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## 2.1 Introduction

In this chapter the larger policy framework that influences the relationships between doctoral education and labor market policy in Europe is described. In the first section, the traditions of doctoral education prevalent in continental Europe are contrasted to the US model of graduate education and a brief account is provided about the international (OECD) debate about the future of doctoral education. This is followed by an analysis of the implications of higher education expansion for doctoral education and training as numbers increased and the production of doctorates no longer exclusively served for the reproduction of academic staff. A third part develops a typology of destinations of doctoral degree holders followed by an analysis of the increasing diversification of the types of doctoral degrees of which altogether nine different ones were found. A major implication of this diversification is the distinction between research doctorates and professional doctorates, the latter being geared towards the transition into non-academic labor markets. A further part discusses the extended policy field in which a doctoral education is no longer an exclusively academic affair but is increasingly managed at the institutional level, embedded in national regulations and performance incentives as well as targeted by policies of supra-national actors, e.g. the European Commission, OECD or UNESCO. Doctoral degree holders have currently become a valuable resource in knowledge societies and economies. In addition, future policy and data needs are identified. The conclusions point out that although recruitment patterns and career

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progress for early career researchers in academia have become more standardised, they continue to be influenced by a number of other factors which contribute to the considerable complexity of the relationships between a doctoral education and academic as well as non-academic labor markets.

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## 2.2 Traditions of Doctoral Education and Training

In the international debates about the character of doctoral education and training, the contrast between the German tradition and the tradition that has evolved in the United States is most often taken as a starting point. The German model, based on Humboldtian principles, understood students as learners to be confronted with the logic of research from the beginning of their studies and nurtured young academics through close relationships with a ‘doctor father’ or ‘doctor mother’. In this model doctoral candidates were not understood as students any longer but as junior academics often in a salaried position as research assistants. The model is often referred to as the ‘master-apprentice model’. The US-American model, though claiming to be based on Humboldtian principles as well, is clearly distinct from the German one in that it puts a greater emphasis on teaching and nurtures doctoral students in the framework of organized and structured programs within graduate schools (for this and the following see Teichler 2014).

The contrast between the two models is evident in the actual discussions that have gained momentum since the 1980s when the OECD identified doctoral education and training as a key issue of higher education and research policy (see Blume and Amsterdamska 1987). In this context the concepts of ‘knowledge society’ and ‘knowledge economy’ became popular in the 1990s implying the notion that the future of modern societies will depend more strongly than in the past on research and that countries might lose out if they cannot achieve the highest level of research. Attention increased to the visible signs of research quality in the USA as well as to the fact that large numbers of doctoral candidates from all over the world intended to have their doctoral training at US research universities. Consequently the policy discourse stimulated by the OECD in the 1980s was based by and large on a shared assumption that graduate schools in the United States could become role models for universities in other economically advanced countries (see Rhoades 1991; Gumpert 1992).

However, looking more closely at the debates in Europe and the OECD countries in the 1980s and 1990s one could argue that many countries were trying to find improved ways of doctoral education and training by adapting elements of the US model. Doctoral education in the US was often portrayed as a ‘success story’ without any reference to debates about its strengths and weaknesses (but see, for example, Nerad 2004). As a consequence implementing the US model was seen as (1) providing a better quality of research training, (2) getting useful ideas for the training of researchers, (3) designing and implementing a more comprehensive training for the professional role of academics, and (4) developing doctoral

education and training programs that were valuable for those who eventually would neither be academics nor researchers in other institutions.

The international debate on the future of doctoral education has intensified and become more sophisticated over the past 20 years. The strengths and weaknesses of a highly institutionalised and programmed approach versus an individualised apprenticeship approach have played a substantial role in this debate. In addition, however, many other issues were on the agenda as well, such as the distinct types of doctorates, the range of competences to be acquired during the doctoral phase beyond the ability to conduct research, and the relationship between training and productive academic work in this phase (see Kehm 2009). The extent of the diversity of views is not only related to the individual insights and preferences of the actors in this debate but also reflects the different conditions of national higher education and research systems and their societal contexts. The different views within countries and the different dominant realities across countries can be examined in seven major dimensions:

1. The extent of higher education expansion.
2. The extent and modes of diversification of the higher education and research systems.
3. The quantity of doctoral degrees as well as the academic and non-academic destinations of doctoral degree holders.
4. The role of the doctoral phase in the overall education, training and career development of academics.
5. The role of doctoral training in the context of overall training and career development for those persons who eventually become professionally active outside academia.
6. The overall situation and role of junior academics.
7. The changing views of desirable competencies and job roles of academics.

These dimensions became visible in various studies aiming to understand the situation of doctoral education and training in the wider context of higher education and its societal functions and from a comparative point of view. They were already evident in a study on the notions of research in graduate education coordinated by Clark (1993, 1994), in a review undertaken in the first years of the twenty-first century on “doctoral studies and qualifications” in Europe and the United States initiated by the European Centre for Higher Education (CEPES) of UNESCO (Sadlak 2004; see notably Kehm 2004), and in publications of a “global network” of researchers analysing “changes in doctoral education worldwide” and a possible trend “towards a global PhD” (Nerad and Heggelund 2008; see also Kehm 2012). Also helpful in this respect are the proceedings of a conference organised by the Academia Europaea on the “formative years of scholars” (Teichler 2006) and by UNESCO (UNESCO Forum on Higher Education, Research and Knowledge 2008). Two issues stand out in most of these reports also supported by the implications of the European Bologna Process for doctoral education and training. First, the need to shape and possibly reconfigure pathways to an academic career during the postdoc

phase. Second, the need to provide doctoral students with skills and competences needed in non-academic labor markets. We will come back to these issues.

In sum, there is a variety of experiences in economically advanced countries based on past models of doctoral education and training and there is a variety of new challenges that call for new solutions. In the following we will address some of the elements for future developments of doctoral education and training that are similar across countries as well as other elements where substantial differences between countries can be observed.

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### **2.3 Expansion of Higher Education and Its Implications for Doctoral Education and Training**

The international debates on possible improvements of doctoral education and training tend to refer to the expansion of higher education as a major factor. Concurrently with this expansion, we also note the growing size of the academic and research system.

Irrespective of quantitative variations of higher education expansion—more than 50 % of an age cohort studying in higher education in many economically advanced countries, clearly less than that in most other countries, the OECD average being 50 %—and irrespective of the time at which expansion occurred—in the 1950s and 1960s in the USA, in the 1970s and 1980s in Europe, and more recently in many other countries—the conventional wisdom of expert debates in economically advanced countries has been rather similar. First, it is often pointed out that students and graduates have become more diverse in terms of their talents, motives and job prospects as higher education expanded (see Huisman et al. 2007; Teichler 2008). Therefore these students might be better served by an increased diversity of higher education institutions and programs. Second, higher education might have expanded to a lesser extent if the need for extending and replenishing teaching and research staff had been the major driving force for this trend. But this is not the case.

The rates of doctoral degrees awarded had been below 1 % in all countries for many years and were not seen as an issue in the general debate on higher education. For example, the chapters on the United States, the United Kingdom, France, and Switzerland in the first major international encyclopaedia for higher education (Clark and Neave 1992) did not provide any information about the number of doctoral candidates or the number of doctoral degrees awarded. Only in recent years has the expansion of doctoral degrees been referred to in the general discourse on the quantitative and structural developments of higher education. An average of 5 % annual growth in doctoral degrees across OECD countries was reported for the first decade of the twenty-first century, raising the rate of doctoral degrees among the respective age group from less than 1 % on average in 2000 to 1.6 % in 2010 (OECD 2012). Actually, the rates of doctoral degrees and similar advanced degrees have varied substantially by country over the decades and continue to vary more

substantially now than the rates of bachelor's and master's degrees together. According to 2010 OECD data, the highest doctoral degree rates can be found in Switzerland (3.6 %), Slovakia (3.2 %) and Germany (2.6 %) as compared to the OECD average of 1.6 % (with 1.6 % in the United States, 1.1 % in Japan, and only 0.5 % in Poland). Interestingly, the proportion of foreigners awarded a doctoral degree was about one fifth across all economically advanced countries. This proportion is higher in Switzerland and the United States where more than two fifths were foreigners. In Germany, the figure is about one tenth in recent years.

Comparative rates of doctoral degrees must be regarded with caution because the figures presented in official national statistics as well as in the statistics of UNESCO, OECD and other supra-national agencies include only academic doctoral degrees in the United States (i.e., not professional degrees) but as a rule all doctoral degrees (including professional ones) in most other countries.

To summarise, the data and the respective discourse suggest that the expansion of doctoral education and training certainly has been affected by the overall expansion of student enrolment and by the respective need for an increase in academic staff in higher education. However, the expansion of doctoral education and training did not closely follow the patterns of overall student enrolment across countries, a finding that suggests that there are other factors at play than merely the reproduction of the academic profession. This will be discussed in the following section.

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## 2.4 Destinations of Doctoral Degree Holders

Many factors might contribute to the large variations in the rates of doctoral degree awards in the respective age group across countries. Thus, a closer look at the role of doctoral education and training for various occupations is necessary. Generally, it is taken for granted that doctoral education all over the world works for the reproduction of the academic profession. However, in many economically advanced countries, more doctoral degree holders are produced annually in the meantime than are needed in academia and publicly funded research institutes.

However, because the categories employed and figures presented vary in national statistics, international educational statistics, and international research statistics it is not possible to present a reliable comparative picture of the various professional careers of doctoral degree holders outside academia. Reflecting about the strengths and weaknesses of available statistics we can attempt to establish a classification system concerning job destinations of doctoral degree holders which consists of the following six categories:

1. Members of the academic profession in charge of teaching and research at higher education institutions.
2. Researchers at public or not-for-profit research institutes.
3. People in industry and commerce whose professional functions include major components of research and development.

4. Persons outside the aforementioned job roles whose tasks include significant research or research-like components and/or require in-depth knowledge of research processes and findings, e.g. new higher education professionals active in quality management or research support at universities, sales managers of pharmaceutical products, or key administrative staff members of a professional association.
5. Persons professionally active without any visible research or research-like elements in their work but profiting from holding a doctoral degree as a higher level of educational achievement or through the symbolic power of the credential.
6. A residual group of individuals holding a doctoral degree and being professionally active but without any sign that their degree is professionally relevant in any respect.

As indicated above, in many economically advanced countries the number of doctoral degree holders has increased over the years more substantially than the number of academic positions in higher education institutions or research institutes. Occasionally, this disparity is depicted as an “over-supply” of doctoral degree holders. However, the employment of doctoral degree holders in non-academic sectors of the economy is increasingly seen as a desirable development on the way towards a ‘knowledge society’ or a ‘knowledge economy’. Of course, this requires the non-academic labor markets to be open for doctoral degree holders which is not the case in all European countries (for example, not in Poland, not in Italy).

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## 2.5 Diversification of Types of Doctoral Degrees

Over the years, the growth in the number of doctoral degrees awarded has elicited debates as to whether the establishment of different types of doctorates would be an appropriate response to the current situation. Based on a synthesis of the literature in the first decade of the twenty-first century, Kehm (2012) has identified nine types of doctorates which are awarded in all, some or just a single European country. These will be briefly described in the following paragraphs.

### 2.5.1 The Research Doctorate

For the research doctorate the dissertation is central and expected to be an original contribution to the knowledge base of a discipline or a research domain. Independent of the fact whether the degree (or title) is acquired within the framework of a structured program including course work or in the framework of a master-apprentice relationship, the research doctorate as a rule is an entrance ticket to the academic profession, which—by being responsible for the training—at the same time also has a gatekeeper function. Using the example of six disciplines, Golde and Walker (2006) have characterised the main purpose of doctoral education in the

research doctorate as developing students to be “stewards of the discipline”. The goal of such training is a scientific or scholarly ideal type characterised as someone “who can imaginatively generate new knowledge, critically conserve valuable and useful ideas, and responsibly transform those understandings through writing, teaching and application. A steward is someone to whom the vigor, quality, and integrity of the field can be entrusted” (Golde and Walker 2006: 5). This rather normative image contrasts starkly with the image generated by Slaughter and Leslie (2000) of the successful academic as a “capitalist entrepreneur” who has recognised the demands and challenges of market orientation, competition and globalisation in the emerging knowledge societies and knows how to draw advantages from these developments.

### **2.5.2 The Taught Doctorate**

By definition, the taught doctorate consists of a substantial proportion of course work. Typically there will be a fixed curriculum and learning outcomes will be graded and weighted for the final grade. As in the research doctorate, students are supposed to contribute to the generation of new knowledge but they do this in the framework of a research project, the results of which are summarised in a project report. The report is presented in the framework of an oral examination and is graded as well. In contrast to the two-phase doctorate in the United States (course work first, then research and writing of thesis), the course work of the taught doctorate is spread over the whole period of degree training (predominantly offered in the United Kingdom). The oral examination and the grade of the research project report are regarded as an equivalent to a dissertation and its defence.

### **2.5.3 PhD by Published Work**

The model of the PhD by published work has been known in Germany since the nineteenth century (it is called “cumulative dissertation”). From there it spread to other parts of the world, mainly the United States but also to Belgium, the Netherlands and Sweden. When considered more closely, the British model of the PhD by published work differs to some extent from the German model of a “cumulative dissertation”. Both models are basically characterised by combining several articles which have appeared in peer reviewed scholarly or scientific journals into a book and providing them with a coherent framework. But while this option is open for many candidates in Germany, the PhD by published work is awarded in the United Kingdom almost exclusively to members or alumni of the university awarding the degree (cf. Green and Powell 2005: 72).

This model has frequently been criticised for:

- its lack of consistency and weak demarcation to other forms of doctorates,
- differences in the definition of what constitutes a publication and which timeframe should be taken into account,
- its threat to undermine other forms of doctoral education,
- the difficulty in allowing for adequate supervision.

Furthermore, in this model of the doctorate it is predominantly a product that is evaluated and graded and not the process of getting the degree itself. Therefore, most countries which provide this opportunity have regulations in place that determine the character and the content of the dissertation and possibly also the question about the form in which a program of additional studies has to be taken (cf. Green and Powell 2005: 71).

#### **2.5.4 The Professional Doctorate**

A number of European countries have by now picked up the British trend to explicitly distinguish between a research doctorate and a professional doctorate. The professional doctorate is not awarded in all disciplines but restricted to subjects like business administration, medicine and health care, education, engineering, social work, etc., i.e. to subjects which have a relatively demarcated field of professional practice. In professional doctorates, the title usually includes an indication of the professional field (e.g. DBA or EdD). Several publications have appeared in recent years on the professional doctorate (cf. Bourner et al. 2000; Park 2005; Green and Powell 2005). To some extent this seems to be related to the fact that in academic circles the professional doctorate is often looked down upon as a second-class doctorate, so pressure for legitimation increased.

The professional doctorate is defined as a program of advanced studies which—apart from fulfilling university criteria for the award of the degree—is geared towards satisfying a particular demand from a professional group outside the university and towards developing research skills needed within a professional context (Bourner et al. 2000: 219). In the United Kingdom, professional doctorates are typically taken up by people who are pursuing a professional career and are employed. Therefore, professional doctorates are frequently offered as part-time programs and usually require several years of professional experience. Tuition fees are often covered fully or in part by the employer. The target group wants to gain the degree in order to be eligible for promotion in their professional field. Consequently the research work carried out for the dissertation is regarded less as a contribution to the knowledge base of a discipline and more as a contribution to the development of a professional field. The dissertation then has a focus on the generation of new but more applied knowledge and the topic is often generated from the respective professional practice. In some areas, e.g., in engineering, the



dissertation can also have the form of a larger or a series of smaller projects which are carried out in the framework of actual professional practice.

Apart from aspects of the subject or discipline, the course work involves training in research and research methods, with which problems in professional practice can be solved and it also involves a familiarisation with research results and their utilisation in or relevance for professional practice. There is also an emphasis on career management skills. Course work is usually graded separately from the dissertation. In the United Kingdom, study programs of professional doctorates are frequently accredited by the relevant professional organizations (cf. Green and Powell 2005: 86ff.).

### 2.5.5 The Practice-Based Doctorate

The practice-based doctorate is a terminological specificity of the British university system as well, but it is also awarded in Australia. It denotes the award of doctoral degrees in Arts and in Design. While German universities, for example, award a doctoral degree in musicology or art history, the highest degree in the various fine arts as such (e.g. painting, sculpting, acting, singing, dancing) is called “*kuenstlerische Reife*” (which can be translated literally as “artistic maturity”). No doctoral degree is awarded in these fields.

The practice-based doctorate increased in importance with the integration of colleges of art into universities in the 1990s in the United Kingdom. The degree is awarded as a result of course work in the framework of which students are familiarised with theories and research methodologies and the presentation of a work of art or performance as a substitute for the dissertation. The presentation or performance is accompanied by a text in which the candidate explains how he or she has arrived at the result or product by applying research methods. This is regarded as generating new knowledge through practice. Successful candidates are also expected to demonstrate how their work of art is related to other works of art in the same field (theoretical, historical, critical, or visual context) and to evaluate possible effects. In the field of composition frequently not just one work is presented but a whole portfolio. In the oral examination, the work of art will be presented or performed and the candidate demonstrates on the basis of the accompanying text that she or he has sufficient knowledge and the appropriate skills to independently generate new knowledge.

The practice-based doctorate is contested in the United Kingdom because—compared to all other models of the doctorate—it shows the least proximity to the traditional notion of a dissertation. However, about half of all British universities offer such a doctorate (cf. Green and Powell 2005: 100ff.).

### 2.5.6 The “New Route” Doctorate

The model of the “new route PhD” (also called the integrated doctorate) was developed by ten British universities as a brand in 2001 with the purpose of attracting international students. In the meantime, it is offered by more than 30 British universities. The program basically consists of three (integrated) elements: a taught component in the area of research methods and subject specialisation, another taught component in the area of transferable skills and work on a dissertation (disciplinary or interdisciplinary). Admission can be granted right after having completed a Bachelor’s degree. The taught components are frequently offered in the framework of related Master programs and accompany the whole 4 years envisaged for getting the degree. For the taught components 240 credit points are awarded. Requirements for the dissertation are similarly high as for the research doctorate.

However, in comparison to the research doctorate the taught elements are more important and also arranged in more detail with respect to the qualifications and competences to be acquired. Often there is also the possibility after having finished all the course work, to write a master thesis instead of a doctoral dissertation and finish with a master’s degree.

In Germany, this model has become known as a “fast track PhD” and is offered in specific subjects at some universities. Although the Master’s degree in Germany is required for admission into doctoral programs or acceptance as a doctoral candidate this model offers transition into the doctoral phase for particularly talented students immediately after earning their Bachelor’s degree.

Basically the new route PhD, as well the fast track PhD, follow the American model of an integrated postgraduate education in which the master’s level and the doctoral level are combined in terms of the course work to be done. However, the American model clearly separates the course work phase from the phase of writing a thesis, which follow each other in a sequence and are not integrated. This American two-phase approach results in high drop-out rates after having finished the course work or (compared to Europe) a rather long time working toward a degree (between 6 and 9 years). Despite the fact that a fast track to the doctoral degree is possible in exceptional cases in many European countries, the European University Association has recommended that the Master’s degree be the rule for access into doctoral programs or the doctoral qualification phase.

### 2.5.7 Two Models of the Joint Doctorate

The model of the joint doctorate is characteristic for doctoral programs jointly offered by two or more universities which may be located in the same region, the same country or different countries. A study carried out by EUA (EUA 2005) about changes in doctoral education in Europe included a survey among member institutions. 18 % of responding universities confirmed that they offer joint doctorates. Leading countries in terms of the number of joint doctoral degree

programs are Germany, Spain, France, Italy, the United Kingdom and the Netherlands.

In the EUA study (EUA 2005: 28ff.) the joint doctorate is characterised as follows:

- a joint curriculum for the taught components which has been developed in close cooperation among the participating institutions; the doctoral students take courses at several universities;
- an agreement signed by all participating institutions clarifying funding issues and other matters (e.g. mobility, quality assurance).

The certification of a joint doctorate is regulated in various ways: from the awarding of the degree from the university at which the candidate is enrolled, to a double degree on the basis of joint supervision (i.e. co-tutelle arrangements) and a joint degree.

Joint doctorates are predominantly awarded by universities (or more exactly by faculties and departments) cooperating in transnational networks. The advantages for doctoral students are that in most cases, phases of mobility are built into the program, and they often have more than one supervisor and additional access to further experts in their field who are members of the network. However, the actual practice differs from this ideal type. Joint doctorates have a higher degree of internationalisation and more opportunities for mobility, but they are often not based on a joint curriculum of the participating partner institutions.

A particular variant of the joint doctorate is the “European doctorate” which does not, however, yet exist in practice. The idea and an informal initiative came up at the beginning of the 1990s during a meeting of the Confederation of European Rectors’ Conferences (an organization which has merged with the former CRE to become EUA). The “Doctor Europaeus”, as the planned title was to be, has been contested until today, although there is a consensus about the promotion and improvement of European cooperation in doctoral education and the mobility of doctoral students (or candidates). Currently another initiative in this direction is being undertaken by the European Commission offering funding for joint doctoral programs emerging from partner universities of an Erasmus Mundus Program. The difficulty of putting the idea into practice is due to the fact that within Europe there is increasing competition for best talent among institutions and on a national level, a more competitive research policy and innovation strategy. Thus, the best talent is not easily “shared”. Still, the discussion about the “Doctor Europaeus” has been revived in the context of the Lisbon Strategy to create a European Research and Innovation Area.

### **2.5.8 The Cooperative Doctorate**

The cooperative doctorate is a model in which professors from universities and professors from (German) universities of applied sciences (the latter have no right

to award doctoral degrees) jointly supervise a doctoral candidate who graduated from a university of applied sciences. Taught elements of such a degree are typically offered in the framework of a university graduate school or program while the research topic is often developed between the candidate and his or her professor from the university of applied sciences. The degree is awarded by the university. This model has emerged in the framework of attempts of research-oriented universities of applied sciences to acquire the right to award doctoral degrees, which so far has failed due to resistance coming from the universities and lack of political will.

### 2.5.9 The Industrial Doctorate

The industrial doctorate is mostly awarded in engineering fields and is a rather applied degree. Research work of the candidate is carried out, for example, in the R&D department of a company and is oriented towards the solution of a particular problem or issue. The research work is supervised by a senior engineer of the company while taught elements, theory and methodology are supervised by a university professor. Research topics frequently emerge from work in that company during an internship (see Borrel-Damian 2009).

As can be seen from this list there has been a considerable diversification in the types of doctoral degrees, some of which are clearly geared towards non-academic labor markets (e.g. the professional doctorate, the industry doctorate). However, only English-speaking countries, notably the United Kingdom, Australia and New Zealand have implemented a clear distinction (including terminological differentiation) between a research and a professional doctorate (see Neumann 2002).

At the same time, the differentiation of doctoral degrees has led to a shift in the phase in which decisions for an academic career are made, namely from the doctoral to the postdoctoral phase (see Fumasoli and Goastellec 2015). A 2010 survey of the academic profession involving eight European countries included an analysis of academic career paths (see Brechelmacher et al. 2015). The study identified the postdoc phase as a critical bottleneck. Not only has it become increasingly difficult to obtain employment as a postdoctoral researcher, but this phase has also become the most competitive while at the same time young researchers have to deal with unclear career paths and a high degree of job insecurity. In addition, perseverance and hard work usually do not automatically lead to a professorship. Many of the junior academics who were interviewed in the framework of the study claimed that getting a professorship was sheer good luck, serendipity or chance.

In some European countries, tenure track models have been introduced recently to provide clearer career progress for junior academics. But there are not enough of these positions and competition is fierce. Thus, many postdoctoral academics use this period to go abroad for some time in order to use a mobility experience as an added value to give them an edge in the ongoing competition. In addition, such a mobility phase helps to build up networks and accumulate social capital. Still, most

young academics aim for a career in their home country and despite many positive experiences of a stay abroad, they encounter problems upon return. They have lost some of their local or national networks and their experience is not valued sufficiently. The analysis concludes that the postdoctoral phase is not only the most critical for an academic career, but it is also characterised by two bottlenecks, one at the beginning when trying to secure a postdoctoral position after completion of the doctorate and one at the end when trying to secure permanent or tenured employment.

However, the fact that the majority of doctoral degree holders enter an academic career, but only about one tenth of them eventually end up in a permanent professorial position makes the period between postdoc and professorship particularly interesting. It is a period often characterised by great uncertainty, frequently more than one fixed-term contract, possibly one or more job changes or a period of research abroad and last but not least a period in which many academics are starting a family. It is also a period about which there is not much research-based knowledge available.

Academic labor markets have been characterised by Musselin (2010) as being either external or internal. An internal academic labor market means that academics can progress upward within their higher education institution through evaluation and promotion, while an external academic labor market means a change of institution when the next step on the career ladder is being taken. Internal academic labor markets have been criticised as tending towards inbreeding, external academic labor markets have been criticised for leading to long periods of instability and job insecurity. In many European countries, the postdoc phase has been extended and it is during this phase that opportunities for a permanent career in academia are opening up. Those national higher education systems that have permanent teaching and/or research positions below the professorial level can provide more opportunities to stay in academia than those systems that offer only fixed-term contracts. Germany is a particularly problematic example in this respect as it offers basically no permanent contracts below the level of professorship and has also introduced time limits, i.e. young academic staff can be employed for up to 6 years before the doctorate and up to 6 years after the doctorate. Then it is either 'up or out' or short-term temporary contracts as researchers in externally funded projects.

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## 2.6 The Extended Policy Field: Policy Questions and Data Needs

In recent years the need to reform doctoral education and training has been high on the policy agenda in many countries around the world as well as in a number of supra-national organizations. Increasingly the production of new knowledge, often a task and an aspiration of doctoral candidates, is no longer regarded as a purely academic affair but as a strategic resource in the emerging knowledge societies and economies. Thus doctoral education and training has become an object of

institutional management, of national policy and of supra-national incentives, regulations and measures for better integration into existing knowledge and innovation systems. Furthermore, increasingly international competition for best talent can be observed.

At the same time public criticism of doctoral education and training has become more widespread: too long, too many dropouts, too specialised, questionable quality of supervision, lack of competences for non-academic labor markets. The answer to such criticism has been a shift away from the traditional continental European ‘master-apprentice’ model to a structuring of this qualification phase by framing it through doctoral programs, centres, schools or colleges and the addition of systematic curricular programs to offer theoretical, methodological and labor market related competences and skills. In fact, the reform of the European Bologna Process conceptualised innovative doctoral training as a third cycle of studies, following a Bachelor’s degree (first cycle) and a Master’s (second cycle) degree. The developments which have been described here currently have three observable consequences: First, the master-apprentice model is regarded as a phase-out model; second, the focus on a point in the framework of a rite of passage (i.e. defence and award of title) with an emphasis on the product “dissertation” is shifting to a focus on the process of doctoral education and training (its structures, content, quality); third, access to doctoral education and the process of getting a doctorate are increasingly embedded in a dense layer of regulations, criteria, defined rights and obligations, procedures of evaluation and controls of success—all in the name of improving quality, transparency and accountability. Doctoral degree holders are considered valuable contributors to innovation and knowledge transfer in knowledge economies and their numbers have become important elements of the key performance indicators of higher education institutions. Thus, their education and training can no longer be left to professors exclusively and we can observe an extended policy field for doctoral education reaching from institutional management, to national policies to supra-national reform agendas. Here a couple of examples how supra-national actors are trying to extend and influence the policy field.

The European Commission’s ‘Principles for Innovative Doctoral Training’ (European Commission 2011) try to provide guidelines for national policy makers as well as institutional management on how to organise doctoral education. The paper is based on seven principles:

- Striving for research excellence.
- Offering an attractive institutional environment with proper career development opportunities.
- Embedding doctoral training into an interdisciplinary research environment.
- Exposing doctoral candidates to industry and other relevant employment sectors.
- Providing opportunities for international networking and mobility.

- Including transferable skills training into doctoral education and involving industry and businesses into the related curricular development.
- Providing transparent and accountable procedures for the life cycle of the doctoral phase from recruitment to graduation and career development by establishing a quality assurance system separate from the first and second cycle of studies.

In 2008, the European University Association (EUA) has established the EUA Council for Doctoral Education (EUA-CDE) in order to create “a strong voice for European universities on doctoral education both inside Europe and internationally...” (see EUA-CDE Website). Objectives of the work of the EUA-CDE are:

- To enhance the quality of doctoral education in European universities.
- To encourage and support the development of institutional policies and strategies.
- To improve the availability of data and information on doctoral education.
- To identify and monitor emerging trends in doctoral education.
- To act as a representative voice of European universities in the dialogue with other stakeholders.
- To contribute to strengthening the international dimension of doctoral programmes.
- To build and develop a strong link between education and research policies and strategies within Europe.
- To promote the doctorate and doctorate holders as careers upon which to build a knowledge-based society (<http://www.eua.be/>).

Contrasting the European Commission’s Principles with EUA-CDE’s objectives we can note that the European Commission’s policy for doctoral education is more strongly geared towards non-academic labor markets than the objectives of the EUA-CDE. Apart from explicit references to non-academic labor markets and transferable skills training, the European Commission tends to use the concepts of ‘research training’ or ‘doctoral education and training’, thus emphasizing the training dimension envisaged for this phase of qualification while the EUA-CDE avoids the notion of ‘training’ but speaks of ‘doctoral education’.

However, the EUA-CDE also notes that the first phase of reforming doctoral education in Europe by providing structure to the process of qualification and establishing management procedures has come to an end. As the new and upcoming challenges for doctoral education, it identifies demography, competitiveness and sustainability and announces a comprehensive policy paper for 2016 that is supposed “to set the tone for the next decade” (<http://www.eua.be/>).

With this we have some indications concerning future policy needs. From what has been discussed so far, it becomes clear that the decision to go for an academic career or opt for non-academic labor markets has shifted to the postdoc phase. This phase is currently characterised as a “bottleneck” (see Brechelmacher et al. 2015;

Fumasoli and Goastellec 2015) in which academic career aspirations are either becoming fulfilled or are broken leaving the young researchers concerned in increasingly precarious working conditions. Some European countries (e.g. Germany, France, Austria, Finland) have recognised the need to develop policies and career opportunities for postdoctoral researchers and shape this particular phase of qualification in a more targeted manner. Major policy questions are, for example, the status of postdocs, financial support of postdocs as well as the creation of working conditions which allow for the compatibility of work and family, the attractiveness of research careers as well as support for non-academic careers and improved opportunities for mobility between university and industry. Here are a few examples.

The German Federal Ministry for Education and Research is supporting a major national report analysing the situation of postdocs (status, funding, career opportunities, potential of tenure track models) and developing appropriate policies for a better compatibility of working and family life (<http://www.buwin.de/buwin/2013/>).

The French Ministry of Higher Education and Research has developed the CIFRE Program (Industrial Agreement of Training through Research) which offers 1300 three-year fellowships each year for PhD students who sign a full-time work contract with a French company while being enrolled in a doctoral course at a university at the same time. In this program the research work is carried out inside the company while the university provides course program and a supervisor (<http://www.phdinfrance.net/txt/cifre.pdf>).

A recent study with interviews being carried out in Austria and Finland (see Brechelmacher et al. 2015; Campbell and Carayannis 2012) looked at the phenomenon of cross-employment, which seems to have increased in both countries. Cross-employment denotes parallel employment inside and outside academia at the same time. It is a form of employment for at least three groups of postdocs:

- The first group consists of young academics with precarious (i.e. fixed-term and part-time) contracts within academia who need to complement their meagre salaries by getting a second job outside academia.
- The second group consists of younger as well as more senior academics who hold positions within academia but have a professional practice (e.g. a law practice, a clinical job or an architecture office) at the same time.
- The third group consists of academics who explicitly do not wish to work fully and only in one institution.

People in cross-employment situations stated a number of advantages and disadvantages. Advantages were in particular, broader perspectives, advancement of competences, well-developed networks and the development of transfer skills. Disadvantages were seen in work and time pressure, tensions between the different work cultures and the perpetuation of short-term contracts. However, the exploratory study needs to be complemented by a fuller and broader analysis of the phenomenon of cross-employment and its positive and negative sides.

Concerning the data needs these will be explored in more detail in another section of this book (see Part II in this book; also see Auriol et al. 2013), however,



it becomes clear from what has been discussed so far that there is an urgent need to find out more about the first and possibly further destinations of doctoral degree holders and analyse their transition into stable employment. Of particular policy interest will be the proportion of doctoral degree holders finding employment outside academia as this is a key indicator for the extent to which a knowledge-based society and economy has been achieved.

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## 2.7 Conclusions

Certainly, national as well as disciplinary cultures continue to influence doctoral education and training and show more differences than similarities. However, Fumasoli and Goastellec (2015) have pointed out that recruitment patterns and career progress in academic markets gradually have been standardised and formalised across Europe. This is more pronounced at the level of senior positions as professors still play an important role when it comes to recruiting early career researchers. This is complemented by a trend (e.g. through tenure track models and state regulations pertaining to career progress) towards increasingly internal academic labor markets (see Musselin 2010) in those countries, which traditionally were relying on external academic labor markets. And to make the picture even more complex we also can observe the emergence of increasingly international external academic labor markets in so far as mobility at the postdoc level has become more common and is often shaped by a year or two of working at a university or research centre abroad.

Concerning general trends for doctoral degree holders with regard to their transition into employment, we can note that (a) non-academic labor markets are increasingly more open to recruiting doctoral degree holders; (b) doctoral degree holders have a clearly lower rate of unemployment than persons with a higher education degree but no doctorate; (c) a doctoral degree is a prerequisite, i.e. a necessary but not sufficient condition, to enter academia. Instead, it tends to be the postdoctoral phase now in which decisions have to be made either to stay in academia or move into professional jobs outside academia.

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