



# EURAXIND

## Literature review of researchers' views and experiences of intersectoral mobility

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## Introduction – Researcher employment and mobility

An open and attractive labour market for researchers is a key priority for the European Research Area (ERA). It is thought that significant progress is being made at both European and national level in achieving this (Deloitte, 2014). This has included: improvements to researchers' employment conditions; more open, transparent and merit-based recruitment; improved doctoral training; and many other efforts to make research careers more attractive. However, although progress has been made it has been uneven with substantial differences remaining between the Member States. The following issues are considered key to further improvement:

- Well-trained, creative and dynamic researchers are indispensable for building and sustaining a competitive knowledge-based economy. While Europe has a large number of talented and skilled researchers, they account for a significantly lower proportion of the labour market than is the case in the USA and Japan, and especially in the business-to-public sector researchers. Continued measures are therefore needed to train more researchers, including improvements to the quality and relevance of doctoral training.
- Europe has not yet achieved gender equality in research and this restricts the talent pool. Although they out-number men in tertiary education, they are considerably less likely to occupy a senior academic position or to participate in decision-making bodies. Measures to enhance women's progression to higher levels in research continue to be needed.
- Open, transparent and merit-based recruitment is a prerequisite for research excellence and optimising research talent. This is an area where Europe is making progress, with several key initiatives currently in progress.
- Attractive working conditions and career prospects are a key driver for attracting young people into a research career and ensuring high quality research. However, career paths are challenging when in the early career stages many researchers are employed on short, fixed-term contracts with little security in terms of health, pension or support benefits. Remuneration varies greatly across Member States, but it is believed that many non-European countries pay researchers better than the EU Member States at all career stages. Training researchers so that they can more readily change career sector will enhance their career prospects generally and make the choice to enter research a less risky career direction.
- Collaboration between academia and industry is key to increasing the value of research results through exploitation. Many countries acknowledge this problem and are promoting partnerships between universities, research institutions and private companies, and measures to improve the skills of doctoral researchers in areas such as technology transfer and intellectual property.



## Intersectoral mobility

Mobility is a core concept of the ERA and is associated with research excellence, by the creation of better networks, enhancing scientific performance, knowledge and technology transfer, and ultimately higher productivity with benefits to economic and social value. This needs to encompass international, interdisciplinary and intersectoral mobility (Borchgrevink and Scholz, 2013).

The MORE-2 programme (IDEA Consult, 2013) defines intersectoral mobility as:

*“being mobile to a sector outside academia, in the researcher’s own country or abroad. This not only relates to private industry but also to the private not-for-profit sector as well as the public and government sectors.”*

However, this is surely a limited vision of intersectoral mobility as it focuses on mobility “to” sectors outside academia, whereas a wider vision would be of two-way mobility, i.e. both “outward” from and also “inward” into academia. This would parallel the modern conceptualisation of knowledge “exchange”, which is two-way, rather than the previous idea of knowledge “transfer” which assumed it was one-way traffic (i.e. outward from academia).

There is strong evidence that policies and programmes relating to training researchers at doctoral and postdoctoral level in Europe are showing increasing interest in intersectoral mobility (Science Europe, 2013), while in other countries such as Russia (Dezhina, 2015) its potential importance is also understood, but there is currently little structural support to develop it.

The potential benefits of business-academic collaboration, and the intersectoral mobility of researchers, are well rehearsed in the literature worldwide. These include potential impacts for academia (chiefly through improved research, science and knowledge) and for industry (technology and knowledge exploitation), both of which support more general economic and societal gains. The literature also reports many potential benefits to the researchers, including enhanced career prospects and development. This is particularly significant when the majority of researchers (i.e. those who obtain a postgraduate research degree and/or work as an early career researcher) will ultimately be employed outside academia.

A number of studies exist which consider the extent of academic-industry collaboration and try to measure its impact, but it has been noted that these evaluation studies focus on the benefits to the universities and to industry, but pay very little attention is paid to impacts on the researchers themselves, and often no attention at all in this direction (Mellors-Bourne, 2012). Millard also notes that while there has been extensive academic research on university-industry links, commercialisation and academic engagement, there has been less on intersectoral mobility, despite the importance of mobility in terms of transferring tacit knowledge (Millard, 2014).

The focus of this review attempts to counter this imbalance by focusing on researchers’ views of academic-business collaborations, and especially intersectoral mobility. This report complements two other literature reviews within the EURAXIND project that focused on institutional practice in promoting the intersectoral mobility of researchers (Deliverable 2.1) and employers’ needs for enhancing intersectoral mobility (Deliverable 3.1).



The key questions we are seeking to answer are:

- What are researchers' views and experiences with respect to intersectoral mobility and research collaboration?
- What can we learn from literature about barriers to intersectoral researcher mobility?

## Researchers' views and experiences of intersectoral mobility and academic-industry collaboration

Based on our review of the literature, very little has been published in relation to the impact of business-academic collaboration on researchers themselves, and/or of intersectoral mobility, to date. Mellors-Bourne (2012) commented on the strong focus of impact studies of university-business collaborations on the benefits to the university and to the industrial partner, with very little attention being paid to the impact for the researcher involved.

There is an established and considerable literature in relation to the impact of international mobility for researchers, summarised in IDEA Consult (2013). It concludes that many authors have established empirically that international mobility improves researchers' careers in the sense that it increases diversification of their research knowledge and experience, while others have shown that researchers who move from Europe to North America or to another European country experience positive effects in terms of their career progression. Ivancheva and Gourova (2011) studied survey responses from 869 researchers from eight European countries and found that for 55% of the respondents, being internationally mobile contributed to improving their personal development and professional profile, including an improvement in their language capabilities and job opportunities. Research within the MORE-2 project itself showed that more than 55% of R2, R3 and R4 level mobile researchers working in the EU perceived that their overall career progression had improved thanks to their mobility experience, while 80% perceived that their research skills had improved. Most were relatively satisfied with their mobility benefits, but those who had been mobile both in and outside the EU showed higher levels of recognition of the effects of their mobility experience than those who had been mobile only within the EU. It seemed that the greater the number and range of research trips made to different locations, the greater the exposure to active researchers in different places, resulting in higher mobility effects. These could also impact positively on job options, particularly in academia, and the researchers' overall career progression.

However, other authors have questioned the assumption that international mobility enhances a research career (Cruz-Castro and Sanz-Menendez, 2010). The MORE-2 also project found that that over 40% of internationally mobile researchers currently working in the EU thought that their job options (both inside and outside academia) had decreased due to their overall international mobility experience. Nearly 45% of their respondents thought that their progression in salary and financial conditions actually decreased as a result. As yet it is not fully clear why this is the case, but it is likely that the issues involve the loss of contacts and networks and also the lack of recognition of mobility in recruitment and/or progression decisions by institutions or funders.



Despite, or perhaps as a result of, all the detailed research carried out in relation to international mobility experiences and impact, the overall picture is complicated, albeit the balance tends to suggest positive outcomes for many researchers from international mobility.

In contrast there is an almost complete lack of published evidence of the impact of intersectoral mobility for researchers. This could be partly because intersectoral mobility is a relatively recent conceptualisation of mobility, so there are no or few studies yet which specifically investigate experiences and impact of researcher mobility under this label. That being the case, and taking a broader view of what intersectoral mobility can entail, there may be insights available through what is known about the impact of other types of experience which are similar to intersectoral mobility as we now conceive it.

The POCARIM project has investigated the career paths and intersectoral mobility of doctoral graduates in the social sciences and humanities (Millard 2014). From interviews with doctoral graduates it identified four types of intersectoral job move:

(1) From academia into other sectors after PhD. These tended to be younger researchers, who had little or only short-term professional experience outside academia to this point. They moved “out” to a variety of professional possibilities, and many did not have a clear career path in mind. This is reinforced by MORE study of mobility patterns and career paths, which reports that it is rare for a full professor to leave an academic post to join industry full-time.

(2) Mid-career ‘switchers’ from other sectors to PhD in academia. These people had started their career in industry or in the public sector, and moved to higher education to pursue research, which in some cases was linked to their previous job.

(3) Several or multiple intersectoral moves. Less common were those who had made multiple moves between sectors, and the moves tended to take place between similar environments and professional fields, for example between academia, government departments and research organisations working in related fields.

(4) Partial intersectoral moves. This was the practice of combining work in more than one sector simultaneously, mostly without the intention of making a permanent move. Many of these worked part-time or else mainly for industry but occasionally doing academic teaching. These combined positions tended also to reflect informal arrangements, where researchers kept up some links to academia and other sectors. These are the ‘dual positions’ found by the MORE study (IDEA Consult, 2010), and Borchgrevink and Scholz (2013) have identified some more formalised types of arrangement, whereby employees in other sectors can have an “add-on” of 20% to their main employment position.

Millard (2014) concluded that although the doctoral qualification and experience has some value in certain types of employment outside academia, it is most valuable where there is clear linkage between the work or research being done by the researcher in the two sectors. Multiple moves between different sectors appeared to be difficult, in particular between academia and business. She also noted that it was common for people to maintain links between the two sectors, and there were positive examples of people working in industry who did some limited teaching in universities, and people working in universities who were involved in some engagement



activities such as consultancy, knowledge transfer and policy advice. There were therefore cases of people who managed to successfully “span” sectors, showing the potential for the development of cross-sectoral communities of practice. However, in most cases this did not translate into permanent or long-term intersectoral changes of employment.

Vitae’s ‘What do researchers do?’ studies offer further insights into the career paths of doctoral graduates, including mobility “outward” from academia. Hodges et al. (2011) analyse data collected about the employment and circumstances of doctoral graduates three and a half years after graduation in the UK, which is compared with data collected six months after graduation. They classify occupations within six clusters, which include higher education (HE) research, teaching/lecturing in HE, other teaching, research outside HE, non-HE occupations commonly entered by doctoral graduates, and other non-HE occupations. Six months after graduation, over 55% were working outside HE, although a quarter of these were working in research. These proportions varied with the discipline of the doctorate (Hunt et al., 2010). Although there was relatively strong stability in terms of graduates remaining in the same sector for the three year period, over a quarter of the graduates had changed sector, and a series of common pathways was identified. For example, 32% of those working in HE research six months after graduation were working outside HE three years later. On the other hand, a quarter of those working in HE research three and a half years after graduation had not been working there six months after graduation, the majority moving “in” from outside HE. These figures suggest that there is a significant extent of intersectoral mobility in the first three to four years after graduation with a doctorate, albeit differing in extent (and direction of mobility) with broad discipline. Some of this may also result from employment gaps and the existence of short duration fixed-term contracts of employment typically available to early career researchers.

Another report in this series (Mellors-Bourne et al., 2013) investigated earnings but also perceived career satisfaction and impact for those with a doctoral qualification, three and a half years after graduation. This showed that over 90% were satisfied or very satisfied with their career to date. Interestingly this varied little (between 89 and 94%) with their occupational sector but was actually highest for those working in common doctoral occupations outside HE. The overwhelming majority, irrespective of occupational sector, believed the skills and competencies they had developed during doctoral training were highly important in gaining their job, whereas a formal requirement for a doctorate was rare outside HE. Over 80% of those in occupations outside HE believed their doctoral degree experience had enabled them to progress towards their long-term career aspirations, although this was not as high as for those pursuing HE occupations.

The most recent of these publications describes the results of a survey of former early career researchers who have left higher education for other careers, across Europe (Haynes et al., 2016). It suggests that up to three quarters of the mobility reported was essentially involuntary, as most researchers had aspired to an academic research career but moved into other occupations because they wanted better long-term employment prospects or more job security.

Similar experiences were related by respondents to the European Science Foundation’s ‘Career tracking of doctorate holders’ survey (ESF, 2015). The overwhelming majority of respondents



were working as academic researchers but those who did not indicated the reasons for not working in research were lack of security of tenure associated with research posts (most commonly), difficulty in getting an academically suitable position and lack of structure in research careers. The main reasons people cited for moving to careers were to do with barriers related to them pursuing research careers, more than positive interest in other careers. In parallel with the lack of tenure-track positions, the study suggests that there is a lack of sectoral transfer from post-doctoral positions into industry and rather little contact with industry in terms of research collaborations. It confirms the preference and orientation of a high proportion of doctoral graduates towards a preferred career in academia, despite the inherent challenges. However, the European context is for ever-increasing numbers of doctoral graduates seeking employment in a sector that is already oversupplied. There are increasing numbers of doctoral graduates entering industry, but demand will need to intensify if the absorption rate into suitable research-based employment in the industrial sector is to be increased. The report recommends that policy-makers and industry encourage more transition pathways into industry, and from industry into academia, to make mobility more attractive to doctoral graduates.

Auriol et al. (2013) used data from the 'Careers of Doctorate Holders' study in 15 countries to document the job mobility of individuals with doctorate degrees. These data show an average rate of job mobility, as measured by the percentage of those who have changed jobs over the previous ten years in total employment, of 27%, ranging from 13% in Romania to 76% in Denmark. Mobility was also relatively high (over half) in Iceland, Germany and the Netherlands. Where data were available there was evidence that this rate of mobility was higher for those who had graduated more recently. Intra-sectoral mobility represented a large share of this mobility (half or more in most countries and 68% in Belgium), but this implies that intersectoral mobility was at a relatively high level in many countries, whether voluntary or forced. The mobility of doctorate holders from higher education to enterprises was highest in Slovenia at 21% of those who now worked as researchers and 16% of those not working as researchers. Auriol et al. found that mobility was more prominent the other way around, i.e. from the business sector towards higher education, with flows of this kind reaching over 20% in Latvia and Portugal, but less than 5% in Belgium, the Netherlands and Russia. There were similar flows from government to higher education which were particularly significant in Portugal.

Maas et al. (2014) undertook a study of the careers of those who had obtained doctorates in the Netherlands during the 1990s through a survey in 2014, and found that there were disciplinary differences in their employment trajectories. 80% still worked in research when surveyed, although this did not differentiate whether it was in higher education or other sectors. Around a quarter of respondents had worked or studied outside the Netherlands during the past ten years, suggesting that mobility was significantly higher amongst those who had studied for their doctorate more recently.

A field where there is more literature available is where doctoral research is undertaken at the business-academic interface, including a specific literature review by Thune (2009). Thune emphasises that doctoral students involved in collaborative arrangements with industry have a



different researcher training experience than non-collaborative students. So their physical surroundings, supervision, research projects and conduct are more heterogeneous than experienced by what 'non-collaborating' doctoral researchers. However, their assessments of the doctoral experience are fairly similar, as is their productivity (number of publications). Thune notes that most studies are carried out where university–industry collaboration has been established a long time, such as engineering or natural sciences, where the collaborating partners have detailed understanding of each other and developed collaborative ways of working offering a good learning environment for doctoral study. These are highly institutionalised forms of university–industry collaboration, such as collaborative research centres, and may not reflect the reality of much of the informal type of university–industry relations, where the experiences and outcomes of doctoral researchers are much less well understood. Thune concludes that a wider variety of collaborative arrangements should be included in future research, and that more longitudinal research is needed, as many studies have focused only on the initial transition from university to work, and not on later career trajectories. Collecting longitudinal data by following

collaborative projects over time would provide more knowledge about how collaborations evolve and impact on researchers' careers in the longer term. Thune does note, however, that from the existing literature there is evidence that collaborations are reported more positively where the businesses are themselves undertaking R&D, and less positively where they have little experience in R&D activities.

Thune reports that the career ambitions of doctoral researchers are broadly similar in both collaborative and non-collaborative arrangements, although there are mixed results from studies that have tried to compare actual career outcomes with differences in doctoral experiences. Some of those studies indicate that interfacing with industry during doctoral study is associated with lower subsequent unemployment and also greater probability of working in the private sector. While doctoral researchers do not have significantly different career ambitions, research suggests that they may have different career trajectories. However, it is also possible that researchers who choose to collaborate during their doctoral degree have particular motivations and characteristics that make them more inclined to collaboration and private sector employment later in career, so this might not result from the doctoral experience itself, but from individual characteristics (also including prior employment). Thus further research should attempt to gain information a wider variety of collaborative research training arrangements.

More recently Kitagawa (2014, 2016) has studied collaborative doctoral training in terms of a potential location for the development of "bridge builders" between academia and industry. Her 2014 work investigates forms of collaborative doctoral programme that enable employer engagement in innovation and skills development. They provide spaces where doctoral researchers can build professional identities as nascent bridging scientists, a crucial mechanism through which knowledge flows across organisations and the labour market. Her 2016 paper focuses on the Engineering Doctorate (EngD) scheme in the UK, and highlights the mobility of these graduates. Their career paths and mobility suggests significant impact in terms of knowledge dissemination and exploitation, and the model appears to support local, national and international flows of knowledge, skills and innovation.



There has been recent growth of collaborative models of doctoral training in the UK, in which industrial partners are involved and in some of which internships outside HE are a core element of the programme. Evaluations of these schemes are currently underway and will potentially add an additional angle to understanding of the career impact of academic-industrial collaboration and, in some cases, short term periods of intersectoral mobility.

## Extent of researcher mobility

According to MORE-2 surveys across Europe, 23% of European researchers in public research institutes (which include higher education institutions) have had some kind of sectoral mobility across sectors during doctoral research and 30% by the time they are post-doctoral researchers. Around half of this mobility involved private industry, but only around one tenth involved dual positions where the researcher was employed in the private sector and higher education simultaneously (IDEA Consult, 2013). 16% of researchers had been employed as a researcher in the private for-profit sector. This share was highest amongst those in the Social Sciences and Humanities, at all research levels, but especially amongst doctoral researchers (26%). The lowest shares were amongst those in the Medical Sciences and Agriculture subject grouping, and the Natural Sciences and Technology (17%). Geographically, the proportion who has been employed as a researcher in the private, for-profit sector was highest in Denmark (29%), Romania (28%) and Greece (24%), and lowest in Slovenia (7%) and the Czech Republic (8%).

In contrast ESF (2015) found from focus groups with doctoral graduates that mobility and cooperation was most common in the biomedical field. Some of its participants had gained intersectoral mobility experience not only by working with or in industry but also through cooperation with ministries or government agencies. For others, their research topics had been more closely related to other sectors and had incorporated outreach activities into those commercial fields. Rare occasions were reported of internships or short-term contracts in management or research consultancies. However, in most cases intersectoral mobility had been considered a possible back-up plan if they could not realise their preferred career path which was academic research.

These relatively low proportions contrast with the extent of international mobility for these researchers. 65% of the respondents in public research institutes in the EU had been internationally mobile, defined as having worked in or made a research visit of three months or more in another country (i.e. other than the country where they attained their highest educational degree). This proportion was higher for postdoctoral researchers (70%) than doctoral researchers (46%). Researchers in the Natural Sciences and Technology were the most internationally mobile (67%), and those in the Social Sciences and Humanities the least internationally mobile (57%), which was the complete opposite of the situation for intersectoral mobility.

From knowledge of progression paths in the UK (Mellors-Bourne and Jackson, 2012; Millard, 2014) it seems highly likely that one of the reasons for higher intersectoral mobility amongst social sciences and humanities graduates, compared with for example natural sciences, is the



different career trajectories taken by researchers in different disciplines. The majority of doctoral researchers in the UK in the humanities and social sciences enter doctoral study at a relatively advanced career stage, often after progressing to an advanced stage in a prior career. In many cases that career has involved working outside academia, and could have included work relating to research in the private or public sector. In contrast, more than half of doctoral researchers in many sciences undertake doctoral research only a few years after their first degree, so they tend to be much younger and there has been far less opportunity for them to work outside academia. These observations reinforce the need to consider intersectoral mobility as a “two way” process.

In the UK, the Careers in Research Online Survey (CROS) (Mellors-Bourne & Metcalfe, 2015) indicated that only 9% of current UK research staff (many of whom are post-doctoral researchers) have undertaken a placement or internship outside higher education, although over 40% would like to do so. This proportion has risen from 5% in a similar survey in 2011. However, in contrast, over 43% of respondents in 2015 reported that they had collaborated in research with a business or other non-academic research user organisation, and a further 40% said that they would like to do so given the opportunity. This suggests that the extent of collaboration with organisations outside higher education is high, but few researchers are mobile in the sense of undertaking periods of employment or structured research visits of significant duration such as an internship or research placement. These results reflect mobility outward to industry or government. Separately, around 20% of respondents reported that they had previously been employed as a researcher in another sector (of whom the majority for three years or less), which is likely to include both those who have migrated “in” to academic research as well as those who have been mobile both out and back in again. The comparable proportion in the 2013 survey was 18%, suggesting that this measure of intersectoral mobility, at least, is also increasing somewhat.

## Barriers to intersectoral mobility

Millard (2014) observes that academia-industry collaboration and mobility remain a challenge, especially if the goal is two-way mobility and collaboration (i.e. not only one-way in terms of university to industry). One of the barriers is in the form of the different career-related performance indicators in these sectors: while an academic has to build his/her career on the basis of peer reviewed publications, a researcher in industry is often not encouraged to publish (and sometimes not allowed to, for reasons of Intellectual Property Rights) and usually has to focus more on applying and transferring knowledge in terms of innovation and exploitation for economic outcomes. Vandeveld (2014) summarises the issue as being that measurements of what constitutes excellence are different in different sectors; while academia has many measures to assess academic excellence, it does not afford the same respect to achievements in relation to social or economic impact that would be considered excellent in other sectors. This problem was also highlighted also in her evaluation of Marie Curie Fellowships, where she noted that Marie Curie fellows on industrial placements expressed concerns about having less time for publication activities, and as a result, reduced academic “output” (Millard 2013).



Multiple moves between different sectors appear difficult, according to Millard, in particular between academia and private sector business. This is for two main reasons: different cultures in the two sectors and, linked to this, different emphases in training and skill development. The purpose of universities is to produce and share knowledge, whereas business exists for commercial gain. These different cultures are reflected in different reward systems, with the main currency in universities being publication in high-reputation journals, and exploitation of research results tends to be less important. Therefore researchers in academia are mainly motivated by increasing knowledge, rather than making money for their employer, although many will cooperate with non-academic partners in knowledge transfer, policy advice and public engagement. The timescales tend also to be longer in academia, where it can take many years to obtain funding, complete projects and produce and publish results, taking many years to establish a career. In industry, and the third sector, timescales tend to be shorter and the need for results tends to be more immediate. Different reward systems relate to these different cultures and purposes, and as a result there are different types of training. There is a focus on research and teaching skills in universities, and less on skill development in terms of management, entrepreneurship and other skills linked to exploitation of results and commercialization, including intellectual property rights (IPR). This makes changing sectors difficult, in particular after a long period spent in one sector, where major investments may have been made by both the researcher and the employer in either an academic or business career. Moves between academia and government appear to be somewhat easier, because the cultural differences are not so great.

The ESF (2015) doctoral tracking report also suggests that some of the barriers to sectoral mobility are attitudinal, reflecting a lack of knowledge and potentially negativity on the part of academic researchers about careers outside academia. That lack of knowledge translates into information gaps where prospective doctoral students may not be provided with the means to judge potential career paths. It cited other barriers that are more structural and institutional, questioning academia's reliance on publications output as the proxy for recognition and recommending development of other incentive systems that would recognise successful industrial employment experience or partnerships. ESF also suggests that interventions are needed to ensure that doctoral education addresses the competences needed to transition into and succeed in non-academic career settings, albeit ones where research is taking place.

Other important obstacles to intersectoral mobility relate to remuneration, health and social security issues, including pensions. For the latter, the European Commission is creating a pan-European pension savings vehicle for researchers called RESAVER.

The MORE-2 study (IDEA Consult, 2013) had a strong focus on these remuneration and employment-related barriers to mobility. It noted that, in terms of purchasing power adjusted salaries, there are complex variations in salaries paid to researchers at different levels in different EU countries which do not always compare well with salaries outside academia. Salaries outside the academic sector tend to increase faster, but there is little evidence to suggest whether researchers at early stages of their careers earn more at a university or in a private sector company. Mellors-Bourne et al. (2013) analysed salaries of doctoral graduates three years after graduation and found that those in HE research could be higher than those



working in research outside academia, and that the comparative position had switched during the recession. However, on average it might be expected that those researchers who start to work at a company and stay there have better promotion prospects and therefore better chances to improve their salaries well during their careers. Waaijer (2016) found that doctoral graduates working outside academia were more negative about long-term career prospects in academia than were graduates working in academia. On the other hand, those working in academia were less positive about long-term career prospects for a career outside academia. This seems likely to reflect that as researchers develop their knowledge and contacts (i.e. become more “anchored”) in their existing sector, it may be easier to predict their prospects in the sector that they know than another. This would suggest that both parties consider that “the grass is greener” on the same side, rather than on the other side.

Fernandez (2015) also reports that issues of recognition mitigate against periods of mobility in other sectors, as researchers (in academia) tend to be assessed on return from their period in another sector in terms of academic achievement only. Practically, the terms of many research grants are such that time spent in business, for example, building other skills is not beneficial in terms of contribution towards the outcomes that are assessed at the end of the grant funding. NCUB also refers to a “deficit culture” in higher education, where an experienced researcher choosing a career path outside academia is considered to have failed or sold-out, because the value of research performed outside academia is considered inferior. Although the extent of this culture may be decreasing, it will continue to deter some from undertaking intersectoral changes, not least if they are intended to be temporary.

There are also issues around the nature of employment contract in higher education (Deloitte, 2014). The later the career stage, the longer tend to be the contracts for researchers. In some EU countries, researchers at R3 and R4 level are regularly employed as civil servants. In contrast, early career stages are characterized by fixed term contracts of less than 4 years and in a significant minority of cases contracts of less than a year’s duration (Mellors-Bourne and Metcalfe, 2015). Only in two EU countries are doctoral candidates given permanent contracts (Poland and Romania). However, by the time researchers reach full professor level (R4), almost all countries provide permanent employment contracts. The complexity of these conditions does not make career moves between academia and other sector simple, and may mitigate against mobility into academia, if a researcher has a good employment contract with their private or public sector employer.

The EC is currently active in improving the employment conditions of researchers which, ironically, may lessen the attractiveness of employment outside academia when these issues of remuneration and employment-related conditions are considered.

There is some growing interest in ‘combined’ positions, where a researcher has partial employment in two sectors simultaneously, such as the “Professor 2” scheme in Norway where an employee in industry may have a 20% position in a university with a full academic professor status, or conceivably vice versa (Borchgrevink & Scholz, 2013). Although this has occasionally been referred to as a “dual career position” this is unwise as the concept of supporting dual careers for academics -- where there is deliberate support to integrate the spouse of a mobile



researcher into the local labour market, or within the same institution – is much more prominent (and is also a concept which promotes mobility)<sup>1</sup>. In practice, the concept of genuine combined/split positions between industry and academia, where both are fully remunerated, is relatively rare outside a few countries such as Norway, although the concept of an industry-based researcher being a ‘visiting’ academic is much more established.

Deloitte (2014) believe that private sector companies usually prefer, rather than developing combined positions, either to cooperate with universities in order to outsource their research activities or to recruit researchers to full-time employment themselves. They fear that combined positions will introduce problems related not only to how to balance challenging workloads but also issues like intellectual property rights. Deloitte’s 2014 review suggests that the more experienced the university researcher, the less likely or often that they switch to the non-academic sector, because they are path dependent in terms of job security and remuneration. They are less likely to move to non-academic research positions the longer they have worked at the university, because employment conditions improve with career progression in academia. Those who have the salary and benefits of top-level university researchers (i.e. full professors) will rarely give up their combination of intellectual freedom, academic independence and high reward. Even if very attractive salaries are available in the private sector, researchers may often decide to stay in a university environment for other motives and remuneration may be secondary. At the same time, private companies often require different skills, and many university researchers will need additional training in management or commercial activities to perform well in the private sector. It is likely that retraining of this type will be easier for researchers who switch at an earlier age. There is some resonance here with the MORE-2 findings that mobility is less common for those who have been established in industry for a longer period; i.e. intersectoral mobility tends to reduce with progression in a career in either academia or industry. As Vandeveld (2014) puts it in a summary of an ERA workshop, “universities have not started to value the non-academic experience”.

Where dual positions do exist, it has been reported that researchers who are currently in a dual position are relatively more satisfied with their opportunities for advancement, remuneration, improved social status and mobility in their current industry post than in their current academic one (IDEA Consult, 2013). On the other hand, they view their academic position more favourably with respect to its job security, location, intellectual challenge and degree of independence, as well as their perceptions of their employer as an organisation. This reflects the idea that many researchers tend to value the type of work they do more than the level of remuneration when choosing a position.

Intersectoral mobility during doctoral study is beginning to become more common, particularly within collaborative doctoral programmes. In some cases, a placement or internship for three months in a non-academic environment is a compulsory part of the programme. However, outside these structured schemes, moving out of higher education into the private sector for a short period during doctoral studies is still the exception, even though it is perceived as potentially beneficial for a researcher’s career. Hitherto it has been thought that research

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<sup>1</sup> See International Dual Career Network, [www.idcn.info](http://www.idcn.info)



placements like this are held back by expectations that doctoral researchers lack preparation in areas such as intellectual property and how to communicate their knowledge transfer (Deloitte, 2014). In much the same way, many businesses consider that because mobility is costly, it should be funded through public or other funding sources, and may only participate in structured schemes where funding is available (Fernandez, 2015).

Researchers may also simply not be aware of their potential value outside academia, or that recruitment policies in other sectors may rely on competencies that they are unaware of or may not have developed. This is either because a general inadequacy of information available for researchers or because the information is available but they have not sought it out. This may practically hinder efforts by non-academic organisations (such as businesses) and researchers to link up and collaborate. This is to some extent a case of academia and business not having a common language; for example the UK Concordat to Support the Career Development of Researchers addresses many of these themes in relation to researchers in academia and how they should be supported to develop transferable skills and broader career knowledge, yet many businesses are simply unaware that such a Concordat exists (Fernandez, 2015).

## Key findings

### Extent of researcher mobility

There is a relatively low extent of intersectoral mobility according to researchers – almost certainly less common than the extent of international mobility.

Assuming that intersectoral mobility is defined as mobility “either way” (from academia to industry, or vice versa), intersectoral career moves into academia are more common in arts, humanities and social sciences, where doctoral study and/or a research career more often follows an early career in another sector, than is the case in the sciences.

In the UK there is some evidence that periods spent outside academia are becoming more common for early career researchers, although they are still rare; this extent is likely to increase through recent collaborative doctoral programmes which include a placement as part of the structure.

Although the extent of international mobility increases with the time spent in academic research, this is not necessarily the case for intersectoral mobility – quite possibly it is the other way around as intersectoral mobility is most popular during doctoral training.

There are few recorded examples of multiple intersectoral moves within a researcher’s career.

Mobility is more common where there are funded schemes to encourage or enable it, rather than where it is fully voluntary on the part of the individual.

There is some growing interest in the concept of combined career positions, where a researcher is actively employed in two sectors simultaneously, i.e. spanning two sectors rather than moving between them.

### Experiences of researchers



There is little published evidence from researchers who have undertaken intersectoral mobility, although there are plenty of studies of doctoral career paths showing “outflow” from academia (for doctoral study) to subsequent careers in other sectors – at least half of doctoral graduates follow such paths.

The POCARIM study of career paths in social sciences and humanities found that intersectoral moves or combined career positions were easier to accomplish where the position in each sector was relatively similar, and the environment was research and development in both cases.

It seems easier to move between academia and the public sector, rather than to or from the private sector, as the cultural differences are lower.

There are more experiences of intersectoral mobility from those in doctoral training, rather than of more experienced researchers, especially during collaborative doctoral training structures which may be positioned “at the business-academia interface”.

### **Barriers to intersectoral mobility**

The different cultures in academia and the private sector (especially) mitigate against repeated or short-term mobility, including a general lack of understanding or respect for skills that have been developed in another sector.

Different sectors have their own views of which skills are important; for example, the importance of intellectual property rights considered by the private sector.

This is linked to the different balance of motivations across sectors: academia tends to focus on knowledge development, whereas the private sector is ultimately focused on exploitation.

Conceptions of excellence or high performance are different in academic research and industry-based research, with different measures of these as a result, which are not readily transferable or understood by other sectors.

Traditionally academia (especially) tends to view time spent in industry as less valuable than time spent in academic research because academic publications and outputs do not result from it (and these are the measures of success in academic research).

Remuneration and employment-related issues, including health, social security and pensions, tend to be sector-dependent rather than portable/compatible, and poorly understood outside each sector.

In academia, security of employment (including contract length) and remuneration increase with length of experience and progression, which mitigates against mobility by more senior researchers (who have worked a long time to gain well remunerated and secure positions, which they are unlikely to forego for purpose of mobility).

With less secure employment, early career researchers could be more willing to undertake mobility than senior researchers, but this is likely to be just at the time when they need to generate the highest academic output in order to maximise their chances of gaining an academic position.



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