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SURVEY

Doctoral education in Europe today: approaches and institutional structures

By Alexander Hasgall, Bregt Saenen and Lidia Borrell-Damian

Co-authors:
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euacde COUNCIL FOR DOCTORAL EDUCATION

UNIVERSITEIT GENT

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Foreword

European ambitions to meet social and economic goals through the application of knowledge can only be realised if there are sufficient well-trained researchers able to take up the challenge. Doctoral education is more important than ever in assuring the supply of early-careers researchers. The decade since the foundation of the EUA Council for Doctoral Education (EUA-CDE) has seen remarkable change in the scale and nature of doctoral education. The direction of travel was clearly signposted in 2005 by the formative Salzburg principles. These affirmed the core component of the doctorate as the advancement of knowledge, while recognising the need to prepare for widening employment opportunities beyond academia.

The impetus of these principles has contributed to the transformations we have witnessed. However, until now the scale of change has not been measured. The EUA-CDE Steering Committee decided that it was time to take stock and launched the survey that is reported here. Multiple motives underpinned this decision. For our own purposes it was a way to understand better the needs of the membership and hence to formulate a future programme attuned to their priorities. We also hoped that it would give institutions the opportunity to benchmark their own practices and policies against their peer institutions. Potentially this could also help in the dissemination of good practices. More broadly, the information base could provide an improved platform from which to argue the case for doctoral education among the many pressing issues facing universities and their funders.

The scope of the issues pursued was broad. The survey examined the balance between institutional responsibility and that of the individual supervisor, as well as the mechanisms that underpin the passage through the doctorate and towards future careers. It also assessed the degree of change, asking if a doctorate today is really different from that of a decade or more ago. The institutional status of the doctoral candidate as a student, colleague, or both was another line of questioning.

The large response to the survey provides confidence in the findings, but also indicates that institutions want to know where we stand on these and many other issues. My deepest thanks go to the survey team for their hard work and to all of those who took the time to answer the questions. Europe now has a shared database that will enhance our understanding of doctoral education and that will help EUA-CDE to shape its agenda for the coming years.

LUKE GEORGHIOU
University of Manchester
Chair of EUA-CDE Steering Committee

Acknowledgements

1 Introduction

1.1 About this survey

The following report by the European University Association (EUA) provides an overview about the current landscape of doctoral education in Europe. The survey was launched in the context of the 10th anniversaries of its Council of Doctoral Education, a special membership service of the EUA which includes more than 250 universities from 36 countries. It presents key results of more than a decade of doctoral education reforms in Europe, which has been marked by the introduction of doctoral schools in many institutions throughout the continent and a significant increase of the number of doctoral candidates and doctoral graduates.

The aim of this survey is to provide an up-to-date picture of institutional approaches to doctoral education in Europe. Over the years, the progress made by universities establishing support structures for doctoral education has been called 'professionalisation' or 'structuration'. This refers to universities taking further their institutional responsibilities and, furthermore, it has been highlighted as part of a virtuous cycle of good institutional practice, despite reservations about possible increased bureaucracy and over-structuration. The methodology of the Survey is described in Section 1.4.

The survey questions have been developed by a research team of the Centre for Higher Education Governance (CHEGG) of Ghent University in Belgium and further developed by the EUA secretariat and the EUA-CDE steering committee. The CHEGG researchers – Freek Van Deynze, Dr. Marco Seeber and Prof. Dr. Jeroen Huisman – also took care of data cleaning, analysis and initial data presentation. They predominantly ask about institutional structures and processes supporting the completion of a doctoral degree, thus focusing on the *institutional management* of the process, not on the *practice* of research. They ask about practical issues related to the organisation of doctoral education, from admissions procedures to career tracking after graduation, but also more general questions such as the status of doctoral candidates within the institutions and current strategic priorities of universities in the area.

Therefore, the outcomes of the present survey can be used as a reference by universities. The identified trends in this area and open challenges will enable university leadership to contextualise their own strategies and practices in doctoral education in a broader European context. The results will also inform the future work of the EUA-CDE.

This report consists of three parts. In the first part, the background of the doctoral education reforms in Europe and the state of research based on different surveys and policy papers are presented. In the second part, we describe the main results of the survey in aggregated form. In the third part, key trends and conclusions based on the already described results are presented. Additional specific data for many countries is provided in the annex.

1.2 Background of doctoral education reform in Europe

Doctoral education reform has taken place in the context of significant shifts in higher education, creating a rise in expectations and a slew of new challenges. This is not new; throughout its existence doctoral education has undergone remarkable changes. The beginning of the doctorate is related to the emergence of the first universities of Europe at the end of the Middle Ages. Initially serving as a license to teach (*docere*), the doctorate has developed into an academic degree that expresses above all the ability to conduct research, conforming to academic standards and presented through a dissertation memo or published articles. The collaboration with one or more senior academics – the supervisor, or supervisory team – plays an important role in obtaining the doctorate. Supervisors support and guide doctoral candidates.

Although this relationship continues to be important, the role of the doctorate itself has evolved, and institutions, too, have gained a more important role. This is for various reasons. Firstly, the doctorate and, in particular, the career opportunities for graduates have changed. In addition to preparing for an academic career, graduates are increasingly following non-academic career paths in a knowledge-based society that relies on highly-qualified staff. Therefore, in addition to research skills, the appropriate development of transversal (also known as 'generic') skills and competences is needed, and doctoral schools and similar structures are also responding to this need. Considering the different demands academics are facing nowadays, these skills are important for an academic and non-academic career alike.

Secondly, in light of the increasing complexity of doctoral education, institutions have taken additional responsibility in this area. They aim at structuring the doctorate in such a way that, while institutional goals are met, early career researchers experience their doctoral period as a productive phase of their lives. The new institutional responsibilities also include the development of processes to avoid possible conflicts between the participants, to address them if they arise, and to ensure transparency and openness during the whole doctoral period. Within the framework of this survey, the status of all these components will be further discussed, and the commonalities and diversities of doctoral education across Europe will be unveiled.

An important step in the policy reforms of European doctoral education: the 'Salzburg' Process

In 2003 the European University Association started the project "Doctoral programmes for the European knowledge society". In this project, 48 university institutions from 22 countries came together and provided a first overview of the landscape of doctoral education in Europe. In its final report,[1] the authors described the diversity of doctoral education on both national and institutional levels, and identified key topics related to doctoral education such as its organisation and funding, career development of doctoral candidates and transversal skills training.

The results of this project were presented in 2005 at the EUA seminar "Doctoral Program for the European Knowledge Society" in Salzburg, Austria.[2] As its outcome, ten foundational principles for doctoral education in Europe, usually described as the "Salzburg Principles", were formulated. They include among other topics: the advancement of knowledge through original research and doctoral candidates as early career researchers; the importance of diversity of doctoral programmes and the reaching of a critical mass; the crucial role of supervision and assessment; the duration of the doctorate between three and four years; and the promotion of innovative structures and of mobility. The emergence of these principles was characterised by movements

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1   https://eua-cde.org/downloads/publications/2005_eua_doctoral-programmes-european-knowledge-society.pdf.

2   http://www.aic.lv/ace/ace_disk/Bologna/Bol_semin/Salzburg/index.HTM.

from both ends, top-down by the university leadership and bottom-up by the supervisors. Doctoral candidates were for the first time considered early career researchers, able to undertake different career-paths, both in and outside academia. Furthermore, the responsibilities of the institutions to ensure a fair, transparent and healthy environment for their doctoral candidates were outlined. The diversity of doctoral programmes in Europe was recognized and identified as a strength of doctoral education in Europe.

A further step in developing a common framework of doctoral education was the development of the set of recommendations known as the "Salzburg Recommendations". Adopted in 2010 by the EUA Council,[3] the recommendations included a series of guideposts for success in doctoral education and addressed some potential obstacles to be overcome. The three key messages were:

1. Doctoral education has a particular place in the European Research Area (ERA) and the European Higher Education Area (EHEA). It rests on the practice of research, which makes it fundamentally different from the first and second cycles

2. Doctoral candidates must be allowed independence and flexibility to grow and develop. Doctoral education is highly individual and based on original research. The path of progress of the individual is unique, in terms of the research project as well as in terms of the individual professional development and

3. Doctoral education must be developed by autonomous and accountable institutions taking responsibility to cultivate the research mindset. Institutions need flexible regulation to create special structures and instruments and continue advancing European doctoral education.[4]

Five years later, in 2015, a new set of recommendations, "Taking Salzburg Forward – Implementation and New Challenges"[5], was published. These recommendations were based on an extensive consultation process with over 200 universities from 39 countries in the previous two years.[6] This publication also included new topics, which had been less frequently addressed in the previous years, such as research ethics and research integrity, the increased importance of digitalisation for the doctorate and the globalisation of research.

The drafting of these three central documents between 2005 and 2015 was accompanied by several projects and studies, ensuring that the developments also reflected the reality in European universities. The following overview presents an insight into previous studies and surveys of doctoral education until today.

3   The EUA Council is the decision-making body consisting of the EUA president, vice-presidents and board and nominated representatives of EUA member national rectors conferences.

4   https://eua.eu/resources/publications/615:salzburg-ii-%E2%80%93-recommendations.html.

5   https://www.eua-cde.org/downloads/publications/2016_euacde_doctoral-salzburg-implementation-new-challenges.pdf.

6   *Ibid.*

1.3 Previous surveys and studies on doctoral education (by Alexandra Bitusikova)

The European University Association collected data on doctoral education several times on other occasions. The report "Doctoral Programmes for the European Knowledge Society", already mentioned in the previous section, was published more than a decade ago. While not aiming at developing a comprehensive view of the major practical aspects of doctoral education in Europe, the biannual TRENDS surveys (especially since TRENDS V in 2007) have provided key comparative information about the development of doctoral education in the countries that signed the Bologna Declaration. This includes mostly the structure of doctoral education, such as the existence of doctoral schools and programmes and the question of credits. A specifically doctoral education-oriented survey was carried out by EUA-CDE in 2011 within the project "Accountable Research Environments for Doctoral Education (ARDE)".[7] This survey focused on the issue of quality assurance but also gathered other key information. Another set of data was collected in the EUA survey about universities in the ERA in the context of a Memorandum of Understanding with the European Commission and other stakeholders in 2013, which was then published in a EUA Progress Report.[8] Additionally, the reports of the DOC-CAREERS I (2009) and DOC-CAREERS II (2015) projects specifically addressed the intersectoral mobility of doctoral candidates.[9]

All EUA surveys confirmed an increasing implementation of reforms in doctoral education that were first defined in the Salzburg Recommendations. Key reforms included changes in the organisation of doctoral education through structured programmes and doctoral schools, introduction of transferable skills training, transparent admissions processes and increased focus on supervision. For instance, Trends V demonstrated that 29% of European universities (respondents in the survey) had some form of a doctoral school, while Trends 2010 showed 65%, the ARDE survey 82% and the ERA survey 85%. However, it is important to stress that there were considerable national differences in these findings and a low response rate from certain countries, usually those with fewer new developments. According to the ERA survey, over 90% of university respondents had structured doctoral programmes with institutional policies concerning admissions procedures, progress monitoring, supervision and thesis assessment, while over two-thirds (68%) provided career development services to doctoral candidates, and 89% provided transferable skills training.

EUA has not been the only organisation collecting data on doctoral education. The European Council of Doctoral Candidates and Postdoctoral Researchers (EURODOC), an important player in the doctoral education sector, carried out a number of projects and surveys among doctoral candidates and young researchers that gave a significant insight into the state-of-the-art of doctoral education in different European countries from the perspective of doctoral candidates.[10] A specific survey within a PRIDE project under LLP in 2014 (Professionals in Doctoral Education: Supporting Skills Development to Better Contribute to an European Knowledge Society) was focused on getting data from professionals in doctoral education.[11]

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7   Byrne, J., Jørgensen, T., & Loukkola, T. (2013). *Quality Assurance in Doctoral Education – results of the ARDE project.* Brussels: EUA Publications, p. 36. Retrieved 21 March 2018, from: http://www.eua-cde.org/reports-publications.html.

8   EUA Progress Report (December 2013) on the implementation of the actions agreed in the Memorandum of Understanding on the European Research Area signed between EUA and European Commission on 12 July 2012. EUA 2013. https://eua. eu/resources/publications/807:progress-report-on-the-implementation-of-the-actions-agreed-in-the-memorandum-of-understanding-mou-on-the-european-research-area-signed-between-eua-and-european-commission-directorate-for-research,-innovation-and-science-on-17th-july,-2012.html.

9   DOC-CAREERS I: https://www.eua-cde.org/downloads/publications/2009_borrell-damianl_c-doctoral-enhancing-knowledge-exchange.pdf, DOC-CAREERS II: https://www.eua-cde.org/downloads/publications/2015_borrell-damianl_collaborative-doctoral-doc-ii-project.pdf.

10 See, for instance, results of the first EURODOC survey in 2008-2009: http://www.eurodoc.net/eurodoc-survey.

11 https://services.phaidra.univie.ac.at/api/object/o:454303/diss/Content/get.

International organisations also organise surveys that provide some selected data on doctoral education, e.g. the OECD collects statistical data for Education at a Glance, and the European Science Foundation has been carrying out a career tracking survey of doctoral holders (2015, 2017).[12] An international initiative organised by the European University Association together with the US Council of Graduate Schools, the Canadian Association for Graduate Studies, the Deans and Directors of Graduate Studies (Australia), and the Association of Chinese Graduate Schools led to the Banff Principles (2007).[13] These institutions strongly supported international and inter-institutional collaboration in doctoral education.

In addition, there have been a number of thematic initiatives in recent years that carried out surveys aimed at defining standards for doctoral education in certain disciplinary areas. For instance, the Organisation of PhD Education in Biomedicine and Health Sciences (ORPHEUS) produced a position paper, "Towards Standards for PhD Education in Biomedicine and Health Sciences" (2010); the IDEA League, CESAER, CLUSTER, EuroTech Universities Alliance and Nordic Five Tech prepared a report, "Innovative Doctoral Training at Universities of Science and Technology" (2015); and art universities published 2016 "The 'Florence principles' on the doctorate in the arts."[14]

Surveys which provide an empirical basis for decision-making are complemented by various policy papers that have provided an important impetus for the development of doctoral education in Europe. The Salzburg principles and recommendations have already been described. In 2011, the European Commission published the "Report of Mapping Exercise on Doctoral Training in Europe – Towards a Common Approach",[15] which was based on the Salzburg I Principles and Salzburg II Recommendations, and built on a study by IDEA Consult and CHEPS (funded by the EC) on the implementation of principles in Europe. Seven principles of Innovative Doctoral Training were identified in this report: research excellence; attractive institutional environment; interdisciplinary research options; exposure to industry and other relevant employment sectors; international networking; transferable skills training and quality assurance.

The League of European Research Universities (LERU) published two position papers, "Doctoral Studies in Europe: Excellence in Research Training" (2007)[16] and "Doctoral Degrees beyond 2010: Training Talented Researchers for Society" (2010)[17], and two advice papers, "Good Practice Elements in Doctoral Training" (2014)[18] and "Maintaining Quality Culture in Doctoral Education at Research-Intensive Universities" (2016).[19] In these papers LERU provided recommendations for universities and doctoral candidates as well as policy makers. The Coimbra Group has described the essential requirements for doctoral training in its position paper "Doctoral Programmes Position Paper" (2007).[20] It also organised a survey on the organisation of doctoral education in Europe and North America (project TRANS-DOC, 2010-12). The Network of Universities from the Capitals of Europe (UNICA) started to work on doctoral education in 2008, and since 2009 it has been annually organising a UNICA Master Class on doctoral education.

12 https://www.elia-artschools.org/userfiles/File/customfiles/1-the-florence-principles20161124105336_20161202112511.pdf.

13 http://www.cgsnet.org/ckfinder/userfiles/files/mtg_BanffPrinciples.pdf.

14 https://www.elia-artschools.org/userfiles/File/customfiles/1-the-florence-principles20161124105336_20161202112511.pdf.

15 https://www.hrk.de/fileadmin/redaktion/hrk/02-Dokumente/02-05-Forschung/Forschermobilitaet/Report_of_Mapping_ Exercise_on_Doctoral_Training_FINAL.pdf.

16 https://www.leru.org/files/Doctoral-Studies-in-Europe-Excellence-in-Researcher-Training-Full-paper.pdf.

17 https://www.leru.org/files/Doctoral-Degrees-beyond-2010-Training-Talented-Researchers-for-Society-Full-paper.pdf.

18 https://www.leru.org/files/Good-Practice-Elements-in-Doctoral-Training-Full-paper.pdf.

19 https://www.leru.org/files/Maintaining-a-Quality-Culture-in-Doctoral-Education-Full-paper.pdf.

20 http://www.coimbra-group.eu/DOCUMENTS/Doctoral%20Programmes%20CG%20Position%20Paper.pdf.

To summarise, doctoral education has attracted a high level of attention from a number of institutions in Europe and worldwide. Results of their initiatives confirmed new trends in doctoral education in terms of organisation and management, but also brought recommendations for higher education institutions and policy-makers that reflect changes in a complex and competitive global world.

The large number of studies and policy papers also indicates that the field of doctoral education is not characterised by a top-down planning, but that the doctoral education community itself is strongly involved in its development. Through constant debates and inquiries, needs were identified, good practices exchanged and a bottom-up process assured. Having gone a long way in developing doctoral education in Europe, it's now time again to reflect on where we have arrived. This publication serves this purpose by presenting an up-to-date view on the current landscape of doctoral education in Europe.

1.4 Methodology of the 2018 EUA-CDE doctoral survey

This study report gives an overview of the characteristics and state of institutional approaches to doctoral education in Europe. It is based on the results of a comprehensive survey developed by EUA-CDE in collaboration with the Centre for Higher Education Governance of Ghent University in Belgium. The survey was open to all European higher education institutions and ran from 8 November 2017 to 7 February 2018, receiving 311 valid responses.

The goal of the survey was to offer EUA members an in-depth study on doctoral education in European universities along a series of key aspects: i) doctoral candidates' qualifications, funding, completion rate and time to completion, ii) purposes, iii) organisation, iv) application and admission, v) supervision, vi) training and activities, vii) quality assurance, viii) career development, ix) decision-making powers, and x) strategic priorities in doctoral education and their implementation. This last item includes strategic priorities for doctoral education, Open Access, research ethics and internationalisation.

The questions were mostly designed 'ex-novo' while building on the experience of previous EUA surveys. In total, the survey included 30 questions, many on a five-point unipolar rating scale (e.g. from 'not at all' to 'always'), some multi-option items and several open-ended questions. The survey was implemented on a Qualtrics platform. Invitations to respond to the survey were sent using several communication channels: via e-mail to EUA-members, promotion at EUA events and on social media. The survey was open from November 2017 to February 2018. Only one response per institution was accepted although, often, the survey was filled in by several people at the same university.

In total, 311 valid responses were received. In comparison to previous surveys on doctoral education, such as the already mentioned ARDE survey), this represents a substantial increase, more than doubling the number of respondents. There is at least one university respondent in each of the 32 countries[21] (c.f. map). With regards to the type of institution, there is a considerable variety. The sample includes comprehensive and specialised institutes, as well as research institutes.

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21 The Flemish and French Communities of Belgium were disaggregated. ‚EUI' refers to the European University Institute, which
     is geographically based in Italy, but is not part of the national system.

Figure 1: Share of doctoral candidates per country attached to institutions participating in the survey
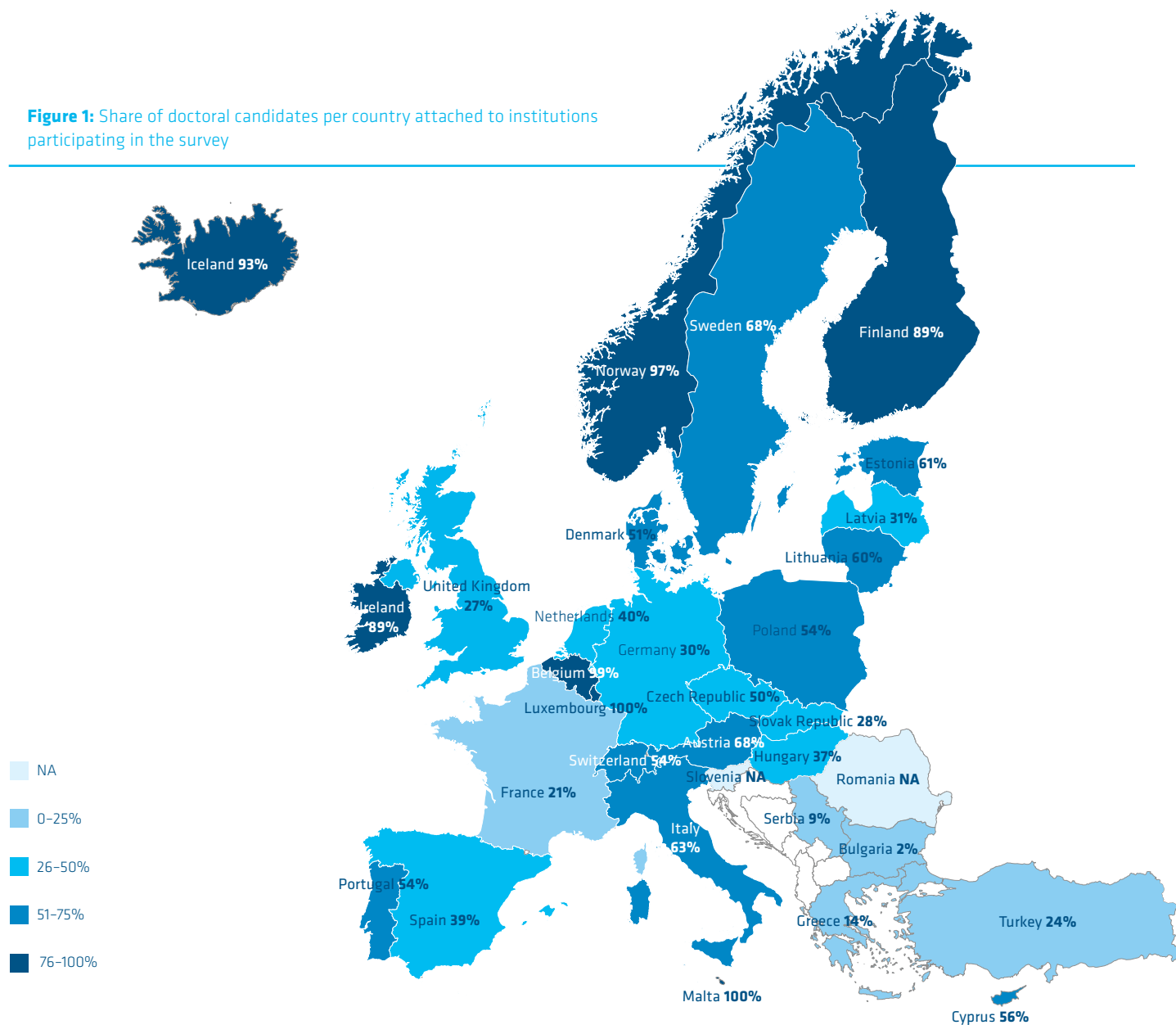
In order to determine the representativeness of the results by country, as well as for analytical purposes, a dataset was created combining survey responses and institutional demographic data from the European Tertiary Education Register (ETER).[22] Table 2 (in the annex) illustrates the representativeness of the EUA survey.

Overall, the survey represents 21% of doctorate-awarding higher education institutions in 32 European countries, who altogether represent 40% of doctoral candidates of the totality of these 32 countries. Remarkable differences exist in the extent to which the survey is representative for each country. Larger institutions are comparatively more represented. Despite the high participation rate, we recommend caution assuming the results to be representative for all higher education institutions in Europe. From these 311 institutions, 292 institutions are in ETER. This includes public (82,5%), private (6,8%), and private government-dependent institutions (10,6%). They include universities (93,5%), universities of applied sciences (6,2%) and a national academy of the arts (0,3%).

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22 https://www.eter-project.com.

2 Doctoral education in Europe

In the following chapter, key results of the survey of doctoral education in Europe are summarised. This includes the organisational structures, training and activities, career development, funding, mobility, time to completion, supervision, application and admissions, decision-making process, completion rate and time to complete. This descriptive part of the report is followed by a more in-depth analysis in chapter 3.

2.1 Organisational structures

The organisation of doctoral education in Europe has undergone a rapid transformation in the past decade. As universities have increasingly assumed institutional responsibility for early-stage researchers, a wide diversity of practices, policies and structures have been implemented to deliver more robust training and support for various aspects related to doctoral research.

To get an up-to-date insight into where this decade-long process has left the organisation of doctoral research in Europe, institutions were asked questions about the type of structures that have been implemented and the institutional level on which they typically reside. The results clearly speak to the great diversity of structures across Europe, while all of them nevertheless point in the same direction: that of a more comprehensive approach by universities.

Respondents were asked to what extent doctoral education in universities is organised in programmes, managed through an organisational unit (i.e. referred to as a "doctoral school" in this report), managed through an inter-organisational unit or led by individual supervisors with no institutional oversight. Looking at the European aggregate results, the survey shows that doctoral programmes and schools are now by far the dominant form of organisation in Europe.

Doctoral programmes with specific elements such as taught courses, milestones, mobility options, etc. are present in 73% of responding universities, either "to a great extent" (24%) or "always" (49%) (cf. Figure 2). Organisational units such as doctoral schools which oversee the development of programmes, ensure quality, develop regulations and guidelines, etc. are present in 62% of responding universities, either "to a great extent" (17%) or "always" (45%).

Inter-organisational units

In general, each institution has its own doctoral schools or similar structure. However, there are in different European countries collaboration schemes between different institutions, sharing some aspects of doctoral education. However, inter-institutional units are noticeably less present at European higher education institutions. Only 13% of responding universities report that an inter-organisational unit (e.g. university consortium, cross-institutional doctoral school, etc.) is present "to a great extent" or "always" and doctoral education without any institutional overview is even smaller. Only 11% of institutions report that this is the case for individual supervisors that work with no institutional oversight.

Figure 2: Organisation of doctoral education

Legend: Not at all · To a small extent · To some extent · To a great extent · Always
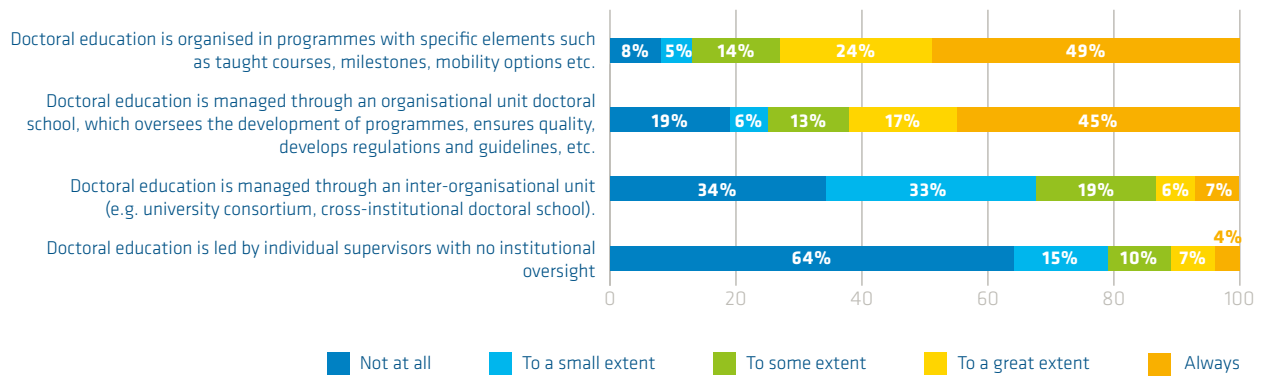
Doctoral education is organised at or around the disciplinary level (e.g. physics, psychology, history) in 64% of responding universities, either "to a great extent" (41%) or "always" (23%) (cf. Figure 3). The faculty level (e.g. natural sciences, social sciences, engineering) serves as the organisational level in 52% of responding universities, either "to a great extent" (33%) or "always" (19%). Following those two levels, there is a noticeable gap with the 14% of responding universities that mostly organise doctoral education based on themes or societal challenges (e.g. water management, energy, migration): either "to a great extent" (11%) or "always" (3%).

Figure 3: Level of organisation
To what extent is doctoral education in your institution organised at or around ...?

Legend: Not at all · To a small extent · To some extent · To a great extent · Always
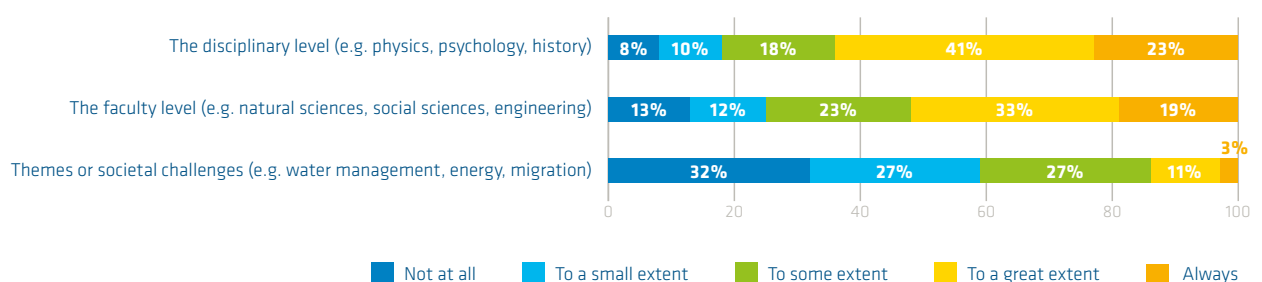
The survey results show that higher education institutions have established diverse, often parallel structures for doctoral education that reside at different levels of university governance. A large majority of institutions have established doctoral programmes and schools, further cementing the "quiet revolution" that took place in the past decade. Indeed, previous EUA data already showed a significant jump in these type of structures from 29% in 2006[23] to 84% in 2014.[24] The survey results also show that structures are predominantly organised on the disciplinary and faculty level.

The emergence of doctoral programmes and schools as the predominant organisational form of doctoral education does not take away from the central role of doctoral supervisors, but in today's state of play, survey results indicate that the latter only rarely work without institutional oversight, further adding to universities assuming institutional responsibility for early-stage researchers.

2.2 Training and activities

Doctoral education is first and foremost about the training and support made available to doctoral candidates as they navigate the research process. Universities were asked to what extent they have rules or guidelines in place to manage training activities for doctoral candidates and which competencies are the focus of those activities. In addition, they were also asked which activities early-stage researchers spend most of their time on. The survey results reveal that training activities for doctoral candidates are well-regulated and predominantly focus on developing their research competencies, which is matched by the results on the time allocation of early-stage researchers.

Survey outcomes show that a large majority of universities have rules or regulations in place for key aspects of doctoral education. This is the case for the definition of required courses (80%, with 69% having this in place "in all doctoral programmes/schools" and 11% "in most doctoral programmes/schools"), assessment of training activities (e.g. examination) (74%, with 65% having this in place "in all doctoral programmes/schools" and 9% "in most doctoral programmes/schools"), course contents (71%, with 59% having this in place "in all doctoral programmes/schools" and 12% "in most doctoral programmes/schools"), or credits (71%, with 64% having this in place "in all doctoral programmes/schools" and 7% "in most doctoral programmes/schools") (cf. Figure 4). These results are another clear indication of the enhanced professional approach universities have adopted towards doctoral education, i.e. assuming institutional responsibility for the training and support of early-stage researchers.

23 Crosier, D., Purser, L., & Smidt, H. (2007). *Trends V: Universities shaping the European Higher Education Area. Brussels:* EUA. Retrieved 30 January 2018, from: https://eua.eu/resources/publications/389:trends-2007-universities-shaping-the-european-higher-education-area.html.

24 European University Association (2014). *Europe's Universities: Main drivers in achieving the European Research Area (ERA).* Brussels: EUA. Retrieved 30 January 2018, from: http://www.eua-cde.org/reports-publications.html.

Figure 4: Guidelines for elements of doctoral education
In your institution, are there rules or guidelines regarding the following aspects of doctoral training?

	Never	In some doctoral programmes/schools	In about half of doctoral programmes/schools	In most doctoral programmes/schools	In all doctoral programmes/schools
Definition of the required courses	4%	12%	5%	11%	69%
Assessment of training activities (e.g. examination)	7%	16%	3%	9%	65%
Course Contents	7%	18%	4%	12%	59%
Credits	14%	12%	3%	7%	64%
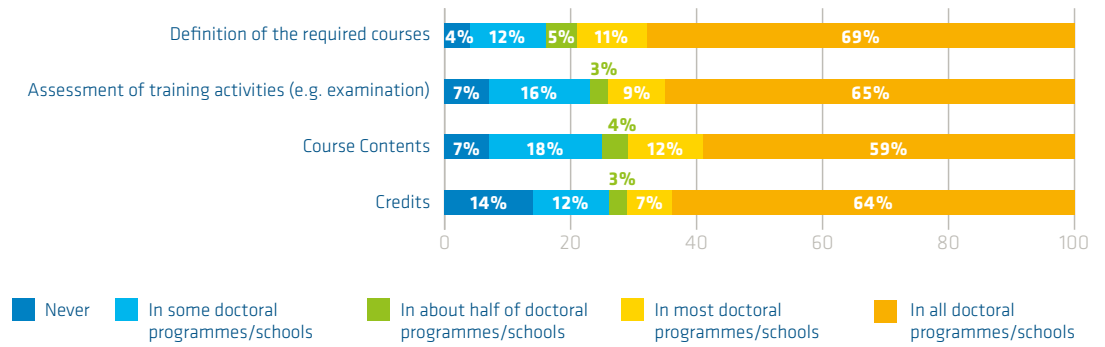
Concerning doctoral training activities, there was a clear focus on research competence training, albeit complemented by significant attention to transferable skills training. Dominating doctoral education are training activities focused on specific research competencies (e.g. advanced methods, up-to-date data knowledge, new techniques) (97%, with 75% finding it "extremely important" and 22% "important") and generic academic competencies, which are not discipline-specific (e.g. grant writing, publishing, ethics) (82%, with 35% finding it "extremely important" and 47% "important") (cf. Figure 5).

Transferable skills training, while still significant, follows at a distance behind specific and generic research competencies. Knowledge valorisation (e.g. intellectual property rights, entrepreneurship, product development) is a focus for 47% of universities, finding it either "extremely important" (11%) or "important" (36%), and management and leadership competencies (e.g. teamwork, conflict management) is a focus for 37% of universities, finding it either "extremely important"(6%) or "important" (31%). In addition, teaching competencies (e.g. pedagogy, didactics) are a focus for 45% of universities, finding it either "extremely important" (11%) or "important" (34%).

Figure 5: Skills training
In your institution, how important are the following elements of doctoral training?

	Unimportant	Somewhat unimportant	Somewhat important	Important	Extremely important
Specific research competencies (e.g. advanced methods, up-to-date knowledge, new techniques)	1%	2%		22%	75%
Generic academic competencies (e.g. grant writing, publishing, ethics)		3%	14%	47%	35%
Knowledge valorisation (e.g. intellectual property rights, entrepreneurship, product development)		4%	11%	38%	36%	11%
Teaching competencies (e.g. pedagogy, didactics)		3%	13%	38%	34%	11%
Management and leadership competencies (e.g. teamwork, conflict management)		3%	20%	40%	31%	6%

Beyond the stated importance universities attach to different aspects of doctoral training, universities were also asked which activities doctoral candidates spend most of their time on. The survey results clearly indicate that doctoral candidates are early-stage researchers and predominantly spend their time on research activities.

Doctoral candidates first and foremost spend their time on scientific and academic research, with 95% of responding universities indicating that this is either "always" (47%) or "to a great extent" (48%) what they spend their time on (cf. Figure 6). To a far lesser degree, doctoral candidates spend their time on research-related administration (e.g. proposal writing, report writing) (20% of responses indicating either "always" or "to a great extent") and teaching (13% indicating either "always" or "to a great extent"). Even less time is spent on science communication (e.g. blogs, activities oriented toward a lay audience) (8% indicating either "always" or "to a great extent"), internships, workplace training or experience (e.g. private/public sector, NGOs) (10% indicating either "always" or "to a great extent") and teaching related administration (e.g. exam supervising) (6% indicating either "always" or "to a great extent").

Figure 6: How do doctoral candidates spend their time?
In your institution, how important are the following elements of doctoral training?

Legend: Not at all · To a small extent · To some extent · To a great extent · Always
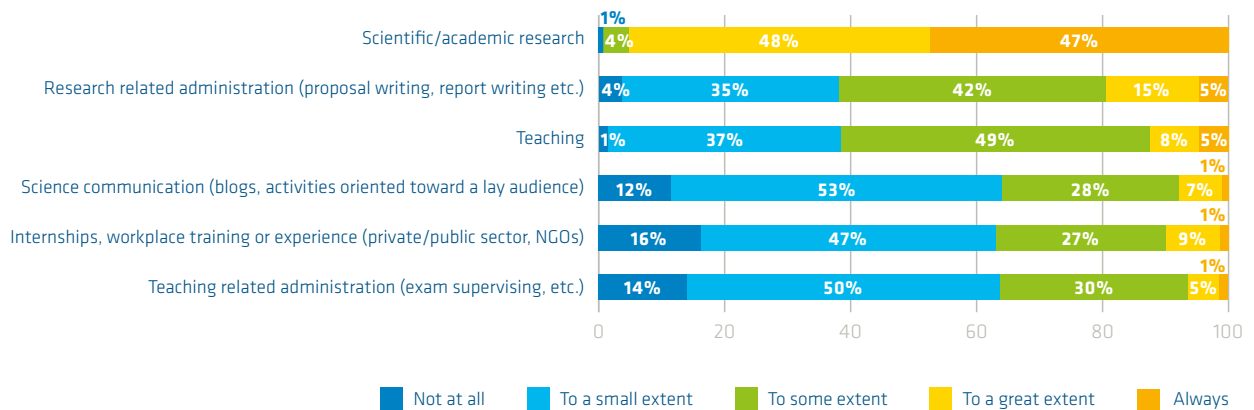
2.3 **Career development**

Driven by increased access to higher education and the growing number of doctoral candidates, career development has become an issue of strategic importance for doctoral education in Europe. The number of doctorate holders has seen a marked increase in line with growing student numbers on every level of tertiary education. While only a small percentage of the population holds a doctoral or equivalent degree, their number "[...] across OECD countries significantly increased over the past decade, growing from 158 000 new doctorates in 2000 to 247 000 in 2012, a rise of 56%."[25]

As a result, academic leaders and doctoral education professionals are focused on how to develop career development support for the growing number of early-stage researchers.

From the results of the survey we can clearly see that universities in Europe offer support measures for early-stage researchers pursuing a variety of academic and non-academic career paths. Doctoral candidates are (mainly) seen as future academics and scholars, but also increasingly as the research professionals of tomorrow. (Figure 7)

Asked to what extent doctoral candidates are prepared for a variety of career paths, 78% of responding universities replied that doctoral education is "always" or "to a great extent" preparing the future generation of academics/scholars (cf. Figure 7). Importantly, career paths outside of academia are also taken into consideration, with 53% underlining the importance of preparing high-skilled knowledge workers, and 52% preparing for research positions outside academia. Preparing the future generation of leaders/managers is noticeably lower on the radar, although 29% of higher education institutions still report that they "always" or "to a great extent" prepare doctoral candidates for this type of role.

Figure 7: Conceived future role of doctoral candidates
To what extent is doctoral education in your institution conceived as preparing the future generation of...?
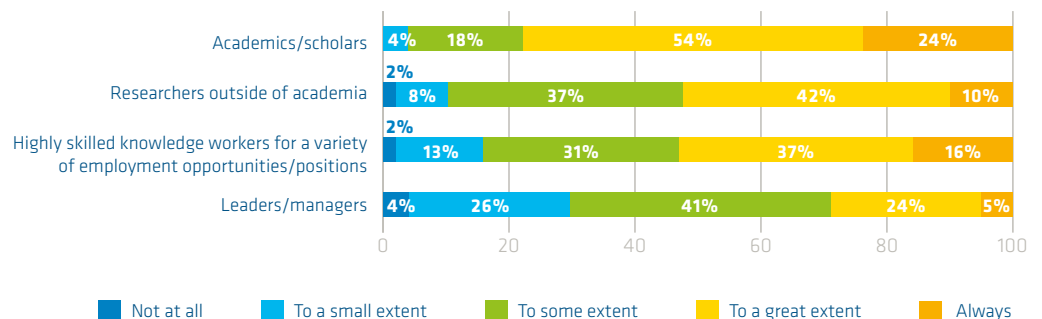
25 Organisation for Economic Co-operation and Development (2014). *Education Indicators in Focus. Who are the doctorate holders and where do their qualifications lead them?* Paris: OECD Publishing. Retrieved 22 March 2018, from: http://dx.doi.org/10.1787/22267077.

Figure 8: Continuation of the academic career in the same institution
Can doctoral graduates continue their academic career in your institution?

- No, because of institution rules
- No, because of institution traditions
- No, it is forbidden by national law
- Yes

4% 2% 0%

94%

Career development is commonly understood to include support for a variety of academic and non-academic career paths. Regarding the former, the evolution of the academic profession has led to a broad consensus on the need for more structured support for early-stage researchers with academic ambitions.[26] For example, the introduction of the tenure-track model in countries such as Austria, Switzerland, Finland and others reflects an attempt by universities to counter the challenges, such as short-term contracts, that have come to characterise early career stages in academia.

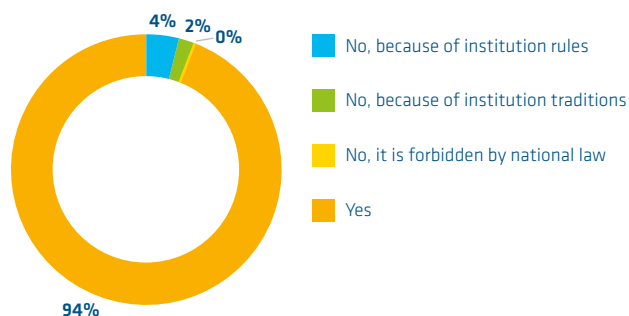In the survey, institutions were asked if doctorate holders can continue their academic career at the same institution. A clear majority of institutions answered with "yes" (i.e. 94%) (cf. Figure 8), with the "no's" because of institutional rules (4%) or traditions (2%) being negligible. No higher education institution indicated that continuing at the same university is not possible because of obstacles in the national law.

Support for non-academic career paths is also increasingly common in doctoral education. Universities have become aware that, depending on the country, a sizeable minority, or in some cases of doctorate holders, go on to pursue "alternative careers" that differ from "traditional" research positions in the university.[27] Transferable skills training and intersectoral mobility schemes[28] are two widespread examples of universities facilitating the transition of doctorate holders into non-academic career paths.

Importantly, the growing importance of career development signals a broader, more diverse scope for doctoral education.[29] As it was shown in section 2.2, doctoral education remains firmly focused on advancing knowledge through original research. At the same time, career development goes beyond the pursuit of original knowledge. Universities preparing early-stage researchers for a broad variety of career paths, including in non-academic sectors, signals a broader scope that looks beyond research output and takes into consideration doctoral candidates themselves and their role in society.

26 Brechelmacher, A., Park, E., Ates, G., & Campbell, D.F.J. (2015). The Rocky Road to Tenure – Career Paths in Academia. In T. Fumasoli et al. (eds.), *Academic Work and Careers in Europe: Trends, Challenges, Perspectives* (p. 13-40). Switzerland: Springer International Publishing.

27 Byrne, J., Jørgensen, T., & Loukkola, T. (2013). *Quality Assurance in Doctoral Education – results of the ARDE project.* Brussels: EUA Publications, p. 36. Retrieved 21 March 2018, from: http://www.eua-cde.org/reports-publications.html.

28 Borrell-Damián, L., Morais, R., & Smith, J. (2015). *Collaborative doctoral education in Europe: research partnerships and employ-ability for researchers. Report on DOC-CAREERS II project.* Brussels: EUA Publications. Retrieved 21 March 2018, from: http://www.eua-cde.org/reports-publications.html and Science Europe (2017). *Intersectoral Mobility Schemes in Science Europe Member Organisations. Survey report.* Brussels: Science Europe.

29 Byrne, J., Jørgensen, T., & Loukkola, T. (2013). *Quality Assurance in Doctoral Education – results of the ARDE project.* Brussels: EUA Publications, p. 36. Retrieved 21 March 2018, from: http://www.eua-cde.org/reports-publications.html.

Tracking doctorate holder careers

Career tracking plays a central role in developing an evidence-based approach and further improving career development in doctoral education. It also allows universities to build a comprehensive case for the added value of a doctorate on the labour market. Past EUA data has shown that universities increasingly track and collect data on the wide variety of career paths pursued by doctorate holders.[30]

Figure 9: Career tracking of doctorate holders
Does your institution track the careers of its doctorate holders?

26% 31%

- Yes
- Yes in most doctoral programmes
- Yes in some doctoral programmes
- No

29% 13%
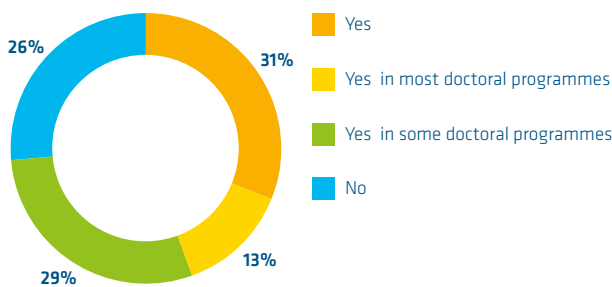
In the survey, institutions were asked if they track the careers of their doctorate holders, presenting them with four options: yes, in most doctoral programmes, in some doctoral programmes and no. Based on European aggregates, the survey results are consistent with previous EUA data, showing that, despite widely different country results, 45% of universities track the career paths of their doctorate holders at least in most doctoral programmes, 29% in some doctoral programmes and 26% not at all (cf. Figure 9).

Approaches to career tracking of doctorate holders vary significantly in Europe. Some projects coordinate efforts by universities in different countries,[31] and the European Commission recently reiterated its commitment to start a European initiative to track graduates,[32] but overall, countries and universities develop their own approach, depending on their needs and limitations.

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30 Sursock, A. (2015). *Trends 2015: Learning and Teaching in European Universities*. Brussels: EUA Publications, p. 90.

31 European Science Foundation (2017). *2017 Career Tracking Survey of Doctorate Holders. Project Report*. Strasbourg: ESF.

32 European Commission (2017). *Communication on a renewed EU agenda for higher education*, COM(2017)247 final, 30 May. Retrieved 21 March 2018, from: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2017:247:FIN. A feasibility study funded by the European Commission was finalised in 2016. The results can be found at http://www.eurograduate.eu.

2.4 **Funding**

Financial support for early-stage researchers is an issue of central importance for doctoral education. The ease and extent with which funding is available during the research process has a knock-on effect on many other aspects that enable doctoral candidates to carry out their research.

Based on the results of the survey, doctoral candidates were financially supported by a variety of funding resources, ranging from national public funding to none at all. However, a clear ranking of funding resources can be seen. (cf. Figure 10)

Figure 10: Financial support of doctoral candidates
To what extent are doctoral candidates at your institution financially supported (stipend, grant, salary, scholarship, fellowship, etc.)
by the following sources?
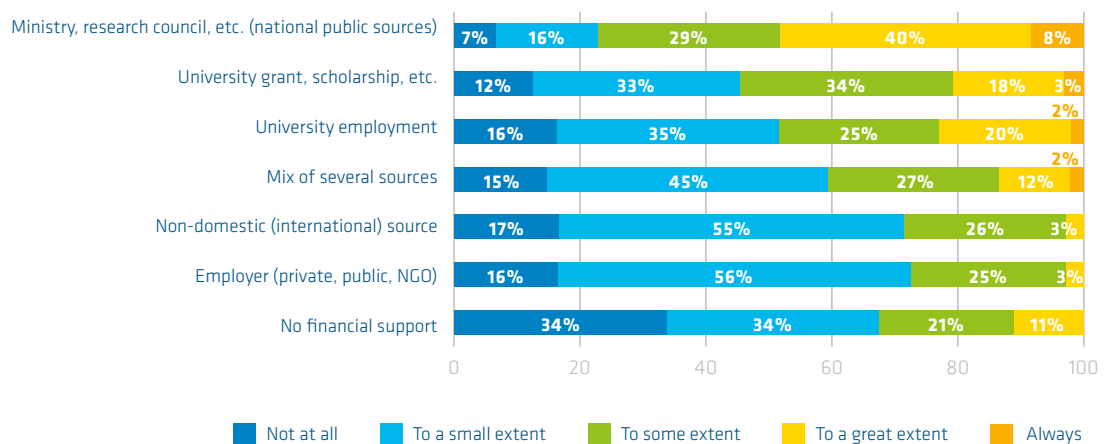
Public resources were by far the most dominant source of funding in Europe. First and foremost, 48% of responding universities indicated that national public resources "always" or "to a great extent" provide financial support for doctoral candidates. Trailing behind national-level resources were university employment and university grants, scholarships, etc. On par with each other, these resources "always" or "to a great extent" provide financial support, respectively 22% and 21% of the time.

Behind public resources, the percentages for other categories of funding were much lower. International and private resources each were available "always" or "to a great extent" for the financial support received by doctoral candidates only 3% of the time. However, at 11%, a sizeable minority of doctoral candidates did "to a great extent" not receive any financial support at all during their research.

The dominance of public funding resources directly ties doctoral education to long-term trends and recent public funding developments in higher education. In this light, it is noteworthy that the EUA Public Funding Observatory[33] in 2017 reported that higher education systems are following

33 The EUA Public Funding Observatory captures trends impacting Europe's universities and offers up-to-date information on dozens of different higher education systems across the continent. An online tool and 2017 report is available online. Retrieved 8 August 2018, from: https://eua.eu/resources/publications/718:eua-public-funding-observatory-2017.html.

starkly different trajectories from one country to another. While some countries continue their commitment to investing public resources in higher education (e.g. Austria, Germany and Luxembourg), others like Ireland, Spain and several others in Southeast and Central Europe have gone through an aggravated decline of funding. These diverging trajectories are sustaining and even widening the divide within the European Higher Education and Research Areas.

2.5 Mobility

In the survey, institutions were asked where doctoral candidates typically obtain their qualifying degree, presenting responding universities with three options: the same higher education institution, another institution in the same country or an institution from another country. The extent to which these categories are chosen give us a simple but telling indication of the national and international mobility of early-stage researchers before starting their research projects.

Figure 11: Qualifying degree from same or other institution
What percentage of doctoral candidates at your institution have a qualifying degree from the same institution, another institution in the same country or an institution from another country? (European aggregate)

- This institution
- Other institution in the country
- Another country

20%
53%
27%
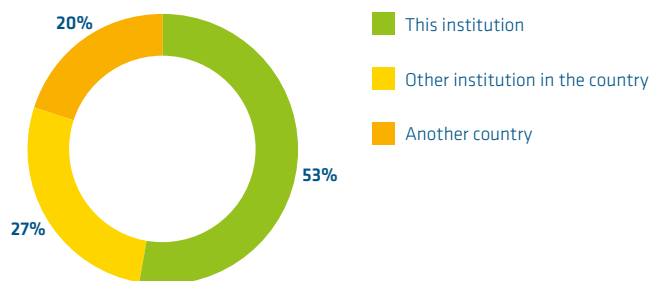
In European universities, a majority of doctoral candidates stay within the same country and often even in the same university in which they completed their higher education and acquired a research-based degree. Slightly over half of all doctoral candidates (i.e. 53%) went on to do research at the same institution where they originally obtained their qualifying degree (cf. Figure 11). Another quarter (i.e. 27%) moved to another institution in the same country, while one-fifth (i.e. 20%) started their research at an institution in another country, which makes the share of international candidates in European universities quite high.

2.6 **Time to completion**

The average time to completion of a doctoral research project is another indicator often discussed when it comes to doctoral education in Europe. The respondents were asked how long doctoral candidates typically take to complete their research and how the average time to completion has evolved compared to 10 years ago.

Looking at the European aggregate, the response to this question indicated that the state of play at a majority of European universities was that early-stage researchers on average take between 3.5 and 4.5 years to complete their doctoral dissertation (cf. Figure 12). The figure shows that in 65% of universities, the average time to completion ranges between 3.5 years (17% of higher education institutions) and 4.5 years (21% of higher education institutions).

A significant number of universities also reported that the average time had either decreased (43%) or remained stable (42%) (cf. Figure 13). In contrast, only 15% of institutions indicated an increase in the average time to complete a doctoral dissertation. Taken together, these results suggest a decrease in the length of doctoral studies in Europe.
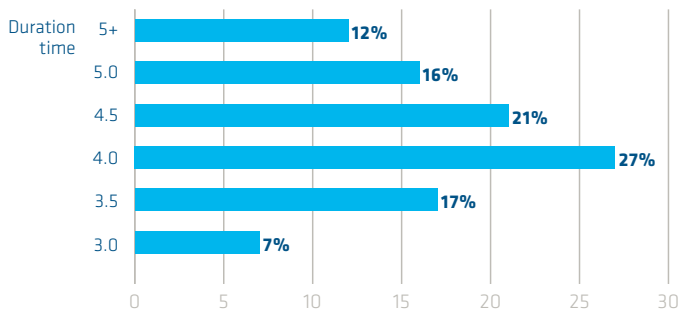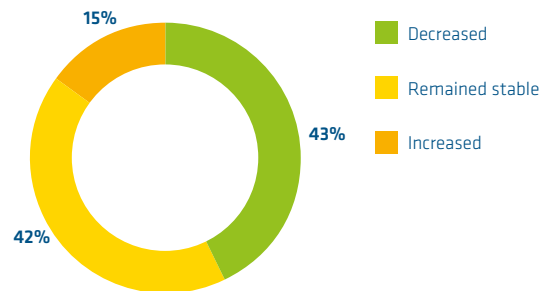
Figure 13: Average time to complete the doctoral programme compared to 10 years ago
Compared to ten years ago, in your institution has the average time to complete a doctoral programme decreased, remained stable or increased?

Figure 12: Time to completion
In your institution, how long do your graduates on average take to complete their full-time doctoral studies?

2.7 Supervision

Doctoral supervision has become a collective effort shared by the academic supervisor, other qualified members of the supervisory team and various structures put in place by the university. Support and guidance for early-stage researchers is now organised on multiple institutional levels. While the supervisor continues to play a central role and is even seeing her or his responsibilities expand dramatically, it is becoming increasingly rare for them to work without any form of institutional oversight.
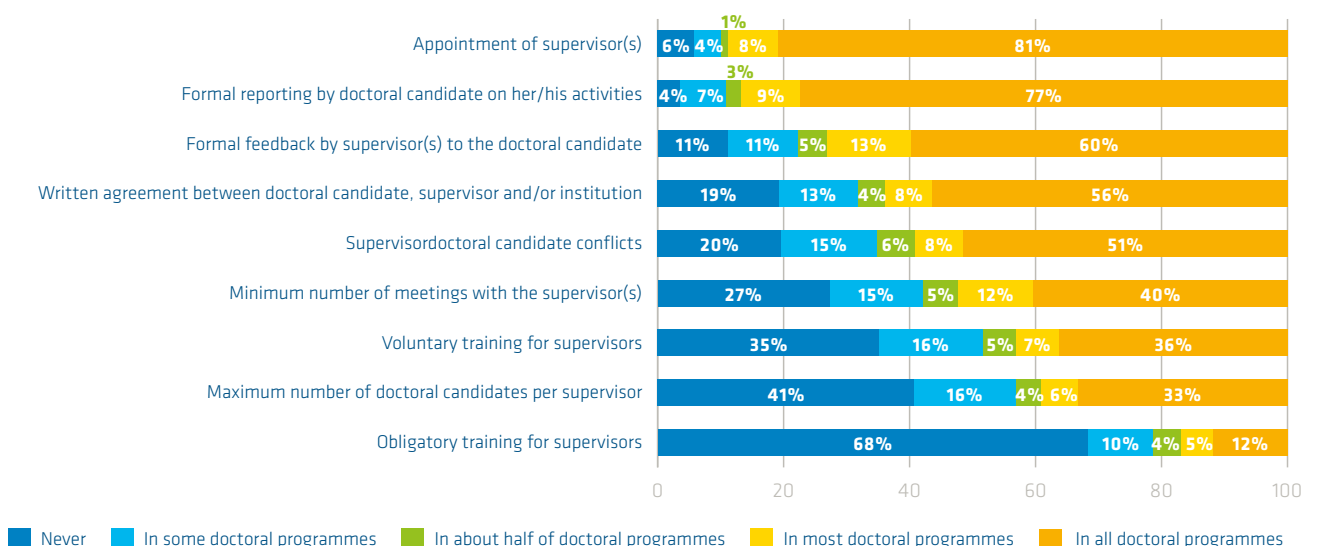
Further exploring the practice of doctoral supervision, universities were asked about institutional rules and guidelines that are in place to organise various aspects of supervision, ranging from the appointment procedure for supervisors to their training. They were also asked to what extent early-stage researchers find themselves supervised by a single supervisor or a supervisory team, either with members internal to the institution or from other universities. Looking at the European aggregate results, the survey further adds to the conclusion that doctoral supervision has become a collective and well-regulated effort in many ways.

Regarding regulation, the outcomes show that rules and guidelines are in place for most aspects of doctoral supervision. First, the appointment of supervisors is covered in 89% of responding universities, with 81% of them having this in place "in all doctoral programmes" (cf. Figure 14). On a comparable level are the results regarding formal reporting by doctoral candidates on their activities (86%) and formal feedback by supervisor(s) (73%). Close behind and present in a majority of responding universities are rules and guidelines for written agreements between the candidate, supervisor and/or the university (64%), conflicts between supervisors and early-stage researchers (59%) and the minimum number of meetings with the supervisor(s) (52%).

However, the results for doctoral supervisors training catch the eye due to the comparably low rate of institutional rules and regulations that are in place. Voluntary training for supervisors is regulated in 43% of responding universities, either "in most" (7%) or "in all doctoral programmes" (36%), and obligatory training only in 17%, either "in most" (5%) or "in all doctoral programmes" (12%) (cf. Figure 14). This shows that a lot of regulation in the area of supervision aims at leaving a paper or

Figure 14: Rules and guidelines on supervision
In your institution, are there rules or guidelines regarding the following aspects of doctoral supervision?

|	Never	In some doctoral programmes	In about half of doctoral programmes	In most doctoral programmes	In all doctoral programmes
Appointment of supervisor(s)	6%	4%	1%	8%	81%
Formal reporting by doctoral candidate on her/his activities	4%	7%	3%	9%	77%
Formal feedback by supervisor(s) to the doctoral candidate	11%	11%	5%	13%	60%
Written agreement between doctoral candidate, supervisor and/or institution	19%	13%	4%	8%	56%
Supervisor-doctoral candidate conflicts	20%	15%	6%	8%	51%
Minimum number of meetings with the supervisor(s)	27%	15%	5%	12%	40%
Voluntary training for supervisors	35%	16%	5%	7%	36%
Maximum number of doctoral candidates per supervisor	41%	16%	4%	6%	33%
Obligatory training for supervisors	68%	10%	4%	5%	12%

electronic trail which can be used in case of conflict between supervisor and supervisee. It is less about interfering in the daily relation between them when everything works well.

Universities were also asked to what extent early-stage researchers find themselves supervised by a single supervisor or a supervisory team, either with members internal to the institution or from other universities. Looking at the European aggregate results, we see that the practice of supervision has become a collective effort, with several supervisors increasingly working in tandem.

Single supervision is the dominant form of doctoral supervision in 49% of the responding universities, either "in most" (25%) or "in all doctoral programmes" (24%) (cf. Figure 15). However, on an almost equal level at 47%, stands supervision in teams composed of members internal to the institution, either "in most" (24%) or "in all doctoral programmes" (23%). In addition, teams of supervisors with members from other universities can be found in 24% of responding universities, either "in most" (11%) or "in all doctoral programmes" (13%).

Figure 15: Team vs. Single supervision
To what extent are doctoral candidates in your institution supervised by ...?
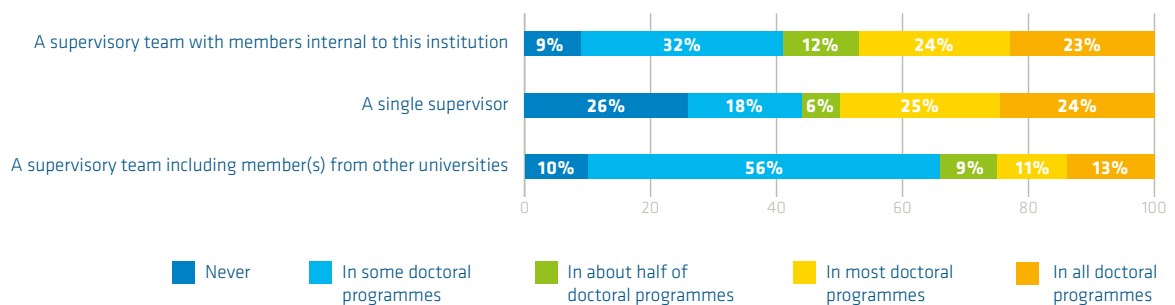
These results indicate that doctoral supervision has become a well-regulated and collective effort in many ways. Regarding the former, they show that regulations are in place for important aspects of doctoral supervision. The state of play in a majority of responding universities is in line with the Salzburg Principles published in 2005, urging higher education institutions to have in place '[...] arrangements for supervision and assessment [based] on a transparent contractual framework of shared responsibilities [...].'[34]

Regarding the increasingly collective nature of doctoral supervision, the emergence of doctoral programmes and schools as the predominant organisation of doctoral education has complemented rather than replaced the central role of doctoral supervisors. While universities have assumed more responsibility and supervisors as a result rarely still work without any form of oversight, there is no indication that their role has diminished. The results in this chapter are an even clearer indication that supervisors remain the first among equals when it comes to doctoral supervision in Europe, but they increasingly work in tandem with supervisory teams consisting of colleagues from inside and (to a lesser extent) outside the same university.

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34 *European University Association (2010). Salzburg II Recommendations: European universities' achievements since 2005 in implementing the Salzburg principles.* Brussels: EUA Publications. Retrieved 3 September 2018, from: http://www.eua-cde.org/reports-publications.html.
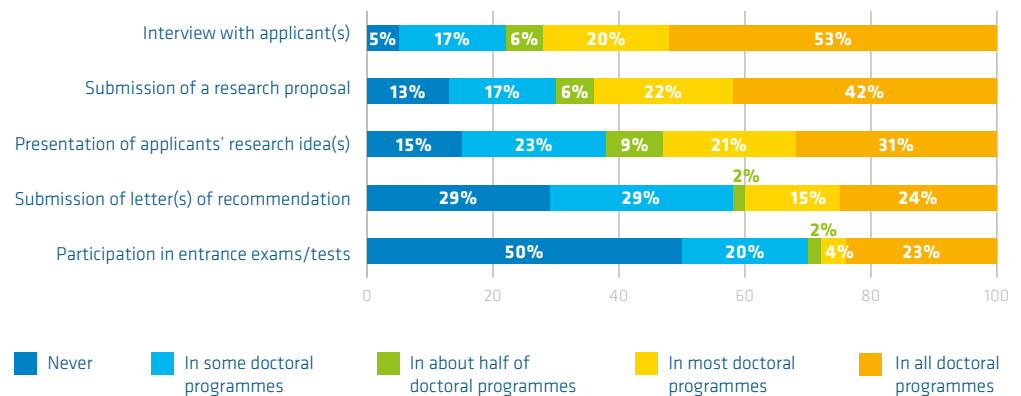
2.8 Application and admission

Setting application and admissions criteria for early-stage researchers is arguably one of the most important responsibilities of higher education institutions with regards to building a vibrant and diverse doctoral research environment. Ensuring equal opportunities for talented researchers to enter doctoral programmes and schools is an institutional responsibility that ideally takes the form of a well-defined and public set of criteria matched with transparent and accountable admissions procedures.

Respondents were asked to indicate which of the following steps are used by universities for the admissions procedure for doctoral candidates: an interview with the applicant(s), the submission of a research proposal, a presentation of the applicants' research idea(s), the submission of letter(s) of recommendation or participating in entrance exams/tests. Looking at the European aggregate results, the survey shows that doctoral candidates are predominantly admitted on the future research potential they show, rather than their past achievements.

The application and admissions procedure for doctoral education involve an interview with the applicant(s) in 73% of universities, either "to a great extent" (20%) or "always" (53%) (cf. Figure 16). Submitting a research proposal is part of the procedure in 64% of institutions, either "to a great extent" (22%) or "always" (42%), while a presentation of the applicants' research idea(s) is included in 52% of universities, either "to a great extent" (21%) or "always" (31%).

Figure 16: Steps for admission to doctoral education programmes
In your institution, which of the following steps are used for the admission procedure for doctoral candidates?

Following these three aspects, other application and admissions procedures at European universities are less frequent. The submission of letter(s) of recommendation is only present in 39% of institutions, either "to a great extent" (15%) or always (24%), and an even lower 27% of universities requires potential doctoral candidates to participate in an entrance exam/test, either "to a great extent" (4%) or "always" (23%). While the requirement for letters of recommendation and entrance exams are still present in a significant number of universities across Europe, the aspects mentioned above score much higher as they are present in between three-fourths and half of all institutions.

The survey results clearly show that doctoral candidates are predominantly admitted on the basis of the future research potential they show during interviews, their research proposal and their ideas. These criteria feature in the application and admissions criteria far more than those reflecting past achievements such as letters of recommendation or current capabilities such as taking entrance exams. This is fully in line with the Salzburg II Recommendations published

in 2010, which urged universities to "[…] value the research potential of the candidates over past performance and above all the candidates' potential to succeed in the programme to which they are being admitted."[35]

Application and admissions procedures focused on the future research potential of doctoral candidates can be considered a key aspect of the virtuous circle mechanism that is driving doctoral education forward in Europe. Not only a growing number of early-stage researchers in Europe being admitted based on their future potential, but in addition the training and support they subsequently receive via doctoral programmes and schools has been professionalised. Taken together, this constitutes one of the key advances implemented in the past decade that has allowed doctoral education to become an essential contributor to Europe's economic, scientific, technological and social development.

2.9 Decision-making processes

Participation in the decision-making processes related to doctoral education gives an insight into the practical effects of universities adopting a more professional approach, i.e. taking on institutional responsibility for early-stage researchers and their doctoral research process. It reveals which levels of administration predominantly participate in various decision-making processes regarding the organisation of doctoral education, while also indicating the extent to which doctoral candidates themselves can influence or challenge the decisions being made that impact them directly.

A wide range of issues related to decision-making and the organisation of doctoral education were investigated in the survey, with options ranging from the national, institutional and sub-institutional level to the supervisor. Another question addressed the means to which doctoral candidates can resort in order to influence or challenge the decision-making process. Answers show that participation in decision-making procedures is largely bottom up, including many opportunities for doctoral candidates to get involved.

The questions about decision-making processes included elements of the selection procedure (e.g. submission of research proposal, interviews required), the selection of doctoral candidate(s), contract conditions between the doctoral candidate and the supervisor/organisational unit, supervision rules and guidelines (e.g. regarding meetings, reporting, feedback), required topics of doctoral training, required tasks of doctoral candidates (e.g. teaching, administration, etc.) and examination rules and guidelines.

Participation in decision-making procedures related to doctoral education is largely dominated from the bottom up, rather than from the top down. The level of institutional sub-units dominates participation in decision-making procedures on almost all the listed issues (cf. Table 1). This holds true for the selection of doctoral candidate(s) (circa 92%), required tasks of doctoral candidates and required topics of doctoral training (both 86%), elements of the selection procedure (84%) and supervision rules and guidelines (78%). Regarding the remaining issues, the institutional level dominates participation in decision-making procedures on examination rules and guidelines (70%) and contract conditions between the doctoral candidate and the supervisor/ organisational unit (66%).

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35 European University Association (2010). *Salzburg II Recommendations: European universities' achievements since 2005 in implementing the Salzburg principles*. Brussels: EUA Publications. Retrieved 30 August 2018, from: http://www.eua-cde.org/reports-publications.html.

The bottom-up nature of participation in decision-making procedures is further accentuated by looking at the second most frequent form of participation. The supervisor partakes in the selection of doctoral candidate(s) in 57% of responding universities, as well as in defining required topics of doctoral training (52%) and required tasks of doctoral candidates (51%), while the sub-institutional level is strongly involved in examination rules and guidelines (69%) and contract conditions between the doctoral candidate and the supervisor/organisational unit (60%).

Table 1: Decision making procedures
Who participates in the decision-making process regarding the following issues? You can choose multiple answers per issue

	National level	Institutional level	Institutional sub-units	Supervisor
Elements of the selection procedure (e.g. submission of research proposal, interviews required)	16,2%	46,9%	84,1%	45,8%
The selection of the candidate(s)	5,0%	16,5%	91,7%	56,8%
Contract conditions between doctoral candidate and supervisor/organisational unit	21,9%	66,0%	60,0%	27,5%
Supervision rules and guidelines (e.g. regarding meetings, reporting, feedback)	12,3%	58,7%	77,9%	42,8%
Required topics of doctoral training	11,6%	37,8%	86,2%	52,0%
Required tasks of doctoral candidates (e.g. teaching, administration, etc.)	14,0%	39,9%	86,3%	50,9%
Examination rules and guidelines	32,8%	69,7%	69,0%	15,7%

Figure 17: Complaint procedures
At your institution, doctoral candidates …
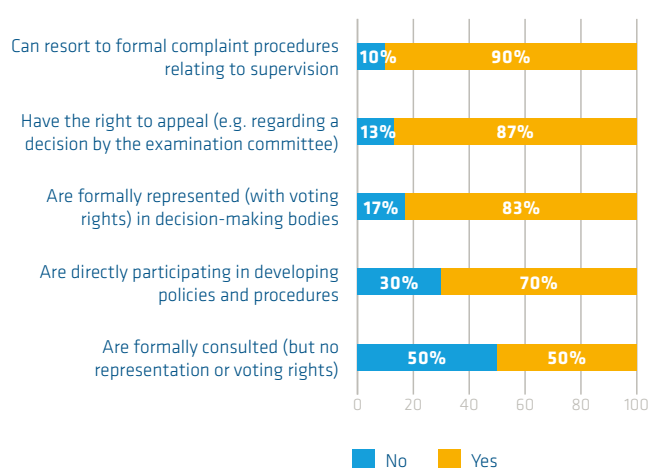
Complaint procedures

The survey asked whether doctoral candidates can resort to formal complaint procedures relating to supervision, have the right to appeal (e.g. regarding the decision by the examination committee), are formally represented (with voting rights) in decision-making bodies, directly participate in developing policies and procedures or are formally consulted (but have no representation or voting rights).

Based on responses to the survey, doctoral candidates predominantly have recourse within their university to influence or challenge the decision-making process. They can resort to formal complaint procedures relating to supervision in 90% of responding universities, have the right to appeal in 87%, are formally represented (with voting rights) in decision-making bodies in 83% and directly participate in developing policies and procedures in 70% (cf. Figure 17). Only the result as to their formal consultation without representation or voting rights stands out lower at 50%.

2.10 **Completion rate**

The completion rate of doctoral research projects is another included in the survey to establish the current state of play for early-stage researchers currently enrolled in doctoral education in Europe. Responding institutions were asked how many doctoral candidates complete their dissertation within six years and how this number has evolved compared to ten years ago.

Looking at the European aggregate, responses to the question of how many doctoral candidates complete their research within six years indicate that a majority of early-stage researchers (i.e. 66%) complete their doctoral dissertation within six years, although with significant differences between the different countries (cf. Figure 18).

Responding universities were also asked how the completion rate at their institution has evolved compared to ten years ago. The responses indicate that the completion rate in Europe has remained predominantly stable, albeit with a sizeable minority of institutions reporting a positive evolution towards a better completion rate. About half of all responding universities (49%) indicated that the completion rate at their institution has remained stable compared to a decade ago (cf. Figure 19), while 35% reported an increase and 16% a decrease.

Figure 18: Percentage of doctoral candidates graduating within six years (SD 28)
What percentage of doctoral students that enrolled in 2009 graduated within six years?
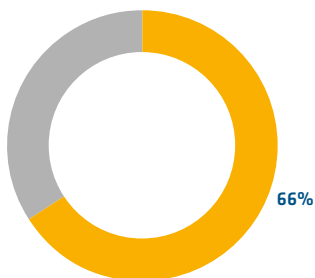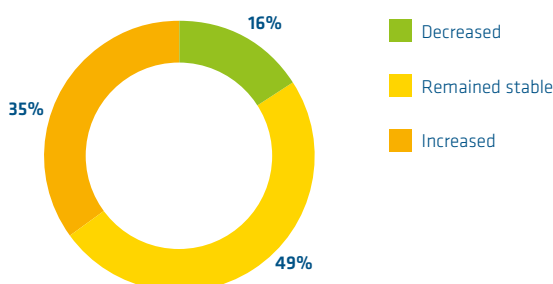

66%

Figure 19: Completion rate over last 10 years
Compared to ten years ago, has this number...?

16%   ■ Decreased
35%   ■ Remained stable
49%   ■ Increased

The average time to completion, despite decreasing, remains closely aligned to the boundaries that were recommended by the Salzburg Principles back in 2005. On the duration of doctoral studies, these principles stated that "[...] doctoral programmes should operate within an appropriate time duration (*three to four years full-time as a rule*)."[36] (emphasis added) More than a decade later, early-stage researchers at most European universities still take between 3.5 and 4.5 years to complete their doctoral dissertation. Despite the fact that 35% of universities reported an increase of the completion rate, the situation had in this aspect, too, remained predominantly stable.

This relative stability of the time to completion (cf. chapter 2.6) and completion rate remind us to make a clear distinction between the organisation of doctoral education (i.e. the many and diverse practices, policies and structures that have been implemented to guide and support early-stage researchers) and the research process itself. Asked what they thought might be some of the reasons behind any change or lack thereof, responding universities pointed to a varied number of reasons ranging from the implementation of more structured programmes to increased availability of funding and support. While these advances are real and have swept across most of Europe to reach most doctoral candidates, the process of advancing knowledge through original research will still have to follow its own, time-consuming, often non-linear path.

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36 European University Association (2010). *Salzburg II Recommendations: European universities' achievements since 2005 in implementing the Salzburg principles*. Brussels: EUA Publications. Retrieved 23 August 2018, from: http://www.eua-cde.org/reports-publications.html.

3 Trends and conclusions

3.1 Strategic priorities

Doctoral education is a dynamic field in which key challenges of higher education and research come together. At the same time, all approaches need to be translated to the specific situation of the doctoral candidates. The priorities identified in this study can be understood as issues that require action with the aim of achieving strategic goals of the institution for the doctoral candidates community, the university research activity and for the institution itself.

The most important strategic priority for the respondents was the funding for doctoral education, identified by 74% of respondents. This may reflect the difficult financial position of many institutions, which has already been addressed in Section 2.4. It also points out that other priorities such as research ethics and integrity need financial support to be addressed properly.

Second in terms of strategic priorities was research ethics, which 70% universities considered highly important. This indicates the increasing awareness of this issue in the institutions. Research ethics and integrity is a core value of universities as education and research institutions. Research misconduct can seriously harm their reputation, as well as that of future researchers and doctoral candidates themselves. In 2017, the EUA-CDE dedicated both the Thematic Workshop 2017 and a focus group to this topic. The participants of the focus group agreed that "research integrity is a central issue to address as part of doctoral education, given that early-stage researchers are likely to take the skills and practices they develop with them throughout the rest of their careers."[37]

The third priority in terms of importance is the attraction of doctoral candidates from abroad (61%). A high degree of priority on internationalisation is no surprise due to the international nature of the research activity, but also of the increased relevance of the issue of diversity within the institutions. As Eurostat data show, there is significant inequality in Europe when it comes to the number of doctoral candidates from abroad. Given the global character of research, institutions deal with the question how to make their doctoral candidates population more diverse.[38]

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37 Report of the focus group: https://eua-cde.org/component/attachments/attachments.html?id=306

38 https://data.europa.eu/euodp/en/data/dataset/1JmnH3ZCIAcySgoxJhpGQ

Figure 20: Strategic priorities
To what extent are the following issues currently considered a strategic priority in doctoral education within your institution?

	Not at all	To a small extent	To some extent	To a great extent
Funding of doctoral education	2%	2%	22%	74%
Research ethics	1%	4%	25%	70%
Attracting doctoral candidates from abroad	3%	10%	26%	61%
Career development of doctoral candidates	1%	12%	41%	47%
Gender equality	9%	11%	29%	51%
Open Access / Open Science	4%	15%	37%	44%
Health/wellbeing of doctoral candidates	5%	16%	37%	41%
Increasing the number of doctoral candidates	14%	11%	32%	43%
University-business cooperation within doctoral education	5%	19%	48%	28%
Societal engagement of doctoral candidates	6%	28%	46%	20%

Other important strategic priorities identified were: career development, gender equality, open access/open science, health/wellbeing of doctoral candidates, and the increasing number of doctoral candidates. University-business cooperation and the societal engagement of doctoral candidates have a lower degree of prioritisation.

Based on these results it can be concluded that specific topics related to doctoral schools, such as career development of doctoral candidates and attraction of doctoral candidates from abroad do not score higher than general topics such as open science, gender equality or research ethics and integrity. This reflects the increasing number of aspects that universities and their doctoral schools must deal with nowadays. It also points to the increasing relevance of doctoral education for the implementation of research policies within universities. In particular, the importance attributed to research ethics and integrity (74%) is remarkable: several years ago, this topic rarely showed up in the debates and publications related in this area. It shows how important the issue of research ethics and integrity has become for universities in a very short time.

3.2 **Quality assurance**

Internal quality assurance usually aims at enhancing a learning process within the institution, and 88% of the institutions had established an internal quality assurance system in most or all doctoral programmes. 61 % of institutions were also evaluated by an external agency in all or most doctoral programmes. Several respondents brought up the issue of frequent parallel evaluation processes by different organisations. For example, doctoral schools and doctoral programmes are often evaluated simultaneously by both external agencies and institutional internal processes. An open question for the community is to find the right balance of co-existing evaluation systems, that is, how evaluation processes can be used as effectively as possible by different organisations while providing added value aiming at improving the doctoral education system.

Figure 21: Internal or external Quality Assurance
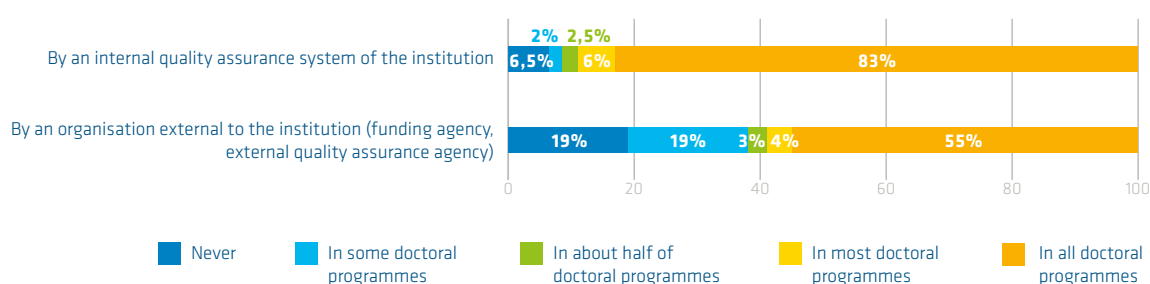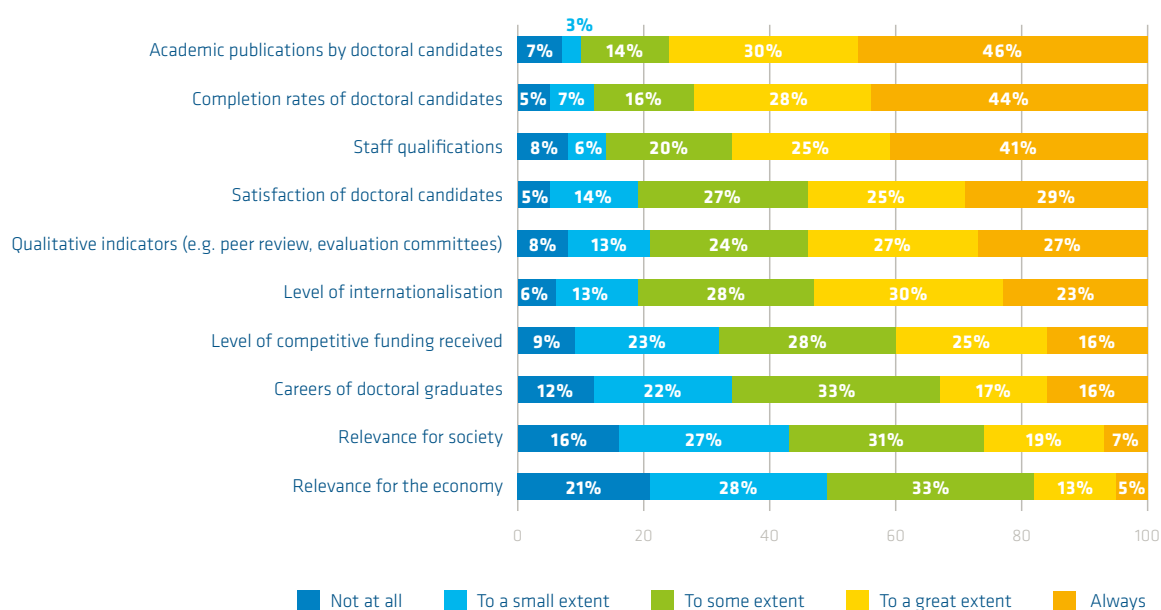In your institution, how is the quality of doctoral education ensured?

Figure 22: Indicators used for assessment
In your institution, to what extent are the following aspects/criteria used to assess/evaluate doctoral education?

The main indicators used by institutions to measure the quality of doctoral education include the academic records of the doctoral candidates, the time to completion and completion rate, the staff qualifications, the perception of satisfaction by the doctoral candidates, and the proportion of international candidates. Comparing the current use of these indicators with respect to 2014 (ARDE Report)[39] we can see only minor differences which can be neglected based on the different size of the sample universities. Thus, presently, 76 % of institutions use academic publications of doctoral candidates (84% in the ARDE Survey) as a main indicator for the quality of doctoral education. Among other indicators used, 72% of institutions use the completion rate of the doctoral candidate (77% in ARDE); 66% use staff qualifications (ARDE 65 %), and 54% measure the satisfaction of doctoral candidates. Also, 54% of universities use other qualitative indicators, 53% use the level of internationalization (Arde 61%), and the capacity to attract competitive funding is measured by 41% (ARDE 47%) of universities.

As the most frequently used indicators relate to the academic work of the doctoral candidates (measured through his/her publications) and to the completion rate of their doctoral degree, it can be concluded that, overall, they aim at assessing doctoral candidates as research professionals as well as in terms of the quality of the candidates' research outcomes. Staff qualification, the third most used indicator, also has a direct influence on the academic work.

3.3 Developments in doctoral education

3.3.1 Doctoral candidates as highly mobile early career researchers

While the status of doctoral candidates significantly differs throughout Europe, their role as early career researchers is uncontested. Their core work is related to performing research under academic standards to create new knowledge while developing their research skills and knowledge. (c.f. chapter 2.2). Doctoral education is different from vocational degrees or typical higher education study programmes. Doctoral candidates therefore need the necessary flexibility and time to undergo their research, with adequate funding. As the survey results show, it takes an average of four years to achieve a doctoral degree in Europe (c.f. chapter 2.6). While considering doctoral candidates as early career researchers, institutions increasingly see doctoral candidates as potential researchers in academic environments, but also as researchers outside of academia – as highly skilled "knowledge workers". (c.f. chapter 2.3). Regarding mobility, doctoral candidates are not only mobile between sectors regarding their career perspectives (academia, industry, education, government, consultancy, etc.) but also geographically. A significant majority (73%) do their doctoral thesis at an institution other than the one where they studied before (c.f. chapter 2.5).

3.3.2 Institutional responsibility

The steep increase in number of doctoral schools and the diversity of trainings they offer, indicates that universities have adopted a more structured approach to doctoral education and have assumed institutional responsibility for the support of early-stage researchers. While they continue to report a wide variety of practices, and develop diverse policies and structures, the underlying trend towards increased institutional strategy on doctoral education is clear.

39 Byrne, J., Jørgensen, T., & Loukkola, T. (2013). *Quality Assurance in Doctoral Education – results of the ARDE project.* Brussels: EUA Publications, p. 36.

The survey results relating to the organisation of doctoral education stand out in this regard (cf. chapter 2.1). We have seen that while universities have established diverse, often parallel structures on different levels of university governance, the goal and motivation behind all these structures is to enhance the institutional role, e.g. through doctoral programmes as well as through services provided by doctoral schools. In addition, many institutions have established further rules and regulations on doctoral results and ancillary training activities such as the development of transversal skills (c.f. chapter 2.2).

3.3.3 Virtuous cycle of quality

A virtuous cycle further propelling the quality of doctoral education forward emerges from the survey results. The applications and admissions criteria set by universities predominantly focus on the future research potential of doctoral candidates (e.g. interviews, research proposals and presentation of research ideas) and less on previous achievements such as grades in past exams or the master thesis (cf. chapter 2.8). While assessing a candidate's potential for possible future achievements can be seen as a risk, this criteria – combined with adequate training and support – offers the most talented early-stage researchers opportunities for their development.

3.3.4 A landscape of diversity

The commonalities in the organisation of the doctorate and in supporting doctoral candidates consolidate the existence of a specific European model on doctoral education. These commonalities, namely the perception of doctoral candidates as early career researchers may also be of interest in other parts of the world. However, the results also show a diverse landscape of doctoral education in Europe. Answers to the questions of the survey differ significantly between countries, but also between institutions. The diversity of doctoral education is reflected in the different status of doctoral candidates as well as in different institutional structures –institution-wide doctoral schools, doctoral programmes and similar structures – at the levels of faculty or discipline. Funding of doctoral education is diverse, and so are the admissions criteria and evaluation processes. A main part of the doctoral education is based on the education and training in research-specific knowledge and related skills. While the survey did not explore disciplinary differences, field experience and literature report diversity of approaches due to disciplinary differences. While, for instance, in humanities, single-authored publication are more common, in the natural science, shared publication are much more common practice.[40] Doctoral research, projects are carried out by individual doctoral candidates, in natural sciences, sharing a project by several candidates is more common practice. For a subsequent survey, it is recommendable to also explore disciplinary considerations.

3.3.5 Future priorities of doctoral education

The last decade was marked by a general establishment of doctoral schools in European universities. Now an open question arises on their future objectives and perspectives. As the study has shown, specific priorities related to doctoral candidates, such as the organisation of their supervision or career perspectives, deserve similar levels of importance as general topics such as open science, research integrity or the attraction of doctoral candidates from abroad. While the establishment of appropriate structures supporting doctoral education is a common goal for institutions, other topics are more particular: some institutions may focus on increasing the number of doctoral candidates, others on doctoral career perspectives, others on making Open Science a reality in doctoral education. However, the essential principles of doctoral education in Europe, established in the Salzburg Principles more than a decade ago, remain unchanged. European universities have developed a

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40 See f.i. Larivière, V., Gingras, Y. & Archambault, É.: Canadian collaboration networks: A comparative analysis of the natural sciences, social sciences and the humanities, in: Scientometrics (2006) 68: 519.

characteristic model of doctoral education, which adapts to diverse contexts to produce excellent, original research according to academic standards.

3.3.6 Looking to the future, building on a successful past

Based on this study, it is fair to say that current doctoral education in Europe truly reflects the principles and guidelines developed in the three Salzburg Principles and Recommendations. It is important to note the importance placed on the role of doctoral education in European research, and the adoption of additional responsibilities by the institutions. The Salzburg Principles and Recommendations, developed since 2005, were never enforced by law or imposed top down. Instead, they emerged and evolved from constant processes of self-questioning by universities, and exchange of practices between them. This demonstrates that, beyond the diversity of practices in doctoral education, it is possible to jointly create and develop ideas that inspire institutions, being adapted to their own legal and academic contexts. The cultural change which started in 2005 with the Salzburg Seminar led by the universities is today a reality. The sharing of practices at the institutional level has proved to be an excellent method to build up a common framework of doctoral education that takes into account the specificities of each institution.

Annex

Table 2: Representativeness of the EUA survey: number of Doctorate awarding higher education institutions included in ETER and number of doctoral candidates compared to totals included in the ETER dataset *

	ETER		EUA survey cases in ETER		Representativeness	
	Doctorate awarding higher education institutions	Number of doctoral candidates	Number of higher education institutions	Number of doctoral candidates	Share of doctoral awarding institutions	Share of doctoral candidates
Austria	26	24056	12	16430	46%	68%
Belgium	12	11626	10	11490	83%	99%
Bulgaria	39	6207	1	107	3%	2%
Switzerland	12	23697	4	12824	33%	54%
Cyprus	8	1109	1	618	13%	56%
Czech Republic	29	24644	13	12445	45%	50%
Germany	155	111409	21	33740	14%	30%
Denmark	10	9691	4	4986	40%	51%
Estonia	7	2903	2	1782	29%	61%
Spain	80	32060	22	12500	28%	39%
Finland	15	19869	11	17782	73%	89%
France	116	70619	7	14888	6%	21%
Greece	21	23156	3	3165	14%	14%
Hungary	24	7130	7	2647	29%	37%
Ireland	25	8157	7	7240	28%	89%
Iceland	3	520	1	485	33%	93%
Italy	85	32775	36	20587	42%	63%
Lithuania	19	2363	4	1423	21%	60%
Luxembourg	1	390	1	390	100%	100%
Latvia	21	2195	2	671	10%	31%
Malta	1	113	1	113	100%	100%
Netherlands	19	8744	5	3488	26%	40%
Norway	25	9586	19	9275	76%	97%
Poland	99	40395	35	21827	35%	54%
Portugal	27	19310	7	10455	26%	54%
Romania	90	na	1	Na	1%	na
Serbia	17	7712	1	694	6%	9%
Sweden	28	21387	13	14455	46%	68%
Slovenia	5	na	4	Na	80%	na
Slovak Republic	28	9071	7	2565	25%	28%
Turkey	180	78223	14	19118	8%	24%
United Kingdom	134	112440	16	30585	12%	27%
Total	**1361**	**721557**	**292**	**288775**	**21%**	**40%**

ETER data 2014; Denmark year 2013; Luxembourg 2011

* *Missing ETER data for respondents of the doctoral education survey: Andorra (1), Armenia (1), Belgian French Community (1), Cyprus (1), France (3), Germany (2), Hungary (1), Ireland (1), Italy (2), Netherlands (2), Norway (1), Spain (2) and the European University Institute (1)*

The EUA Council for Doctoral Education was launched in 2008 at the initiative of the European University Association, responding to a growing interest in doctoral education and research training in Europe. It is now the largest European network in this field, covering more than 30 countries and bringing together a community of academic leaders and professionals from over 250 universities awarding doctoral degrees and institutions working on issues related to doctoral education and research training.

The main objective of the EUA Council for Doctoral Education is to strengthen the doctoral research capacity of European universities to attract and shape talented early-stage researchers in a competitive and global environment. By promoting collaboration and exchange of good practices among its members and disseminating the outcomes of its work, the Council makes an important contribution to the development of doctoral education and research training in Europe.

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