good time),
- **team working** (working constructively with colleagues, acknowledging their contribution),
- **leadership** (identify the strength of your team and bring out the best in them),
- **languages** (communicating effectively in a language other than my mother tongue),
- **entrepreneurship** skills (ability and willingness to develop, organise and manage a business venture along with any of its risks)
- **Intellectual Property** (understanding how to manage Intellectual Property rights, e.g. how to file a patent).

We explore if there are any significant discrepancies between the acquired and needed competences and if there are any major differences according to the sector of employment.

As seen from Figure 8, the most important competences in the job the respondents held concurrently with their survey response are **critical-analytical thinking** (3.8), **problem solving** (3.7) and **effective communication** (3.7). The least important are **entrepreneurship** skills (2.2), understanding of **intellectual property** (2.3) and **employment context** (3). When needed and acquired competences are compared, we observe no major discrepancies, and the respondents perceive that they have mostly acquired sufficient levels of competences required in the current job. The largest discrepancies concern such skills as **effective communication** (3.3), **project management** (3.2), and **networking** (3), all rated important for the current job; respondents rated their acquired competences for these areas as not entirely sufficient for the requirements of their current job. These discrepancies do not suggest that doctorate holders currently do not sufficiently possess certain competences but only that they did not perceive these as sufficiently acquired during their doctoral training to match to the level required in their current position.

Figure 8: A comparison of the self-reported level of competences at the time of the doctorate completion and their importance in the current job

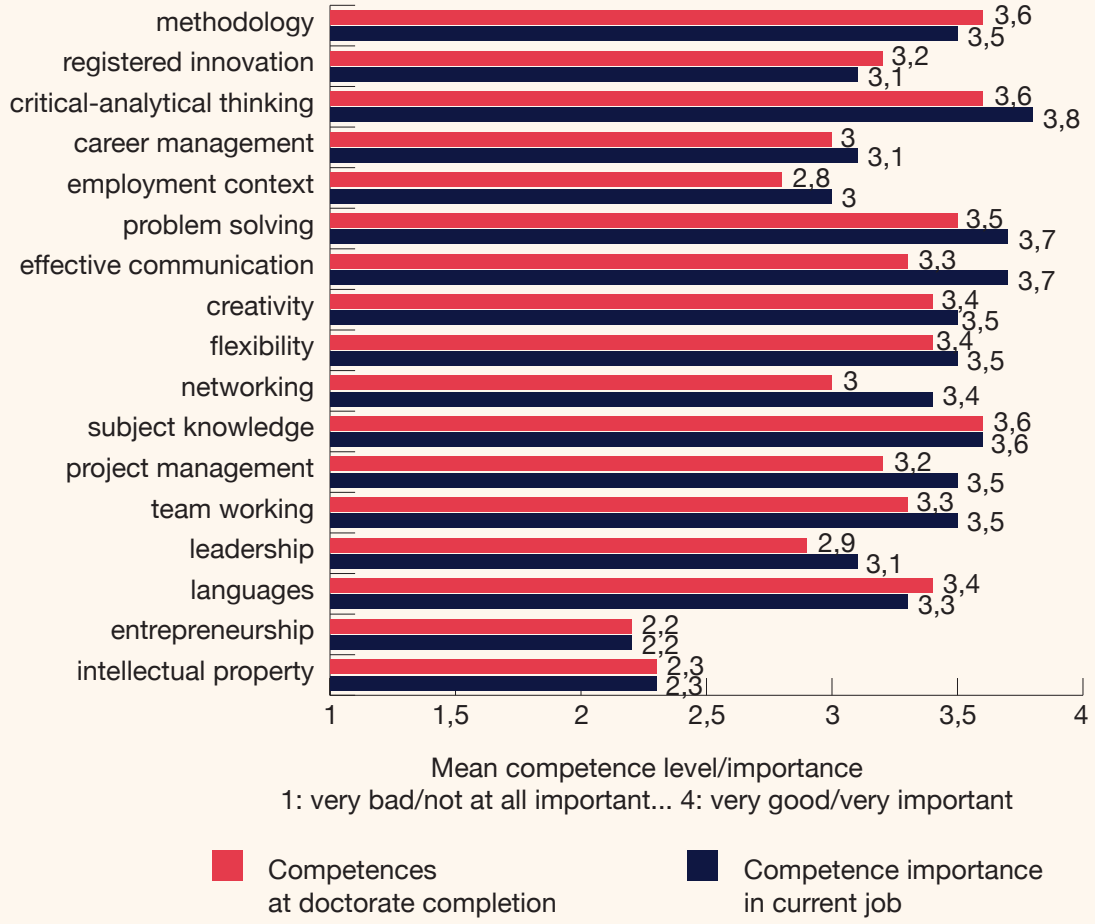
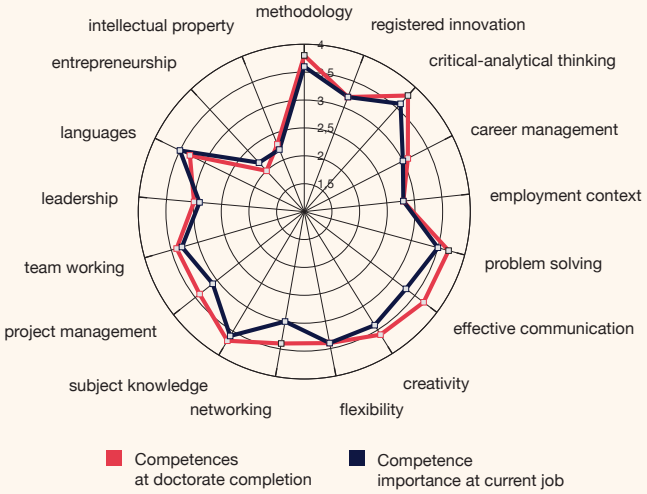
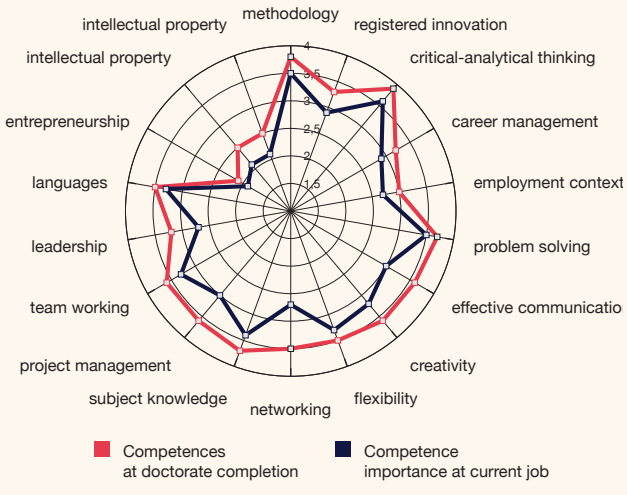


Figure 9: A comparison of the self-reported level of competences at the time of the doctorate completion and their importance in the current job according to sector of employment

Sector of employment: University (n=936)

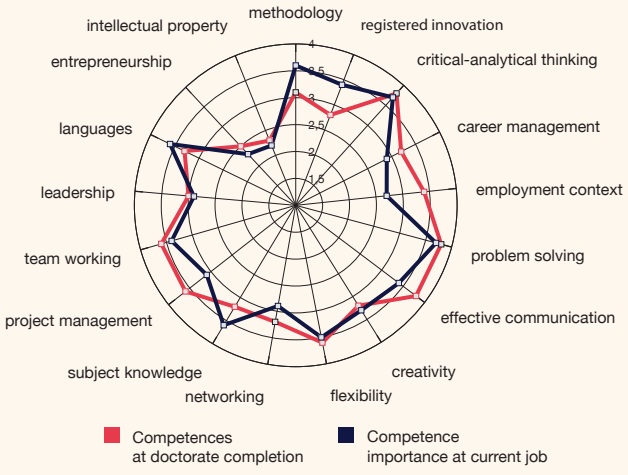


Sector of employment: RPOs and RTOs (n=292)



Sector of employment: Industry (n=236)

Sector of employment: Service or other business sector (n=109)



Sector of employment: Government or other public sector (n=163)

Sector of employment: Hospital (n=103)

Looking at the different sectors of employment (Figure 9), we see that the respondents working at the university have few discrepancies between the acquired and required skills. There two exceptions: they rated their acquired competences of networking and effective communication lower than their importance in the current job.

Respondents working at **Research Performing Organisations (RPOs) and Research and Technology Organisations (RTOs)** overall appear to have more discrepancies than those working at university, especially when it comes to skills such as project management, networking and effective communication. They perceive that these were underdeveloped during doctoral training, whereas they are highly relevant for the current job.

Doctorate holders working in **industry** exhibit a good match between acquired and needed competences when it comes to critical analytical thinking, methodology, problem solving, flexibility and subject knowledge, which are also seen as important competences for the current job. However, the following needed competences were perceived as underdeveloped during doctoral training to match the requirements of the current job: leadership, project management, networking and effective communication.

Respondents employed in service or other business sector found the following competences most important in the current job: problem solving, effective communication, and critical analytical thinking. Minor discrepancies concern knowledge of employment context, project management and effective communication, where respondents rated their acquired competences at graduation lower than their importance for the current job. They rated their acquired research competences such as subject knowledge, methodology or registered innovation slightly higher than was currently needed in their job.

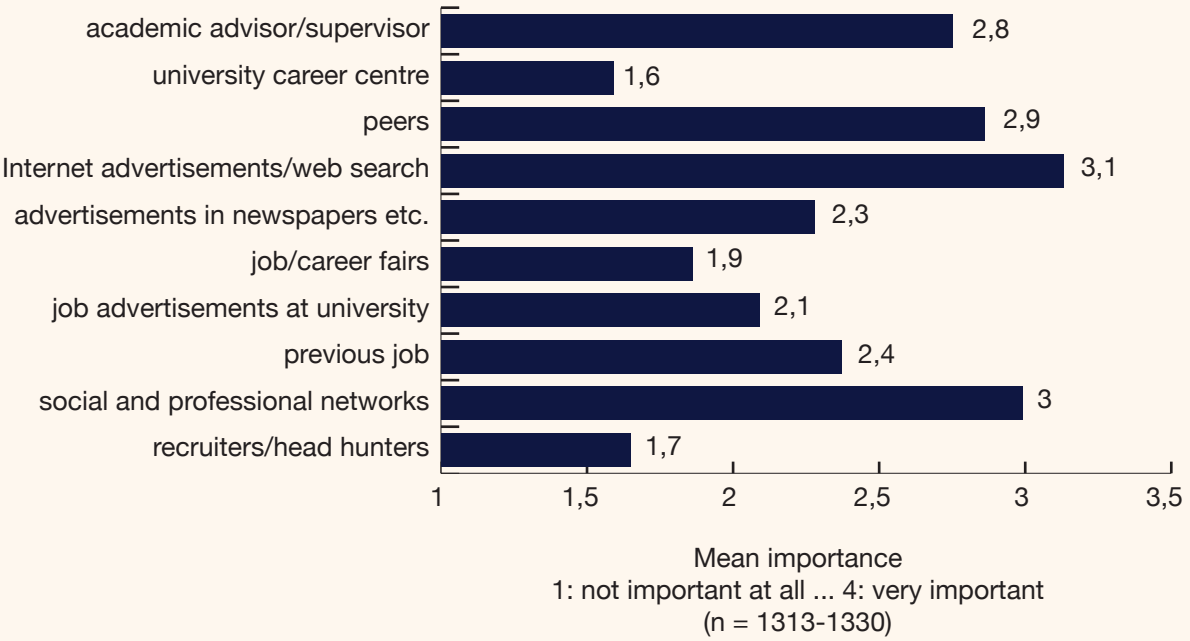
Respondents employed in **government** or other public sector, and respondents employed in **hospitals** gave similar ratings to the importance of competences at work and the competences acquired during their doctoral studies.

4.2.3 Job search

After finishing doctoral studies 62 % of respondents were looking for a job. 43 % of respondents already had a job at the completion of their doctorate, and those who did not spent on average four months to find one. 23 % of respondents found their first paid job after Ph.D. in one month or less, 13 % found it in two to six months, and 6 % within seven to twelve months. Only 2 % of respondents spent more than one year to find a job.

There are several resources at the university that can assist in the job search. The most important resource for (a first) job search after completing the Ph.D. was web search (3.1), followed by social and professional networks (3), peers (2.9) and academic advisor/supervisor (2.8). University career centres were not perceived as important for job search – respondents rated their importance with the average grade 1.6, which was the lowest rated resource for job search (Figure 10).

Figure 10: Importance of different resources when looking for a first job after the completion of the doctorate



Note: Only respondents who were looking for a job at any time after the doctorate completion are included in the analysis.

4.2.4 Post doctorate positions

More than half of the respondents (56 %) took a post doctorate position after completion of PhD. It has to be noted here that the target population of the AXA Research Fund involved recipients of their post-doctorate scholarships, while other respondents were graduates from participating universities or doctorate holders who did their doctorate at the participating institutes. Therefore, if we take the AXA respondents out of the analysis, the share of those who went for a post-doctorate position is slightly lower (51.3 %).

Looking at gender differences, among men there is a slightly higher share of those who took a post doctorate position (59 %) compared to women (52 %) and the difference between the two groups is statistically significant (χ^2=9.531, df=1, sig=0.00).

The most important reason for pursuing a post-doctoral position was personal motivation (a desirable career path (3.5)), followed by the wish to continue research or receive additional training in a Ph.D. field (3.3). The least important reason to accept the post-doctoral position was the "only acceptable employment" that the respondent was able to find (2.1).

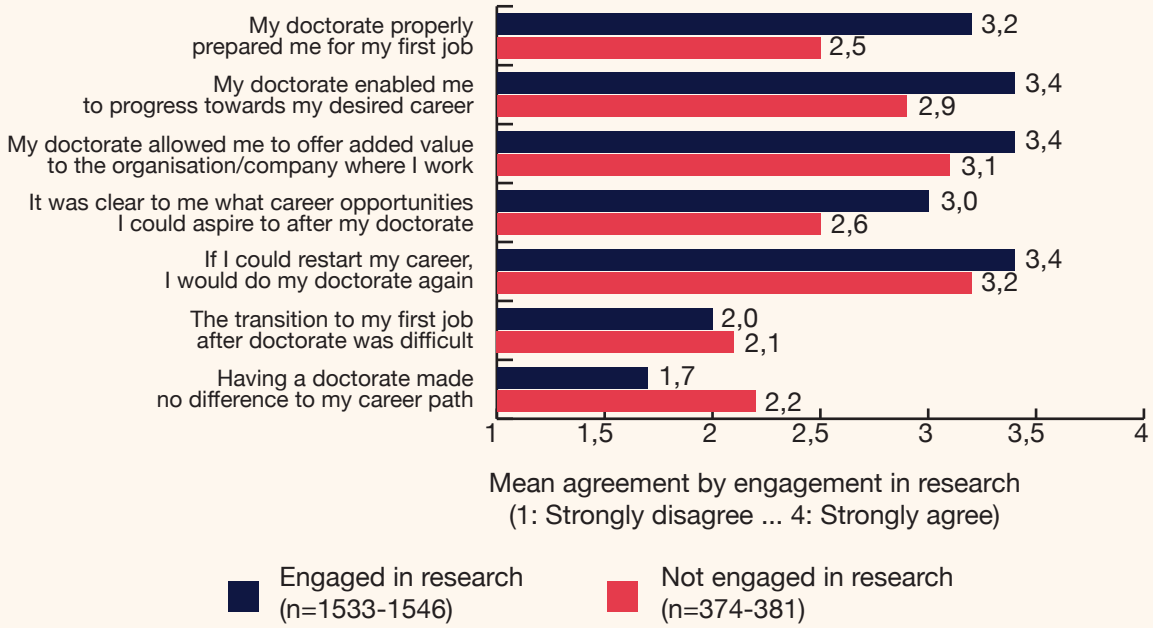
Figure 11: Importance of reasons for taking a post doctorate position

4.2.5 Experience with the transition from the doctorate to the first position and added value of the doctorate

How did respondents experience the transition from the doctorate to their first job? How did they perceive the added value of the doctorate? On average respondents see their doctoral studies as a positive experience and added value (Figure 12). But when we compare the attitudes of researchers and non-researchers we can observe statistically significant differences between two groups (Figure 13) – respondents engaged in research are, in general, more positive regarding their doctorate and the doctoral study. Researchers felt more prepared for the first job after doctorate compared to non-researchers (F=179.7, df=1, sig=0.00), and they felt that it enabled them to progress towards their desired career (F=134.2, df=1, sig=0.00) more than non-researchers. For non-researchers it was less clear what career opportunities they could aspire to after the doctorate (F=65.0, df=1, sig=0.00). Both researchers and non-researchers would still do a doctorate again, if they had to restart their career.

Figure 12: The average rated benefits of doctorate degree for career development

Figure 13: The average rated benefits of doctorate degree for career development among researchers and non-researchers



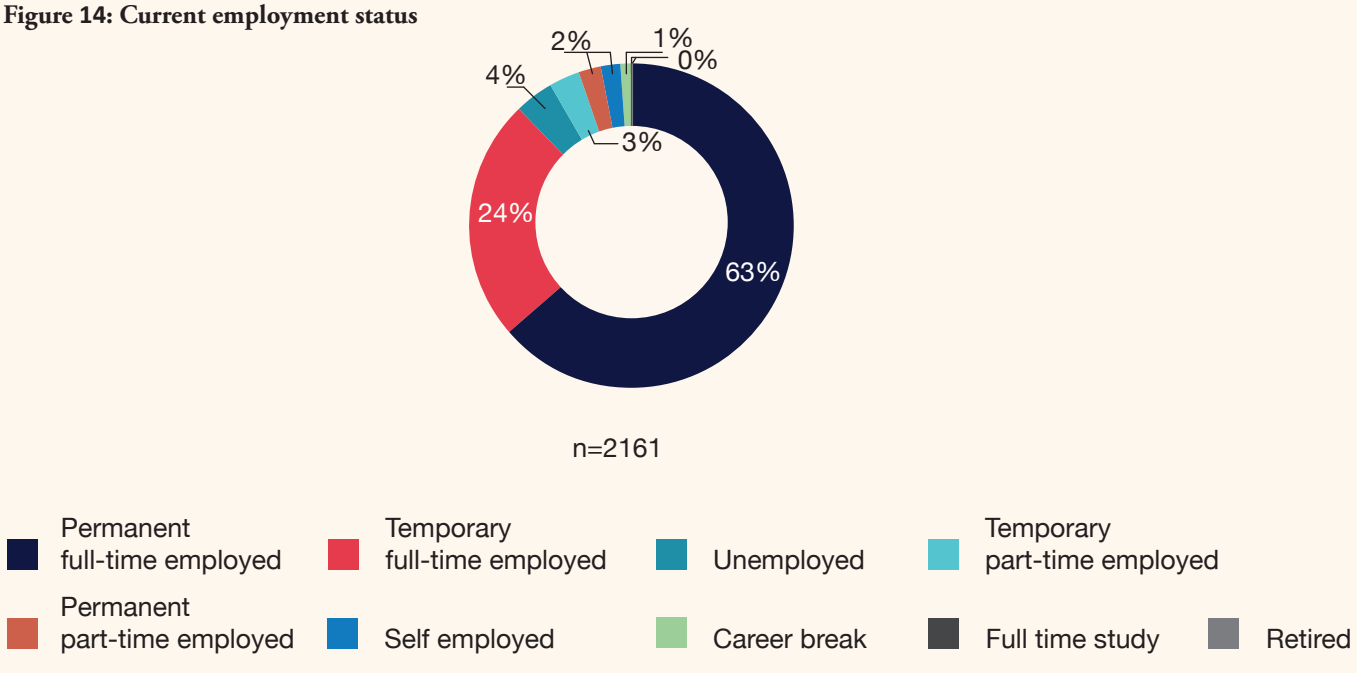
Note: Only employed respondents are included in the analysis.

4.3 Employment situation

4.3.1 Employment status

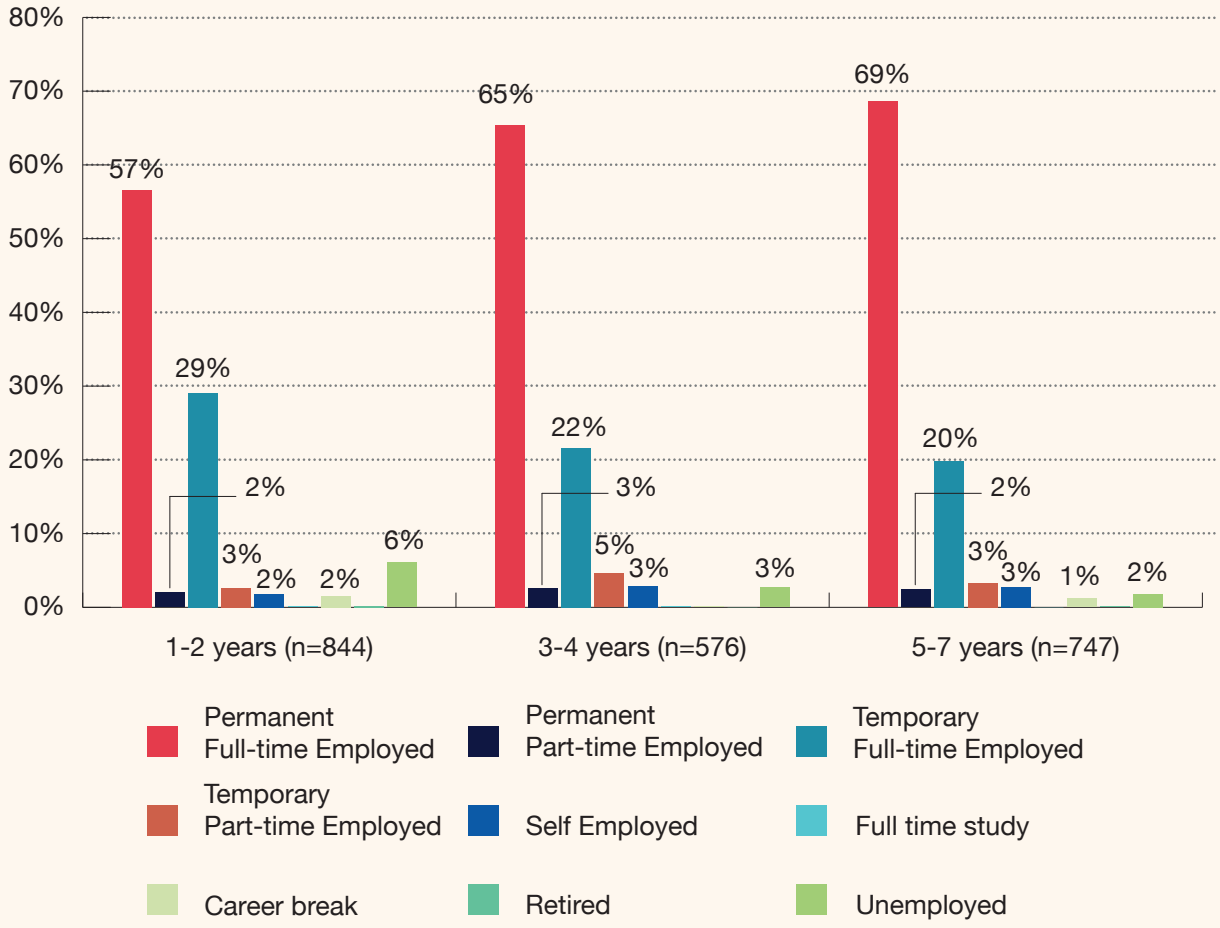
The vast majority of respondents are employed (95 %), yet their employment situations differ. 63 % of all respondents are in full-time permanent employment (30 hours per week or more), 23 % are in full-time temporary employment, 2 % are in part-time permanent employment (less than 30 hours per week) and 3 % are in temporary part-time employment. 2 % of respondents are self-employed. The 5 % who are not employed are either on a career break, full-time studying, retired or unemployed (4 %).

Figure 14: Current employment status



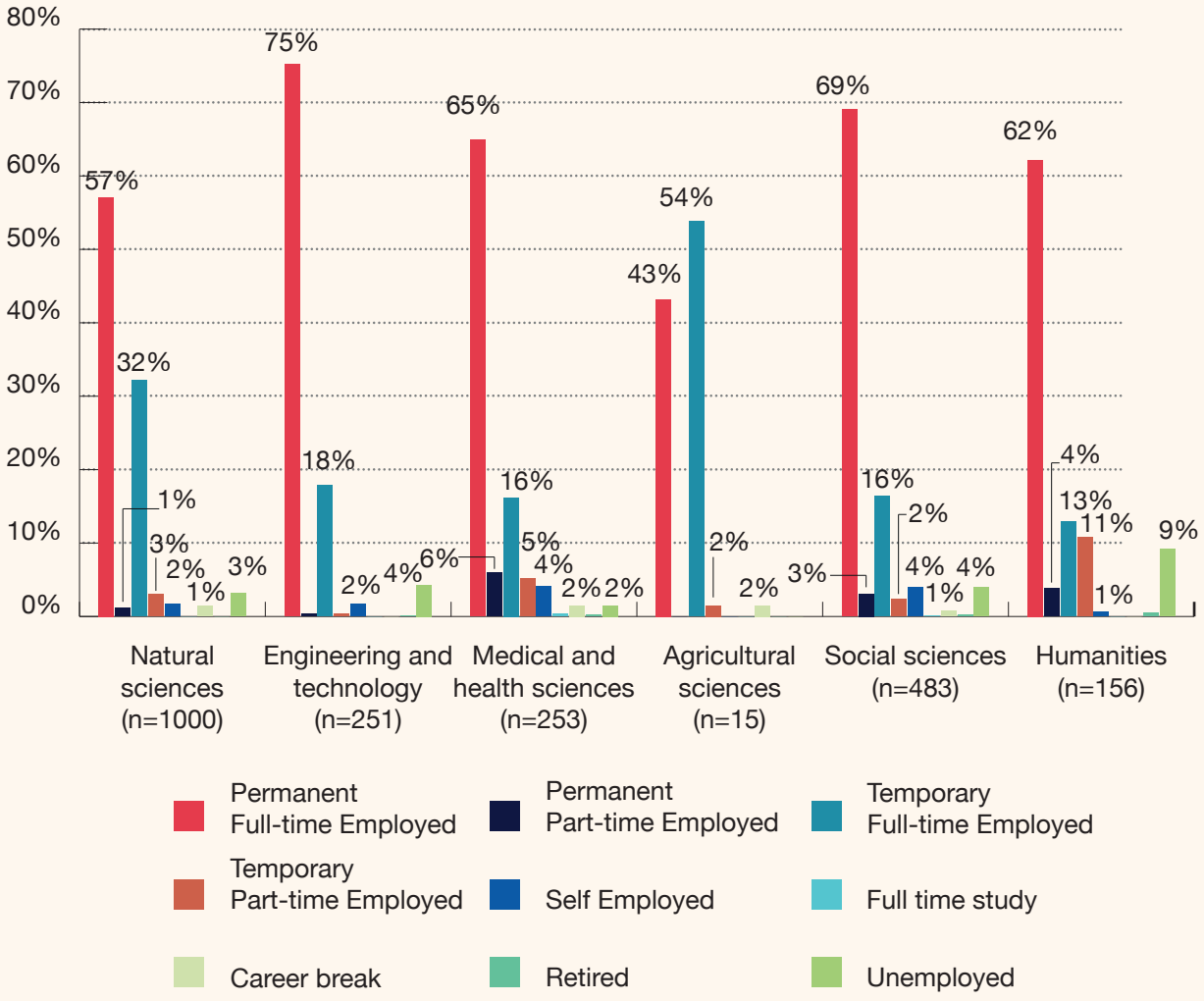
As presented in the Figure 15, in the group of respondents who have finished their doctoral studies one or two years ago, the share of those with permanent full-time employment is 57 %, the share of respondents with temporary full-time employment is 29 %, and 6 % are unemployed. In the group of respondents who have finished their studies at least five years ago, the share of respondents with permanent full-time employment is higher (69 %), 20 % have temporary full-time employment, and only 2 % are unemployed.

Figure 15: Employment status according to the number of years since doctorate completion



Employment status also varies by doctorate field. The highest share of permanently full-time employed is in the group of respondents who studied engineering and technology (75 %), while in the group of respondents with a doctorate in natural sciences just 57 % are permanently full-time employed and a high share are temporary full-time employed (32 %). The share of temporary full-time contracts among doctorate holders in natural sciences is significantly higher compared to other fields such as humanities and engineering and technology, where we observe, respectively, 13 and 18 per cent of respondents in temporary full-time contracts. The highest share of unemployed (9 %) can be observed in the group of respondents with a doctorate in humanities. Due to the low number of respondents with a doctorate in agricultural sciences we do not interpret these results.

Figure 16: Employment status according to doctorate field



Looking at respondents by sector of employment, we see that universities are the institutions with the smallest percentage of permanently employed doctorate holders: only 53 % of respondents are in permanent full-time positions and 39 % have temporary full-time contracts. In industry, by contrast, the vast majority of respondents are permanently full-time employed (95 %), and other forms of employment are more the exception than the rule. At the RPOs and RTOs the share of permanent full-time positions is also relatively low (63 %) compared to other sectors. In the services or other business sector 92 % of respondents are permanently full-time employed, compared to 82 % in the government sector, and 76 % at hospitals.

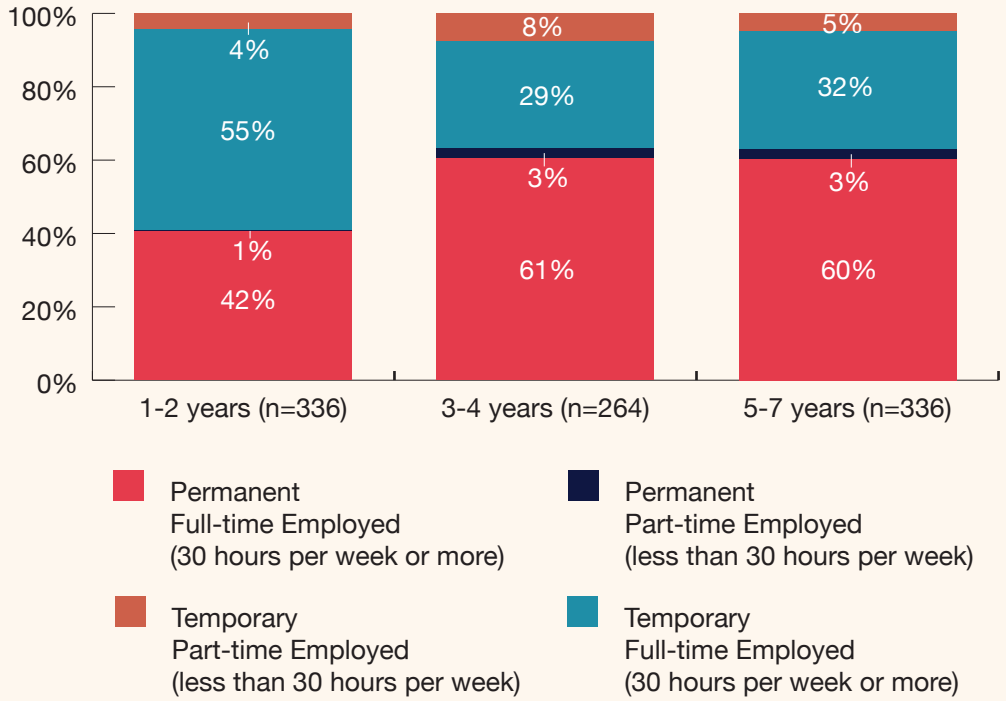
Table 3: Employment status according to sector of employment

Sector of employment	Employment status				
	Permanent Full-time Employed (30 hours per week or more)	Permanent Part-time Employed (less than 30 hours per week)	Temporary Full-time Employed (30 hours per week or more)	Temporary Part-time Employed (less than 30 hours per week)	Total
University	53,2%	1,9%	39,4%	5,5%	100,0%
	(498)	(18)	(369)	(51)	(936)
RPOs and RTOs	62,5%	1,3%	34,0%	2,2%	100,0%
	(183)	(4)	(99)	(7)	(293)
Industry	94,9%	0,9%	4,0%	0,2%	100,0%
	(224)	(2)	(9)	(1)	(236)
Service or other business sector	91,7%	3,9%	1,9%	2,4%	100,0%
	(100)	(4)	(2)	(3)	(109)
Government	82,2%	3,9%	11,5%	2,4%	100,0%
	(134)	(6)	(19)	(4)	(163)
Hospital	76,2%	6,0%	12,9%	4,8%	100,0%
	(79)	(6)	(13)	(5)	(103)
Other	90,2%	4,9%	3,0%	2,0%	100,0%
	(142)	(8)	(5)	(3)	(158)

Only applicable to employed respondents.

As the share of permanent full-time contracts at universities is the lowest compared to other sectors, we examined if the situation changes as university careers progress. Figure 17 shows that the situation improves somewhat with time. While among recent graduates (within one or two years after graduation) only 41 % have permanent contracts, the share is higher for those within five to seven years after graduation (60 %). This is still very low compared to other sectors.

Figure 17: Employment status of respondents employed at universities by the number of years since doctorate completion



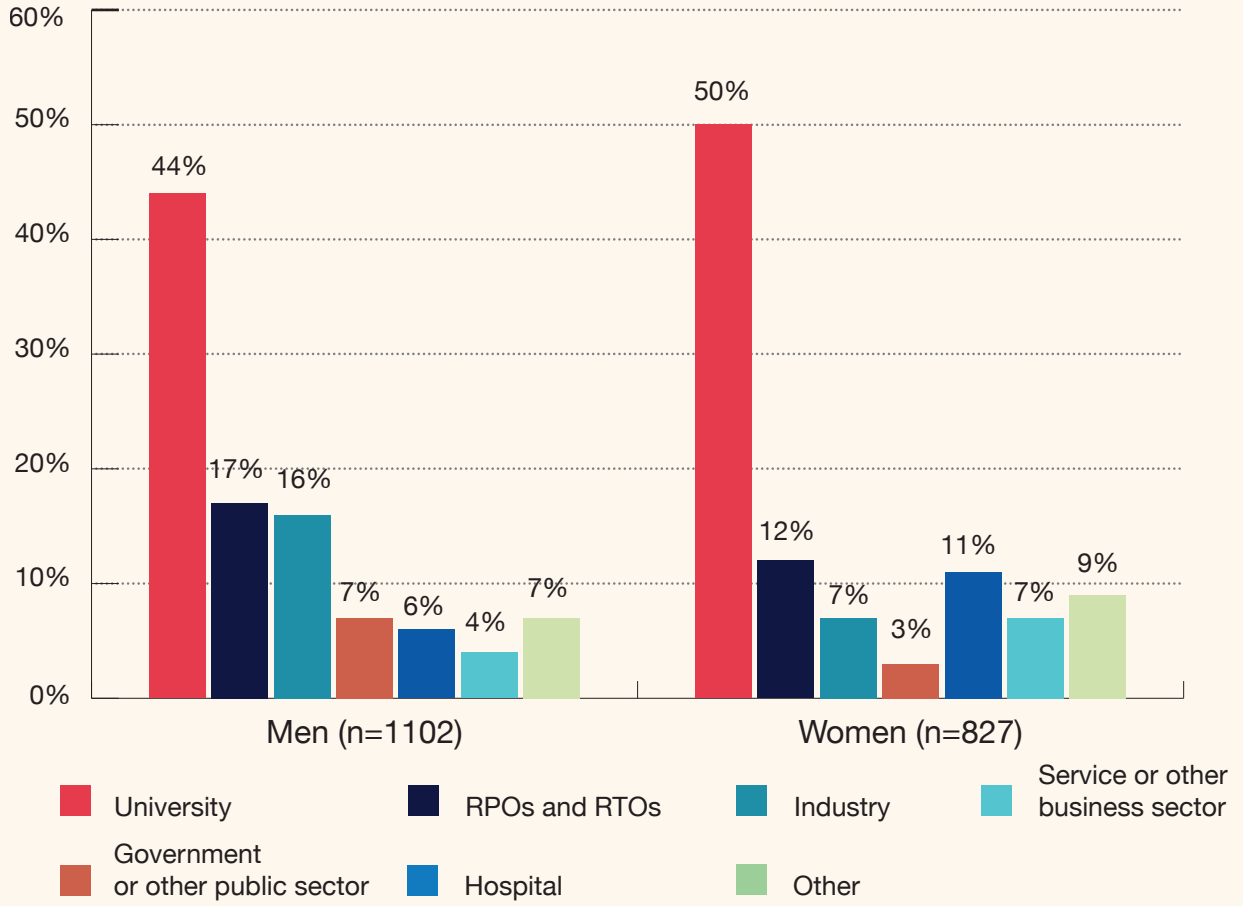
Note: Only respondents employed at a university are included in the analysis.

4.3.2 Sector of employment

The majority of employed respondents work at universities (47 %), 15 % work at RPOs and RTOs, 12 % are employed in industry, 8 % in the government or other public sector, 5 % in the service or other business sector, 5 % in hospitals and 8 % at other sectors.

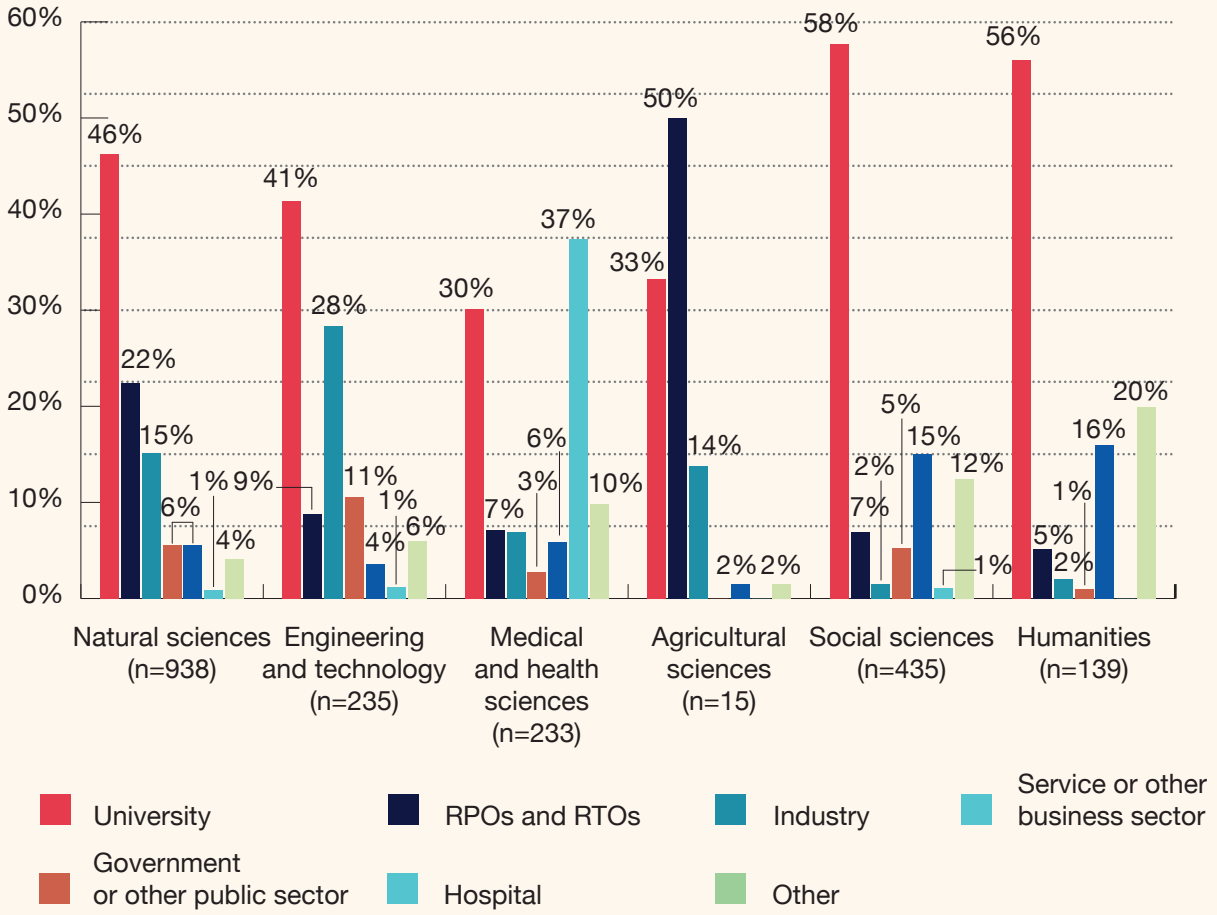
The sector of employment differs significantly between men and women (χ^2=86.84, df=6, sig=0.00). Women work in universities and the government and public sectors more often than men, while men work in industry and the services and other business sector more often than women. Thus, it would appear that while more men than women start with a post-doctorate position after PhD completion, they would tend to move to other sectors as their career progresses.

Figure 18: Sector of employment by gender



Although the majority of respondents work at universities, the employment sector differs depending on the field of study. While respondents studying social sciences and humanities mainly work at universities (social sciences: 58 %; humanities: 56 %), and only as an exception work in industry (2 %), respondents studying engineering and technology, as expected, often work in industry (28 %). It is also unsurprising that respondents studying the medical and health sciences are most often employed in hospitals (37 %); in this group of respondents, employment at universities is the lowest compared to other groups (Figure 19).

Figure 19: Sector of employment by doctorate field

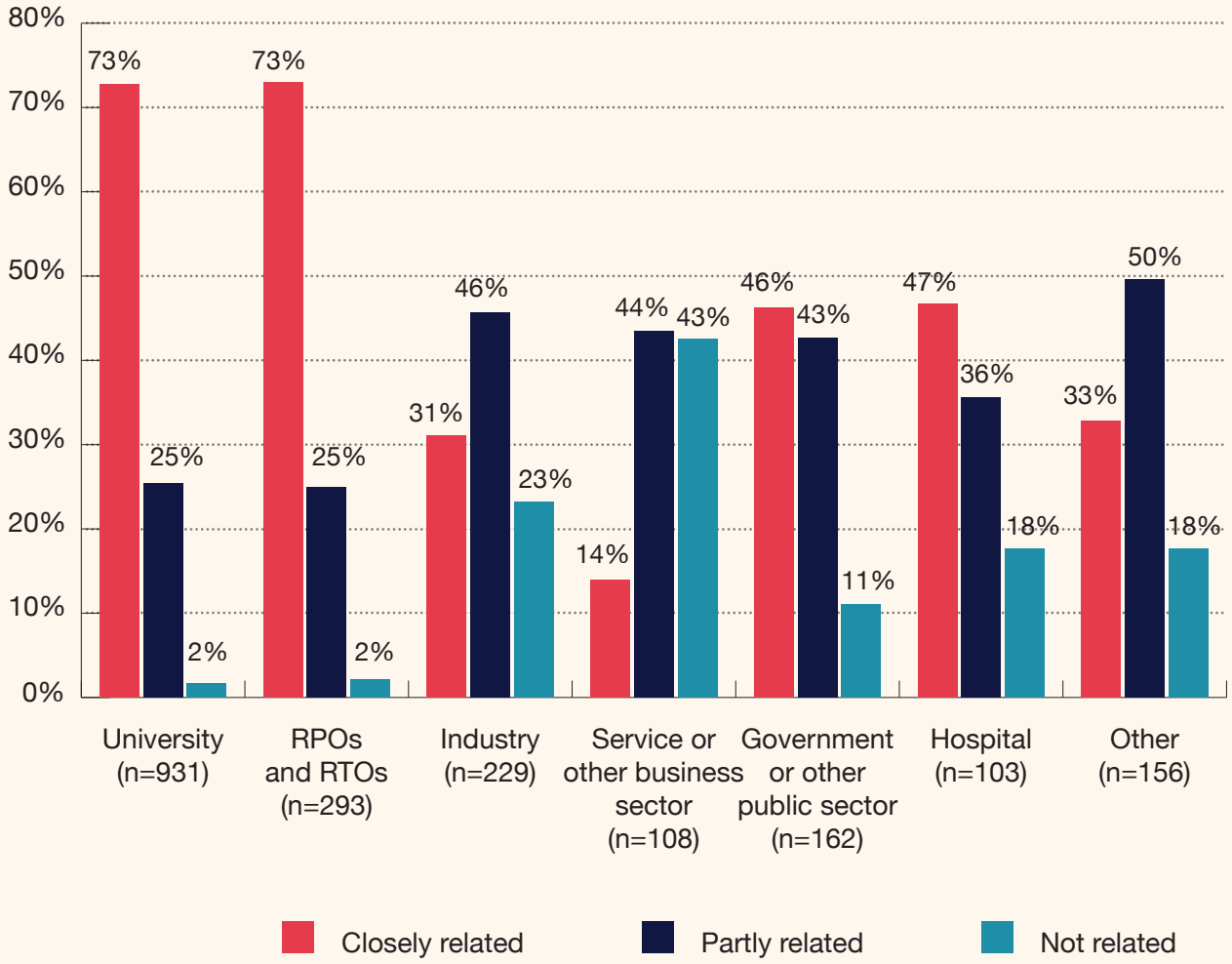


4.3.3 Relation of employment with doctoral degree

Overall, the vast majority of respondents see their PhD at least partly related to their work, with the exception of those working in service or other business sector (Figure 20).

The relation between employment and doctoral degree is different for those working in the academic sector and those outside academia. Respondents working at universities or RTOs and RPOs, in most cases, see their doctorate closely (73 %) or at least partly (25 %) related to their work. Among respondents working in industry, 31 % see their doctorate as being closely related to their work; this share is higher for those working in government (46 %) and in hospitals (47 %). Among respondents who work in the services or other business sector, 43 % find their doctorate not related to their work.

Figure 20: The relationship between work and doctorate by sector of employment

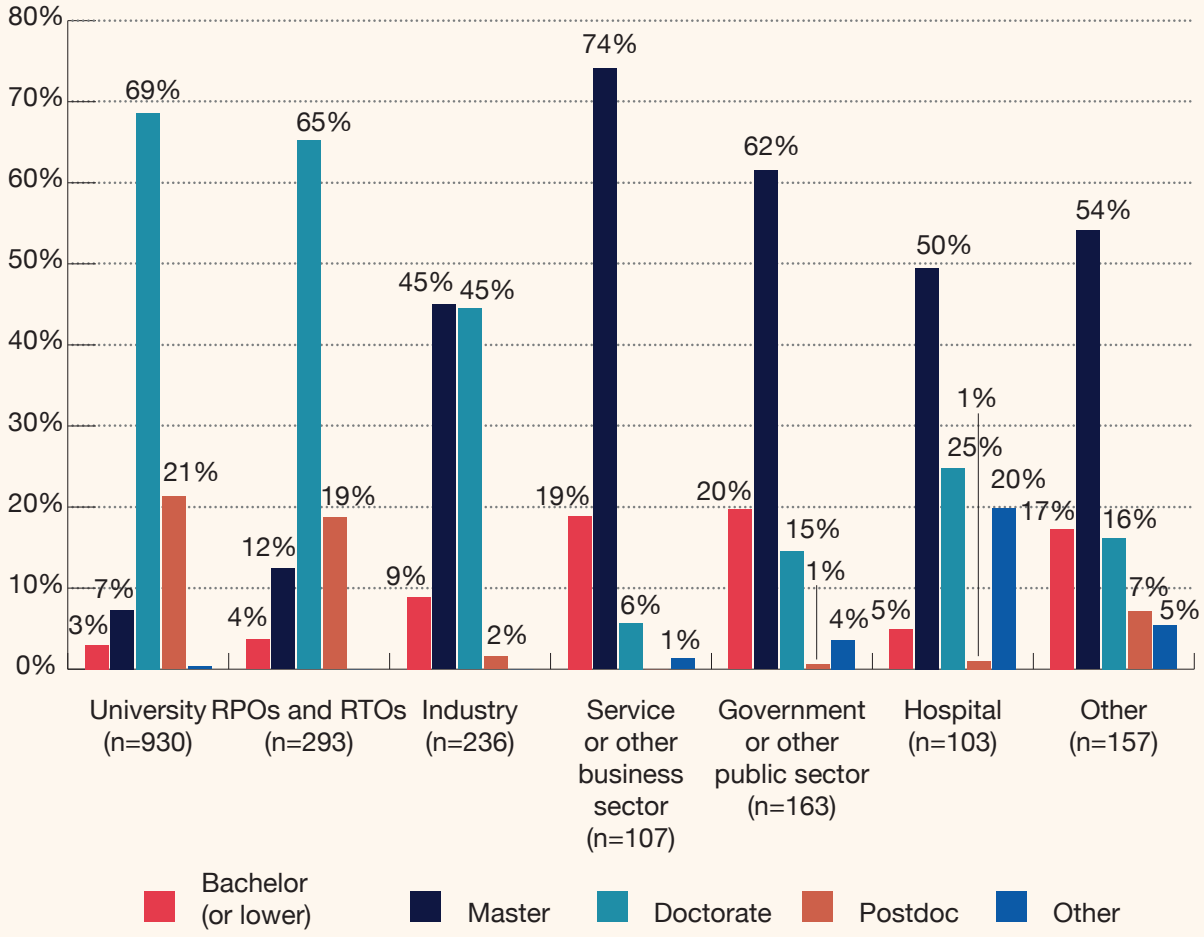


4.3.4 Level of qualification

With regard to the minimum qualification requirements for employed doctorate holders, here, again there are large differences between those in and outside academia. At universities, RPOs and RTOs, the majority (90 % and 84 % respectively) of respondents work in jobs requiring a PhD, or a post-doctorate. By comparison, in industry 47 % of respondents are employed in jobs requiring a PhD or higher, and a significant share (45 %) are working in jobs requiring no more than a master's-level degree.

A master's-level degree appears to be by far the most required qualification in other sectors, i.e. service or other business sector (74 %), government and other public sector (62 %), or hospital (50 %). A doctorate-level degree was least required in the services and other business sector (6 %). Thus, it would appear that, with the exception of industry, doctorate holders in other non-academic sectors are formally overqualified for their job. However, as argued in Section 5: Discussion and Conclusions, this may not necessarily mean over-qualification when it comes to job tasks and responsibilities.

Figure 21: Minimum education requirement for current job by sector of employment



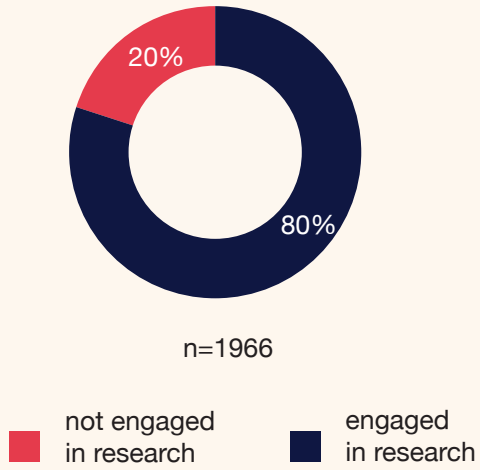
4.3.5 Engagement in research

The OECD's Frascati Manual (2002)[17] defines researchers as professionals 'engaged in creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.' This definition was used to ask respondents if they were engaged in research in their current job.

Among the employed respondents, a vast majority (80 %) are engaged in research in their current job (see Figure 22), with minor differences among men (82 %) and women (78 %).

17 OECD, *Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development,* 2002.

Figure 22: Share of researchers and non-researchers



Only employed respondents are included in the analyses.

There are differences when looking at different sectors of employment. Not surprisingly, it is in the academic sector that doctorate holders are most engaged in research, with 98 % of those working at RPOs and RTOs and 95 % of those at universities engaged in research. In the other sectors, the largest shares of researchers are working at hospitals, in government or other public sector, followed by industry. The sector with the lowest share of researchers is the services or other business sector (26 %). Shares of researchers in each sector are presented in Table 4.

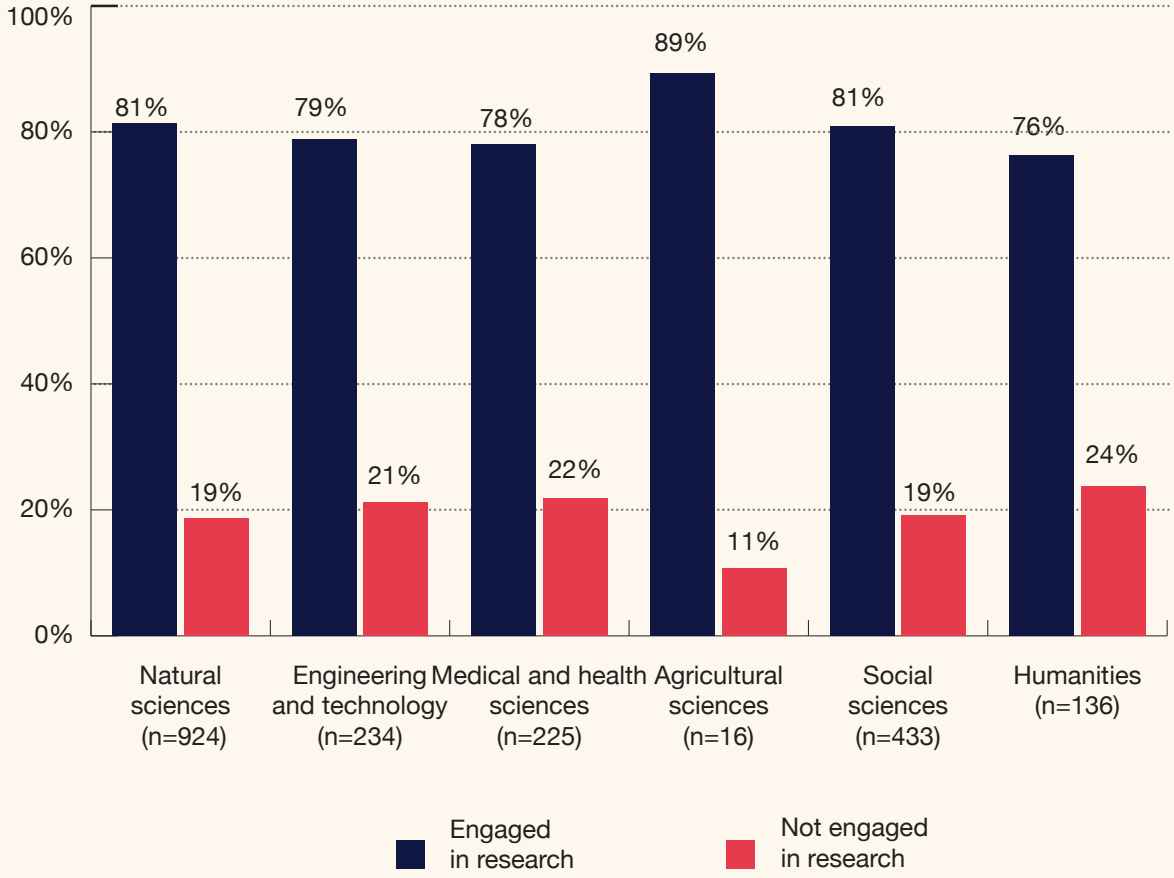
Table 4: Engagement in research in current job by sector of employment

Sector of employment	Engagement in research		
	Yes	No	Total
University	94.7%	5.3%	100,0%
	(862)	(48)	(910)
RPOs and RTOs	98.1%	1.9%	100,0%
	(287)	(5)	(292)
Industry	55.0%	45.0%	100,0%
	(130)	(106)	(236)
Service or other business sector	26.3%	73.7%	100,0%
	(28)	(78)	(106)
Government or other public sector	59.6%	40.4%	100,0%
	(97)	(66)	(163)
Hospital	72.7%	27.3%	100,0%
	(74)	(28)	(102)
Other	64.5%	35.5%	100,0%
	(101)	(56)	(157)

Only applicable to employed respondents.

There are also some minor differences in the share of researchers by field of doctorate. They span from 76 % in humanities to 81 % in natural sciences.

Figure 23: Engagement in research in current job by doctorate field

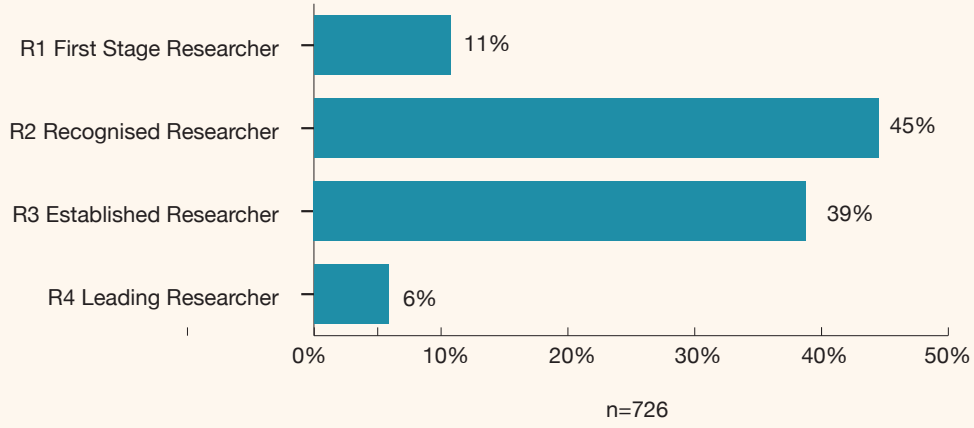


Only applicable to employed respondents.

4.3.6 Researchers: activities, outputs and motivation

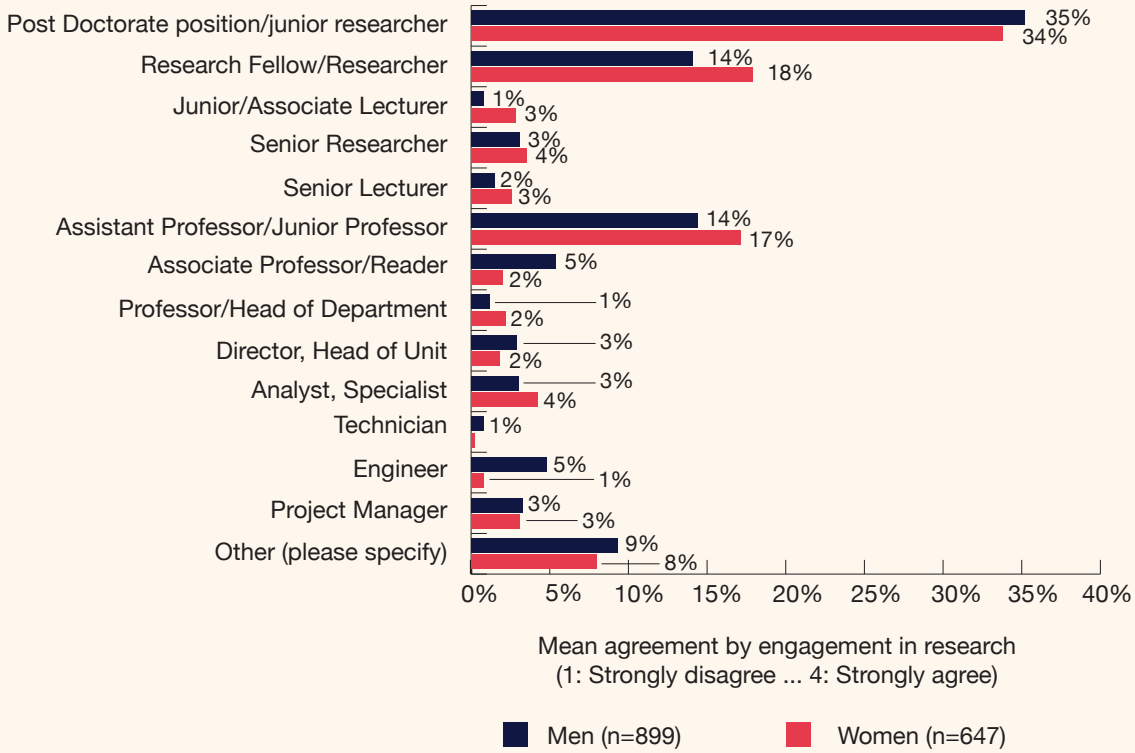
The majority of employed researchers describe themselves as already recognized (45 %) or established researchers (39 %) per the European Framework for Research Careers).

Figure 24: Researcher career stage (level per European Framework for Research Careers)



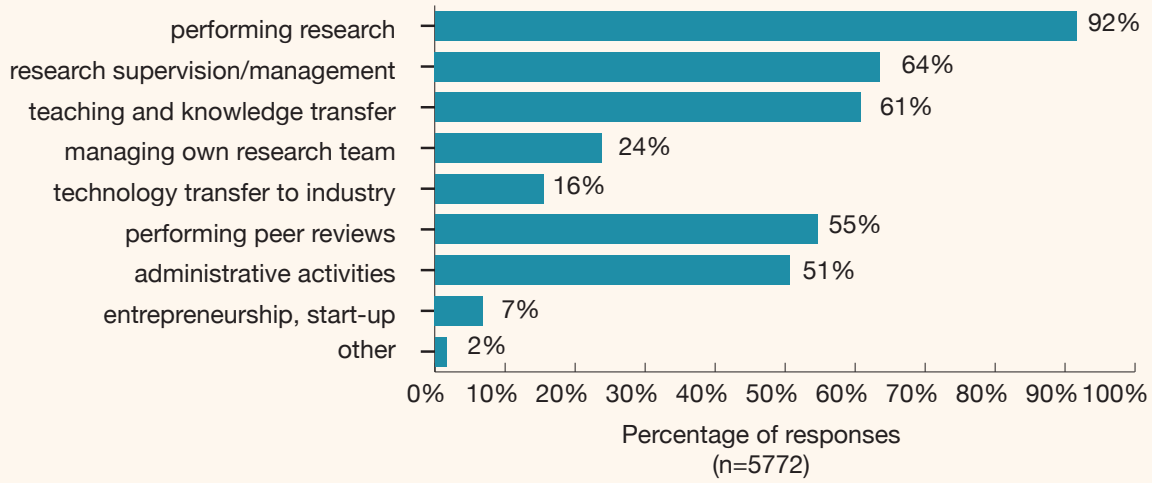
Only applicable to currently employed researchers.
As seen from Figure 25, most of researchers are in post-doctorate positions, with significant shares also working as research fellows or assistant/junior professors. Similar proportions of men and women work in senior academic posts and other position levels. Slightly more men than women work as engineers and associate professors, while more women than men work as research fellows and assistant professors.

Figure 25: Researcher position: men vs. women



In terms of activities at their current job (Figure 26), as expected, almost all of the researchers are engaged in traditional academic duties such as performing research (92 %), research supervision/management (64 %) and teaching and knowledge transfer (61 %). They are also engaged in peer reviews (55 %), administrative activities (51 %) and managing their own research team (24 %). Fewer respondents are engaged in technology transfer to industry (16 %) and entrepreneurship (7 %).

Figure 26: Researchers' activities at current job



Only applicable to currently employed researchers.

Looking at researchers' activities in the different employment sectors (Table 5), most research is performed at universities (98 %), RPOs and RTOs (98 %) and hospitals (89 %). Not surprisingly, researchers at universities also engage in teaching and knowledge transfer (75 %), peer reviews (67 %) and research supervision (67 %). 55 % of them also report performing administrative activities. Researchers working in industry conduct research supervision at the rate of 70 % and research at 67 %, while researchers working in services or other business sector are mainly engaged in technology transfer to industry (67 %) and research (66 %). Researchers employed in the government or other public sector report performing research at the rate of 75 % and administrative activities at 72 %. Researchers working at hospitals mainly report performing research (89 %), knowledge transfer (62 %), and research supervision (57 %).

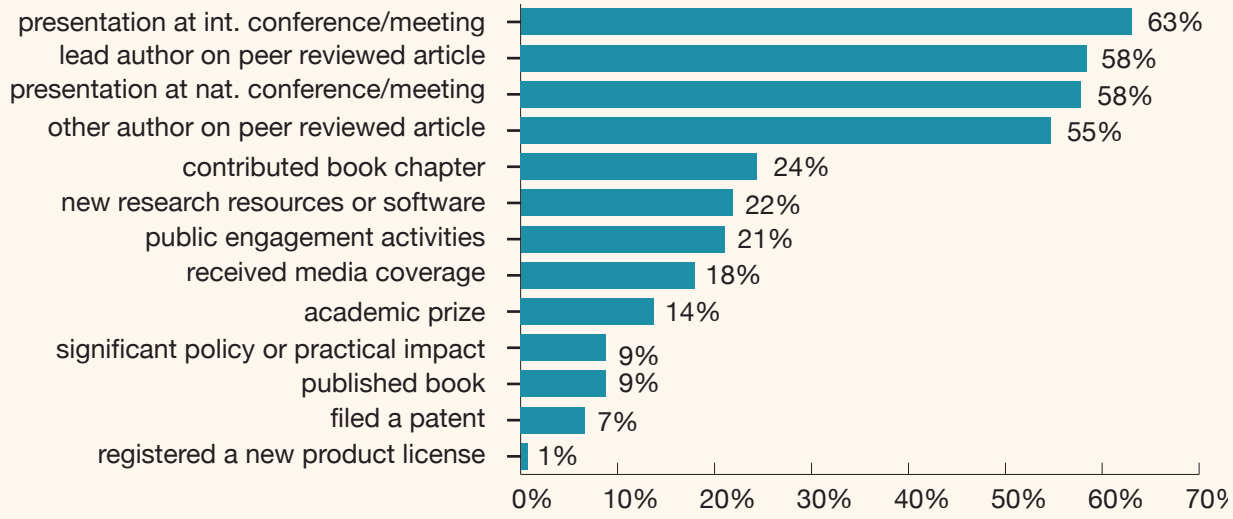
Table 5: Researchers' activities according to sector of employment

	performing research	research supervision/ management	teaching and knowledge transfer	managing own research team	technology transfer to industry	performing peer reviews	administrative activities	entrepreneurship, start-up	Total
University	98.3%	67.2%	75.0%	23.4%	11.0%	67.1%	54.7%	5.4%	860
	(845)	(578)	(645)	(201)	(95)	(577)	(470)	(46)	
RPOs and RTOs	97.5%	62.9%	43.8%	21.6%	17.5%	49.9%	39.7%	2.5%	285
	(278)	(179)	(125)	(62)	(50)	(142)	(113)	(7)	
Industry	67.3%	70.0%	22.1%	21.6%	45.3%	23.3%	45.3%	14.7%	128
	(86)	(90)	(28)	(28)	(58)	(30)	(58)	(19)	
Service or other business sector	65.7%	43.2%	50.1%	15.0%	68.0%	2.7%	22.8%	40.7%	28
	(18)	(12)	(14)	(4)	(19)	(1)	(6)	(11)	
Government or other public sector	74.8%	43.9%	32.1%	24.2%	5.1%	35.5%	71.9%	12.0%	95
	(71)	(42)	(31)	(23)	(5)	(34)	(68)	(11)	
Hospital	88.9%	57.0%	62.0%	27.1%	3.6%	41.6%	30.3%	7.3%	71
	(63)	(41)	(44)	(19)	(3)	(30)	(22)	(5)	
Other	74.6%	55.8%	66.6%	37.4%	14.3%	44.0%	55.3%	8.2%	94
	(70)	(53)	(63)	(35)	(14)	(42)	(52)	(8)	

Only applicable to currently employed researchers.

Employed researchers produced the following outputs in the last 12 months (Figure 27): most had presented at international and national meetings or conferences (68 % and 62 %, respectively), and reported being lead or other authors on a peer-reviewed article (63 % and 59 %, respectively). Fewer respondents reported having product-type impacts, which is not surprising, as these take longer to develop: 24 % reported having developed new research resources or software, 7 % filed a patent and just 1 % registered a new product license. A considerable share of researchers (23 %) undertook public engagement activities and 19 % received media coverage.

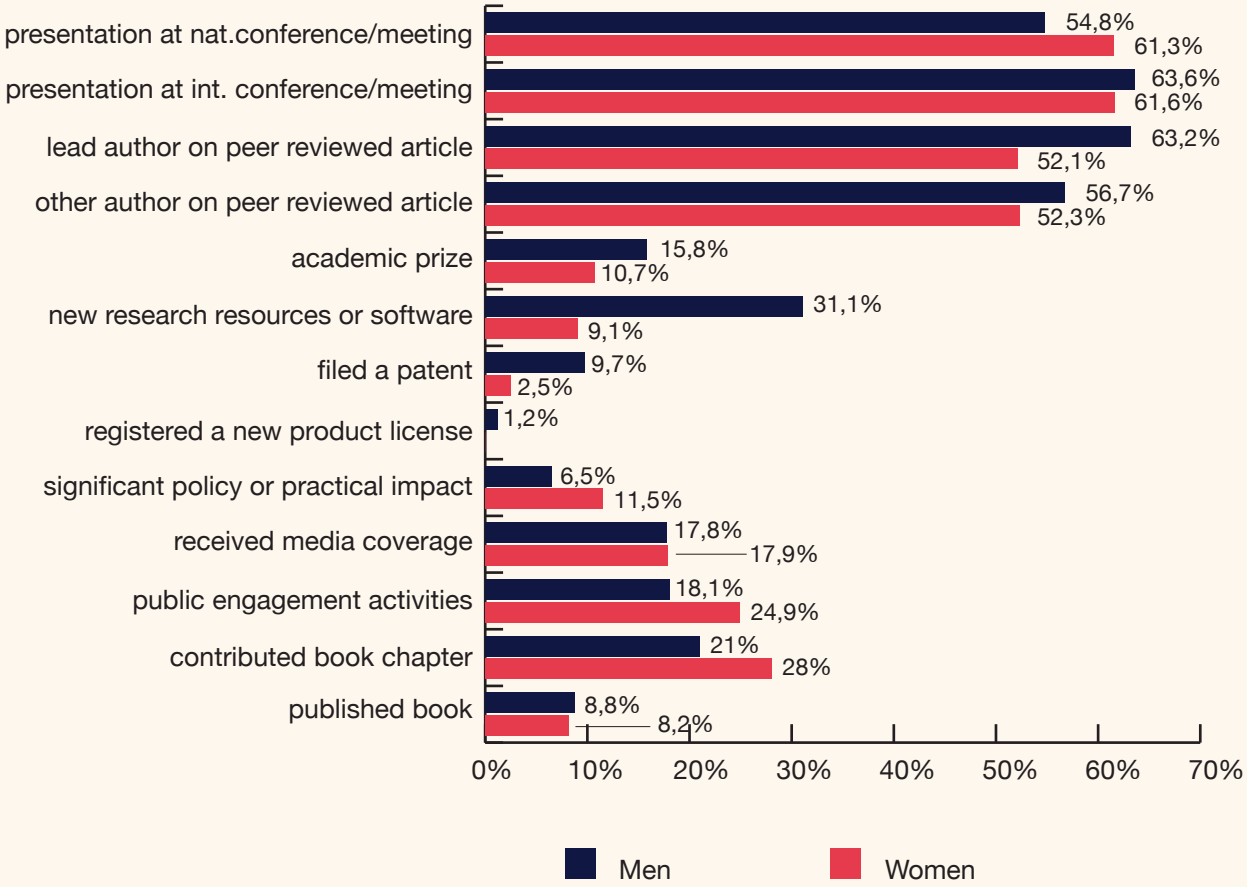
Figure 27: Researchers' outputs in the last 12 months



Note: Only applicable to currently employed researchers.

In terms of differences in research outputs (Figure 28), men tend, more often than women, to publish as lead authors, develop new research resources of software, or file a patent; women, more often than men, are involved in public engagement activities, achieve significant policy impact, contribute a book chapter, and take part in national conferences.

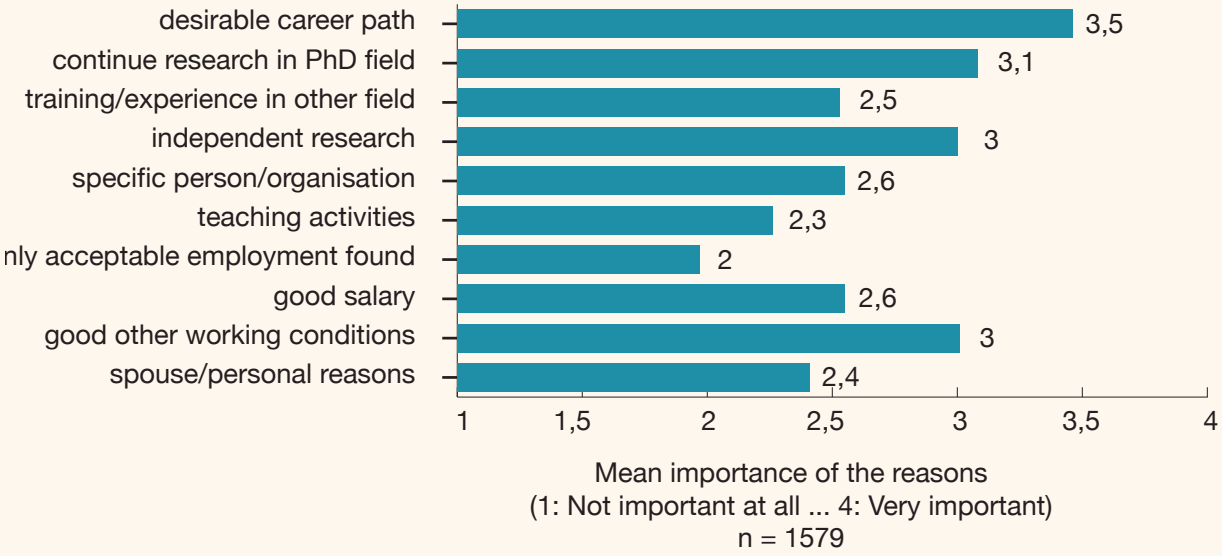
Figure 28: Researchers' outputs: men vs. women



4.3.7 Motivation for taking the current job: researchers and non-researchers

With regard to motivation for taking the current job, the most important reason given by researchers was that the job was on their desirable career path (3.5), followed by the possibility to continue research in their PhD field (3.1). Being able to conduct independent research and good working conditions (other than salary) were also considered important. Salary, the possibility to perform teaching activities, or spouse/personal reasons were of lesser importance.

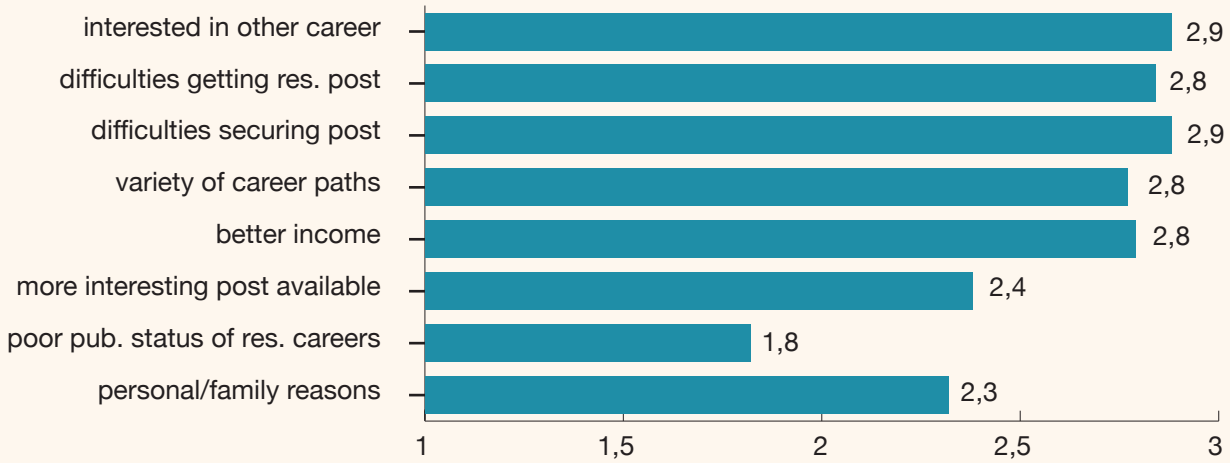
Figure 29: Reasons for taking current job: researchers



Only applicable to currently employed researchers.

There are a number of reasons why doctorate holders working in non-research positions took their current job, all with nearly the same degree of importance: interest in other career (2.9) and a better variety of career paths (2.8), but also difficulties securing tenured research post (2.9), difficulties getting a research position (2.8), and better income (2.8). It would, therefore, seem that for some doctorate holders a non-research career is a desirable career path, while for others it is a 'second best' choice that was made due to lack of positions in academia, less attractive income or lack of secure employment. Considering that the majority of non-researchers work in non-academic sectors, it may, therefore, mean that, at least for a share of respondents, the move from academia to other non-academic sectors, and for non-research jobs, might not have been their most preferred option.

Figure 30: Reasons for taking non-research job



4.3.8 Satisfaction with current working environment : researchers

In general, as can be seen from Table 6, researchers are most satisfied with intellectual challenge (3.38), followed by prestige of organization or job (3.21), and least satisfied with job security (2.79) and salary (2.88).

Table 6: Satisfaction with current working environment : researchers

	Per cent (count)					Mean (std. dev.)
	Very dissatisfied	Fairly dissatisfied	Fairly satisfied	Very satisfied	Total	
Career growth opportunities	9.0	16.3	43.0	31.7	100.0	2.97
	140	253	668	493	1554	.92
Intellectual challenge	1.9	8.8	38.4	50.9	100.0	3.38
	29	136	595	789	1549	.73
Contribution to society	2.7	15.3	46.0	36.0	100.0	3.15
	42	237	711	557	1547	.77
Prestige of organisation or job	2.2	12.0	48.3	37.5	100.0	3.21
	33	186	747	581	1547	.73
Scientific environment	4.3	19.7	36.7	39.3	100.0	3.11
	66	306	570	610	1552	.87
Organisational culture	8.2	26.1	45.0	20.7	100.0	2.78
	127	405	698	321	1551	.87
Ethical awareness	4.7	15.8	49.1	30.4	100.0	3.05
	73	243	757	468	1541	.81
Job security/ stability	20.0	15.3	30.1	34.5	100.0	2.79
	311	238	468	536	1553	1.12
Salary	8.0	24.0	45.8	22.3	100.0	2.82
	124	372	710	346	1552	.87
Mentoring and training	5.1	25.3	45.9	23.7	100.0	2.88
	79	394	713	368	1554	.82
Research infrastructure	6.7	19.4	44.4	29.5	100.0	2.97
	104	301	690	458	1553	.87
Work/life balance	8.0	19.1	41.2	31.8	100.0	2.97
	124	296	640	493	1553	.91
Proximity to family	14.2	17.8	35.1	32.9	100.0	2.87
	218	273	539	505	1535	1.03

Men and women have nearly the same levels of satisfaction with the different job aspects (see Figure 31), but there are some marked differences in satisfaction levels between researchers and non-researchers (Figure 32). In particular, researchers appear more satisfied with intellectual challenge, while non-researchers with the security/stability of the job, salary and proximity to family.

Figure 31: Job satisfaction: men vs. women

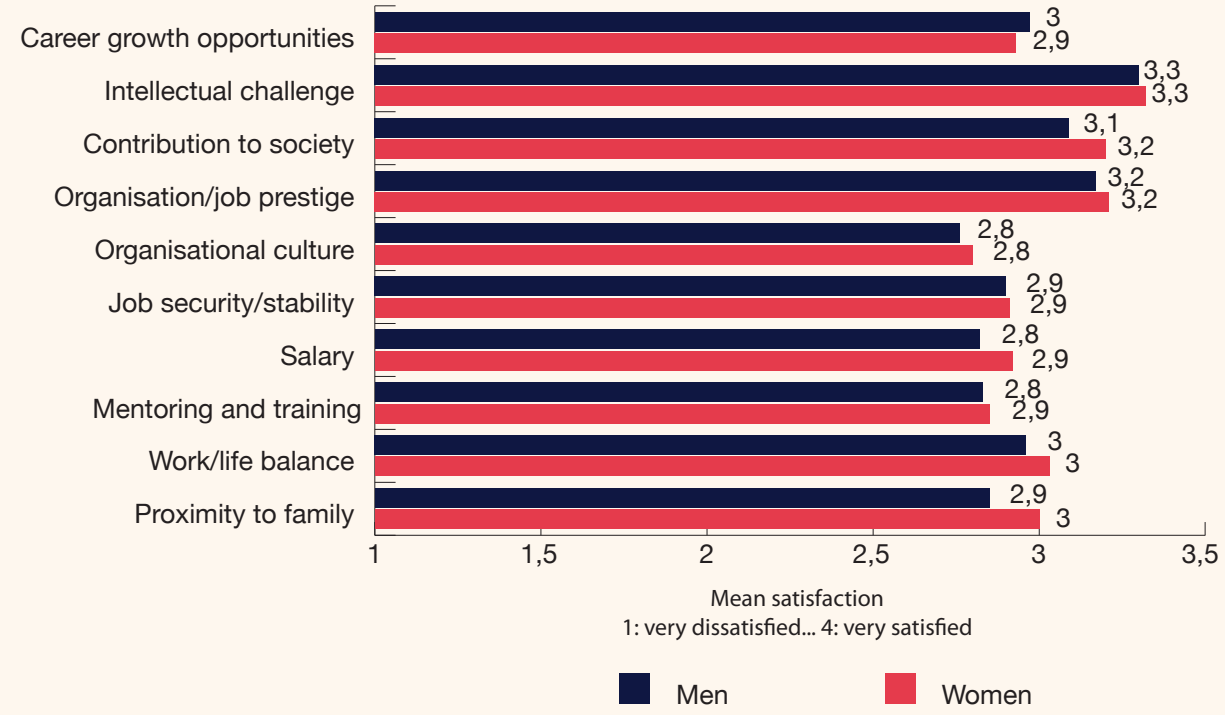
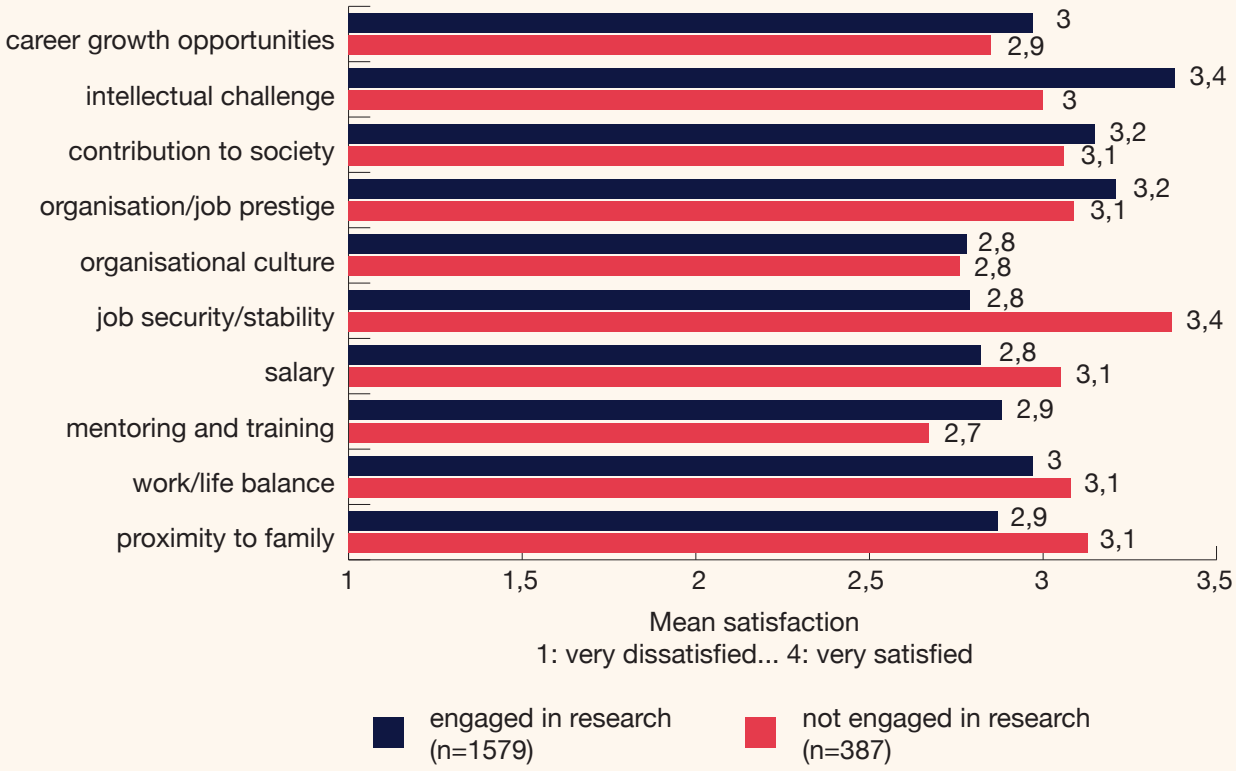
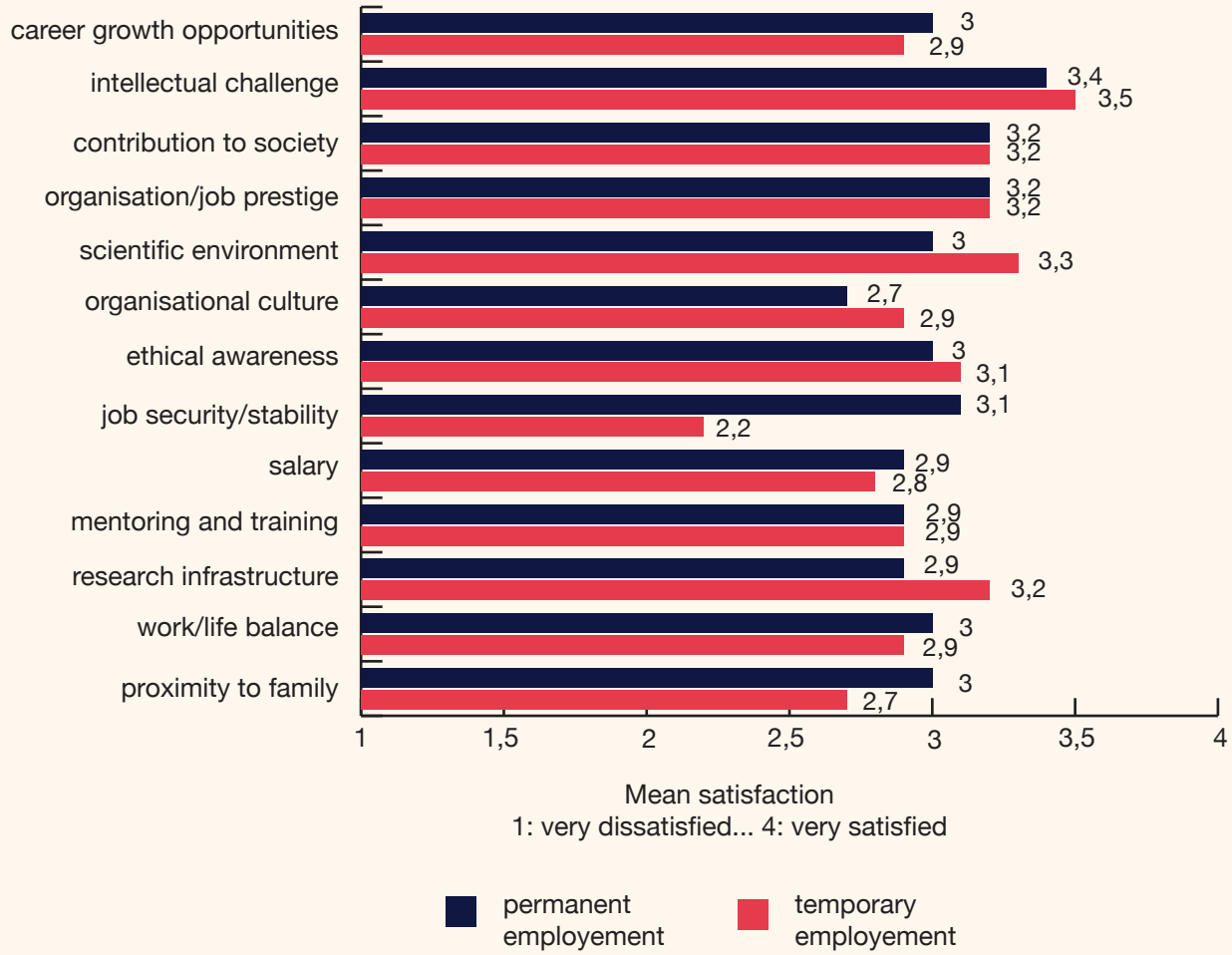


Figure 32: Job satisfaction: researchers vs. non-researchers



When looking at job satisfaction between researchers on permanent and temporary contracts (Figure 33), we observe that those on temporary contracts are much less satisfied with job stability and proximity to family but more satisfied with research environment and research infrastructure than researchers on permanent contracts.

Figure 33: Job satisfaction: researchers on permanent and temporary contracts



Looking at the different sectors of employment (Table 7), respondents working at government or other public sector are the most satisfied with all aspects of employment (total mean satisfaction 3.12), and respondents working at hospitals are the least satisfied (total mean satisfaction 2.87). In all sectors of employment, respondents are most satisfied with intellectual challenge (total mean satisfaction 3.31) and least satisfied with organizational culture (total mean 2.8). At universities, respondents are least satisfied with job security (mean 2.6), which is not surprising as only 50 % of them are in full-time permanent employment. As for job security, the most satisfied respondents can be found in the industry sector (3.4) and the service or other business sector (3.4). In these two sectors, job security is also the highest rated employment attribute. At universities, respondents are most satisfied with the intellectual challenge (3.4), which is also the highest rated attribute at RPOs and RTOs, and is highly rated by respondents working at hospitals. Respondents working at hospitals are the least satisfied with work/life balance (2.5), mentoring and training (2.6) and salary (2.7).

Table 7: Work satisfaction according to sector of employment

	University	RPOs and RTOs	Industry	Service or other business sector	Government or other public sector	Hospital	Other	Total
career growth opportunities	2.88	3.05	3.09	3	2.97	2.81	3.01	2.95
	(895)	(290)	(233)	(106)	(160)	(98)	(156)	(1939)
intellectual challenge	3.36	3.44	3.18	3.28	3.21	3.22	3.11	3.31
	(893)	(290)	(233)	(106)	(159)	(98)	(154)	(1933)
contribution to society	3.1	3.07	3.01	2.83	3.44	3.3	3.41	3.13
	(894)	(287)	(233)	(106)	(159)	(98)	(154)	(1931)
organisation/job prestige	3.19	3.18	3.27	3.08	3.26	2.96	3.24	3.19
	(891)	(290)	(233)	(104)	(159)	(98)	(154)	(1930)
organisational culture	2.76	2.84	2.92	2.84	2.7	2.52	2.75	2.78
	(896)	(290)	(233)	(104)	(159)	(98)	(154)	(1934)
job security/ stability	2.58	2.79	3.39	3.39	3.37	3.2	3.3	2.91
	(896)	(290)	(233)	(106)	(158)	(98)	(156)	(1937)
salary	2.74	2.79	3.19	3.03	3.14	2.74	2.95	2.87
	(894)	(290)	(233)	(106)	(160)	(98)	(156)	(1937)
mentoring and training	2.84	3.03	2.87	2.71	2.68	2.64	2.86	2.84
	(895)	(290)	(226)	(104)	(159)	(98)	(156)	(1928)
work/life balance	2.96	2.97	3.08	3.19	3.23	2.46	2.99	2.99
	(896)	(290)	(233)	(106)	(159)	(98)	(155)	(1938)
proximity to family	2.84	2.68	2.96	3.24	3.21	2.89	3.28	2.92
	(889)	(288)	(232)	(106)	(155)	(96)	(145)	(1911)
Total mean	2.93	2.98	3.10	3.06	3.12	2.87	3.09	2.99

4.3.9 Changing career

More researchers are planning to change their career to a non-research career (39 %), than vice versa (Figure 34). Among those not engaged in research, 26 % plan to change their career to a research career in the next three years. Considering that researchers represent 80 % of the total number of employed doctorate holders, it is important to understand why nearly 40 % of them are thinking of changing to a non-research career.

Figure 34: Plans to change career in the next three years by engagement in research

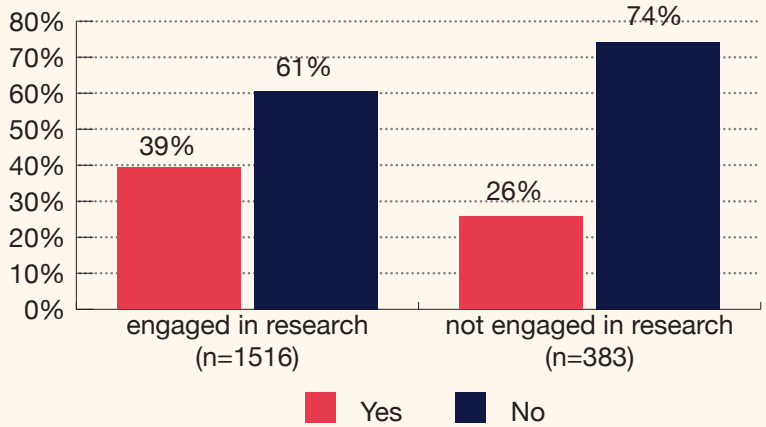
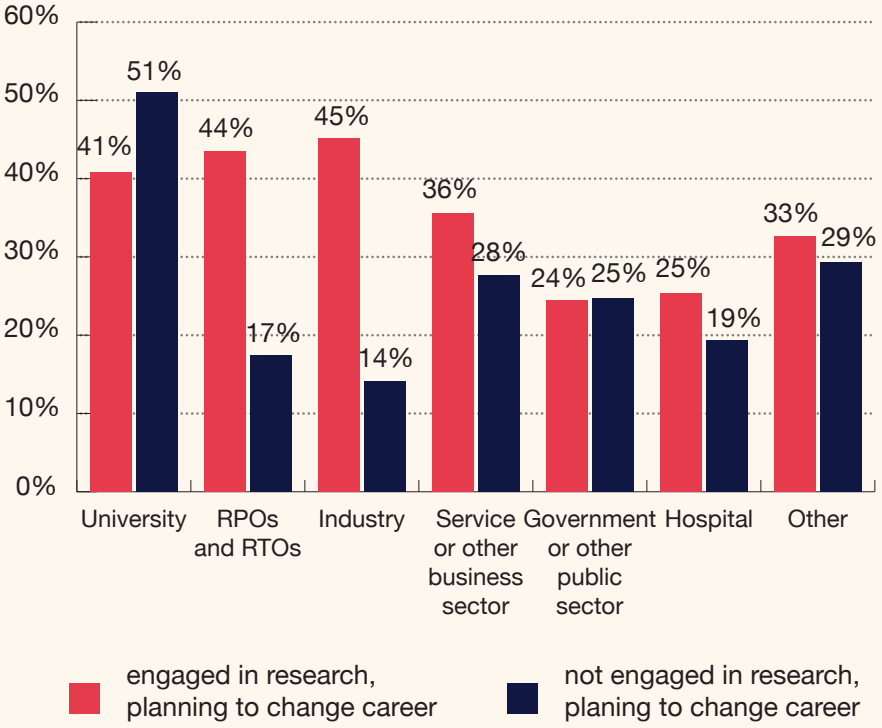


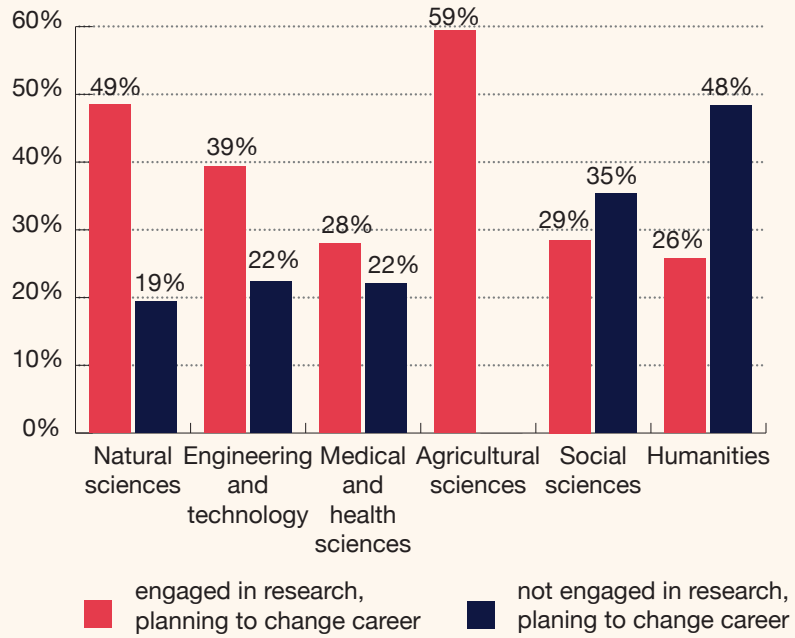
Figure 35 presents all employed respondents who are considering changing their career in the next three years. As already shown above, a significant share of doctorate holders engaged in research are considering a career change. In industry, the share of researchers among doctorate holders who consider changing careers is the highest (45 %), followed by researchers employed at RPOs and RTOs (44 %) and researchers employed at universities (41 %). In the group of non-researchers employed at the university (a minority), the share of those who want to switch to a research career is also high (51 %). In other sectors, the share of non-researchers who want to change career is relatively low, the lowest being in industry (14 %).

Figure 35: Plans to change career in next three years by sector of employment



Some differences can be observed between doctorate holders in the various fields (Figure 36). In the group of researchers who were studying natural sciences, almost half (49 %) are considering switching to a non-research career; while among non-researchers studying natural sciences 19 % are considering changing to a research career. On the other side, among non-researchers who studied humanities, 48 % ,are considering changing to a research career, while among researchers who studied humanities, 26 % are considering a career change. It would be useful to study whether some of the dynamics here are driven by salary level, job insecurity or prevalence (or not) of post-doctoral positions across different disciplines.

Figure 36: Plans to change career in next three years by doctorate field



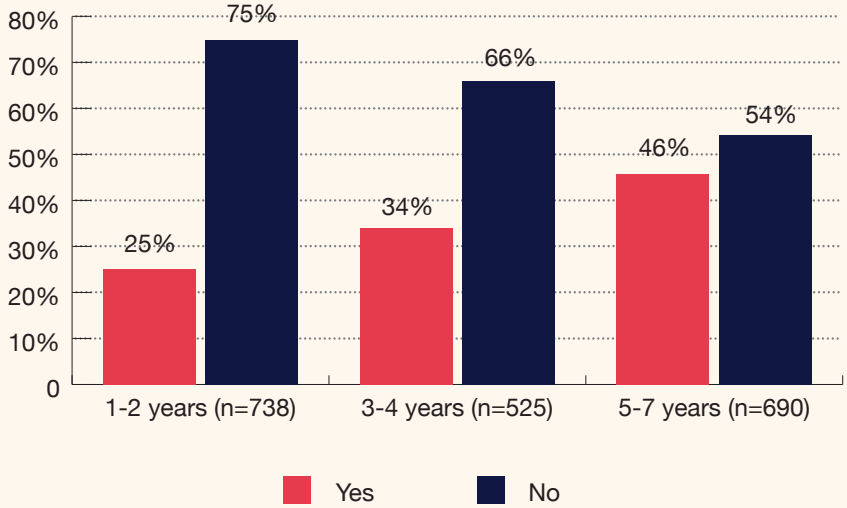
4.3.10 Staff management responsibilities

Over one third (35 %) of employed respondents have staff management responsibilities in their current job. Among researchers 36 % of respondents have staff management responsibilities compared to 32 % among non-researchers, but the differences between the two groups are not statistically significant.

When comparing the share of employed respondents with staff management responsibilities between men and women, we see no statistically significant differences between two groups–among men, 35 % have staff management responsibilities and among women, 33 %.

Unsurprisingly, as shown in Figure 37, it is within the group that defended their Ph.D. thesis five to seven years ago that the share of respondents with staff management responsibilities is the largest. In this figure only those employed with staff management responsibilities are presented.

Figure 37: Staff management responsibilities by the number of years since doctorate completion

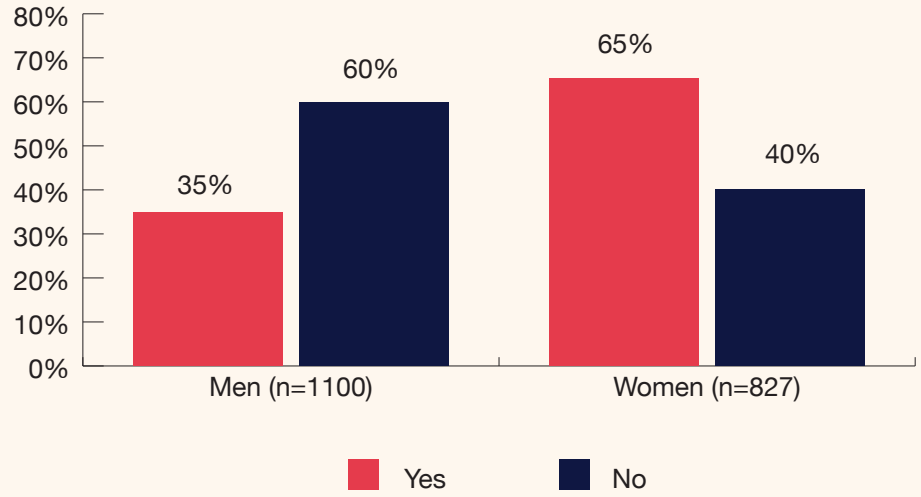


Note: Only applicable to employed with staff management responsibilities.

4.3.11 Career break

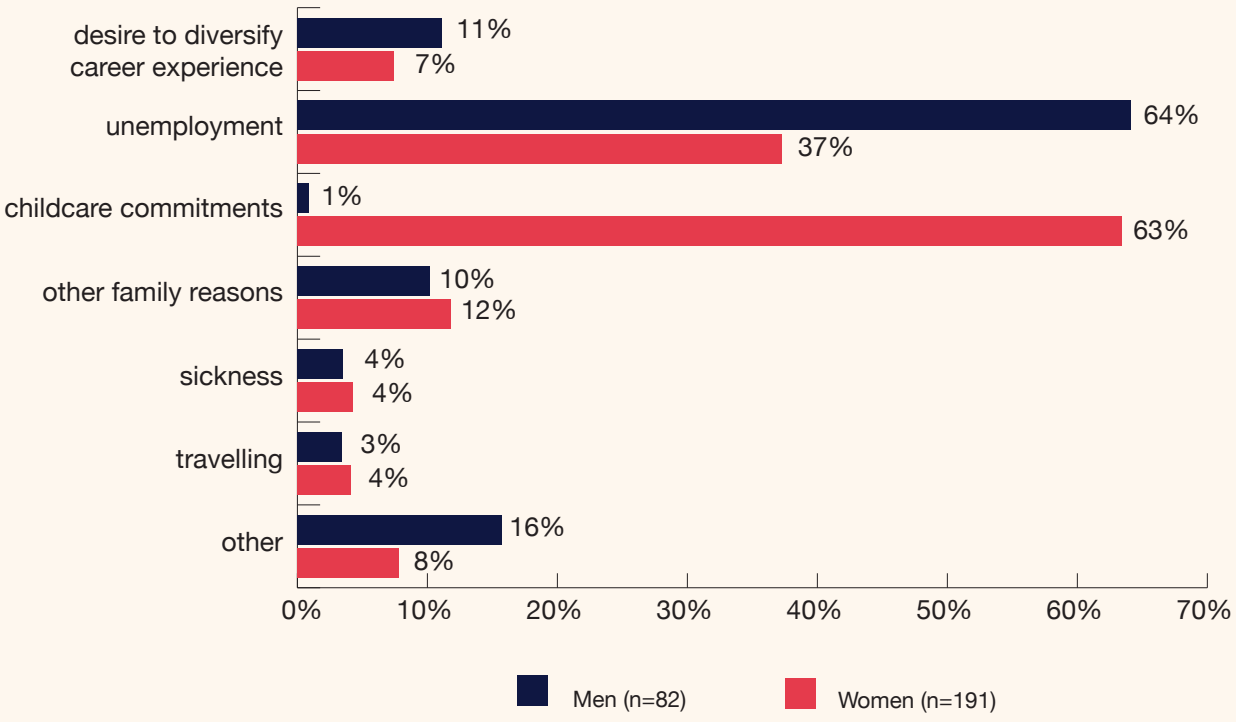
Among employed respondents, 11 % of took a career break since their doctorate completion. Among those, there are nearly twice as many women (65 %) than men (35 %).

Figure 38: Employed respondents who took career break since doctorate completion



As can be seen from Figure 39, the reasons for taking a career break appear to be different between men and women: while the majority of women took a career break because of childcare commitment (63 %), men took a career break mainly because of unemployment (64 %).

Figure 39: Reasons for taking career break



Respondents were asked whether it was easy or difficult for them to return to their previous position or find a new one after the career break. The answers varied substantially in both groups. In general, it can be said that there were more respondents for whom it was (very or fairly) easy to go back to a previous or new position after a career break than those who said it was (very or fairly) difficult. Among women this share was slightly less (55 %) than among men (57 %).

Table 8: Ease of return to previous or new position after career break

	Men	Women
Very easy	31.8 %	21.8 %
	(24)	(30)
Fairly easy	25.9 %	32.7 %
	(19)	(45)
Fairly difficult	19.7 %	20.4 %
	(15)	(28)
Very difficult	22.6 %	25.1 %
	(17)	(35)

4.4 Mobility

4.4.1 Mobility after completion of the doctorate

The survey asked the respondents whether they had worked in a foreign country for more than three months since the completion of their doctorate. A significant share (40 %) of the employed respondents had lived in a foreign country for more than three months since completion of their doctorate. This share is higher for men than women – nearly half of men lived abroad (48 %) compared to one third of women (29 %). The percentage of respondents who lived abroad is the highest in the age groups of 35-39 years (46 %) and 30-34 years (33 %), and lowest in the age group of 50 years or more (11 %). Researchers were significantly more mobile (44 %) than non-researchers (23 %).

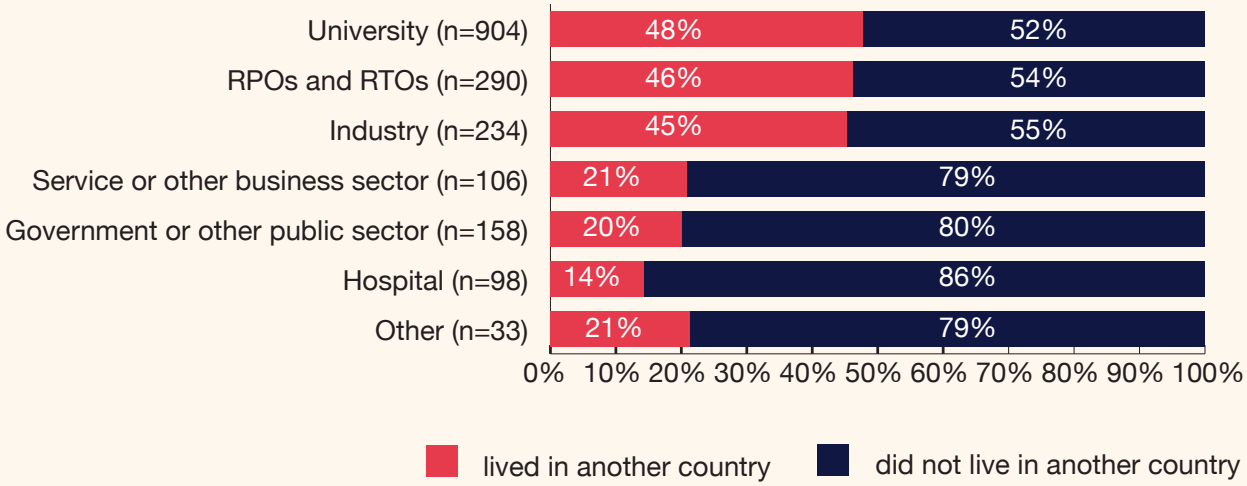
Table 9: Profile of the geographically mobile doctorate holder

		Lived in a foreign country		
		Yes	No	Total
Gender	Man	47.7 %	52.3 %	100,0 %
		(524)	(576)	(1100)
	Woman	29.3 %	70.7 %	100,0 %
		(242)	(585)	(827)
Age	Less than 30 years	34.2 %	65.8 %	100,0 %
		(37)	(70)	(107)
	30-34 years	43.5 %	56.5 %	100,0 %
		(349)	(453)	(802)
	35-39 years	45.6 %	54.4 %	100,0 %
		(286)	(341)	(627)
	40-44 years	32.9 %	67.1 %	100,0 %
		(75)	(153)	(228)
	45-49 years	14.6 %	85.4 %	100,0 %
		(12)	(68)	(80)
	50 years or more	11.2 %	88.8 %	100,0 %
		(10)	(80)	(90)
Involved in research	Yes	43.8 %	56.2 %	100,0 %
		(686)	(878)	(1564)
	No	22.8 %	77.2 %	100,0 %
		(87)	(295)	(382)

Only applicable to employed respondents.

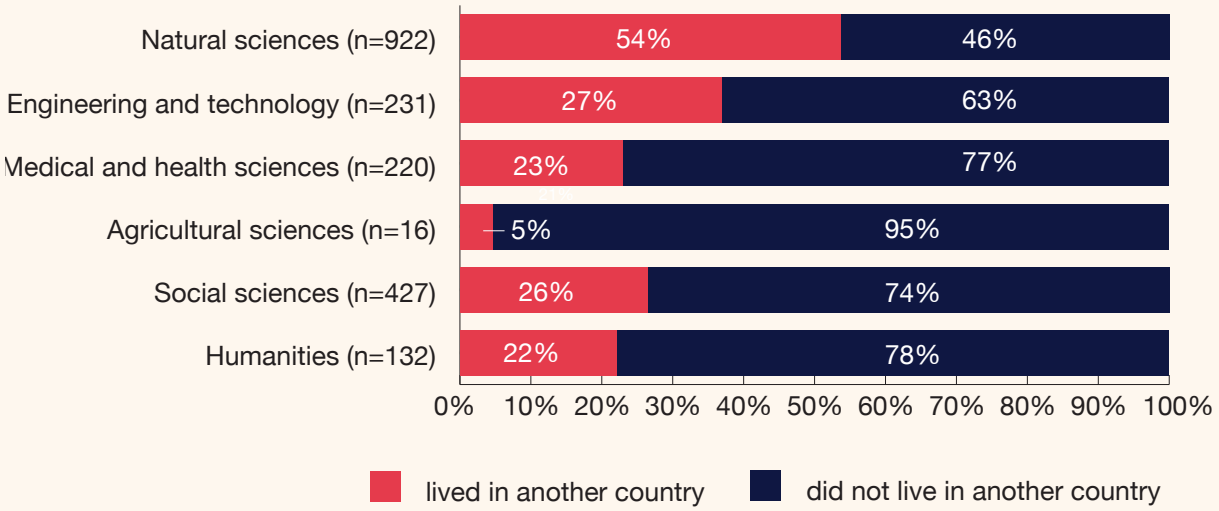
Looking at different employment sectors, one can note that among respondents working at the university, RPOs or RTOs, and industry, nearly half lived in a foreign country for more than three months after the completion of their doctorate (Figure 40). For those working in other sectors, mobility is less frequent, ranging from 14 % for doctorate holders employed in hospitals to 21 % for those employed in the service or other business sector.

Figure 40: Mobility by sector of employment



Respondents who did their doctorate in the field of natural sciences were most mobile; more than half (54 %) of them lived abroad after completing their doctorate. They are followed by respondents who studied engineering and technology (37 %). 26 % of respondents with a doctorate in social sciences lived abroad, followed by those with a doctorate in medical and health sciences (23 %) and humanities (22 %).

Figure 41: Mobility by doctorate field



Only employed respondents are analysed.

Not surprisingly, the highest amount of mobility happened within Europe, with 68 % of mobile respondents choosing to live in one or more countries within the European Union. North America was the next most popular destination, with 34 % of mobile respondents having chosen this region. 10 % of respondents lived in one or more other European, non-EU countries. Moving to other regions (Central/South America, Australia/Oceania, Africa, and Asia) is relatively rare (less than 10 %). Within the EU, the largest share (41 %) lived in one foreign country, and 24 % in two or three foreign countries.

Table 10: Number of foreign countries lived in for more than three months

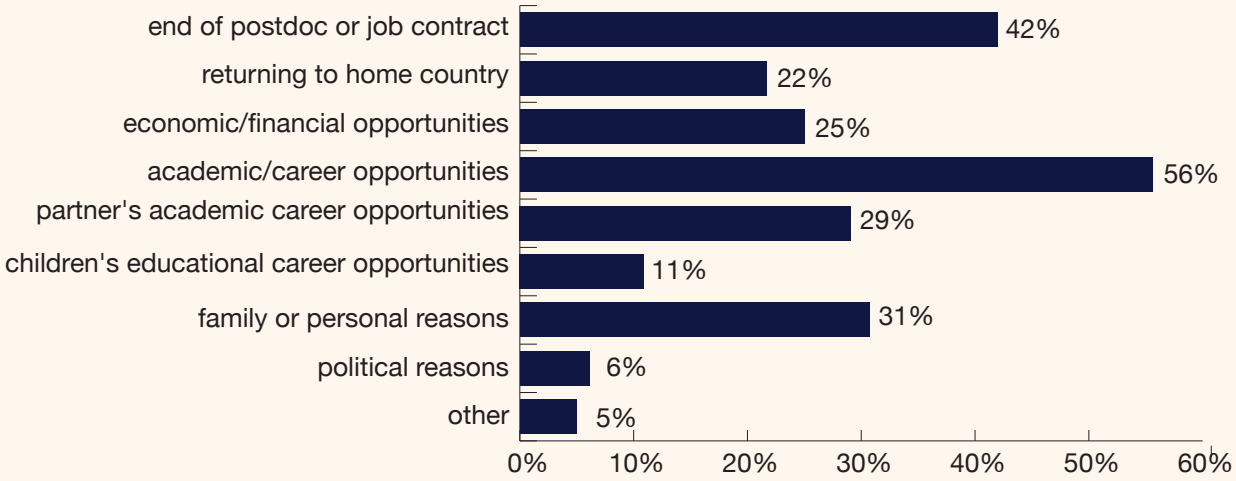
*	None	1	2-3	4-5	More than 5	Total
EU	31.4 %	40.5 %	24.1 %	0.5 %	3.5 %	100 %
	(213)	(275)	(163)	(3)	(24)	(678)
rest of Europe	89.6 %	8.0 %	1.3 %	0.2 %	0.9 %	100 %
	(607)	(54)	(9)	(1)	(6)	(677)
N America	66.6 %	22.3 %	4.9 %	0.5 %	5.8 %	100 %
	(452)	(151)	(33)	(3)	(39)	(678)
C/S America	95.4 %	2.8 %	0.6 %	0.4 %	0.8 %	100 %
	(647)	(19)	(4)	(3)	(5)	(678)
AUS/Oceania	96.5 %	2.8 %	0.5 %	0.2 %	0.0 %	100 %
	(654)	(19)	(3)	(2)	(0)	(678)
Africa	96.3 %	1.2 %	0.4 %	0.2 %	1.9 %	100 %
	(653)	(8)	(3)	(1)	(13)	(678)
Asia	91.5 %	5.5 %	1.5 %	0.0 %	1.5 %	100 %
	(621)	(37)	(10)	(0)	(10)	(678)

*Only applicable to employed who lived abroad

4.4.2 Reasons for moving to another country

Employed respondents were asked if they were planning to move to another country within the next year. 10 % are considering moving to another country, with the main reason being better academic/career opportunities (56 %), followed by the end of a job contract or the end of the post-doctorate position (42 %), and family or personal reasons (31 %). *Please note that respondents could select more than one answer, so the total sum exceeds 100 %.*

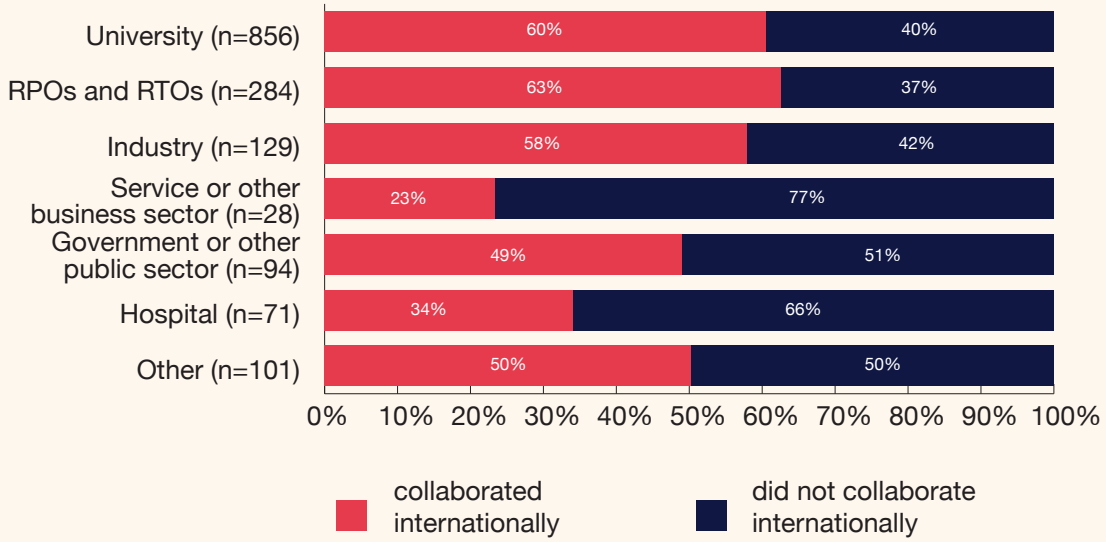
Figure 42: Reasons for moving to another country



4.4.3 Transnational collaboration

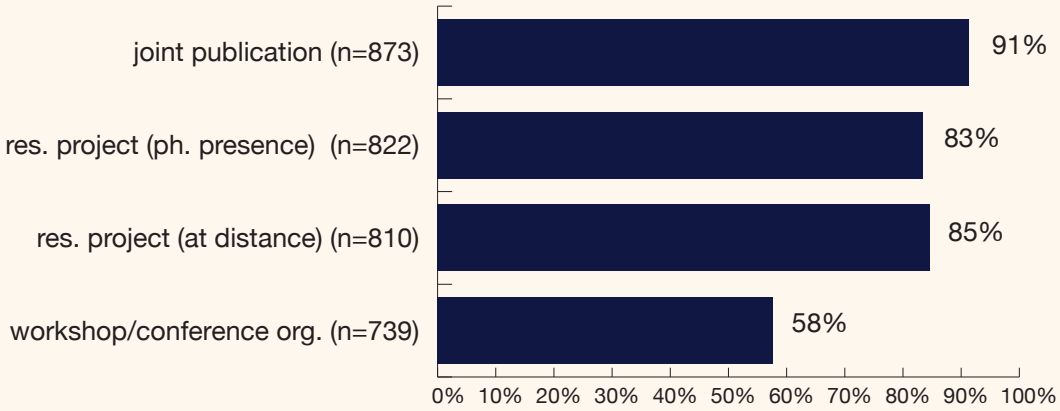
Researchers were asked if they had been involved in transnational collaboration in the past 12 months. The level of transnational collaboration was relatively high: 58 % of employed researchers conducted research with researchers based in another country/region, with the highest share of collaboration occurring at RPOs and RTOs (63 %), at universities (61 %) and in industry (58 %).

Figure 43: Involvement in transnational collaboration in last 12 months by sector of employment



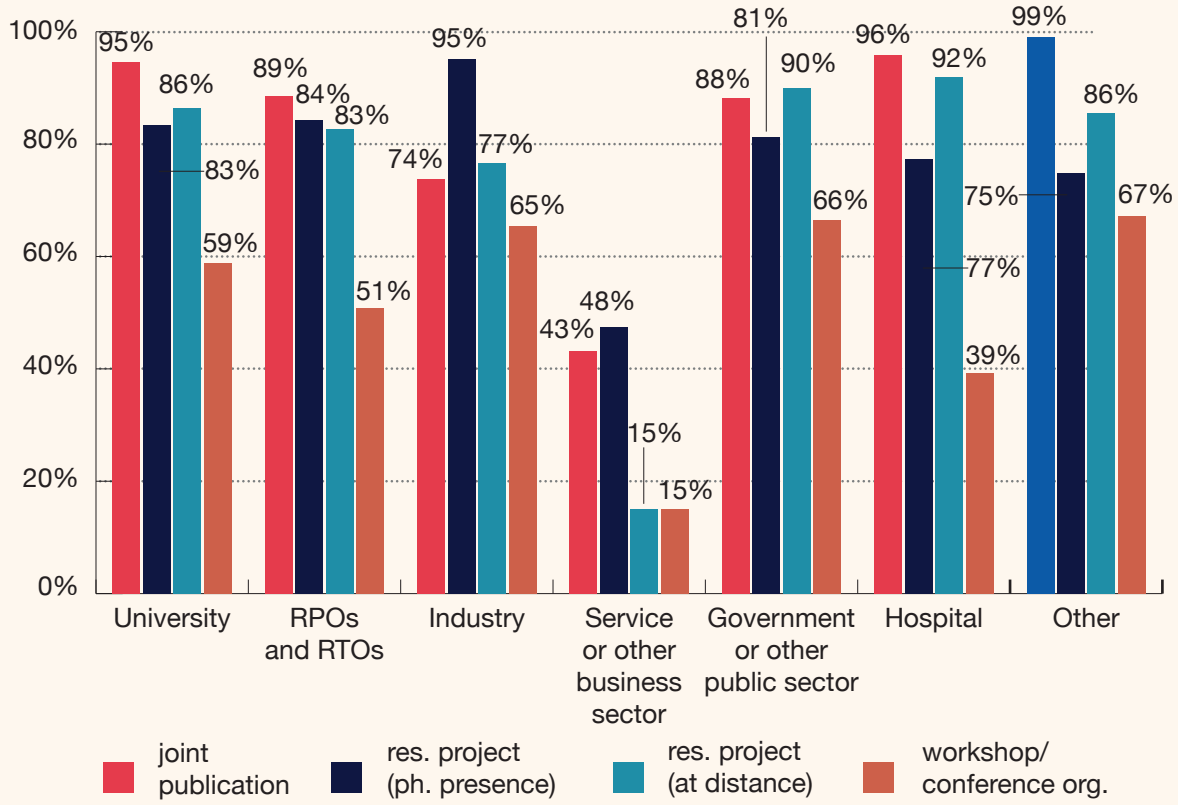
In terms of types of collaboration, as expected, researchers collaborated most often through joint publications (91 %) and research projects: projects involving both virtual collaboration (85 %) and physical presence (83 %).

Figure 44: Types of transnational collaboration



As seen from Figure 45, respondents employed at universities and RPOs and RTOs have similar patterns of transnational collaboration: mainly through joint publications (95 %) and research projects – both at distance (86 %) and requiring physical presence (83 %). Respondents working in industry collaborate with researchers based in other countries most often through research projects requiring physical presence (95 %), but they are also actively involved in other forms of collaboration. Respondents working in government or other public sector most often collaborate in research projects requiring no physical presence (90 %), and compared to other sectors they also (co)organise more workshops and conferences (66 %). Respondents working at hospitals most often collaborate through joint publications (96 %) and research projects remotely (92 %). The sector with the least transnational collaboration is the service or other business sector.

Figure 45: Types of transnational collaboration by employment sector

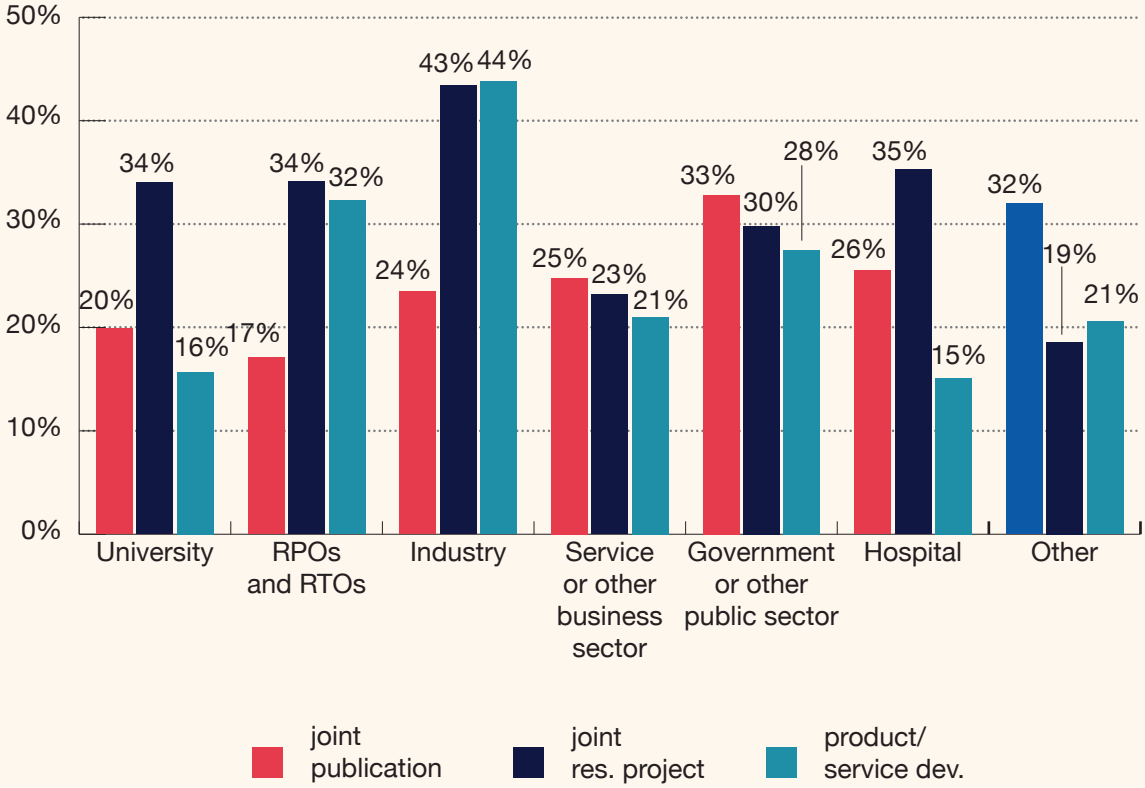


4.4.4 Cross-sectoral collaboration

Overall, the levels of cross-sectoral collaboration are significantly lower than the levels of transnational research collaboration. All employed respondents were asked if they were involved in collaboration between

the academic sector, on the one hand, and industry or any other non-academic sector, on the other, through any of the three types of collaboration suggested: collaborating on a joint publication, on a joint research project and on a product or service. Overall, only 23 % worked on a joint publication, 33 % collaborated on a joint research project and 23 % on the development of a product or service. As expected, patterns of collaboration vary depending on the sector of employment.

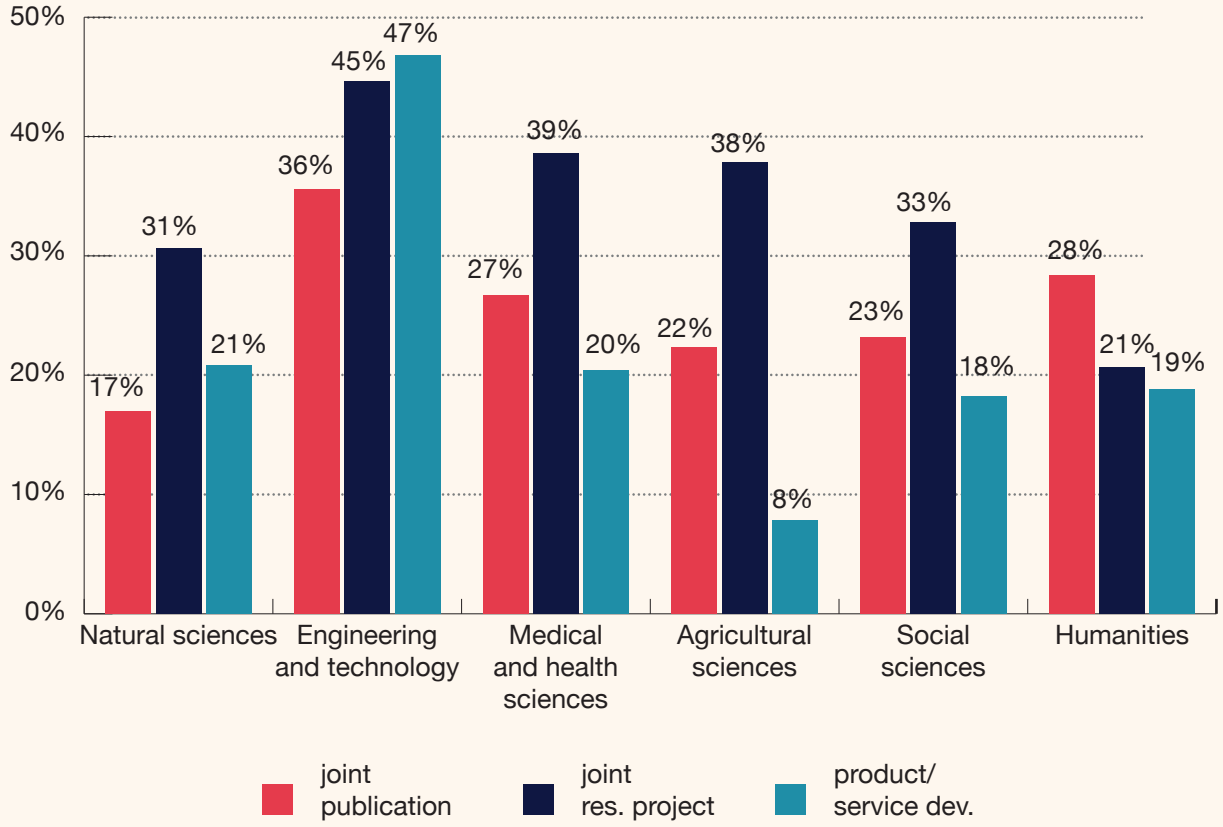
Figure 46: Level of cross-sectoral collaboration by sector of employment



As seen from Figure 46, most cross-sectoral collaboration can be observed among the respondents working in industry: a large share of respondents employed in industry collaborate with the academic sector through joint research projects (44 %) and product or service development (44 %). Respondents employed at universities mainly collaborate with other non-academic sectors in joint research projects (34 %) and joint publications (20 %) and relatively less on joint product or service development (16 %). In comparison, respondents employed in RPOs and RTOs collaborate more on product or service development (32 %). Respondents employed in the government or other public sector also demonstrate significant levels of collaboration with the academic sector through publications (33 %), projects (30 %) and product/service developments (28 %). Respondents working at the hospital appear to mainly collaborate with the academic sector through joint research projects (35 %) and publications (26 %), and less through product/service development (15 %).

When looking at the differences by research field (Figure 47), we observe that respondents in the engineering and technology field demonstrate the highest levels of cross-sectoral collaboration (product/service development: 47 %, joint research project: 45 %, joint publication: 36 %). In most other research fields, the preferred type of collaboration is through joint research projects (ranging from 31 % in natural sciences to 39 % in medical and health sciences), with the exception of humanities, where respondents engage in cross-sectoral collaboration most often through working on joint publications (28 %).

Figure 47: Cross-sectoral collaboration by doctorate field



5. Discussion and Conclusions

The cohort of doctorate holders under study is a highly international and mobile group, who after completing their Ph.D. in one of the participating organisations are now living and working across the world and are, in their vast majority, working as researchers. Being highly employable, doctorate holders pursued a large array of careers, although a transition into non-academic jobs appears to be less straightforward. The majority of respondents started with a traditional academic career track, with over half going into post-doctoral positions after their Ph.D. and, even more were working in the academic sector at the time of the survey. A significant share of doctorate holders work in industry and other business sectors, government, hospital and other non-academic sectors. The fact that only half of respondents employed at universities are in permanent positions (compared to the majority of those in other sectors) may lead to other sectors becoming more attractive in the future. This section discusses the main findings of this study in the context of other similar studies and policy developments, focusing on issues such as employment of doctorate holders, doctoral training and transition to the labour market. The last section also discusses the methodological approach of the current study and future perspectives.

5.1 Employment situation

Doctorate holders demonstrate high rates of employment, with a majority working on permanent contracts and an even larger proportion working as researchers

Despite the voiced concerns in the media and academic press (see for instance editorials in Nature, 2011[18] and Paris Innovation Review, 2014[19]) about the overproduction of PhD graduates over the past decades, our findings report a very high employment rate of the studied cohort, with 95 % being employed. Among these employed respondents, a vast majority (80 %) are working as researchers. The overall unemployment rate is 4 %, which diminishes over time, reaching 2 % for those who received their degree six to seven years ago. These employment outcomes are consistent with the OECD Careers of Doctorate Holder's (CDH) report[20], which, however, highlighted the fact that high employment rates may mask relatively precarious working conditions, evidenced for instance by predominant shares of temporary contracts for those who received their degrees less than five years ago. Similar findings were also reported in the ESF pilot project. The findings for this cohort indicate that a majority (65 %) of doctorate holders are in permanent contracts and less than a third (27 %) in temporary contracts. Furthermore, the share of permanent contracts appears to increase as doctorate holders progress on their career path.

Only slightly over half of those in the academic sector are employed on permanent contracts, compared to the vast majority of those in other sectors

When looking at the different sectors, one notices a major difference between academic and non-academic sectors in terms of permanent employment, which indicates a persistent structural problem of saturation within academia, criticised by a large body of literature in Europe and the US. Only slightly over half of doctorate holders working in universities (54 %) are on permanent contracts, compared, for instance, to the vast majority of respondents working in industry (91 %) or for the government (82 %). We have seen that about one third of all researchers in our sample are currently employed in post-doctorate positions, and over 40 % in other positions (e.g. research fellow, senior

18 Cyranoski, D., Gilbert, N., Ledford, H., Nayar, A., Yahia, M. *Education: The PhD factory, Nature 472, 276-279 (2011).*

19 Editors, *The PhD bubble: when production outstrips demand,* Paris Innovation Review (January 29, 2014).

20 OECD (2013) *Key Findings of the OECD KnowInno Project on the Careers of Doctorate Holders.* www.oecd.org/sti/cdh [accessed online 2015).

researcher, Assistant Professor, Associate Professor, Professor, etc.) While one may argue that temporary post doctorates are beneficial in the sense that they incentivise researchers to move out of their home institutions and gain valuable experience elsewhere, the paucity of permanent contracts at universities in later career stages is more worrying.

5.2 Employment sector

Universities and the academic sector are the main destination for early-career doctorate holders, although the presence of doctorate holders in industry, government and other sectors is also non-negligible

Despite the lack of permanent academic positions, nearly two thirds of respondents are currently working in the academic sector (47 % in universities and 15 % in RPOs and RTOs), and 40 % in non-academic sectors (17 % in industry and other business sector, 8 % in government, 5 % in hospitals). That the higher-education sector attracted the largest share of doctorate holders is consistent with the OECD CDH project results (op.cit.), but recent available data from Eurostat (from 2015) indicate that in the EU-28, only 39 % of all researchers work in the higher education sector, while a larger share (49 %) is employed in the business enterprise sector and 12 % work in the government sector – and there are great variations across EU countries[21].

It is important to keep in mind that the studied cohort are early career graduates – up to seven years after PhD – and mostly from research universities, and this may be reflected in the seemingly high share of university-based employment, compared to countries like Germany or Luxembourg or the EU average. With the progression of careers and the corresponding search for employment stability, many may leave academia for other sectors.

While universities are the main destination for 60 % of doctorate holders in social sciences and humanities, engineers are also very present in industry, and social scientists in the government sector. One can assume that with the lack of permanent jobs within academia, and seemingly more secure job prospects in the private sector or government, the latter sectors would become increasingly attractive destinations in the future for other fields as well. That 80 % of doctorate holders are engaged in research in their current jobs (including most of the respondents employed in the academic sector and also between 55 % and 60 % of those working in industry or government) is indicative of the fact that, to a large extent, non-academic sectors can also offer positions utilising the research skills of this highly-trained group. However, to fully evaluate this, one needs to look at whether the skills and education level match the jobs, and whether respondents are satisfied with pay and other aspects of their job.

5.3 Doctorate holders in Humanities

There are higher levels of unemployment among doctorate holders in humanities

When looking at the employment rate by discipline, we notice that doctorate holders in humanities have a significantly higher level of unemployment (9 %) which is more than two times higher than for other research domains, including social sciences (4 %); they also have a slightly lower share of respondents engaged in research compared to the average for the entire cohort. Respondents in both social sciences and humanities work in very similar sectors, with over half of them working at universities and a good share in the government and other public sector. However, they work in industry only as an exception. High unemployment among the humanities doctorate holders is an alarming result and it is important to understand why these doctorate holders in our sample seem to have a harder time than others finding employment.

This appears to be a wide-spread situation, as demonstrated by the OECD CDH project results across several countries: doctorate holders in humanities have the highest unemployment rates as well as the highest share of temporary contracts compared to other fields[22]. Derycke et al. (2014) have looked at the CDE project data with a specific focus on Ph.D. graduates in Humanities and Social Sciences in Belgium, and found that doctorates in the humanities have experienced a more difficult transition from academia to other sectors of employment than doctorate holders in other fields,

21 http://ec.europa.eu/eurostat/statistics-explained/index.php/R_%26_D_personnel

22 Auriol, Laudeline, Misu, Max, and Freeman, Rebecca Anna, *Careers of Doctorate Holders: Analysis of Labour Market and Mobility Indicators*, OECD Science, Technology and Industry Working Papers, OECD Publishing, Paris, 2013/04.

including the social sciences[23]. Canal Dominguez and Muniz-Perez (2012) have also shown that Spanish doctorate holders in the humanities working outside universities had lower satisfaction with their job and wages than other fields[24]. Considering that younger doctorate holders across Europe increasingly need to be able to find jobs outside universities, doctoral training institutions should reflect on how to facilitate this seemingly difficult transition.

5.4 Employment relationship with doctoral degree and level of qualification

Most doctorate holders work in jobs that are at least party related to their doctorate

The majority of doctorate holders (over 90 %) have jobs that are at least partly related to their doctorate, with nearly 60 % closely-related, but there are differences between the academic and other sectors. It is in the academic sector that respondents work in jobs most closely related to their PhD; still, a vast majority of respondents working in other sectors such as industry, government or hospitals have jobs that are at least partly related to their PhD. Only in the services and other business sector is there a significant share of respondents working in unrelated jobs. Therefore, it would appear that, even when not engaged in research, most doctorate holders still find jobs related with their study and are able to offer skills other than those related to research at their workplace.

It is widely acknowledged that, in the knowledge economy, doctorate holders represent a key strategic resource and are expected to play an important role in the innovation process, as they are, themselves, innovators and problem-solvers[25] (Nerad, 2015). Both EUA[26] and LERU[27] point to the growing need for doctorate holders' skills in sectors beyond research and higher education: in policy-making, management, industry and commerce, charity, etc. Yet, available data show that, often, large shares of doctorate holders are employed in jobs requiring lower levels of qualification. For instance, in the OECD CDE project data for Belgium shows that at least 39 % of doctorate holders work in jobs that require no more than a master's-level degree and this is much more pronounced in industry, government, etc., compared to universities and other non-university higher education institutions[28]. Thus, authors conclude that, at least formally, a non-negligible share of these doctorate holders can be considered as overqualified for their positions.

A doctorate is most needed for jobs in the academic sector and to a lesser extent, in industry, while a Master's is the most widely required qualification in other sectors

The findings for our sample also demonstrate that, while the vast majority of jobs of respondents working in universities and RPOs/RTOs required a doctorate, or even a post-doctorate, a master's-level degree was by far the most required degree for those working in government, services or hospital (50-74 %). In industry, equally large shares (45 % each) of respondents worked in positions that required a doctorate or a master's-level degree.

There is an emerging literature looking at the possible effect of over-education of doctorate holders, and their possible misallocation in the labour market, which can bear a significant societal and individual cost – especially considering the length of, and the high public and individual investment, into doctorate education. However, educational mismatch may not necessarily mean that doctorate holders are working in jobs that do not sufficiently utilise their capacities and knowledge. The work by Pouliakas (2012)[29] or Di Paolo et al. (2016)[30] among others, suggest that educational mismatch alone does not provide a complete picture, and it is important to see whether it is also accompanied by a mismatch in the skills usage as well as low levels of satisfaction with the

23 Derycke, Hanne, te Kaat, Adriana Johanna, Van Rossem, Ronan, Groenvynck, Hans, and Vandevelde, Karen, *Ph.D. graduates in the humanities and social sciences: what do they do?* International Journal for Education, Law and Policy, 10(1), 2014.

24 Canal Dominguez, Juan Francisco and Muniz-Perez, Mauel, *Professional Doctorates and Careers: The Spanish case,* European Journal of Education, March 2012.

25 Nerad, Maresi, *Professional Development for Doctoral Students: What is it? Why Now? Who does it?*, Nagoya Journal of Higher Education, Vol. 15, 2015.

26 EUA (European University Association), *Doctoral programmes in Europe's universities: achievements and challenges: Report prepared for European universities and ministers of higher education,* Brussels and Geneva, 2007.

27 LERU (League of European Research Universities), *Doctoral degrees beyond 2010: Training talented researchers for society,* 2010.

28 Boosten, Karl, Vandevelde, Karen, Derycke, Hanne, te Kaat, Adriana and Van Rossem, Ronan, *Careers of doctorate holders survey,* R&D and innovation in Belgium Research Series, 2010.

29 Pouliakas, K., *The Skills Mismatch Challenge in Europe. Employment and Social Developments in Europe,* Luxembourg: Publications Office of the European Union, 2012.

30 Di Paolo, Antonio, and Mane, Ferran, *Misusing our talent? Overeducation, overskilling and skill underutilisation among Spanish PhD Graduates,* The Economic and Labour Relations Review, 2016.

salary and other aspects of the job. High satisfaction for instance may mean that the mismatch is in fact voluntary, which can be the case of those doctorate holders working in jobs for which they may be formally overqualified, but not when it comes to the actual job requirements and content. Di Paolo et al. (op.cit.) further demonstrated, based on the 2011 survey of early labour market experiences of Catalan doctorate holders, that underutilisation of skills is significantly more damaging to job satisfaction than disregard of the attained level of qualification, and that when education and skills mismatches are combined, the level of satisfaction with the job is the lowest. One of their conclusions is that it is the extent to which doctorate holders can utilise their 'scientific knowledge' in the workplace that seems to determine job satisfaction.

5.5 Job satisfaction and plans for career change

Doctorate holders are mostly satisfied with their jobs, with researchers being more satisfied with the intellectual challenge of their position than non-researchers, but less so with job security, salary and work/life balance

Our results indicate overall high levels of satisfaction with different aspects of respondents' jobs. Doctorate holders engaged in research are more satisfied with the intellectual challenge inherent in their positions than respondents working in non-research positions, while being significantly less satisfied with job security, salary and work/life balance. When looking at satisfaction levels across the different employment sectors, it is encouraging to see similarly high levels of satisfaction with intellectual challenge, despite the fact that the level of engagement in research across sectors varies. At universities, doctorate holders are least satisfied with job security, which is unsurprising given the low share of permanent contracts compared to other sectors mentioned earlier. In the industry and services/other business sectors, as well as in the government/other public sector, on the other hand, job security is one of the most highly rated job attributes. Overall mean levels of satisfaction across all job-related aspects are highest for those working in the government or public sector and industry and services, followed by the academic sector and hospitals.

More researchers are planning to change to a non-research career than vice versa

Here, another noteworthy finding is that significantly more researchers are planning to change their career to a non-research career in the next three years (ca. 40 %) than vice versa. Considering that researchers represent 80 % of the total number of the employed doctorate holders, it is important to understand the underlying reasons for this, especially as these reasons may be very different across different sectors of employment.

5.6 Doctorate completion time and type of doctoral training

The majority of respondents needed four to five years to complete their doctorates, with younger doctorate holders having a shorter completion time

Only one quarter of doctorate holding respondents finished their doctorate studies within the period of three years, which is the most typically prescribed duration for a Ph.D. in most of the countries involved in this survey, according to the 2015 Bologna implementation report (2015)[31]. The majority (nearly 60 %) needed four to five years and 18 % needed six years or more to complete their doctorate. In our sample, younger doctorate holders have shorter completion time which dovetails with the results of the ESF pilot study. It is also consistent with the general trend of decrease in the median Ph.D. completion time over the past decades, as universities are increasingly starting to monitor *time to degree* as one of the indicators in the evaluation of the quality of doctoral education.

Less than half of doctorate holders followed a structured doctoral programme, traditional individually supervised study still being most widespread

While in Europe there are growing numbers of structured doctorate programmes[32] and more systemic approaches towards doctoral education, traditional individually supervised study still remains most widespread (Bologna implementation report, op.cit.). In our sample of doctorate holders, 56 % of respondents followed an individually supervised study during their doctorate training

31 European Commission/EACEA/Eurydice, *The European Higher Education Area in 2015: Bologna Process Implementation Report.* Luxembourg: Publications Office of the European Union, 2015.

32 EUA (European University Association), *Doctoral programmes in Europe's universities: achievements and challenges: Report prepared for European universities and ministers of higher education,* Brussels and Geneva, 2007.

and 44 % followed a structured doctorate-training programme. There were no statistically significant differences in doctorate completion time between the two groups, similar to the ESF pilot results.

5.7 Transition to first job

Most doctorate holders experienced a smooth transition into the job market, yet those who went for non-academic careers felt less prepared

Our study suggests that doctorate holders experienced a relatively smooth transition into the job market, with 40 % of them already having a job at the completion of their doctorate, and those without, on average, having found one in four months. That a large majority of doctorate holders already had a job at the completion of their doctorate may indicate that many stayed on at universities, which once again points to the attractiveness of a university career for doctorate holders, at least in early career stages. More than half of doctorate holders pursued a post-doctorate position, which is often required in order to get a research position afterwards. The two most important reasons for making this choice were that a post-doctorate was needed for the respondent's desirable career path and that a post-doctorate allowed respondents to get additional training in their Ph.D. field.

Although, overall, respondents see their doctorate as an added value, and would do it again if they had to restart their career, the attitudes of researchers and non-researchers differ. Namely, researchers felt more prepared for their first job compared to non-researchers, and their job prospects were clearer to them than for non-researchers. Doctorate holders obtain their qualifications through academic research, and thus it should not be surprising that they feel best prepared for a career in academia. However, doctoral education today is also expected to train doctoral students for a range of other careers, as discussed below. Our findings may indicate that a transition to a job in non-academic sectors – where non-researchers are concentrated – may be more difficult, and could suggest that doctoral education institutions should make efforts to improve training that prepares doctoral students for non-academic careers.

5.8 Doctoral training and skills

There is a need for better training in professional or transferable skills such as communication, networking, or project management

The reform of doctoral education has been high on European and American policy agendas for a number of years. Kehm (2007) explains that, in the context where more and more doctorate holders look for jobs outside academia, doctoral students cannot remain narrowly educated within disciplinary boundaries, with skills geared mainly towards academic teaching and research[33]. Nerad (2015, op. cit.) also argues that in order to access a broader variety of careers, in addition to the traditional Ph.D. completion skills (e.g. analytical skills, writing and publishing) doctoral students need to develop professional skills such as teamwork, communication, project management, career management, and/or personal effectiveness. The ESF-initiated *Member Organisation Forum on Research Careers* defines these skills as transferable skills, i.e. *"learned in one context (for example research) that are useful in another (for example future employment whether this is in research, business, etc.)"* [34] Through the *European Alliance on Research Career Development* (2012), ESF promoted the professional development of researchers in Europe and, building on UK experience, called for a common European Researchers' Professional Development Framework for all career stages in order to improve researchers' "*competences, employability and ability to pursue multiple career paths*"[35]. While the feasibility of such a joint framework is yet to be studied, the European Commission's *Seven Principles of Innovative Doctoral Training* (2011)[36], also building on the EUA's Salzburg Principles I and the Salzburg II Recommendations, encourage countries and institutions to develop training in transferable skills as part of their doctoral training provision.

Looking at our findings with regard to skills acquired by doctorate holders during their studies compared to the skills they need in their work place, we can say that, in general, doctorate holders have acquired the necessary skills for their jobs.

33 Kehm, M. Barbara, *Quo Vadis doctoral education? New European approach in the context of global challenges,* European Journal of Education, Vol. 42, No. 3, 2007.

34 European Science Foundation, *Research Careers in Europe: Landscape and Horizons,* a report by the ESF Member Organisation Forum on Research Careers, 2010.

35 European Science Foundation, *Developing Research Careers In and Beyond Europe: Enabling – Observing – Guiding and Going Global,* a report by the ESF Member Organisation Forum 'European Alliance on Research Career Development' (EARCD), 2012.

36 European Commission, Report of Mapping Exercise on Doctoral Training in Europe 'Towards a Common Approach', 2011.

The only notable discrepancies concerned what can be defined as professional or transferable skills such as communication, networking, or project management. While some of these skills can also be learned on the job, doctoral training institutions may wish to further examine whether and how to improve training in these areas, especially since these skills were also rated as important for respondents' current position. As for research skills such as knowledge of methodology, subject knowledge or critical-analytical thinking, these were rated, for the most part, as sufficient for, or even be slightly under-used in, their job, depending on the sector of employment.

While some countries such as the UK or Ireland have national policies for researchers' professional training, others let universities develop their own approaches. Transferable skills training has been introduced as either part of the obligatory coursework, like in Swiss universities, or as optional modules that students can take depending on their need, like in some German universities where these modules are often delivered by graduate schools or academies. A LERU Advice Paper offers testimony of the large array of best practices in doctoral education adopted across some of the universities in Europe in this regard (LERU, 2014)[37].

Some of the training can, of course, occur through exposure to and collaboration with industry, government, NGOs, museums, etc. during doctoral training. EUA's DOC CAREERS (2009) project has highlighted the multiple benefits of collaborative doctoral programmes that involve industry through, for example, teaching by non-academics from relevant industry sectors, collaborative project work, or placements during research training[38]. This type of collaboration can only bring about a better understanding by the Ph.D. candidate of the skills required in a relevant sector of their desired career, and would help to adjust their doctoral training goals accordingly. Mangematin (1999), for instance, used a sample of science and engineering Ph.D. graduates from the Grenoble INP Institute of Engineering to demonstrate that those Ph.D. students who aspired to an academic career focused on their publication record significantly more than those who planned a career in industry: the latter prioritised collaborations with industry during their studies[39]. In our sample only a very small share of respondents were, for instance, funded by industry during their doctoral study (3.6 %), and the levels of cross-sectoral collaboration in the post-doctorate phase were relatively modest (20-30 %).

5.9 Career orientation and support for job search

Institutional career orientation and support should offer doctoral candidates tools for evaluation and development of their skills, and assist their largely independent job search by raising awareness of their broader career options

Our survey explored the importance of available resources for a first job search, and university career centres were rated as the least important resource for job search, well behind search on the Internet and using one's social and professional networks. It would therefore appear that doctorate holders were not supported by career services in their job search, were not aware of such support being available or did not consider these services as relevant or adapted to the doctorate level, but looked for a job largely on their own or with the advice of their academic supervisor. It would seem appropriate that institutional career services should focus on activities supporting doctoral students in their job search through independent skills evaluation and tools for networking with the relevant actors.

That non-researchers – who are mostly concentrated in non-academic sectors – felt less aware of the various career options available for them after graduation, does suggest that there is also a need for career orientation and advice presenting a broad range of career options including those outside the traditional academic track. Students and doctoral candidates also need to be presented available data – ideally from their institution or nationally and internationally available reports and studies – as to their possible employability prospects within and outside academia, so that a choice of going into a particular doctoral programme, or requesting a particular supervisor, is well-informed and reasoned.

37 LERU, *Good Practice Elements in Doctoral Training,* Advice Paper No. 15, January 2014.
38 EUA, *Collaborative Doctoral Education, University-Industry Partnerships for Enhancing Knowledge Exchange,* DOC-CAREERS project, EUA Publications, 2009.
39 Mangematin, Vincent, *PhD Job Market: Professional Trajectories and Incentives during the PhD, Research Policy,* February 2000.

5.10 Mobility

Doctorate holders are highly geographically mobile, with EU and North America being the most popular destinations

The level of mobility is relatively high, with 40 % of doctorate holders having lived in a foreign country for more than three months since completion of their doctorate. The MORE2 large-scale survey of researchers in all stages of their career working in Higher Education Institutions across the EU countries[40] reported slightly lower levels of post-PhD mobility with a duration of more than three months (30 %). Researchers are significantly more mobile (44 %) than non-researchers (23 %), and respondents in natural sciences, and science and engineering, are more mobile compared to respondents in social sciences, medical and health sciences, and humanities. Not surprisingly, the highest amount of mobility is within Europe, North America being the next most popular destination. A small share of respondents also lived in one or more other European, non-EU countries, while moving to other regions is relatively rare.

The level of transnational collaboration among researchers is moderately high while the level of cross-sectoral collaboration is more modest

Nearly 60 % of employed researchers conduct research with researchers based in another country/region, with the highest share of collaboration occurring at RPOs and RTOs, at universities, and in industry. The level of transnational collaboration is somewhat lower than the EU-wide level of 77 % reported in the MORE2 survey report (op.cit.), but it has been shown that levels of collaboration are highest in the later stages of researchers' careers. The level of cross-sectoral collaboration is relatively low, in the range of 23-33 %, depending on the type of collaboration.

5.11 Gender aspects

Men and women are concentrated in different research fields and employment sectors, have similar levels of job satisfaction, and are similarly represented in senior academic posts and other position levels

Among survey respondents who identified their gender in the survey, 56 % were men and 44 % women. Our data reflects a concentration of men and women in different research fields as well as in different sectors of employment. Men are over-represented in the natural and engineering sciences, while women are more concentrated in the medical sciences, humanities and social sciences. After completion of their doctorate, men are more likely to pursue post-doctoral positions than women. As regards the current sector of employment, women work more often at universities as well as in the government and public sector, while men, on the other hand, are significantly more represented in industry and the services and other business sector. It would seem, therefore, that, although men start out with a post-doctorate position, which is often at a university or in a RPO, they then tend to move to other sectors more often than women.

Men and women have very similar levels of satisfaction with the various aspects of their job, as well as similar levels of staff management responsibilities. In terms of engagement in research, similarly high shares of men and women work as researchers, and similar proportions of men and women work in senior academic posts and other position levels. In terms of differences in research outputs, men tend, more often than women, to publish as lead authors, develop new research resources or software, or file a patent; women, more often than men, are involved in public engagement activities, achieve significant policy impact, contribute a book chapter and take part in national conferences. Some of these differences reflect different disciplinary traditions. For instance, it is not surprising that a higher share of women write book chapters, reflecting a specificity of the publishing tradition in the humanities. Men on the other hand are over-represented in natural and engineering sciences, and therefore their outputs more often involve patents or new research resources or software.

40 *MORE2 project: Support for continued data collection and analysis concerning mobility patterns and career paths of researchers,* Higher Education Sector Report, Brussels, June 2013.

Women also appear to be significantly less mobile than men in the post-doctoral phase, with only one third of women having lived abroad for more than three months since the completion of their doctorate, compared to nearly half of the men.

Among the few of those who took a career break women were twice as many as men and their reasons differed – women took a break because of childcare commitments and men mainly due to unemployment

Among employed respondents, 11 % of took a career break since their doctorate completion. Twice as many women than men took a career break, and women and men took career breaks for differing reasons: while women mainly took a break for childcare commitments, men were more likely to be 'forced' into a break because of unemployment. Almost no men took a break in order to take parental leave. While there were more respondents who found it easy or relatively easy to return to their previous position after the break than those who felt it was (fairly or very) difficult, women found the return somewhat more difficult than men.

5.12 Methodological approach

The study demonstrated the feasibility and appropriateness of the selected approach and instrument to study the careers of diverse groups of doctorate holders

The study once again demonstrated the feasibility and appropriateness of the selected approach and instrument to study the careers of diverse groups of doctorate holders in a cross-sectional or longitudinal manner. It allows for the selection of representative samples of graduates within participating organisations, and the possibility to create a central statistical database that can be used as a benchmark for analysis at the level of individual organisations.

Compared to the ESF pilot study, the current group of Participating Organisations (POs) included significantly more universities (six here, compared to one in the pilot), and therefore the respondents – doctorate graduates – represented a much broader variety of career paths: doctorate holders working as researchers in academia, industry, government, hospitals, etc. but also doctorate holders engaged in non-research careers in the various sectors. In the pilot study, the group under study was largely made up of academia-based post-doctorates performing basic research, which were funded or employed by the POs. The questionnaire in this study was developed further to account for the broader variety of the target population.

The response rate across all participating organisations was 23 %. The two reminders sent to the mailing list proved very effective, and resulted in corresponding peaks in responses. Some of the organisations with smaller samples, such as the IST Austria or Luxembourg Institute for Science and Technology, achieved 73 % and 72 % response rates respectively, while one university, Goethe University Frankfurt, even despite targeted reminders, remained at an exceptionally low rate of 17 %. Response rates of other universities ranged from 21 % and 47 %. Although according to the protocol, POs were expected to clean the contact lists of their doctorate holders, but universities with larger samples did not manage to clean their email addresses. As a result 15 % of all 9954 email addresses bounced as invalid, or for a different technical reason (e.g. full email inbox). It has to be noted that two organisations, the AXA Research Fund and Goethe University Frankfurt took part in the survey a second time, the first time being the pilot survey, and a lower percentage of response rate for these POs compared to the pilot study may potentially indicate a certain degree of survey fatigue, and should be taken into consideration when planning future waves of surveys in the same POs.

The high survey completion rate (90 %) indicates that those who started the questionnaire seem to have found it relevant and meaningful, and reached the end of the questionnaire. This is encouraging, especially considering that the questionnaire took about 20 min to complete.

As the pilot study also highlighted, it is important to be "alert to intra-organisational features or variances in salary, gender and geographic location that can cause distortions in overall trends, particularly if sample numbers are relatively small." It should therefore be kept in mind that the data presented in this report should not be generalised beyond the participating institutions.

There is a clear benefit to continuing and scaling up this study in the future, to enable better benchmarking opportunities for participating organisations

There is a clear benefit in continuing and scaling up this study in the future, which would allow for the study of larger groups of organisations, and provide more possibilities for continuous benchmarking for participating organisations, especially if studies focused on a more homogenous group e.g. technical universities. The possibility of country-level studies needs to be further explored.

The current survey was a retrospective cross-sectional survey providing up to seven years of career path data, and it can be repeated in the same way for new cohorts in three -four years. For organisations that wish to track their doctorate holders in a longitudinal way, it is possible to trace the same population with a follow-up survey at regular intervals of several years. For two participating organisations, this survey was a second wave, and included the cohorts previously surveyed in the ESF pilot survey along with new graduates from the past three years.

For organisations wanting to pursue the challenge of tracking their doctorate holders, it is of the utmost importance to gather the personal contact information of, and keep contact with, their alumni. This can be achieved, for example, via a short PhD graduation survey, which can collect a personal email contact and ask if the respondents would be willing to take part in any future career follow-up surveys. While the graduation survey could be useful for collecting data on e.g. evaluation of the doctorate programme and career destinations, the follow-up surveys could then study the graduates' entry into the labour market, career progression and use of the doctorate skills in the job.

Annex: Summary statistics of survey questions

This Annex contains tables of basic descriptive statistics for all analysed survey questions. As in the main report, detailed survey questions related to the currently not employed respondents and self-employed respondents were excluded from analysis. Below each table, notes about respondents eligible to answer the corresponding question are presented as needed. This information should be considered when interpreting the reported statistics.

1. Doctorate education

q1 - Years from formal admission, derived from question: In which year did you start your doctorate (formal admission)?

	%	Count
5 years or less	16.2	368
6-7 years	29.2	664
8-9 years	28.6	651
10-11 years	19.1	436
12 years or more	7.0	159
Total	100.0	2277

Mean (std. dev.): 7.94 (2.42)

q2 - Years from thesis defence, derived from question: In which year did you defend your doctorate thesis?

	%	Count
1-2 years	38,8	883
3-4 years	26,5	604
5-7 years	34,7	790
Total	100.0	2277

Mean (std. dev.): 3.44 (1.96)

q3 - Please select the field (Field or Science and Technology Classification in the Frascati Manual) that best corresponds to your doctorate.

	%	Count
1.1 Mathematics	2,3	53
1.2 Computer and information sciences	9,9	225
1.3 Physical sciences	6,2	140
1.4 Chemical sciences	2,8	64
1.5 Earth and related Environmental sciences	7,2	163
1.6 Biological sciences (excluding Medical and Agricultural)	16.3	372
1.7 Other natural sciences	1.8	41
2.1 Civil engineering	1.5	33
2.2 Electrical engineering, Electronic engineering, Informat	1.8	40
2.3 Mechanical engineering	3.4	77
2.4 Chemical engineering	.3	7
2.5 Materials engineering	1.8	42
2.6 Medical engineering	.4	9
2.7 Environmental engineering	.7	16
2.8 Environmental biotechnology	.5	11
2.9 Industrial biotechnology	.0	1
2.10 Nano-technology	.5	11
2.11 Other engineering and technologies	.3	7
3.1 Basic medicine	2.1	47
3.2 Clinical medicine	4.2	97
3.3 Health sciences	4.6	104
3.4 Medical biotechnology	.5	11
3.5 Other medical sciences	1.1	25
4.1 Agriculture, Forestry, and Fisheries	.3	7
4.2 Animal and Dairy science	.1	1
4.4 Agricultural biotechnology	.0	
4.5 Other agricultural sciences	.3	8
5.1 Psychology	3.3	76
5.2 Economics and Business	6.8	154
5.3 Educational sciences	2.2	50
5.4 Sociology	2.7	62
5.5 Law	2.4	54
5.6 Political science	1.8	41
5.7 Social and economic geography	.7	16
5.8 Media and communications	.5	11
5.9 Other social sciences	1.7	38
6.1 History and Archaeology	1.6	35
6.2 Languages and Literature	2.8	63
6.3 Philosophy, Ethics and Religion	1.7	38
6.4 Arts (arts, history of arts, performing arts, music)	.4	9
6.5 Other humanities	.8	19
Total	100.0	2277

q3 - Please select the field (Field or Science and Technology Classification in the Frascati Manual) that best corresponds to your doctorate. Recoded into a shorter list of fields.

	%	Count
Natural sciences	46.5	1058
Engineering and technology	11.2	254
Medical and health sciences	12.5	284
Agricultural sciences	.7	16
Social sciences	22.0	502
Humanities	7.2	164
Total	100.0	2277

q4 - Please indicate if your doctorate was achieved through structured training programme or individually supervised study? Select the option that best describes your situation.

	%	Count
Structured training programme	43.6	987
Individually supervised study	56.4	1276
Total	100.0	2263

q5 - In which country was your doctorate awarded?

		Count
AT - Austria	11.5	261
AU - Australia	.3	6
BE - Belgium	2.1	47
CA - Canada	.6	14
CH - Switzerland	.3	6
CL - Chile	.2	5
DE - Germany	24.0	546
DK - Denmark	.4	9
ES - Spain	1.8	41
FI - Finland	.3	7
FR - France	6.2	141
FX - France, Metropolitan	.5	12
GB - United Kingdom	2.5	57
HK - Hong Kong	.2	5
HR - Croatia	10.9	249
IN - India	.2	5
IT - Italy	1.2	28
KE - Kenya	.2	5
LU - Luxembourg	11.1	254
NL - Netherlands	13.2	300
PL - Poland	.1	2
PT - Portugal	.3	7
RE - Reunion	.1	1
RO - Romania	11.1	253
TR - Turkey	.1	3
US - United States	.6	14
VN - Vietnam	.0	1
ZA - South Africa	.0	1
Total	100.0	2275

q6 - Which of the following were financial sources during your doctorate training period? Select all that apply.

	Percent (count)		
	No	Yes	Total
Fellowship or scholarship from your institution	67.6	32.4	100.0
	(1521)	729	2250
Fellowship or scholarship from government	75.0	25.0	100.0
	1688	562	2250
Fellowship or scholarship from industry	96.4	3.6	100.0
	2170	80	2250
Fellowship or scholarship from other business sector	99.6	.4	100.0
	2240	10	2250
Fellowship or scholarship from a private non-profit organisation	96.2	3.8	100.0
	2165	85	2250
Fellowship or scholarship from a public research fund	81.3	18.7	100.0
	1829	421	2250
Fellowship or scholarship from abroad	96.5	3.5	100.0
	2172	78	2250
University position/ teaching and/or research assistantship	70.3	29.7	100.0
	1581	669	2250
Another job	86.7	13.3	100.0
	1950	300	2250
Loan	98.1	1.9	100.0
	2207	43	2250
Personal savings	86.7	13.3	100.0
	1950	299	2250
Family support	88.70	11.30	100.0
	1996	254	2250
Other sources	95.2	4.8	100.0
	1996	254	2250

q7 - How would you rate your own competences at the time you completed your doctorate?

	Percent (count)					
	Very bad	Fairly bad	Fairly good	Very good	Total	Mean (std. dev.)
Methodology	0.1	2.1	39.8	58.0	100.0	3.56
	2	45	864	1256	2167	.54
Registered innovation	2.7	12.3	49.4	35.6	100.0	3.18
	58	265	1063	765	2151	.75
Critical-analytical thinking	0.0	2.6	31.9	65.5	100.0	3.63
	0	56	689	1413	2158	.53
Career management	4.4	21.6	46.8	27.2	100.0	2.97
	95	467	1010	586	2158	.81
Employment context	4.5	30.9	42.7	21.9	100.0	2.82
	97	665	919	471	2152	.82
Problem solving	0.0	2.1	41.3	56.6	100.0	3.55
	0	45	888	1217	2150	.54
Effective communication	0.8	8.7	48.6	41.9	100.0	3.32
	18	186	1043	900	2147	.66
Creativity	0.2	8.8	46.1	45.0	100.0	3.36
	4	189	996	972	2161	.65
Flexibility	0.4	6.2	46.3	47.2	100.0	3.40
	8	132	996	1016	2152	.62
Networking	3.5	23.3	46.8	26.3	100.0	2.96
	76	497	998	560	2131	.80
Subject knowledge	0.0	2.7	37.0	60.2	100.0	3.57
	1	59	797	1297	2154	.55
Project management	1.4	16.8	46.8	35.0	100.0	3.15
	30	363	1010	755	2158	.74
Team working	0.8	9.0	46.1	44.1	100.0	3.33
	17	195	992	949	2153	.67
Leadership	4.0	27.1	47.4	21.5	100.0	2.86
	86	573	1004	455	2118	.79
Languages	2.1	6.6	38.4	52.9	100.0	3.42
	45	142	827	1140	2154	.71
Entrepreneurship	23.1	41.3	26.6	9.1	100.0	2.22
	491	879	566	194	2130	.90
Intellectual property	25.3	35.8	26.0	12.9	100.0	2.26
	544	769	557	276	2146	.98

2. Transition from doctorate to the first position

q8 - Were you looking for a job after completion of your doctorate?

	%	Count
Yes	62.1	1355
No	37.9	829
Total	100.0	2184

q9 - How important were the following resources when looking for your FIRST job after completion of your doctorate?

	Percent (count)					
	Not at all important	Slightly important	Somewhat important	Very Important	Total	Mean (std. dev.)
Academic advisor/supervisor	21.7	18.1	24.2	36.0	100.0	2.75
	287	239	320	476	1322	1.16
University career guidance centre	63.4	21.1	8.7	6.8	100.0	1.59
	835	278	114	90	1317	.91
Peers (e.g. colleagues, alumni)	14.4	18.3	34.7	32.6	100.0	2.86
	190	241	459	431	1321	1.03
Web search/online job portal	14.1	10.3	24.1	51.5	100.0	3.13
	187	137	320	685	1329	1.08
Job advertisement in newspapers, professional journals, etc.	36.7	20.0	21.7	21.5	100.0	2.28
	485	265	287	284	1321	1.17
Job/career fairs	50.5	22.9	17.0	9.6	100.0	1.86
	667	302	224	127	1320	1.02
Job advertisements in Department/ University	43.4	19.8	21.2	15.6	100.0	2.1
	571	260	279	205	1315	1.1
Previous job	35.8	15.9	23.3	25.0	100.0	2.4
	472	210	306	328	1316	1.2
Social and professional networks	15.1	14.3	27.0	43.6	100.0	3.0
	199	189	357	576	1321	1.1
Recruiters or head hunters	65.2	13.8	12.1	8.9	100.0	1.65
	857	181	159	117	1314	1.00

Only applicable to those who were looking for a job after doctorate completion.

q10 - Did you take a postdoctorate position (or equivalent) at a university or a research performing organisation after obtaining your doctorate?

	%	Count
Yes	56.2	1218
No	43.8	951
Total	100.0	2277

q11 - Thinking back to your FIRST post doctorate position, how important were each of these reasons in influencing your decision to accept that position:

	Percent (count)					
	Not at all important	Slightly important	Somewhat important	Very important	Total	Mean (std. dev.)
It was the next step in my desirable career path	4.4	7.6	22.7	65.3	100.0	3.49
	53	91	273	786	1203	.82
It was encouraged by my PhD supervisor	21.4	30.1	28.0	20.4	100.0	2.47
	256	360	335	244	1195	1.04
I wanted to continue research or receive additional training in my PhD field	5.5	13.2	22.8	58.5	100.0	3.34
	66	158	275	704	1203	.90
I wanted to receive training/experience in another field	23.2	21.6	30.1	25.0	2.57	2.57
	275	255	356	296	1182	1.10
I wanted to work with a specific person, organization or company	21.2	21.7	29.5	27.6	100.0	2.64
	253	258	351	329	1191	1.10
I wanted to carry out and support teaching activities	40.2	23.1	18.4	18.4	100.0	2.15
	479	275	219	219	1192	1.14
It was the only acceptable employment I could find at the time	45.3	16.6	19.4	18.7	100.0	2.12
	537	197	230	222	1186	1.18
Good salary available	29.1	27.5	27.4	15.9	100.0	2.30
	347	328	327	190	1192	1.05
Good working conditions other than salary	12.2	16.5	36.6	34.6	100.0	2.94
	145	197	436	412	1190	1.00
Spouse/personal reasons	38.6	19.9	17.8	23.8	100.0	2.27
	458	236	211	282	1187	1.20

Only applicable to those are/were in post-doc position at a university/research organisation after doctorate.

q12 - Is this postdoctorate position your current position?

	%	Count
Yes	47.2	572
No	52.8	639
Total	100.0	1211

Only applicable to those are/were in post-doc position at a university/research organisation after doctorate.

3. Employment situation and career related experience

q13 - Please tick your current main employment status

	%	Count
Permanent Full-time Employed (30 hours per week or more)	63.1	1363
Permanent Part-time Employed (less than 30 hours per week)	2.3	50
Temporary Full-time Employed (30 hours per week or more)	23.9	517
Temporary Part-time Employed (less than 30 hours per week)	3.4	73
Self Employed	2.4	53
Full time study	.1	2
Career break	1.0	22
Retired	.1	3
Unemployed	3.7	80
Total	100.0	1261

q14 - Were you employed at any time after completing your doctorate?

	%	Count
Yes	47.5	76
No	52.5	84
Total	100.0	159

Only applicable to currently not employed .

q51 - Approximately how many months passed between the time you completed your doctorate and your first paid job?

	%	Count
Already had a job	42.6	971
1 month or less	23.2	528
2-6 months	13.3	302
7-12 months	5.7	129
More than 12 months	2.3	53
Total	100.0	1983

Mean (std. dev.): 3.55 (5.31)

Only applicable to currently employed. Mean value is reported only for respondents who did not have a job at the time of doctorate completion.

q52 - How many times have you changed employer (including post-doc positions) since the completion of your doctorate?

	%	Count
None	57.2	1137
1	21.6	430
2	14.5	287
3	5.1	100
4	1.2	23
5	.5	9
Total	100.0	1987

Mean (std. dev.): 0.73 (1.01)

Only applicable to currently employed.

q53 - Please indicate the sector of your current employment

	%	Count
University	46.9	936
Research performing and R&T organisations	14.7	292
Business sector: industry	11.8	236
Business sector: services	5.3	105
Business sector: other	.2	3
Government and other public sector	8.2	163
Hospital	5.2	103
Non-higher education	2.2	45
Private non-profit sector	1.4	29
Other (please specify)	4.2	84
Total	100.0	1996

Only applicable to currently employed.

q54 - Which of the following best describes your current occupation?

	Percent (count)		
	No	Yes	Total
Management occupations	85.6	14.4	100.0
	1698	285	1983
Business and financial operations occupations	94.5	5.5	100.0
	1873	110	1983
Computer and mathematical occupations	83.7	16.3	100.0
	1659	323	1982
Architecture and engineering occupations	94.1	5.9	100.0
	1867	116	1983
Life science occupations	75.9	24.1	100.0
	1506	477	1983
Physical science occupations	87.0	13.0	100.0
	1724	258	1982
Social science occupations	88.2	11.8	100.0
	1748	235	1983
Community and social service occcupations	98.9	1.1	100.0
	1962	21	1983
Legal occupations	95.8	4.2	100.0
	1900	83	1983
Education, training, and library occupations	76.9	23.1	100.0
	1525	458	1983
Arts, design, entertainment, sports, and media occupations	97.7	2.3	100.0
	1937	46	1983
Healthcare practitioners and technical occupations	93.1	6.9	100.0
	1846	136	1982
Healthcare support occupations	96.5	3.5	100.0
	1912	70	1982
Protective service occupations	99.3	0.7	100.0
	1968	14	1982
Food preparation and serving selated occupations	99.9	0.1	100.0
	1980	3	1983
Building and grounds cleaning and maintenance occupations	99.7	0.3	100.0
	1977	5	1982
Personal care and service occupations	99.3	0.7	100.0
	1968	14	1982
Sales and related occupations	99.0	1.0	100.0
	1964	19	1983
Office and administrative support occupations	97.6	2.4	100.0
	1936	47	1983
Farming, fishing, and forestry occupations	99.3	0.7	100.0
	1969	14	1983

Construction and extraction occupations	99.3	0.7	100.0
	1970	13	1983
Installation, maintenance, and repair occupations	98.9	1.1	100.0
	1962	21	1983
Production occupations	99.0	1.0	100.0
	1963	19	1982
Transportation and material moving occupations	99.3	0.7	100.0
	1970	13	1983
Military specific occupations	99.8	0.2	100.0
	1978	5	1983
Other occupations	90.9	9.1	100.0
	1802	181	1983

Only applicable to currently employed.

q55 - What was the MINIMUM education level for your current main job?

	%	Count
Bachelor (or lower)	7.0	139
Master	26.5	526
Doctorate	51.0	1015
Postdoc	13.5	270
Other	2.0	39
Total	100.0	1989

Only applicable to currently employed.

q56 - To what extent is the content of your work in your current main job related to your doctorate degree?

	%	Count
Closely related	58.1	1152
Partly related	32.5	645
Not related	9.3	185
Total	100.0	1982

Only applicable to currently employed.

q57 - To what extent are the following competences important in your current main job?

	Percent (count)					
	Not at all important	Slightly important	Somewhat Important	Very important	Total	Mean (std. dev.)
Methodology	4.1	6.2	22.3	67.4	100.0	3.53
	80	121	434	1311	1946	.79
Registered innovation	8.4	17.2	28.4	46.0	100.0	3.12
	162	335	552	895	1944	.98
Critical-analytical thinking	0.5	3.1	17.1	79.3	100.0	3.75
	9	61	331	1540	1941	.53
Career management	6.4	15.4	37.3	40.9	100.0	3.13
	125	299	723	792	1939	.90
Employment context	7.0	21.9	35.1	36.0	100.0	3.00
	136	424	679	698	1937	.93
Problem solving	0.5	3.0	21.2	75.3	100.0	3.71
	9	59	413	1464	1945	.54
Effective communication	0.3	3.7	22.6	73.5	100.0	3.69
	5	72	439	1428	1944	.55
Creativity	0.9	8.1	34.5	56.5	100.0	3.47
	17	157	671	1098	1943	.68
Flexibility	0.5	8.2	32.2	59.1	100.0	3.50
	9	160	625	1146	1940	.66
Networking	2.0	10.3	37.7	50.0	100.0	3.36
	38	199	731	970	1938	.74
Subject knowledge	2.1	6.3	24.3	67.3	100.0	3.57
	40	123	472	1306	1941	.70
Project management	1.0	8.2	32.7	58.0	100.0	3.48
	20	160	636	1127	1943	.69
Team working	1.0	7.9	31.6	59.6	100.0	3.50
	19	154	614	1159	1946	.68
Leadership	5.6	16.8	37.9	39.7	100.0	3.12
	108	326	737	771	1942	.88
Languages	6.6	11.7	26.3	55.3	100.0	3.30
	128	227	509	1070	1934	.92
Entrepreneurship	34.4	29.5	21.8	14.3	100.0	2.16
	666	571	422	277	1936	1.05
Intellectual property	28.5	30.4	20.8	20.3	100.0	2.33
	551	588	403	392	1934	1.09

Only applicable to currently employed.

q58 - Did you take a career break for a year or more since the completion of your doctorate?

	%	Count
Yes	11.1	219
No	88.9	1748
Total	100.0	1966

Only applicable to currently employed.

q59 - What was your main reason(s) for taking a career break?

	Percent (count)		
	No	Yes	Total
Desire to diversify career experience	91.4	8.6	100.0
	200	19	219
Unemployment	53.2	46.8	100.0
	116	102	219
Childcare commitments	58.4	41.6	100.0
	128	91	219
Other family reasons	88.9	11.1	100.0
	194	24	219
Sickness (personal health problems)	96.0	4.0	100.0
	210	9	219
Travelling	96.2	3.8	100.0
	210	8	219
Other reasons	89.6	10.4	100.0
	196	23	219

q60 - After your career break, how easy or difficult was it to return to your previous position or find another suitable one?

	%	Count
Very easy	25.6	55
Fairly easy	30.8	67
Fairly difficult	19.8	43
Very difficult	23.8	52
Total	100.0	55

Mean (std. dev.): 2.15 (0.95)

Only applicable to currently employed who have taken a career break.

q61 - In your current main job are you engaged in research?

	%	Count
Yes	80.3	1579
No	19.7	387
Total	100.0	1966

Only applicable to currently employed.

q62 - Please indicate your position.

	%	Count
Post Doctorate position/junior researcher	34.4	542
Research Fellow/Researcher	15.4	243
Junior/Associate Lecturer	1.7	27
Senior Researcher	3.4	54
Senior Lecturer	1.9	31
Assistant Professor/Junior Professor	15.3	242
Associate Professor/Reader	4.1	64
Professor/Head of Department	1.6	26
Director, Head of Unit	2.6	40
Analyst, Specialist	3.6	56
Technician	.6	10
Engineer	3.1	49
Project Manager	3.4	53
Other (please specify)	8.9	140
Total	100.0	1578

Only applicable to currently employed, engaged in research in current job.

q63 - At which level (as per European Framework for Research Careers) do you work?

	%	Count
R1 First Stage Researcher	10.8	168
R2 Recognised Researcher	44.5	690
R3 Established Researcher	38.8	602
R4 Leading Researcher	5.9	91
Total	100.0	1551

Only applicable to currently employed, engaged in research in current job.

q64 - How important were the following reasons for taking your current position?

	Percent (count)					
	Not at all important	Slightly important	Somewhat important	Very important	Total	Mean (std. dev.)
It was the next step in my desirable career path	3.3	9.3	25.5	61.9	100.0	3.46
	34	96	264	641	1035	.79
I wanted to continue research in the field of my PhD	12.2	14.5	26.5	46.8	100.0	3.08
	126	150	273	482	1031	1.05
I wanted to receive training/experience in another field	20.5	26.8	31.6	21.1	100.0	2.53
	211	276	324	216	1027	1.04
I wanted to carry out research independently	12.2	18.4	27.0	42.5	100.0	3.00
	126	190	279	439	1034	1.05
I wanted to work with a specific person, organisation or company	22.8	23.3	29.6	24.3	100.0	2.55
	235	241	306	250	1032	1.09
I wanted to carry out and support teaching activities	35.5	22.7	21.7	20.1	100.0	2.26
	365	233	222	207	1027	1.14
It was the only acceptable employment I could find at the time	48.7	17.4	21.7	12.1	100.0	1.97
	496	177	221	124	1018	1.09
Good salary available	20.8	23.0	36.4	19.9	100.0	2.55
	213	236	373	204	1026	1.03
Good work conditions other than salary	8.3	18.1	37.9	35.6	100.0	3.01
	85	185	386	363	1019	.93
Spouse/personal reasons	31.4	19.7	25.2	23.8	100.0	2.41
	315	197	253	239	1004	1.16

Only applicable to currently employed, engaged in research in current job.

q65 - Which of the following activities do you perform as part of your job?

	Percent (count)		
	No	Yes	Total
Research performing activities (including publications)	8.0	92.0	100.0
	125	1433	1558
Research supervision/management activities	36.2	63.8	100.0
	563	994	1557
Teaching activities and knowledge transfer	39.0	61.0	100.0
	607	950	1557
Managing own research team	76.1	23.9	100.0
	1185	372	1557
Technology transfer to industry	84.4	15.6	100.0
	1315	242	1557
Performing peer reviews	45.1	54.9	100.0
	703	855	1558
Administrative activities	49.3	50.7	100.0
	767	790	1557
Entrepreneurship, start-up activities	93.1	6.9	100.0
	1449	108	1557
Other activities	98.3	1.7	100.0
	1546	27	1573

Only applicable to currently employed, engaged in research in current job.

q66 - Within the last 12 months, which (if any) of the following outputs did you achieve?

	Percent (count)		
	No	Yes	Total
Presented work at a national research conference or meeting	42.3	57.7	100.0
	665	906	1571
Presented work at an international research conference or meeting	37.1	62.9	100.0
	583	988	1571
Lead author on peer reviewed article	41.7	58.3	100.0
	655	915	1570
Other author on peer reviewed article	45.4	54.6	100.0
	713	858	1571
Awarded an academic prize	86.3	13.7	100.0
	1356	215	1571
Produced new research resources or software	78.2	21.8	100.0
	1228	343	1571
Filed a patent	93.4	6.6	100.0
	1466	104	1570
Registered a new product license	99.3	0.7	100.0
	1559	12	1571
Had a significant impact on policy and/or changes in practice	91.2	8.8	100.0
	1433	138	1571
Received media coverage	82.1	17.9	100.0
	1290	281	1571
Undertaken public engagement activities	79.0	21.0	100.0
	1241	329	1570
Contributed book chapter	75.7	24.3	100.0
	1189	381	1570
Published book	91.2	8.8	100.0
	1432	138	1570

Only applicable to currently employed, engaged in research in current job.

q67 - Please rate the reasons for NOT working as a researcher.

	Percent (count)					
	Not at all important	Slightly important	Somewhat important	Very Important	Total	Mean (std. dev.)
Interested in other career	13.7	20.2	30.8	35.3	100.0	2.88
	51	76	116	133	376	1.04
Difficulty getting an academically suitable research post	21.2	14.5	23.2	41.2	100.0	2.84
	80	55	87	155	377	1.18
Difficulty securing tenured/secure post	19.2	14.5	25.0	41.3	100.0	2.88
	72	54	93	154	373	1.15
Bigger variety of career paths	16.8	19.8	33.4	30.0	100.0	2.77
	62	74	124	111	371	1.06
Better income	19.0	14.6	34.5	31.9	100.0	2.79
	72	55	130	120	377	1.09
More interesting post became available	31.9	19.0	28.6	20.5	100.0	2.38
	119	71	107	77	374	1.13
Poor public recognition/status of research careers	56.1	16.3	17.3	10.3	100.0	1.82
	210	61	65	39	375	1.06
Personal/family reasons	38.5	17.3	17.8	26.4	100.0	2.32
	144	65	66	98	373	1.23

Only applicable to currently employed, not engaged in research in current job.

q68 - Do you have staff management responsibilities in your current position?

	%	Count
Yes	34.9	680
No	65.1	1272
Total	100.0	1952

Only applicable to currently employed.

q69 - How many hours do you work per week in your current main job, according to your contract?

	%	Count
Less than 40 hours	28.2	543
40 hours	59.5	1144
More than 40 hours	12.3	236
Total		100.0 1923

Mean (std. dev.): 38.70 (8.86)

q70 - What is your annual gross income (before deductions)?

	%	Count
Under €5,000	5.6	104
€5,001-€10,000	6.7	124
€10,000-€15,000	6.2	113
€15,001-€20,000	5.1	94
€20,001-€25,000	4.7	86
€25,001-€30,000	3.3	60
€30,001-€40,000	10.5	193
€40,001-€60,000	33.0	607
€60,001-€85,000	15.5	285
€85,001-€100,000	4.1	76
€100,001-150,000	3.8	70
€150,001-200,000	.5	9
Over €200,000	1.0	18
Total	100.0	1839

Only applicable to currently employed.

q73 - How satisfied are you with the following aspects of your main current host/working environment?

	Percent (count)					
	Very dissatisfied	Fairly dissatisfied	Fairly satisfied	Very satisfied	Total	Mean (std. dev.)
Career growth opportunities	9.0	16.3	43.0	31.7	100.0	2.97
	140	253	668	493	1554	.92
Intellectual challenge	1.9	8.8	38.4	50.9	100.0	3.38
	29	136	595	789	1549	.73
Contribution to society	2.7	15.3	46.0	36.0	100.0	3.15
	42	237	711	557	1547	.77
Prestige of organisation or job	2.2	12.0	48.3	37.5	100.0	3.21
	33	186	747	581	1547	.73
Scientific environment	4.3	19.7	36.7	39.3	100.0	3.11
	66	306	570	610	1552	.87
Organisational culture	8.2	26.1	45.0	20.7	100.0	2.78
	127	405	698	321	1551	.87
Ethical awareness	4.7	15.8	49.1	30.4	100.0	3.05
	73	243	757	468	1541	.81
Job security/stability	20.0	15.3	30.1	34.5	100.0	2.79
	311	238	468	536	1553	1.12
Salary	8.0	24.0	45.8	22.3	100.0	2.82
	124	372	710	346	1552	.87
Mentoring and training	5.1	25.3	45.9	23.7	100.0	2.88
	79	394	713	368	1554	.82
Research infrastructure	6.7	19.4	44.4	29.5	100.0	2.97
	104	301	690	458	1553	.87
Work/life balance	8.0	19.1	41.2	31.8	100.0	2.97
	124	296	640	493	1553	.91
Proximity to family	14.2	17.8	35.1	32.9	100.0	2.87
	218	273	539	505	1535	1.03

q74 - Are you considering changing your current career for a non-research career in the next three years?

	%	Count
Yes	39,4%	597
No	60,6%	919
Total	100.0	1516

Only applicable to currently employed, engaged in research in current job.

q75 - To what extent do you agree or disagree with the following statements?

	Percent (count)					
	Strongly disagree	Disagree	Agree	Strongly agree	Total	Mean (std. dev.)
My doctorate properly prepared me for my first job	5.9	12.4	40.6	41.1	100.0	3.17
	91	192	627	635	1545	.86
My doctorate enabled me to progress towards my desired career	2.7	6.6	41.7	49.0	100.0	3.37
	41	102	644	758	1545	.73
My doctorate allowed me to offer added value to the organisation/company where I work	1.9	5.0	44.0	49.1	100.0	3.40
	30	77	677	757	1541	.68
It was clear to me what career opportunities I could aspire to after my doctorate	4.8	26.3	36.6	32.4	100.0	2.97
	73	403	563	497	1536	.88
If I could restart my career, I would do my doctorate again	4.7	8.0	29.1	58.1	100.0	3.41
	73	124	448	893	1538	.83
The transition to my first job after doctorate was difficult	34.9	42.5	14.5	8.1	100.0	1.96
	535	651	222	125	1533	.90
Having a doctorate made no difference to my career path	51.2	35.7	7.3	5.8	100.0	1.68
	787	549	113	89	1538	.84

Only applicable to currently employed, engaged in research in current job.

q76 - How satisfied are you with the following aspects of your main current host/working environment?

	Percent (count)					
	Very dissatisfied	Fairly dissatisfied	Fairly satisfied	Very satisfied	Total	Mean (std. dev.)
Career growth opportunities	11.4	16.7	47.6	24.4	100.0	2.85
	44	64	183	94	385	.92
Intellectual challenge	4.9	21.0	43.8	30.3	100.0	3.00
	19	80	168	116	385	.84
Contribution to society	6.1	16.5	42.8	34.7	100.0	3.06
	23	63	164	133	385	.87
Prestige of organisation or job	5.7	11.1	51.3	31.9	100.0	3.09
	22	43	196	122	385	.81
Organisational culture	7.6	27.4	46.2	18.8	100.0	2.76
	29	105	177	72	385	.84
Job security/stability	5.6	8.3	29.4	56.7	100.0	3.37
	22	32	113	218	385	.86
Salary	5.9	15.2	47.0	31.9	100.0	3.05
	23	58	181	123	385	.84
Mentoring and training	12.2	22.7	51.1	14.0	100.0	2.67
	46	85	192	52	385	.86
Work/life balance	4.5	19.3	40.3	35.9	100.0	3.08
	17	74	155	138	385	.85
Proximity to family	5.5	18.3	34.2	42.0	100.0	3.13
	21	69	129	158	385	.90

q77 - Are you considering changing your current career for a research career in the next three years?

	%	Count
Yes	25.8	99
No	74.2	284
Total	100.0	383

Only applicable to currently employed, not engaged in research in current job.

q78 - To what extent do you agree or disagree with the following statements?

	Percent (count)					
	Strongly disagree	Disagree	Agree	Strongly agree	Total	Mean (std. dev.)
My doctorate properly prepared me for my first job	15.6	30.1	43.0	11.3	100.0	2.50
	59	113	162	43	377	.89
My doctorate enabled me to progress towards my desired career	9.5	20.5	44.2	25.8	100.0	2.86
	36	78	168	98	380	.91
My doctorate allowed me to offer added value to the organisation/company where I work	4.8	14.5	47.9	32.8	100.0	3.09
	19	55	183	125	382	.81
It was clear to me what career opportunities I could aspire to after my doctorate	13.8	35.3	32.8	18.1	100.0	2.55
	52	134	124	68	378	.94
If I could restart my career, I would do my doctorate again	6.9	11.2	35.5	46.4	100.0	3.21
	26	43	135	177	381	.90
The transition to my first job after doctorate was difficult	31.5	33.8	25.5	9.2	100.0	2.12
	118	126	95	34	373	.96
Having a doctorate made no difference to my career path	26.0	41.8	22.1	10.1	100.0	2.16
	99	159	84	38	380	.93

Only applicable to currently employed, not engaged in research in current job.

4. Mobility

q79 - Have you lived in another country for more than three months continuously since the competition of your doctorate?

	%	Count
Yes	39.7	773
No	60.3	1174
Total	100.0	1946

Only applicable to currently employed.

q80 - In how many countries per region did you live for more than three months continuously since the competition of your doctorate (excluding your home country)?

	Percent (count)					
	None	1	2-3	4-5	More than 5	Total
EU	31.6	41.0	22.5	0.5	4.4	100.0
	242	314	173	4	34	767
Rest of Europe	90.0	7.8	1.2	0.2	0.9	100.0
	689	59	9	1	7	765
N America	68.0	22.0	4.3	0.4	5.3	100.0
	520	169	33	3	40	765
C/S America	95.9	2.5	0.5	0.4	0.7	100.0
	734	19	4	3	5	765
AUS/Oceania	96.8	2.5	0.4	0.2	0.1	100.0
	741	19	3	2	1	766
Africa	96.1	1.7	0.4	0.2	1.7	100.0
	735	13	3	1	13	765
Asia	91.6	5.5	1.3	0.0	1.5	100.0
	701	42	10	-1	11	763

Only applicable to currently employed who lived abroad for over 3 months.

q81 - In the past 12 months, have you conducted research with researchers BASED IN another country/ region (i.e. transnational research)?

	%	Count
Yes	57.5	899
No	42.5	665
Total	100.0	1564

Only applicable to currently employed, engaged in research in current job.

q83 - In the past 12 months, have you been involved in a collaboration between research and industry or other non-academic sector in any of the following ways:

	Percent (count)		
	Yes	No	Total
Working on a joint publication	22.5	77.5	100.0
	(426)	(1647)	(2072)
Collaborating on a joint research project	33.1	66.9	100.0
	(633)	(1283)	(1916)
Collaborating on the development of a product or service	23.1	76.9	100.0
	(434)	(1449)	(1883)

Only applicable to currently employed.

q84 - Within the next year, do you plan to move to another country to live or work (for more than one year)?

	%	Count
Yes	10.1	197
No	64.1	1246
Don't know	25.8	501
Total	100.0	1943

Only applicable to currently employed.

q85 - Which country do you plan to move to?

	%	Count
AR - Argentina	.1	
AT - Austria	1.2	2
AU - Australia	8.3	14
BE - Belgium	6.2	11
BR - Brazil	.1	
CA - Canada	2.9	5
CH - Switzerland	16.8	29
CN - China	1.0	2
CZ - Czech Republic	.7	1
DE - Germany	9.5	16

DK - Denmark	.1	
ES - Spain	2.8	5
FR - France	3.7	6
FX - France, Metropolitan	8.2	14
GB - United Kingdom	6.1	10
GR - Greece	.3	1
HK - Hong Kong	.3	
IE - Ireland	2.3	4
IL - Israel	1.7	3
IN - India	.9	2
IT - Italy	.7	1
JP - Japan	1.7	3
LU - Luxembourg	4.4	7
NG - Nigeria	.3	1
NL - Netherlands	2.8	5
NO - Norway	2.8	5
NZ - New Zealand	1.1	2
PL - Poland	2.8	5
RO - Romania	1.3	2
SI - Slovenia	.1	
TT - Trinidad and Tobago	.1	
UG - Uganda	.1	
US - United States	8.0	14
VN - Vietnam	.3	1
ZA - South Africa	.1	

q86 - Please indicate the main reason(s) for moving:

	Percent (count)		
	No	Yes	Total
End of postdoc or job contract	61.9	38.1	100.0
	119	73	192
Returning to home country	75.6	24.4	100.0
	145	47	192
Economic/financial opportunities	75.7	24.3	100.0
	146	47	193
Academic/career opportunities	45.4	54.6	100.0
	87	105	192
Partner's academic/career opportunities	72.8	27.2	100.0
	140	52	192
Children's educational/career opportunities	88.8	11.2	100.0
	171	22	193
Family or personal reasons	70.5	29.5	100.0
	136	57	193
Political reasons	93.6	6.4	100.0
	180	12	192
Other reasons	95.3	4.7	100.0
	183	9	192

Only applicable to currently employed who plan to move to another country.

5. Demographic details

q88 - In which country do you currently live?

	%	Count
AE - United Arab Emirates	0.0	1
AL - Albania	0.0	1
AM - Armenia	0.1	1
AR - Argentina	0.1	2
AT - Austria	4.2	88
AU - Australia	0.7	15
BA - Bosnia and Herzegovina	0.5	10
BE - Belgium	2.0	41
BG - Bulgaria	0.0	0
BJ - Benin	0.0	1
BR - Brazil	0.5	11
BY - Belarus	0.1	2
CA - Canada	1.0	21
CH - Switzerland	1.8	37
CI - Cote d'Ivoire	0.0	1
CL - Chile	0.3	6
CN - China	0.5	10
CO - Colombia	0.3	7
CW - Curacao	0.0	1
CZ - Czech Republic	0.5	10
DE - Germany	25.1	525
DK - Denmark	0.3	6
EE - Estonia	0.0	0
EG - Egypt	0.1	1
ES - Spain	1.8	37
ET - Ethiopia	0.0	1
FI - Finland	0.0	0
FR - France	5.2	110
FX - France, Metropolitan	0.2	5
GB - United Kingdom	3.6	75
GH - Ghana	0.0	1
GR - Greece	0.3	5
HR - Croatia	9.8	206
HU - Hungary	0.0	1
ID - Indonesia	0.1	2
IE - Ireland	0.2	4
IL - Israel	0.3	7

IN - India	0.7	14
IQ - Iraq	0.0	0
IR - Iran	0.3	7
IS - Iceland	0.3	7
IT - Italy	1.4	29
JP - Japan	0.1	2
KE - Kenya	0.0	1
KR - Korea, South	0.1	3
LU - Luxembourg	7.0	146
ME - Montenegro	0.1	2
MK - Macedonia	0.0	1
ML - Mali	0.1	3
MX - Mexico	0.4	8
MY - Malaysia	0.0	0
MZ - Mozambique	0.0	1
NC - New Caledonia	0.2	5
NG - Nigeria	0.2	4
NL - Netherlands	7.7	161
NO - Norway	0.6	12
PE - Peru	0.0	1
PK - Pakistan	0.2	4
PL - Poland	0.5	11
PT - Portugal	0.6	12
QA - Qatar	0.0	0
RE - Reunion	0.1	1
RO - Romania	10.4	217
RU - Russia	0.4	8
SA - Saudi Arabia	0.0	1
SE - Sweden	1.0	21
SG - Singapore	0.4	9
SI - Slovenia	0.1	2
TD - Chad	0.0	0
TG - Togo	0.3	7
TH - Thailand	0.2	5
TR - Turkey	0.7	14
TW - Taiwan	0.0	0
TZ - Tanzania	0.0	1
UG - Uganda	0.0	0
US - United States	5.6	117
VN - Vietnam	0.0	1
XK - Kosovo	0.0	1
ZA - South Africa	0.3	7
ZM - Zambia	0.0	1
Total	100.0	2099

q89 - Please select the country of your citizenship.

	%	Count
AL - Albania	0.0	1
AM - Armenia	0.1	1
AR - Argentina	0.2	4
AT - Austria	2.4	49
AU - Australia	0.2	5
BA - Bosnia and Herzegovina	0.5	11
BD - Bangladesh	0.1	2
BE - Belgium	1.7	35
BG - Bulgaria	0.1	2
BJ - Benin	0.0	1
BR - Brazil	0.5	11
BW - Botswana	0.0	0
BY - Belarus	0.1	2
CA - Canada	0.5	11
CH - Switzerland	1.3	27
CI - Cote d'Ivoire	0.0	1
CL - Chile	0.2	4
CM - Cameroon	0.2	3
CN - China	1.2	24
CO - Colombia	0.7	15
CR - Costa Rica	0.0	0
CZ - Czech Republic	1.0	20
DE - Germany	26.5	550
DK - Denmark	0.6	13
DZ - Algeria	0.7	14
EC - Ecuador	0.0	1
EE - Estonia	0.0	0
EG - Egypt	0.1	2
ES - Spain	1.9	39
ET - Ethiopia	0.1	2
FI - Finland	0.0	1
FR - France	6.1	127
FX - France, Metropolitan	0.3	7
GB - United Kingdom	1.9	39
GE - Georgia	0.0	1
GH - Ghana	0.0	1
GR - Greece	0.9	19
HK - Hong Kong	0.0	0
HR - Croatia	10.5	218
HU - Hungary	0.3	5
ID - Indonesia	0.0	1
IN - India	2.2	46

IQ - Iraq	0.0	0
IR - Iran	0.6	12
IS - Iceland	0.1	3
IT - Italy	4.3	89
JP - Japan	0.0	0
KE - Kenya	0.0	0
KR - Korea, South	0.2	5
LB - Lebanon	0.0	0
LU - Luxembourg	3.8	79
MA - Morocco	0.0	0
MK - Macedonia	0.1	2
MX - Mexico	0.2	4
MY - Malaysia	0.0	1
NG - Nigeria	0.2	5
NI - Nicaragua	0.0	1
NL - Netherlands	6.3	131
PE - Peru	0.2	5
PH - Philippines	0.0	1
PK - Pakistan	0.4	8
PL - Poland	1.5	30
PS - Gaza Strip	0.0	0
PT - Portugal	1.2	25
RO - Romania	12.0	249
RS - Serbia	0.2	3
RU - Russia	1.1	23
SA - Saudi Arabia	0.0	1
SE - Sweden	0.3	5
SG - Singapore	0.2	5
SI - Slovenia	0.1	2
SK - Slovakia	0.0	1
SV - El Salvador	0.0	0
TD - Chad	0.0	0
TG - Togo	0.3	7
TH - Thailand	0.1	2
TR - Turkey	1.3	28
TW - Taiwan	0.0	0
TZ - Tanzania	0.0	1
UA - Ukraine	0.1	3
UG - Uganda	0.0	1
US - United States	1.2	24
VN - Vietnam	0.1	3
XK - Kosovo	0.0	1
ZA - South Africa	0.0	1
ZM - Zambia	0.0	1
ZW - Zimbabwe	0.0	1
Total	100.0	2078

q90 - Do you have a second citizenship?

	%	Count
No	92,9	1936
Yes	7,1	148
Total	100.0	2084

q91 - Please select the country of your second citizenship?

	%	Count
AT - Austria	3.3	4
AU - Australia	4.1	5
BA - Bosnia and Herzegovina	7.5	10
BE - Belgium	5.7	8
BG - Bulgaria	0.2	0
BR - Brazil	1.0	1
CA - Canada	6.1	8
CH - Switzerland	2.0	3
CM - Cameroon	1.4	2
CO - Colombia	3.4	5
DE - Germany	9.7	13
DM - Dominica	0.4	1
DZ - Algeria	0.2	0
ES - Spain	2.2	3
FI - Finland	0.2	0
FR - France	1.9	3
GB - United Kingdom	3.4	4
HR - Croatia	6.0	8
HU - Hungary	1.2	2
IL - Israel	0.2	0
IR - Iran	2.6	3
IS - Iceland	0.2	0
IT - Italy	3.1	4
LB - Lebanon	0.2	0
LU - Luxembourg	10.1	13
MD - Moldova	0.6	1
NL - Netherlands	2.7	4
PL - Poland	3.3	4
PT - Portugal	1.2	2
RO - Romania	2.6	3
RU - Russia	2.4	3
SI - Slovenia	1.5	2

SY - Syria	5.3	7
TN - Tunisia	0.2	0
UA - Ukraine	0.4	1
US - United States	3.8	5
ZA - South Africa	0.2	0
Total	100.0	132

Only applicable to those with secondary citizenship.

citzn_d - Citizen of the institution country, derived from the citizenship and country of partner organisation

		Count
Yes	53.6	1107
No	46.4	960
Total	100.0	2067

q92 - Age, derived from question: What is your year of birth?

		Count
Less than 30 years	6.1	128
30-34 years	40.8	852
35-39 years	32.1	671
40-44 years	12.1	253
45-49 years	4.1	85
50 years or more	4.8	101
Total	100.0	2089

Mean (std. dev.): 36.31 (6.48)

q93 - What is your gender?

		Count
Man	56.0	1167
Woman	44.0	917
Total	100.0	2084

q94 - How many dependents (e.g. children, elderly parents, partners, etc.) do you have?

	Percent (count)				
	None	1	2	3 or more	Total
5 years and younger	68.2	21.3	8.9	1.6	100.0
	1395	435	183	33	2046
6 to 18 years	84.0	8.6	6.2	1.2	100.0
	1718	176	127	25	2046
19 years or older	73.1	15.9	3.6	7.3	100.0
	1496	326	74	150	2046

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November 2017