

Excellence, Equality and Entrepreneurialism Building Sustainable Research Careers in the European Research Area

by the Expert Group on the Research Profession

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FOREWORD

This is the report of an independent Expert Group (EG) convened by the European Commission (EC). The overall objective of the EG was to support the European Research Area (ERA) Framework Impact Assessment by focussing on the areas that impact on an open and competitive single labour market for researchers.

Global competition for the best research talents is growing. The European Union (EU), therefore, needs to make strong progress in improving career prospects for researchers and creating conditions for their mobility between research sectors and across national borders. This will help ensure an adequate supply of researchers and enhance the quality of EU research. Thus, a comprehensive and coordinated approach is required to create a genuine European labour market for researchers in which supply and demand are balanced and where researchers across the EU would benefit from the right training, attractive career conditions and the removal of barriers to mobility.

In 2008, Member States agreed with the European Commission (EC) to implement a new partnership for researchers, the European Partnership for Researchers (EPR)¹. Member States endorsed the common European framework proposed by the EC as reference for developing national action plans. The partnership was designed to strengthen national ownership and to achieve, by the end of 2010, rapid and measurable progress. Its goals were to:

- Systematically open recruitment
- Meet the social security and supplementary pensions needs of mobile researchers
- Provide attractive employment and working conditions
- Enhance the training, skills and experience of researchers

Although progress was made towards these goals, it was slow and not uniform across Member States. Consequently, it was decided to incorporate the EPR into the Innovation Union Flagship Initiative² of the “EU 2020 Strategy”, unveiled by the European Commission on 6 October 2010³. The European Innovation Union (IU) calls for a unified European Research Area in which all actors, both public and private, can operate freely, forge alliances and gather critical mass in order to compete and cooperate on a global scale. The ERA is to be completed by 2012.

The IU Flagship announces for 2012 an ERA framework and supporting measures to remove obstacles to mobility and cross-border co-operation, to be in force by the end of 2014. It was formally endorsed by the European Council of 4 February 2011⁴, according to which "efforts should be made to improve the mobility and career prospects of

¹ Communication from the Commission to the Council and the European Parliament - Better careers and more mobility: a European partnership for researchers, COM/2008/0317 final.

² Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *Europe 2020 Flagship Initiative Innovation Union*, SEC(2010) 1161, Brussels, 6.10.2010, COM(2010) 546 final, http://ec.europa.eu/research/innovation-union/pdf/innovation-union-communication_en.pdf#view=fit&pagemode=none

³ http://ec.europa.eu/europe2020/index_en.htm

⁴ European Council 4 February 2011 Conclusions, Brussels, 8 March 2011, http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/119175.pdf.

researchers, the mobility of graduate students and the attractiveness of Europe for foreign researchers".

The core strategic objective of the ERA framework is to lay the foundation to gradually create a genuine single research market. The proposed ERA framework will constitute the basis for removing current obstacles hampering research efforts in Europe, whilst laying the foundation of a forward-looking research policy at EU level, which is commensurate to future societal challenges. The proposed ERA framework should act as both:

- a policy "corrector", by addressing the deficiencies in the European Research Area and tackling current problems; and
- a policy "catalyst" for the future of European research: the proposed framework should anticipate the future needs of EU research policy and set up the framework conditions for supporting excellence in research and maximising the impact of research on society.

The most tangible part of the European Research Area is arguably the issue of "researchers". Therefore, the ERA framework will notably seek to ensure, through a common approach:

- quality of doctoral training, attractive employment conditions and gender balance in research careers;
- mobility of researchers across countries and sectors, including open recruitment in public research institutions and comparable research career structures and making possible the creation of European supplementary pension funds.

Hence, a public consultation on the future ERA Framework was launched on 13 September 2011, which ran until 30 November 2011. Its aim was to gather views and evidence from stakeholders on the key obstacles which have to be tackled to achieve a well-functioning ERA and a single market for research and innovation by 2014. The outcome of the consultation helps the European Commission to decide on the issues which should be addressed as priorities when preparing the ERA Framework proposal.

Observations from the Chair

It has been an honour to have been requested by the European Commission to carry out this task and to work with such distinguished experts. As someone with a diverse background, it may be useful to make some general observations.

Business has moved dramatically to de-risk its research investment by focusing on speed and agility. Increasingly, instead of employing researchers in its own large-scale facilities, companies outsource research delivery in a variety of ways—one of the most dramatic has been referred to as “open innovation”. Even nations have de-emphasised national institutes or laboratories, demanding instead the flexibility of relatively short-term contracts.

Collaborations with research Universities, project-based research, short-term rotations are all contributions to addressing their efforts to deliver new products and services in a competitive fashion to global markets.

Yet, as recently observed by a colleague, research is one of the few sectors in which it is not common to have a “Manpower”- like agency specialist recruitment service. Thus Universities have adapted their own structures and models to act as the default employer and locus for research efforts—and they are, generally speaking, ill adapted to that role. The result has been a very unsatisfactory situation for young research talent that must face a life of short-term contracts.

The modulation between the clear enterprise demand and the human supply side warrants much closer examination and innovation in this regard will yield short-term returns.

There is clear room for a Community action respecting the rights and responsibilities of individual Member States but with a European added-value. Such an action needs to support what has been termed a “flexicurity”⁵, the longer term career development dynamic for the talent already available, and provide the linkages to the enterprise demand whilst acknowledging the dynamic in that sector to avoid employment lock-in.

Such an action can have the nature of a beneficial spiral:

- ***Human capital, already developed, can be actively deployed with greater respect for individual talent***
- ***Enterprise can be supported to be lean, agile and with renewed innovation capacity***
- ***Better career development not only has a human benefit but can, in turn, lead to much more active consumers***
- ***The new products and services can benefit society in a context of energy, demographic and competitiveness challenges.***

⁵ Discussed in Ackers, H.L. and Oliver, E.A. (2007) ‘From Flexicurity to Flexsecquality? The Impact of the Fixed-term Contract Provisions on Employment in Science Research’ *International Studies of Management and Organization*, 37(1), pp. 53-79. In addition, see: Oliver and Hooley, (2010) *Researchers, fixed-term contracts and universities: understanding law in context* (Cambridge: VITAE); www.vitae.ac.uk/CMS/files/.../Fixed-term%20contract_July_2010.pdf.

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PREAMBLE

GENERAL CONTEXT

Mandate and Tasks of the Expert Group

The European Commission's Directorate General (DG) on Research and Innovation set up the Expert Group on the Research Profession⁶ in the context of preparatory work on the ERA Framework. The overall objective of the Expert Group was to support the ERA Framework Impact Assessment by focusing on the areas that impact on an open and competitive single labour market for researchers. The mandate of the Expert Group was thus to carry out a comprehensive analysis of the key issues affecting the research profession in order to better describe and substantiate the problems as well as the underlying drivers of the problems. The areas identified were: 1) Working Conditions; 2) Mobility; and 3) Open Recruitment.

Europe must take much better care of its great human potential, which has been the source of Europe's cultural and economic achievements throughout history. Currently, Europe is underutilising the capacity it has built for innovation, not least as a consequence of the missing links between an ill-adapted academic system and the business enterprise sector, and persistent gender differentials in research careers. If there is a political will and an economic requirement to develop a highly innovative and thus competitive European economy, then an essential ingredient of this policy has to be the promotion of research and researchers. There are three elements that especially need a concerted action:

Proper investment in research

Europe at large is well behind its 3% GDP target with unsustainable disparities across the EU that lead to severe negative social and economic effects.

Increasing the number of researchers in Europe

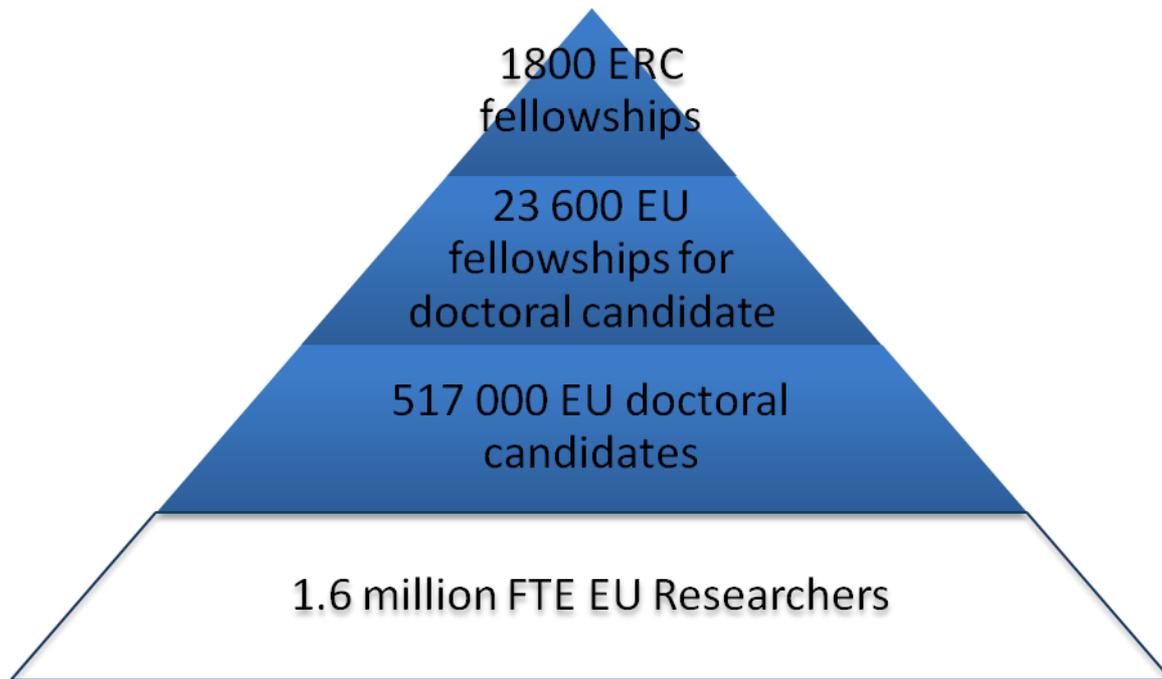
There are currently 1.5 million researchers in the 27 EU countries, almost the same as in the USA where the figure is 1.4 million. However, the population of Europe is 60% larger – 500 compared to 300. Taking into account similarities, as well as the level of economic development of EU-27 and the USA, a simple demographic scaling suggests a deficit of about 1 million researchers in Europe. A closer look at the structure of employment of these two global markets indicates that the prime source of the EU researchers' population deficit is not the academic community, but business firms. These are among the major sources of lower competitiveness in Europe and threats for future living standards on that continent.

Figure 1 below shows how these figures were reached for 2009 (see note⁷).

⁶ Term used synonymously with researchers who are defined as the "professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned" (Frascati Manual, OECD 2002).

⁷ *Note for the triangle:*

In 2009, approximately 600,000 doctoral candidates carried out research in the EU, with 110,000 graduates every year (source Eurostat).



Whilst these numbers are estimations, the scale is impressive.

In 2009, there were 1.58 million full time equivalent (FTE) researchers in the EU, compared to 1.46 million in the United States and 0.68 million in Japan (China has taken the world lead with 1.6 million researchers). Although the number of researchers in the EU has been increasing since 2000 at a faster rate than in the USA and Japan, the EU still lags behind in terms of its share of researchers in the total labour force. In 2008, this stood at 6 per 1,000, compared to 9 in the USA and 11 in Japan, i.e. one third less for the EU in comparison to the USA.

With regard to doctoral education funding (on the EURAXESS website): “At European level, the most well known scheme specifically dedicated to the excellent and structured training of doctoral candidates are the Initial Training Networks (ITN) of the Marie Curie Actions (estimated total of more than 18 000 doctoral candidates supported during FP7). Other European funding sources include Erasmus Mundus (1400 doctoral candidates in seven years), and further programmes not mainly focused on doctoral training but effectively funding doctoral candidates and training, such as Erasmus (estimated 35 000 one or two semester mobility grants under the current LLP programme), European Research Council (estimated 13 000) the Cooperation Programme of FP7 (estimated 70 000), Structural Funds (estimated more than 50-100,000) and development aid programmes (estimated 1400).” (EU calculation, 2011 report from the working group on skills, European Commission).

With regard to post-doctoral education funding: in 2004 the EU and its Member States awarded post-doctoral positions to at least 11 000 people (schemes or programmes resulting from an open call for proposals), including 2 100 by pan-European organisations, mainly through the European Commission’s Marie Curie programme. The inventory exercise also found that the average duration of a post-doc was 2 years and the average post-doc candidate (EURAXESS website): “The European market for fellowships can surely benefit from being better structured. Only France, Germany, Norway, Spain, Switzerland, Turkey and the UK have programmes awarding more than 200 positions a year. In addition to the larger number of minor schemes in the inventory, other aspects make the application procedure difficult, such as the short duration of some of the fellowships offered (between 6 and 24 months), and the different requirements from one scheme to the other.”

The difference is due to a much lower share of researchers in the business sector: 46% of the total number of researchers in the EU against 79% in the USA. This is not by coincidence as the private sector R&D investment is increasing at considerably lower rates in Europe than in the USA or China. However, in times of crisis companies are clearly less prone to risk-taking than in times of prosperity. The Expert Group therefore advocates that the European Commission should foster and encourage strong public-private associations together with the development of existing institutions and the creation of new ones, and the inter-sectoral interface.

Concerning R&D intensity, the EU - with 2% of GDP in 2010 - also lags behind the USA (2.8%) and Japan (3.4%). According to the European Commission (2011, Innovation Union Competitiveness report), Europe will need 1 million additional researchers to reach the objective of 3% of GDP invested in researchers, one additional point of investment in R&D. "The EU will need to create at least 1 million new research jobs⁸ if it is to reach an R&D intensity of 3 %. This net increase by two thirds of the number of European researchers by 2020 should primarily benefit the business sector, where there is a large gap with the United States. In addition a large number of the existing research work-force will retire by 2020. This, combined with the need to strongly adapt the profiles of researchers to new priorities and market demands, will constitute one of the main challenges facing national research and innovation systems in the years to come."

Creating a truly European market for researchers

There is clear evidence of striking deficiencies in the career development of researchers that make it relatively less attractive and unsustainable. The Expert Group's report is devoted to a critical but constructive analysis of these aspects of the EU research market.

Key policy observations

1. Europe does not adequately support the application of the intellectual potential into which it has already invested. Europe is behaving as if there was a surplus of highly qualified people in the R&D system, particularly underutilising women's talents.
2. Europe urgently needs to substantially increase its investments in research and the research base in order to stay competitive in the global markets. Europe lacks in the order of 1 million researchers, primarily in the business sector, where the investment in RTD is not only too small, but also lacks a risk-taking component (venture capital is one of most underdeveloped business sectors in the European RTD market).
3. A truly integrated and competitive European research system will demand more coherent and concerted structuring actions. The EC is expected to use more vigorously its financial and legal strength to shape the European R&D&I system, with a focus on the research profession system.
4. The current research market in Europe is very fragmented and dominated by national conditioning, which *de facto* creates severe barriers for mobility of researchers, portability of funding research and transferability of social rights and privileges between the Member States. The current EC-led research funding does not

⁸ COM(2010) 546 final. Europe 2020 Flagship Initiative Innovation Union

play a sufficiently strong leadership role to allow it drive harmonisation and improvements. In addition, the scale of EU-budget based instruments (Framework Programme and Structural Funds) does not match the real needs of the researchers' market, especially at the early career stage.

5. Among major deficiencies in the European research market are very weak inter-sectoral mobility and cooperation. This should become the focus of the EC's attention and activity on a broad scale (from legal to financial).
6. The awards system should become one of the major instruments at the EU-level to mobilise and motivate researchers, allowing them to conduct curiosity-driven research, while at the same time having to acknowledge societal needs.
7. The research community in Europe is very fragmented and clearly lacks a strong voice to communicate and interact with policy-makers and funders of research.

RECOMMENDATIONS

A European Monitoring System

The Expert Group's central recommendation is the establishment of a European Monitoring System for the Research Profession with a view to overcoming the current fragmentation and lack of information, data and statistics on the research profession in Europe, thus creating a sound base for policy.

Such a Monitoring System would involve all relevant stakeholders at the European level (Eurostat, DG Research and Innovation, European Research Council, Joint Research Centre and the Institute for Prospective Technological Studies, European Institute of Innovation and Technology) and should be developed in close interaction with the Member States, building on the structure of the European Framework for Research Careers. The Monitoring System should provide:

- a set of common standards to be applied at both European and national level in order to achieve consistency, especially in terms of break-down by discipline, sector, nationality, gender, type of position, remuneration
- an information system to measure and track the mobility of researchers (geographical, inter-sectoral) and their career paths, taking into account gender.

Harmonising Career Structures

The Expert Group identified a major challenge to a robust enhancement of European research and innovation in the fragmentation and differences in career structures across national contexts. The Expert Group therefore recommends initiating a feasibility study on implementing the European Framework for Research Careers and involving Member States, particularly in view of:

- providing juridical, administrative and economic definitions of the different research career stages;
- applying the European Framework for Research Careers as a career structuring mechanism to facilitate recognition of career stages and mobility in Europe in all Horizon 2020 programmes.

Harmonising Working Conditions

At the core of the Expert Group's recommendations is the recognition that working conditions are among the most important factors contributing to job satisfaction of

researchers and their career planning. It is therefore suggested to harmonise or align European-level and Member States' criteria and practices, in terms of access to: research funding, mobility, lifelong training, salary and social security. Member States should be urged to monitor the implementation of the fixed-term directive and to review possibilities of implementing a labour law that allows open-ended contracts (including severance) with a view to combating the current levels of precariousness, especially in the early-career stages.

Realising the 5th Freedom – Essential Role of Mobility

The Expert Group advocates that at least four types of mobility be recognised: geographical, inter-sectoral, 'virtual' (based on tangible cross-border research collaboration) and mobility related to change of topics or disciplines. To this end, a European clearing house should be established with a view to creating transparency, harmonising or aligning the conditions for, e.g. the portability of grants, administrative compliance, funding schemes, appraisal and evaluation systems. Flexible forms of mobility should be fostered, considering individual factors such as age, gender and family needs, as well as health conditions.

Conditions for Career Development: Transparency & Open Recruitment

Open and fair recruitment are at the core of creating an excellent, fair and researcher-friendly working environment that will facilitate the development of skills and talents available without prejudice. To this end, the Expert Group recommends that Horizon 2020-funded appointments and hiring should be contingent upon open and fair recruitment procedures, including considering gender balance of selection committees (the EU Code for recruitment or common set of principles defined by the European Commission's Steering Group on Human Resources and Mobility (SGHRM) should be applied). This should involve periodic reviews of hiring and appointments under Horizon 2020-funded projects.

The Expert Group recommends a more nuanced approach to merit-review, capable of capturing research potential (in the case of early career researchers and those researchers with less linear career paths). The Group questions the ability to measure 'scientific excellence' objectively using bibliometric indicators. However, performance evaluation is critical to transparency. We therefore propose that approaches to quality assessment are carefully contextualised to reflect the impact of respective topics and disciplines, the research environment and a researcher's personal circumstances. Positive experiences of research in other sectors should be recognised during recruitment and career evaluation/progression to promote career alignment. Criteria might include co-publications with non-academic partners, evidence of productive professional collaborations and the potential for cooperation and, where appropriate, commercialisation.

The Group proposes the development of a consultation process on 'research assessment' involving research policy-makers, research institutions and researchers.

Individual-Oriented Research Funding

To facilitate an individualised and flexible European labour market for researchers with a high degree of mobility, the Expert Group urges the European Commission to make available individual-oriented funding for different forms of mobility, including short-term mobility options, as part of Horizon 2020. Furthermore, more private money

should be attracted to the public sector, e.g. by setting up joint doctoral programmes, shared positions, flexible remuneration schemes, and research institutions operating at the borders between sectors.

Larger Use of Awards and Prizes

Awards and prizes are among the most powerful mechanisms that can mobilise and motivate researchers, often becoming milestones in careers at all stages. Unfortunately, these have been abolished at the EU level (e.g. the Descartes Prize was abandoned in the 7th Framework Programme and there are as yet no equivalent proposals in Horizon 2020.) If properly publicised, they can serve not only as a benchmarking instrument but also become a powerful vehicle to inform society at large.

SETTING THE SCENE

MANDATE AND TASKS OF THE EXPERT GROUP

The Expert Group on the Research Profession (the 'Expert Group') was invited to respond to the following challenge:

'To support excellence in research and maximise the [positive] impact of research on society by identifying and helping to remove or reduce obstacles hampering research efforts.'

In the first instance the Expert Group was divided into three working groups focusing on:

1. Working Conditions
2. Mobility
3. Open Recruitment

FOCUS AREAS OF THE EXPERT GROUP

Given these initial focus areas the Expert Group has chosen to define a number of key questions for each of these fields. It has also defined in which way it understands some key topics, such as 'mobility' or 'open recruitment'.

The Expert Group Usefocused on mechanisms that shape the mobility of researchers, in and out of the research profession.

1) Working Conditions

Some basic questions that are relevant to the working conditions of the research profession are set:

- What drives individuals to be researchers?
- Why do they leave the research profession?
- How can researchers be motivated to stay in research?
- What additional instruments are necessary in order to assure and encourage research institutions to use best the talents of their employees?
- What drives countries to support researchers?

It must also be acknowledged that the questions asked refer to different levels, namely:

- the macro-level, i.e. the level of the European or national research systems and their interfaces
- the institutional level, more precisely all relevant factors contributing to the researchers' working environments
- the individual level that is usually linked to the social aspects and thus the personal conditions of the research profession.

2) Realising the Fifth Freedom: “The Free Movement of Knowledge”

The theme of ‘mobility’, broadly construed, effectively captures the essence of the Expert Group’s findings. Recent years have witnessed a shift from traditional conceptualisations of mobility (as an end in itself) to a more nuanced understanding of its contribution, as a tool to the realisation of more effective and dynamic knowledge transfer processes. This perspective was echoed by the European Council in 2008⁹ in a report that immediately linked mobility to the free circulation of researchers, knowledge and technology:

“In order to become a truly modern and competitive economy [...] Member States and the EU must remove barriers to the free movement of knowledge by creating a ‘fifth freedom’ based on:

- enhancing the cross-border mobility of researchers, as well as students, scientists, and university teaching staff
- making the labour market for European researchers more open and competitive, providing better career structures, transparency and family-friendliness
- further implementing higher education reforms
- facilitating and promoting the optimal use of intellectual property created in public research organisations so as to increase knowledge transfer to industry, in particular through an "IP Charter" to be adopted before the end of the year
- encouraging open access to knowledge and open innovation
- fostering scientific excellence
- launching a new generation of world-class research facilities
- promoting the mutual recognition of qualifications.”

The emphasis on the circulation of knowledge echoes the new Treaty Competence underpinning the European Research Area (Article 179 TFEU):

“The Union shall have the objective of strengthening its scientific and technological bases by achieving a European Research Area in which researchers, scientific knowledge and technology circulate freely, and encouraging it to become more competitive.”
(paragraph 1)

Paragraph 2 refers more specifically to encouraging ‘researchers to cooperate freely across borders.’ This is what is often referred to as ‘virtual mobility’.

A recent EC document further illustrates the perceived importance attached to mobility in the ‘Innovation Union’:

“Increased mobility is strongly associated with the creation of knowledge networks, improved scientific performance, improved knowledge and technology transfer, improved productivity and ultimately enhanced economic and social welfare.” (CEC, 2010:21)

3) Conditions for Career Development: Transparency and Open Recruitment

The Expert Group was invited to pay particular attention to the concept of ‘open recruitment’. It discussed a number of alternative concepts which are often used inter-

⁹ The Council of the European Union, Presidency Conclusions, Brussels, 20 May 2008.

changeably and synonymously but which may convey rather distinct meanings ('openness', 'fairness', 'transparency'). The Group decided to work with the concept of 'transparency.'¹⁰ Transparency conveys an interest in process rather than outcomes which was felt to be most appropriate and least likely to generate externality effects, potentially compromising excellence and other more social goals (such as substantive equality¹¹).

The European Science Foundation emphasises the 'importance of transparency of recruitment criteria and their accountability in order to ensure equal opportunities in all stages of the career process is a precondition to excellence and innovation in research. The lack of transparency and accountability.... appear to disadvantage women scientists and other minority groups of researchers. This leads to a limited pool of potential candidates at the expense of scientific excellence' (ESF, 2010:28).

Transparency conveys an interest in process rather than outcomes which the Group felt was most appropriate and least likely to generate externality effects potentially compromising excellence and other more social goals (such as substantive equality).

Transparency also conveys a more holistic concern with the 'research career' over the life course embracing recruitment, progression and exit. This approach is essential as these stages are relational and do not operate in a vacuum: recruitment is dependent upon 'turnover' or 'churn'¹² and exit to release positions.

¹⁰ This term was used by: ESF Member Organisation Forum on Research Careers Report: Research Careers in Europe – Landscapes and Horizons, Strasbourg 2010 (http://www.esf.org/fileadmin/links/CEO/ResearchCareers_60p%20A4_13jan.pdf).

¹¹ We are making a distinction here between procedural equality (unfettered equality of opportunity) and substantive equality (equality of outcomes). Such derogations are permitted in specific contexts in European Employment Law (Fredman, 1997; 2000)

¹² Adams et al, 2005.

TOWARDS AN ENTREPRENEURIAL SYSTEM OF RESEARCH CAREERS

THE RESEARCH PROFESSION BETWEEN ART AND PROCEDURES

A key issue for Europe is to develop a whole system of research support and motivation to make research an attractive profession. This synergetic system, encompassing all financial resources (national, business, foundations and EU funds), should enable specific human talents present in or wishing to come to Europe to develop into the competitive chain of growth, based upon knowledge, ingenuity, excellence and entrepreneurship. The most effective way to nourish this type of human activity is to develop a whole system of quantifiable motivating tools, ranging from providing an excellent and competitive research environment, through proper and research-friendly employment rules and procedures, career development and finally a system of awards and prizes.

The heart of such a system lies, however, not in formal procedures or even massive financial support, but in the interpersonal relations based upon trust, respect, fairness and integrity. An essential part of the research profession is career advancement, which in its final stage assures maximum independence, leadership and the formal right to develop, to shape and to elevate the next generations of researchers. This system has been well described through the European Framework for Research Careers.¹³

The research process is at a borderline between art and strict procedural work. The first underlines the essential role of the curiosity-driven ingenuity and the critical thinking which is necessary to question existing paradigms and authorities. The latter is a consequence of years' long development of knowledge which resulted in the so-called scientific methodology requesting repeatability of research results and compliance with all available information, but also the power of predictability.

Working in research is a most demanding and challenging process, carrying extremely high personal risks that cannot be sustained only by what Max Weber called the "vocation to science profession" (M. Weber, *Science as a Vocation*), all the more if the research is carried out at the frontiers of knowledge. The more unknown and unexplored the selected research topic is, the greater the risk for personal career.

For Europe to achieve its goal of 'excellent science, competitive industries and better society' (Horizon 2020), it needs first and foremost to create such material conditions and foster open and fair interpersonal relations as a basis that make the research profession an attractive and sustainable career choice in the academic and industrial sectors.

¹³ European Commission: Towards a European Framework for Research Careers, Brussels 21st July 2011: http://ec.europa.eu/euraxess/pdf/research_policies/Towards_a_European_Framework_for_Research_Careers_final.pdf.

HARMONISING THE EUROPEAN RESEARCH, DEVELOPMENT AND INNOVATION SYSTEM

In recent years, the European Commission has undertaken several policy initiatives to overcome the current fragmentation of the research system in Europe, specifically with respect to research career development. The work is still in progress and even today Europe does not coherently support the application of the intellectual potential into which it has already invested.

In this framework the Expert Group is convinced that risk should be related to exploring unknown territories rather than personal risks related to one's career. This can be achieved through harmonising research career structures and working conditions in a flexible sense, without imposing new bureaucratic burdens.

Harmonising research career structures

The concept of 'a community of learners' is vital to the success of any Higher Education institution or national system - it is largely absent in the research profession in Europe. Indeed a key issue is that research is not universally recognised as a 'profession' in some member states and Higher Education institutions: outdated ideas still persist about postdoctoral research as a training stage or form of apprenticeship, although such thinking has little in common with the requirements of a dynamic, innovative knowledge-based economy. The first requirement in achieving a successful European Research Area is to treat researchers as respected, autonomous professionals in their disciplinary area and valuable contributors to wider societal and economic goals.

The proposals made are worthwhile and would have some impact, especially providing more individual funding and developing opportunities for early stage researchers to build up research networks. Individual funding should be linked to career development and should be designed to facilitate a gradual transition to independent researcher status.

However, researchers are often caught 'in limbo' between grants, waiting for the conclusion of a grant application process as (or after) their contract expires - this may lead to researchers leaving the institution, country or even the research profession, because contracts and grant application processes are imperfectly aligned. A very desirable solution is the introduction of an EU-level mechanism to provide bridging funding to high-quality researchers, to enable to remain in employment temporarily, while awaiting the outcome of funding applications or working to secure alternative sources of funding. Such an initiative could be structured as a competitive awards scheme, linked to the merit of the candidate/project. A related possibility is the development of a 'near miss' funding initiative (which operates in Australian universities, including Sydney), which assigns bridging funding based on the merit of a high-ranked but unsuccessful application.

The European Framework for Researcher Careers promotes transparency and could provide a valuable basis for career progression. However, there is a serious danger that researchers will tend to congregate on the lowest rungs of the pyramid - notably R1 and R2, if the FTWA is implemented in a highly restrictive fashion (see below). Nevertheless a clear framework of titles and roles for externally funded posts on a European scale

would facilitate mobility, recognise achievement by postdoctoral researchers and allow greater comparability with lecturer grades.

Heterogeneity of career steps

At present, the heterogeneity of career steps and confusion about terminology distract researchers from a career in the public research sector. A key component of transparency (and mobility) concerns the [shared] understanding of what progression in a 'research career' entails. The development of the 'European Framework for Research Careers' by the European Commission is a direct response to the perceived need for 'an open and transparent internal labour market for researchers:'¹⁴

Europe does lack an open and transparent internal labour market for researchers. There are no comparable research career structures. The researchers' labour market is fragmented nationally and there is segregation between careers in academia, industry and other sectors. There is cross-country and cross-sector mobility, but many barriers remain. Career choices are often irreversible as it can be very difficult to move between sectors. Research careers frequently lack a clear and transparent prospective; early career researchers may not be aware of the range of opportunities across employment sectors. Employers are not always clear of the competences that researchers possess and the benefits they could bring to their company.

The development of the 'European Framework for Research Careers'¹⁵ is a direct response to this perceived information barrier. It describes four broad profiles:

- R1: First Stage Researcher (up to the point of PhD)
- R2: Recognised Researcher (PhD holders or equivalent who are not yet fully independent)
- R3: Established Researcher (researchers who have developed a level of independence)
- R4: Leading Researcher (researchers leading their research area or field)

Autonomy/Independence

At present the Principal Investigator(PI)-researcher relationship is far too dominant in the careers of researchers and could fairly be characterised as a semi-feudal relationship, which places even experienced researchers in an inappropriate 'apprenticeship' position to more senior academics, which greatly restricts their autonomy (p.18). Among the possible solutions are:

- Ensuring full recognition of work-based achievements by researchers other than publication (postgraduate supervision, grant writing, teaching), which are often currently recognised only at the discretion of the PI as institutional and national policy does not insist on such recognition: this should form part of any harmonisation measures with regard to career structures. Realistic career development will be impossible, and mobility much more difficult, if the existing achievements of researchers are not fully recognised. This problem highlights the relatively limited practical impact of the European Charter on the ground.
- Facilitate a more rapid and structured transition to independent researcher status (R3). A 'community of learners' will only be achieved by removing

¹⁴ 'Towards a European Framework for Research Careers', European Commission DG for Research and Innovation, Brussels 21st July 2011.

¹⁵ http://ec.europa.eu/euraxess/pdf/research_policies/Towards_a_European_Framework_for_Research_Careers_final.pdf.

barriers and restrictions at national level on independent applications for funding by contract researchers e.g. related to length of contract, lack of permanency, status within an institution. Specifically, contract research staff should be allowed to apply for grants at European and national level as principal investigator, while including a member of permanent staff as a mentor. This is currently possible in FP7 applications but depends on the willingness of institutions to facilitate such applications: Horizon 2020 should build in rules and/or schemes to encourage independent applications by younger researchers. This would involve much greater competition for grants and would reward the best researchers, not necessarily the most established ones.

- Securing greater flexibility by funding agencies to overcome fragmentation within the research profession: a number of funding agencies do not allow researchers to apply for salary as part of their grant and effectively prevent younger researchers applying for grants as PI. This militates strongly against the achievement of independent or established researcher status, limits competition and reduces the attractiveness of researcher careers.

Perhaps the most pragmatic approach is to have a flexible career structure, characterised by:

- mobility between full-time contract research and lecturing posts (this is currently unlikely as core-funded lecturing posts are incomparably more attractive, if also more scarce, than contract research posts);
- significantly greater funding for people and projects involving long-term contract research;
- more coherent and structured career development to prepare early stage researchers both for academic posts and employment in industry or the public sector.

The working time directive should be observed by institutions with regard to regular research employment - researchers will still do additional 'work from home', but the acceptance of more regular working hours would enhance the attractiveness of research as a career.

In Ireland, for example, the research profession is certainly not a meritocracy - success owes at least as much to the patronage of a senior PI as ability. Moreover, working conditions are far from attractive to most early stage researchers and many of their more senior colleagues. It would be a major advance if the EC was to use its leverage as a key research funding provider within Horizon 2020 to ensure open and transparent recruitment, fair pay in accordance with qualifications and attainment and merit-based treatment of researchers in contract renewal.

CONCLUSIONS ON CAREER STRUCTURES

The Expert Group believes that a European structure for research careers can only be established if joint actions are taken by the EC and its Member States. It therefore urges Member States and Institutions to engage with the European Framework for Research Careers in order to increase awareness of career paths and remove barriers to mobility.

The Expert Group identified a major challenge to robust enhancement of European research and innovation in the fragmentation and differences in career structures

across national contexts. We therefore recommend initiating a feasibility study on implementing the European Framework for Research Careers and involving the Member States, particularly in view of:

- *providing juridical, administrative and economic definitions of the different career stages;*
- *applying the European Framework for Research Careers as a career structuring mechanism to facilitate recognition of career stages and mobility in Europe in all Horizon 2020 programmes.*

Harmonising working conditions

For the time being research careers in Europe, especially at the R1 and R2 levels, and sometimes still at the R3 level, are characterised by instability and low levels of social security and payment, long working hours and very limited autonomy in carrying out one's own research projects. Even if some examples of promising practice in some countries can be identified, these do not apply to the system as a whole.

Issues referring to all career stages

What is a 'Position'?

Implicit in any discussion of entry, progression or indeed exit, is the concept of 'position'. The standard presumption of an 'employment relationship' fails to capture the varying quality of positions. These might include:

- 'Student'/Stipendiary positions
- Paid/Unpaid positions
- Positions with diverse funding sources: ranging from 'core' (internally funded) to 'periphery' (externally funded)
- Positions of diverse duration (temporary-permanent continuum)
- Positions involving diverse working hours (full-part-time continuum)

All of these positions constitute a means of entry into the research profession. But they may be governed by divergent human resource management systems with permanent, remunerated employment positions triggering the most stringent Human Resources (HR) attention (full process), whilst part-time or temporary positions, or positions funded through external income sources (research grants or fellowships), may be dealt with in a less formal or institutionalised manner.

Fixed-term appointments versus open-ended contracts

Research careers, together with the research profession, have undergone tremendous changes in the past decades. In the 1970s and 1980s expanding research systems and increasing funds offered long-term safe career prospects with reasonable remuneration, whereas the first decade of the 20th century seems to be increasingly characterised by short-term arrangements. Undoubtedly, these developments have to be seen as a consequence of the shift towards short-term project based funding, and the omnipresent phenomenon of acceleration, which is clearly a side effect of globalisation.

This shift creates new challenges and insecurities for researchers (loss of employment, change of research focus depending on the source of funding, deepening of gender inequalities as women are at greater risk of being contract-research staff, etc.) but also waste at institutional level (loss of tacit knowledge, care work, etc.). Despite this, the traditional notion of a linear, uninterrupted research career prevails as the ideal, which results in temporary employment being seen and treated as inferior and creating inefficiencies in the system.

This, often institutionalised, inferior status may take various forms and affect the researchers both psychologically (in terms of work satisfaction and identity) and in terms of their ability to work effectively and generate career enhancing outputs. Contract researchers often experience different treatment, for example:

- Accommodation and access to facilities
- General inclusion, participation and integration within the life of departments
- Access to training budgets, conference funding and related occupational 'perks'
- Representation on e-mail networks, web sites and publicity material
- Opportunities for (internal) promotion and progression (and the pay linked to these)

Due to this increase in short-term contract research employment, the harmonisation of career structures is all the more important.

CONCLUSION ON FIXED-TERM EMPLOYMENT

The Expert Group recommends that in order to prevent abuse arising from the use of successive fixed-term employment contracts and relationships, the Member States, after consultation with the social partners, should introduce one or more of the following measures (taking into account the needs of specific sectors and categories of workers):

- *objective reasons that justify the renewal of such contracts and relationships*
- *the maximum total duration of successive fixed-term employment contracts and relationships*
- *the number of renewals¹⁶*
- *such measures must also take into account the increased precariousness in women's careers related to career breaks due to parenthood in these early career stages.*

Remuneration and reward

Academic positions, especially at the early career stage, are often characterised by low salary levels, and poorly defined rights and responsibilities. Pay and remuneration remain one of the main factors that reduce the appeal of research careers and encourage graduates to develop their careers elsewhere. Furthermore, the gender pay gap in research persists, failing one of the basic beliefs of the research profession, meritocracy.

¹⁶¹⁶ Discussed in Ackers, H.L. and Oliver, E.A. (2007) 'From Flexicurity to Flexsecquality? The Impact of the Fixed-term Contract Provisions on Employment in Science Research' *International Studies of Management and Organization*, 37(1), pp. 53-79. In addition, see: Oliver and Hooley, 2010) *Researchers, fixed-term contracts and universities: understanding law in context* (Cambridge: VITAE); www.vitae.ac.uk/CMS/files/.../Fixed-term%20contract_July_2010.pdf.

CONCLUSION ON REMUNERATION AND REWARD

The Expert Group urges the EC to use its leverage as research funding provider in ensuring gender balance, fair and adequate remuneration for researchers, especially at the early career stages R1 and R2.

Working hours

One of the factors that shapes the appeal of research careers concerns the expectation of long and anti-social working hours and their implicit association with commitment and excellence. Despite widespread acknowledgment of this issue, there has been little research on it. One exception to this is a European Commission funded study on Gender and Career Progression in Research¹⁷. The findings indicate that scientists in the academic sector work, for the most part, extraordinarily long and anti-social hours which are seen as essential to the successful execution of their employment and to progression in their careers. The experiences of scientists suggest that it is not simply that work is allowed to 'spill over' into additional hours (giving some researchers a lot more time to produce) but also that the quality of the work undertaken in the additional hours can be distinguished in important ways to the usual schedules. For many scientists, the work undertaken in 'anti-social' hours is entirely focused on generating 'privileged' forms of output such as publications. The ability to work these hours depends to a large extent on personal and family circumstances, and on gender with regard to working mothers (and to a lesser extent fathers) reporting a significant decline in the amount of 'overtime' they are able to commit when children are born.

The Working Time Directive¹⁸ is designed to curb the long and anti-social working hours that characterise academic research, although the derogations restrict its applicability at present. Arguably its extension to cover these forms of work could be of benefit to men and women working in science. It is not so much that employers require their staff to work long hours, but rather that there is a culture of long and anti-social working which is linked closely to the highly competitive and individualistic nature of science research as well as concerns about output and performance. Legal measures, such as the Working Time Directive, which may be effective in other areas of work (such as transport, for example) may have less of a direct impact in science careers where the work is inherently unmeasurable, unremunerated and 'voluntary'.

CONCLUSIONS ON HARMONISING WORKING CONDITIONS

At the core of the Expert Group's recommendations is the recognition that working conditions are among the most important factors contributing to job satisfaction of researchers and their career planning. We therefore suggest harmonising or aligning European-level and Member States' criteria and practices, in terms of, access to research funding, mobility, lifelong training, salary and social security. Member States should be urged to monitor the implementation of the fixed-term directive and to review possibilities of implementing a labour law that allows open-ended contracts (including severance).

The Expert Group also sees the need for activity in the following areas:

¹⁷ Equal Pay, Career Progression and the Socio-Legal Valuation of Care (MOBISC), European Commission (2003)

¹⁸ Council Directive 2003/88/EC

- Encouragement and realisation of beneficial individual (working) conditions, including the flexibility of working hours and working locations to the widest possible extent
- Availability of medium-range and long-term funding for people and projects with strong emphasis on the evaluation of results, rather than requiring over-detailed project descriptions
- Supply more reliable and predictable career tracks, based on personal achievements and trust, such as tenure-track arrangements
- Renovate the use of short-term contracts in view of the European Fixed-Term Directive and encourage new legislations to enable more unlimited contracts with enough flexibility on the employer's side in cases of under-performance and lack of funding.

Issues referring to specific career stages

As we have to ensure that the supply chain into the research profession functions, we have to consider especially the PhD/postdoc level (R1 and R2), but also other issues related to R3 and R4, such as the retirement schedule of R3 and R4 level researchers.

R1 First Stage Researchers - the status of doctoral training

In some Member States positions for doctoral researchers are classified and treated as employment with various rights-bearing obligations and benefits. In others, doctoral positions typically take the form of 'studentships' funded through stipends on a tax-free basis. As such they do not give rise to full social security entitlements. Both of these types of positions constitute an entry point to a research career with the researchers concerned performing essentially similar work. This issue of status also raises important questions about relative remuneration and the social rights conveyed to doctoral researchers. The First Eurodoc Survey on Doctoral Candidates in Twelve European Countries (Ates et al, 2011) identified this issue of status as a critical factor shaping the attractiveness of research careers and issued the following statement, on the use of the terms of 'doctoral candidates' versus 'doctoral students':¹⁹

Recognising doctoral candidates as employees stimulates the research working environment. Senior researchers would benefit from the fresh perspectives of their junior colleagues, and PhDs would be encouraged to explore beyond the current scientific frontiers. By categorising doctoral candidates as 'students' merely restricts their capacity to fully contribute to scientific research; it is actually a great barrier to retaining – and attracting future researchers - because many are unable to see themselves as young scientists in either academia or industry. This is aligned with the Salzburg Principles.

CONCLUSION ON THE STATUS OF DOCTORAL CANDIDATES

The Expert Group endorses this statement and encourages Member States and Institutions to follow the example set in relation to the Marie Curie Fellowship Scheme and, wherever possible, extend employment status to doctoral researchers.²⁰

¹⁹ ERA Consultation Contribution (2): Recognising PhDs as Professionals.

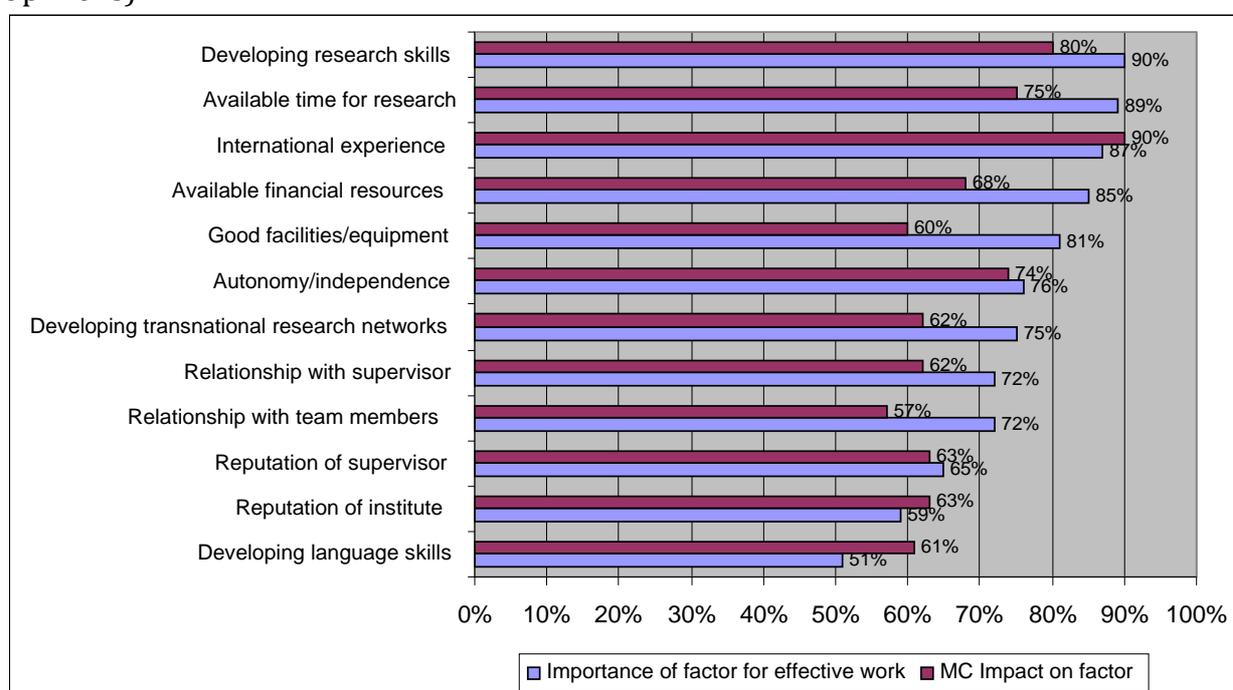
²⁰ Exceptions will have to be made in the cases where students are conducting doctoral research without any funding, for example.

R2 Recognised researchers - autonomy and independence

Whilst post-doctoral positions funded through awards to Principle Investigators (PIs) may constitute important mentoring and training opportunities for early career researchers, they may also be associated with less constructive forms of dependency inhibiting the exercise of autonomy and independence.

A study assessing the impact of Marie Curie Fellowships²¹ found that respondents attached a high value to autonomy and, linked to that, time to devote to their own research:

Figure 2. Relative importance of factors rated as ‘important’ to working effectively in research and the impact of the Marie Curie fellowship on these factors (Fellows’ Opinions).



Source: Van de Sande, Ackers and Gill, 2007.

Individual research fellowships (such as the Marie Curie Fellowships) are often regarded very highly by early career researchers as they provide more autonomy than project-related grants.

CONCLUSION ON CREATING A ‘COMMUNITY OF LEARNERS’

The Expert Group endorses the concept of a Community of Learners, as a crucial factor contributing to the success story of the United States’ research system. In many places in Europe we still find structures that are not conducive to developing researchers’ independence and creativity, and communication, at equal levels. The Expert Group believes that the international mobility of future research leaders can play an essential role in questioning their own behaviour and applying democratic values to research.

The Expert Group also sees the need for activities in the following respects:

²¹ Van de Sande, Ackers and Gill, 2007.

- Make more individual funding available, especially at supranational/European level
- Provide opportunities already at early career-stages for scientific self-assembly and building up of research networks
- Create trust in individuals to do their work with a high degree of autonomy, in line with their personal strengths and institutional priorities
- Supply favourable material conditions for research, especially availability of necessary research
- Raise awareness and improve the preparation of mentors, supervisors and scientific advisors to form a 'community of learners' with early-career researchers, making particular efforts to integrate women into these networks.

R3 Established Researchers and R4 Leading Researchers - retirement from the research profession

The issue of retirement also demands attention. This is particularly relevant in research systems which do not have obligatory retirement ages. However, it is of utmost importance here not to associate chronological age with a decline in merit. Furthermore, the new European Union Legislation on Age Discrimination²² may result in more variable retirement ages in the academic profession (and others). If these processes are effectively performance-managed, then the impact of ageing on research systems will be mitigated. If, however, the inability or unwillingness of public sector/civil service employers to performance manage senior staff results in 'staying-on practices' then the situation cannot be said to comply with the principles of transparent and merit-based recruitment and human resource management.

Institutions' and systems' policies in dealing with retirement are particularly sensitive in this respect. . Although it is clearly desirable to use the potential of very senior researchers in the best possible way, it has to be assured that 'position-blocking' does not impede the career advancement of future generations.

CONCLUSION ON CAREER EXITS

While recognising the potential of very senior researchers, the Expert Group emphasises the need to manage career exits in research, in order to avoid position blocking and the fruition of research talents of the upcoming generations of researchers.

REALISING THE 5TH FREEDOM – ESSENTIAL ROLE OF MOBILITY

Researchers are certainly more mobile than most other categories of worker and this is likely to continue. In developing a culture of mobility among PhD graduates, it is vital to

²² Age [discrimination](#) is contrary to EU law, as stipulated by [Council Directive 2000/78/EC](#) of 27 November 2000, which establishes a general framework for [equal treatment](#) in employment and occupation. Both direct and indirect discrimination are unlawful. However, in relation to age discrimination, [Article 6 \(128Kb PDF\)](#) of the directive permits a justification for discrimination, where, in the context of national law, it is 'objectively and reasonably justified by a legitimate aim, including legitimate employment policy, labour market and vocational training objectives, and if the means of achieving that aim are appropriate and necessary'.

recognise different types of mobility - currently mobility is strongly associated in public perceptions with geographical mobility. This perception could lead to negative associations of mobility with economic recession in peripheral states characterised by high emigration. Intersectoral mobility is particularly important for researchers - there should be a two-way flow of researchers between academia and industry, instead of the current widespread perception that researchers must choose between one or the other.

Compared to the 2% of working age citizens and the 3% of highly qualified workers that currently live and work in another Member State, 7% of doctoral candidates and 12% of post docs have worked in another country (European Commission, 2007 & 2010). As a result, 56% of EU university-based researchers have been mobile at least once in their careers for three months or more (European Commission, 2010).

Mobility associated with changes of topic or discipline is still not very frequent, but may become more common as researchers seek new funding opportunities in a growing unfavourable economic environment. Such mobility should be encouraged wherever possible - barriers between disciplines in similar thematic areas are often more artificial than real and more associated with academic preconceptions than fundamental philosophical or intellectual divergences.

Adopting the concept of 'Free Movement of Knowledge' enables the USA to identify the challenges facing research and the ways of improving the attractiveness of 'boundary-less'²³ research careers in order to promote excellence and impact. This wider concept of mobility implies a more creative and holistic approach to the concept of boundary, extending it from traditional geographical connotations to anything impeding knowledge generation and transfer processes, thus replacing the more traditional notion of career development within specific organisations.

Mobility takes different forms, from geographical mobility (including from third countries) to mobility between industry and academia as well as changing patterns of mobility such as virtual or short-term mobility. Other forms of mobility are also important such as disciplinary mobility. Mobility should also be seen dynamically during the career of a researcher, and there can be an accumulation of different types of mobility.

A last type of mobility is outside the research career. While EU countries still produce nearly twice as many doctorates than the United States (111 000 new doctorates in Europe for 47 000 doctorates in Science and Engineering awarded every year in the United States), researchers make up a much lower share of the workforce in the EU (0.66% in the EU against 0.94% in the USA) (European Commission, 2011a). Does the private sector need to increase its number of doctorate holders? Many European graduates and doctorate holders, the majority of whom are employed as researchers, either move away from research careers or pursue research in countries where they find better opportunities. However, some doctorate holders may also move away from research or abroad as a result of industrial structure, where researchers are quickly asked to integrate development teams.

²³ Arthur and Rousseau (1996).

Geographical mobility

Research is international by nature, even more so for academic researchers where the diffusion of knowledge takes place with peers without borders (OECD, 2008). An important lesson learned during the ESF Member Organisation Forum (2010) was that young people seek to move (1) to institutions providing a good balance between independence and mentoring, reflecting their needs; (2) to institutions providing the necessary infrastructure and an inspiring work environment, and (3) to locations where the living conditions meet their expectations.

In addition to these, the Expert Group identified a number of research-specific factors that motivate researcher mobility ('push factors'):

- Lack of funding and opportunities in some locations generates 'push factors (rather than incentives as such). This is particularly so at early career level where the lack of doctoral or post-doctoral positions, or the very poor quality of these positions, results in forms of 'forced' mobility
- False promises or the lack of transparency for early career researchers about their options. Lack of comparable career structures and transparency at EU level (and outside EU) presents problems for international mobility (ESF, 2010²⁴). It is difficult to find information on the correspondence of different degrees used as eligibility criteria for many funding instruments and research positions
- PhD programmes continue to be based on the outdated 'apprenticeship-models' implying serious constraints on individual autonomy and research time
- Concerns about the ability to re-integrate into national research systems/institutions following a stay abroad, even for a short period (system closure).

In addition to specific research-related obstacles, researchers face many of the same barriers to mobility as other workers, including:

- Legal and administrative obstacles
- Housing costs and availability
- Opportunities and rights for the employment/continuing education of spouses and partners
- Schooling for children
- Portability of pensions
- Linguistic barriers
- Persistent concerns around the mutual recognition of qualifications and experience
- Personal obstacles to mobility due to family situation and gender-related constraints.

Migration and mobility

It was noted at the beginning that mobility can take many forms and should not be interpreted narrowly as implying a long-term unilateral stay requiring relocation of

²⁴ ESF Member Organisation Forum on Research Careers Report: Research Careers in Europe – Landscape and Horizons, Strasbourg 2010

residence and employment. This type of move can be best defined as a 'labour migration'. Labour migrations are an important component of overall scientific mobility. They play a role in 'matching' the demand and supply for researchers, supporting the development of Centres of Excellence and critical mass.

Migrant researchers also play a very important role in reducing shortages of skills in specific areas (such as economics and finance) where national labour markets face serious difficulties in recruiting and filling positions (Ackers et al, 2006). Migrations, maybe involving the registration for doctorates in another country or post-doctoral positions, also constitute an important means of providing access to the know-how, know-who and infrastructures essential to the career development of early career researchers in resource-poor contexts (Ackers and Gill, 2008).

The greater proportion of unilateral (one-way) moves in less developed research systems take the form of inter-sectoral moves, often to industries with little or no R&D function. The biggest and most permanent losses to research take place within countries and not internationally.

Research diasporas

The existence of a diaspora enhances the transfer of knowledge. A stock of skilled human resources abroad can act as a conduit for flows of knowledge and information back to the home country, and social and other links increase the probability that knowledge will continue to flow back, even after individuals move back or move away. In some emerging economies, diaspora networks play a vital role in developing science and technology capacity. The Indian diaspora, for instance, played a vital role in developing the IT and business process outsourcing industry in India. Chinese Taipei has also benefited from its USA-educated engineers and entrepreneurs, who have linked the two economies and contributed to the development of the IT industry (OECD, 2008).

The European Commission recognises that "a very large number of European researchers are working abroad [...] This represents a potential asset for the European Research that has been largely unrecognised until recently [...] Europe wants to build and maintain links with its expatriate researchers. For this reason the European Commission has been actively pursuing Euraxess-Links Abroad (EC, 2009). The first Euraxess-Links was launched in the USA since EU countries had the strongest diaspora policy in this country²⁵.

Inter-Sectoral Mobility

Knowledge flows from academia to the private sector are important for innovation. The Aho report, 'Creating an Innovative Europe' addresses the conditions for Europe to 'provide an innovation-friendly market for its businesses, the lack of which is the main barrier to investment in research and innovation'. Far greater mobility is needed at three levels:

- Human resources need a step change in mobility across boundaries

²⁵ The service was called ERA-LINKs at the time.

- Financial mobility requires an effective venture capital sector and new financial instruments for the knowledge-based economy
- Mobility in organisation and knowledge means cutting across established structures to allow new linkages to be made through the instruments of European technology platforms and clusters (European Commission, 2006b).

The current situation is that 'more than half (54%) of the researchers in the EU work in the public sector, and only 46% work in the business sector. This is a European exception. The share of researchers employed by the business sector is much higher amongst our main economic competitors, e.g. 69% in China, 73% in Japan and 80% in the United States (European Commission, 2011a). The Expert Group identified the following barriers to inter-sectoral mobility. Many of these concern aspects of mutual recognition of experiences and competences:

- Academia traditionally places too much emphasis on the continuous accumulation of academic merits such as publications, citations, or academic rewards²⁶
- Whilst public research institutions (universities) play an important role in providing human resources for industry, it is important that researchers are able to move both between positions (and sectors) and also to engage with colleagues working in other sectors. This will create more attractive careers and promote effective knowledge transfer activity
- Skills requirements. Researchers have learnt the skill to manage and analyse large amounts of data, valuable to any employer. But many researchers are trained in a traditional academic environment, which does not equip them for the needs of the modern knowledge economy where connections with society's needs and the private sector are increasingly important. In addition, even in academia, modern researchers are required to manage research projects, teams, and to work across disciplines to tackle complex research topics. The private sector values other dimensions of 'skills' such as the transfer of innovation, teamwork, communication and social skills. As a consequence, an exit from academia to industry/enterprises is seen as a predominantly one-way street.

The Expert Group has identified the following incentives to tackle the barriers mentioned above:

- Positive experience of research also in the private sector should be recognised during recruitment and career evaluation/progression. Criteria for appraising experience in the private sector should be linked to the benefit of the host institution, the researcher's group or the individual researcher. Examples of criteria might include co-publications with industrial partners, number of private sector contacts (for potential collaboration/PhD training), extent of cooperation, commercialisation, IPR knowledge and ownership, start-up, even when failed.
- Increased exchange of researchers on short and mid-term visits between academia and industry (enterprises) at all levels of research careers would be

²⁶ Patents receive some attention, but their comparison with publications remains difficult.

one way to overcome the prevailing barriers and prejudices between academia and industry.

- Collaborative institutions. The framework conditions for academia-private sector collaboration require a long tradition of partnerships (see the EMBL good practice below) or new settings such as regional clusters, competence centres, science parks, etc. *The EMBL model stipulates that fixed-term contracts cannot be renewed after 5 + 4 years, and this has been copied by other very successful institutions in Europe, although it is indeed an anomaly from the labour law perspective.*
- Shared professorships of researchers working in companies and concurrently employed in universities are advancing, e.g. in Norway and Germany. The Expert Group has strong reasons to believe that in the future there will be more research institutions that receive only minor block grants, e.g. of 35% as in the case of the German Fraunhofer Institutes, and which are consequently obliged to raise funds through collaborations with external partners, such as private companies. It should be further discussed to which extent relevant schemes to foster such institutions already exist at the European level and where there might be potential for action with respect to Horizon 2020, for example, in the framework of co-funding mechanisms.

CONCLUSIONS ON INTER-SECTORAL MOBILITY

The Expert Group sees the need to rethink public-private research collaborations and inter-sectoral mobility. Through its recent introduction of the European Industrial Doctorates Programme²⁷ the European Commission has taken another important step in this direction. This programme has been set up in the framework of the Marie Curie Scheme and was modelled according to the Danish Industrial Doctorate Programme. However, given that not all inter-sectoral cooperation involves industry, but might also refer to other types of institutions, e.g. representing the service sector, hospitals or museums, the notion 'Industrial Doctorates' should be reconsidered.

Extending traditional concepts of skills (Entrepreneurialism and Transferable Skills)

The complexity of research careers today demands a new type of researcher, whom we would like to describe as an 'entrepreneurial researcher'. This implies that a researcher should be innovative, risk-oriented, prepared to take leadership and respond to different tasks in parallel, often even holding more than one position at a time. Recent reports have described the trend that '[R]esearch careers nowadays tend to be less path-dependent and to develop more and more into 'portfolio careers.' (ESF, 2010).

An entrepreneurial researcher needs to acquire and develop additional professional skills that include, but go beyond, being a good or even outstanding researcher. In contrast, nowadays the more advanced a research career is, the more likely individuals are to become at least part-time managers or high-level administrators, as well as conducting research and very often teaching. However, we need to ask ourselves whether our culture and education indeed help future researchers to develop such an

²⁷ Cf. http://ec.europa.eu/research/mariecurieactions/docs/eid_en.pdf

‘entrepreneurial spirit’. We should also question whether the trend to become a manager is really desirable for each and all or whether certain ‘reserves’ should be created to allow some researchers to do what they are best at, that is to say research. The European Research Council’s Starting and Advanced Grants are clearly a step in the right direction.

Recent findings by the European Science Foundation²⁸ and the OECD²⁹ have shown that universities and non-university research performing institutions are becoming increasingly aware of the need to provide researchers with additional professional skills. Even if more or less sophisticated systems to analyse training needs and provide skills are in place, many of them focus on the early-career or doctoral training phase. Yet, the rapidly changing conditions of the research system and its related labour market, require that professional skills development becomes a continuum throughout a researcher’s career. This calls for orientation and monitoring of what is useful to researchers and what is not. For instance, the British Researcher Development Framework, which is provided by Vitae®, can be seen as a good practice example in this respect.

CONCLUSIONS ON DEVELOPMENT OF PROFESSIONAL SKILLS

Institutions need to prepare doctoral candidates for a labour market that is wider than academia or publicly funded research through appropriate career advice provision.

Research institutions have the responsibility to advise their employees in career planning in view of options outside public research. This requires specific preparation and qualification on the side of supervisors and HR specialists. These should devote special attention to researchers who are employed on project-basis, e.g. in the framework of EU-funded collaborative research projects. They might not benefit to the same extent from funds to support their career development as others who receive individual grants or fellowship, e.g. in the context of Marie Curie or ERC programmes.

The Expert Group has identified the following additional needs for action:

- Fellowships and continuous training. Skills needs should be tackled during the PhD training by experts with various profiles from the private sector and academia (European Commission, 2006a). The recent DocCareers projects (I & II) are looking at good practices for doctoral training between universities and industry (European University Association, 2009). EU fellowships such as the Marie Curie Industry Academia Partnerships and Pathways (IAPP), and national fellowship (PhD or post-doc) in France, Spain and Denmark provide such collaboration.

²⁸ ESF Survey Report from the ESF’s MO Forum European Alliance on Research Career Development: http://www.esf.org/index.php?eID=tx_nawsecuredl&u=0&file=fileadmin/be_user/CEO_Unit/MO_FORA/MOFORUM_ResearchCareers/MOF_RC_surveyreport_final.pdf&t=1331999811&hash=a7cb5b6c7e5bc4ae99fb6dd8d5db7bf2e83d9bec

²⁹ OECD, “OECD Skills Strategy”, Feb. 2012. http://www.oecd.org/document/6/0,3746,en_2649_33723_47414086_1_1_1_1,00.html

- Finding the skills needed. Some initiatives such as Expertise Ireland (website currently closed) help actors to match their needs. Potential recruiters can find the scientific expertise they are searching, although at the European level, a larger network is necessary.
- Train researchers to become 'entrepreneurial researchers' and responsible leaders of research institutions by means of higher education mechanisms and professional skills development.

Policy case study: EMBL as an example for an attractive top-level training site and research environment

The European Molecular Biology Laboratory (EMBL), one of the world's top research institutions in the field of molecular life sciences, is funded by 18 European member states, Israel and Australia (an associate member). The cornerstones of EMBL's mission are: to perform basic research in the life sciences, to train scientists, students and visitors at all levels, to offer vital services to scientists in the Member States, and to develop new instruments and methods in the life sciences, and technology transfer. EMBL could be seen as a reference for life science training.

The Laboratory has five units: the main Laboratory in Heidelberg, and outstations in Hinxton near Cambridge (the European Bioinformatics Institute), Grenoble, Hamburg, and Monterotondo near Rome. EMBL is international, innovative and interdisciplinary. Its 1 600 employees from 60 nations bring creativity and cultural exchange and represent scientific disciplines including biology, physics, chemistry and computer science. Research at EMBL is conducted by approximately 85 independent groups covering the spectrum of molecular biology. The budget is around 200 million euro with about 50% from competitive funding.

The Laboratory has established a number of highly successful training activities, of which the world-class International PhD Programme is the flagship. The programme is renowned for the internationality of its students, the dedicated mentoring provided by its supervisors and the early independence granted to its researchers. Entry is highly competitive, and the programme is committed to providing its PhD students with the best starting platform for a successful career in science. As the mission of EMBL is to contribute to the European academic landscape, EMBL has established partnerships for a joint PhD degree with some of the most highly respected universities in 18 European countries and Australia.

EMBL provides an equally exciting environment for postdoctoral fellows. World class research facilities and infrastructures, high quality seminar programmes and the international atmosphere combine to ensure that postdoctoral fellows have access to all they need at this critical career stage. The diversity of biological research conducted at EMBL provides opportunities to pursue interdisciplinary research and to acquire a broad perspective on biological problems and the technological approaches that can be used to address them. Most postdoctoral fellows enter EMBL with external funding in the form of individual postdoctoral fellowships. In 2007, EMBL together with Marie Curie Actions started its own fellowship programme, the EMBL Interdisciplinary Postdocs (EIPOD), to fund interdisciplinary research between any two labs at the five EMBL sites. Applicants are invited to design and propose an interdisciplinary project of their choice according to scientific interest.

EMBL's group leaders greatly benefit from the loosely structured research under thematic units, giving scientists the intellectual freedom to pursue the topics that most interest them while drawing on the diverse techniques and expertise available in the institute. But what really distinguishes EMBL is the large number of inter-unit collaborations, bringing people with common interests but distinct skills together to tackle ambitious projects. Increasingly, EMBL's scientists come with physics, chemistry, engineering, mathematics and computer science backgrounds, contributing new perspectives and the complementary expertise required to unravel the complexity of living systems. And, to meet the demands of young scientists, EMBL even operates a kindergarten on its premises.

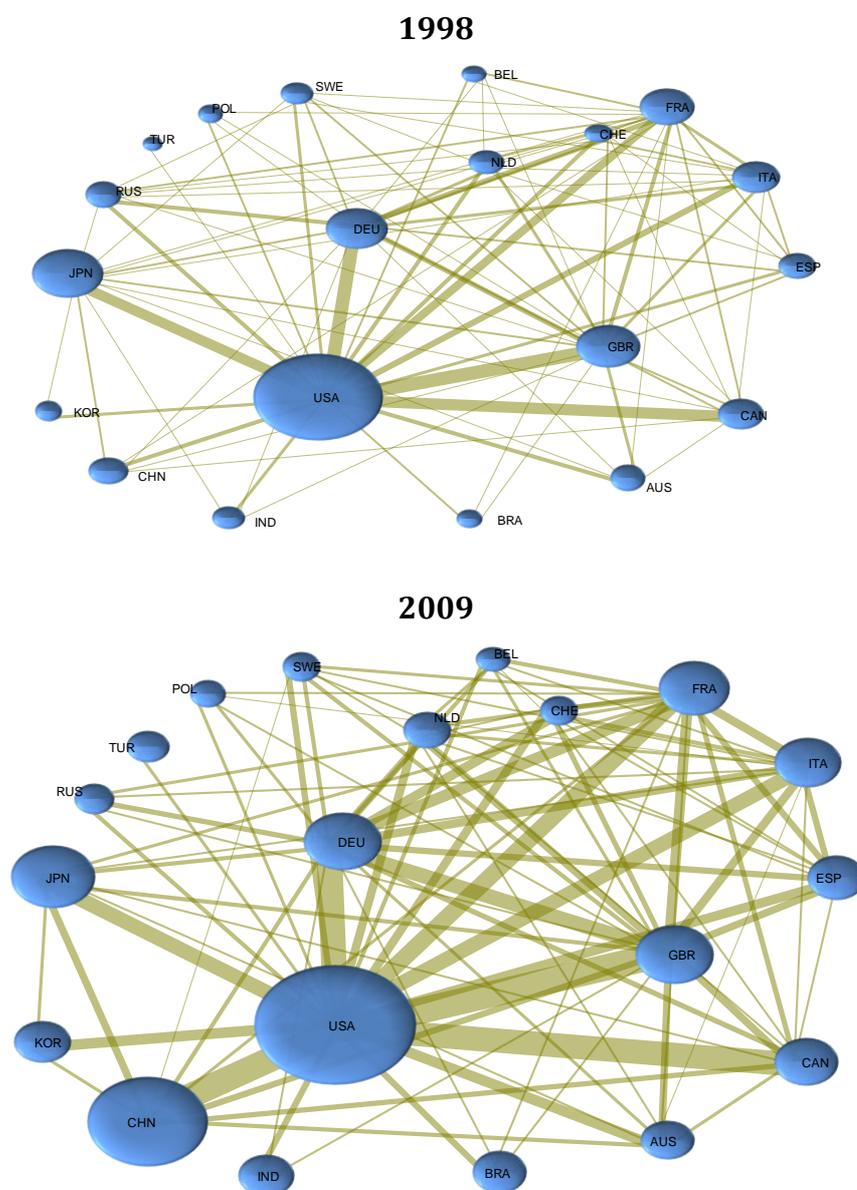
Virtual mobility

Virtual mobility is the favoured mobility as it potentially links all researchers. It also avoids time lost travelling and settling oneself into a new environment.

Problems from the individual or institutional perspectives

In practice, virtual mobility mostly takes place within professional networks and cross-border research collaborations. Those are the results of a visit, or a first contact established during a workshop, conference, research contract, evaluation conducted for another country, etc. Virtual mobility has intensified lately as can be shown by the growth of international co-authorship. It has grown markedly in the last 10 years.

Scientific articles and co-authorship, 1998 and 2009
Numbers based on whole counts



Note: The area of the bubbles reflects the number of scientific publications and the thickness of the link indicates the intensity of the collaboration i.e. co-authorship.

Source: OECD (2011), *OECD Science, Technology and IndUSAty Scoreboard 2011*, OECD, Paris, p. 46.

Conclusions on virtual mobility

Virtual mobility is still very often hindered by lack of funds to establish true cross-border collaborations. Although research organisations in Europe have taken initiatives to enable such collaborations through agreements such as the EUROHORCs 'Money Follows Cooperation Line' agreement or the 'Lead Agency' concept, remaining bureaucratic and political obstacles, together with missing harmonisation of (peer review and selection) procedures, prevent effective work and the flow of national funds across borders. The Expert Group therefore advocates setting up a European clearing house in view of creating transparency, harmonising or aligning the conditions for, e.g. the portability of grants, administrative compliance, funding schemes, appraisal and evaluation systems.

Incentive to remove obstacles

- Short-term mobility should be funded, for example, 'travel' funds to attend conferences, visiting labs, etc.
- E-facility for virtual mobility and programmes that favour networking should also be developed
- Provision of a common pool of funding from different national sources to enable effective cross-border collaborations: examples of good practice are the European Young Investigator Award administered by the ESF and the NordForsk collaboration.

CONDITIONS FOR CAREER DEVELOPMENT: TRANSPARENCY AND OPEN RECRUITMENT

The European Science Foundation places a similar emphasis on transparency:

The importance of transparency of recruitment criteria and their accountability in order to ensure equal opportunities in all stages of the career process is a precondition to excellence and innovation in research. The lack of transparency and accountability.... appear to disadvantage women scientists and other minority groups of researchers. This leads to a limited pool of potential candidates at the expense of scientific excellence (ESF, 2010:28).

The Expert Group focused on the mechanisms that shape the mobility of researchers into and out of the research profession³⁰. Taken together these mechanisms determine the quality of the human resources 'pool' in research. It traces the implications of 'formal' or 'procedural transparency' where entry, progression and exit are based solely on merit and open to a global pool (equality of opportunity in its perfect form). In the

³⁰ For the purposes of this paper we focus on the academic research trajectory (career progression in higher education and public research).

process, it also identifies the need for carefully specified derogations from this 'pure' principle, which are both transparent and objectively justified. These include derogations designed to promote excellence (perhaps involving concerns around retention) and measures influenced by wider social goals such as 'fair' employment (legitimate protectionism) and substantive equality (ranging from positive action to positive discrimination)³¹.

Approaches to the management of research staff vary enormously across the ERA both between countries and institutions. This report cannot begin to grasp this level of diversity and is not designed to act as a comprehensive, comparative, analysis. Instead the Expert Group has attempted to identify an approach to good practice in recruitment and progression that can be implemented in different ways in different contexts.

The 'challenge' is to recognise complexity and diversity and even welcome this whilst ensuring that a necessary level of system-wide cohesion is developed to facilitate the development of the European Research Area and the negotiation of careers across that space.

Performance-related recruitment and progression: the issue of metrics

The fact that recruitment and progression should be based on merit and contribution is largely unchallenged. What is highly controversial is the selection of indicators or metrics to be used in this process. This is where the complexity of careers and the levels of disciplinary and national and institutional diversity emerge once again.

Related to this is the issue of gender bias in scientific excellence, which has been recently addressed in the Structural Change Report (European Commission 2011) from many perspectives.

Furthermore, in recent years, a number of other criteria have been included to broaden the concept of excellence in research to encompass various types of impact factors (economic impact, social relevance, or the translation of research into 'products').³²

CONCLUSIONS ON MERIT REVIEW

The Expert Group calls for new approaches to merit-review, especially insofar as early career researchers and researchers with less linear career paths are concerned. While the Expert Group is in no way proposing to question the need for distinguishing between high and low quality in research, it wishes to advocate the need to contextualise quality assessment in view of the respective topics and disciplines, the research environment, gender and the individual circumstances of a researcher. Consequently, we would like to induce a consultation process on 'research assessment' involving research policy-makers, research institutions and researchers, especially sociologists who are concerned with review and evaluation procedures.

³¹ Which may also promote excellence if not 'meritocratic' in a narrow sense.

³² These metrics have become embedded in the Framework Programmes.

Essential components of recruitment procedures

Selection Processes

Advertisements should normally be followed by some form of short-listing/selection process organised by the employing institution at one level or another. This often depends on the seniority of the position with more and very senior positions requiring the participation of external /independent evaluators. In some cases, and especially in the case of smaller countries, there may be a requirement for international representation.

Advertising open positions

In 2004, the Researchers' Mobility Portal³³ was launched to provide information on fellowships/grants, research job vacancies and practical information when moving house. More than 22 000 jobs were posted on the Portal between January and August 2011.

RECOMMENDATION ON EURAXESS

The Expert Group recognises the importance of the use of the EURAXESS portal and endorses the further expansion of services provided, adapted to researchers' personal situations. The EURAXESS portal should be used as the European job advertising portal for research jobs.

Appointment committees

Clearly, there is much to be said about good or detrimental practices in appointment committees. Besides the aspect of merit-based review, the Expert Group is particularly concerned with the potential impact of gender balance in appointment committees and on gender equality in recruitment procedures.

Gender balance in appointment committees

The recent report *Structural change in research institutions: Enhancing excellence, gender equality and efficiency in research and innovation*³⁴ identifies five obstacles to gender equality:

- opaqueness in decision-making processes
- institutional practices inhibiting career opportunities
- unconscious bias in assessing excellence
- wasted opportunities and cognitive errors in knowledge, technology and innovation
- employment policies and practices

³³ <http://ec.europa.eu/euraxess/index.cfm/jobs/index>

³⁴ European Commission. 2011. *Structural change in research institutions: Enhancing excellence, gender equality and efficiency in research and innovation*. Luxembourg: Publications Office of the European Union. Available at http://ec.europa.eu/research/science-society/document_library/pdf_06/structural-changes-final-report_en.pdf.

The recommendation to increase the percentage of women in decision-making was also made to the Member States to fix a 25% target of women in top level positions in research, specifically to “formulate ambitious targets for the participation of women focusing on areas where women are seriously under-represented, and in particular increase significantly the number of women in leading positions, with the aim of reaching, as a first step, the goal of 25% in the public sector as an average in the EU, as well as boost their participation in industrial research and technology”, in the 19 April 2005 Competitiveness Council Conclusions³⁵. In 2007, the European Parliament’s Committee on Women’s Rights and Gender Equality discussed a report³⁶ presented by MEP Britta Thomsen on “Women and Science”. The report supported the Commission’s and Council’s recommendations concerning increasing women’s participation in decision making and called on the Commission and Member States to intensify their activities in addressing the issue.

CONCLUSION ON GENDER BALANCE IN APPOINTMENT COMMITTEES

Member States and employing institutions are urged to reflect on their current practices to ensure that selection committees are representative of the population they serve and remember that women now outnumber men amongst graduates.

The European Commission should ensure that Horizon 2020 funded appointments and hiring contingent upon open and fair recruitment procedures, including gender balance of selection committees, apply the EU Code for recruitment or common set of principles defined by the SGHRM.

Internal appointments

It is important not to discount all situations which fall short of the ‘formal’ principle (of explicit international or European public advertisement) as necessarily ‘closed’ or ‘opaque’. The practice of re-deployment in the UK is a case in point. Re-deployment is a particular policy negotiated between the social partners specifically to protect the very large number of researchers employed on fixed term (temporary) contracts usually for no other reason than the funding streams (i.e. reasons not based on the merits of the individual). As such it is presented in this report as an example of derogation from the principle of open recruitment that may be justified on the basis of fairness, and excellence balancing the needs of individual early career researchers with the need for continuity on the part of the institution. This is an example where excessive ‘turnover’ or ‘churn’ can be counterproductive:

Internal Promotions (within position employment mobility)

In principle internal promotion should adhere to the same Human Resource Principles as initial recruitment (entry) with individuals making applications in response to an agreed and common job description. In this situation they may not be competing with other internal or external candidates but rather against a specified role description or for a particular managerial responsibility. Nevertheless the principle of transparency should apply so that the procedure can be tracked and outcomes justified.³⁷

³⁵ Available at <http://ec.europa.eu/research/science-society/women/wssi/pdf/st08194.en05.pdf>.

³⁶ EP 2007/2206(INI)

³⁷ This may be necessary should any discrimination case be made relying on a comparator (Fredman, 2011).

In some institutions and contexts individuals are also awarded annual increments or pay increases. The principles embedded within the concept of Performance-Related Pay should ensure that this dimension of career progression is transparent and open to scrutiny. This will also safeguard against the kinds of recommendation-based progression referred to earlier.

Validation of 'Foreign' Degrees and Issues of Mutual Recognition

Selection should be based on objective criteria and the valuation of degrees, and not their origin. The issue of mutual recognition and validation of qualifications remains a concern for many researchers seeking to access one national system with qualifications gained in another (or across several) or, in many cases, seeking to access labour markets in their home country with degrees awarded abroad.

Mutual recognition of qualifications and experience remains a major factor restricting inter-sectoral mobilities and, in particular, a return to academic research after a long stay in industry. This requires greater cultural changes.

CONCLUSION ON MUTUAL RECOGNITION

Member States and Research Institutions should actively implement the letter and spirit of the Mutual Recognition principle in order to remove remaining discrimination against foreigners and their own nationals.

LIST OF RECOMMENDATIONS TO KEY STAKEHOLDERS

European Monitoring System for the Research Profession

Addressed to the European Commission (Eurostat, DG Research and Innovation, European Research Council, Joint Research Centre (especially to the Institute for Prospective Technological Studies) and the European Institute of Innovation and Technology (EIT):

- We recommend establishing a coherent **European Monitoring System for the Research Profession**. This monitoring system should be developed in close interaction with the Member States and build on the structure of the European Framework for Research Careers.
- More specifically, the European Monitoring System should provide:
 - a set of common standards to be applied both at European and national level in order to achieve consistency, especially in terms of break-down by discipline, sector, nationality, gender, type of position, remuneration
 - an information system to measure and track, taking into account gender balance, the mobility of researchers (geographical, inter-sectoral) and their career paths.

Addressed to Member States:

- To join EU efforts to develop an information system to measure and track, taking into account gender balance, the mobility of European researchers and their career paths
- To monitor and evaluate the outflow and inflow of researchers as well as the demand and supply for inter-sectoral mobility as part of the European Monitoring System.

Addressed to institutions:

- To provide data in line with the requirements by the European Monitoring System regarding gender balance.

Harmonising the Career Structure

Addressed to the European Commission:

To initiate a feasibility study on implementing the European Framework for Research Careers and involving the Member States, particularly in view of:

- Providing juridical, administrative and economic definitions of the different career stages
- Applying the European Framework for Research Careers as a career structuring mechanism to facilitate recognition of career stages and mobility in Europe in all Horizon 2020 programmes
- Reviewing the possibility for a European definition and implementation of tenure track and encouraging the implementation of tenure track procedures in Member States, e.g. through co-funded programmes
- Develop the EURAXESS portal with the aim of making tailored information accessible to individual researchers and institutions

- Provide a common framework for the professional skills development of researchers. To this end the British Researcher Development Framework could serve as a model.

Addressed to Member States:

- To adopt the structure of the European Framework for Research Careers in order to give more orientation to the individual researcher, institutions and research policy-makers
- To implement research performance assessment mechanisms that recognise research merit and acknowledge individual career paths (especially in view of inter-sectoral mobility, family care, change of topics or disciplines). These mechanisms should be developed in line with the European Charter for Researchers.

To institutions:

- To adopt the European Framework for Research Careers
- To provide career guidance and support, especially at early career stages through specialised departments (human resources or otherwise).

Harmonising Working Conditions

Addressed to the European Commission:

- To synchronise European-level and Member States' criteria and practices, in terms of access to research funding, mobility, lifelong training, salary and social security.
- To introduce model rules for European funding as a leverage to ensure open recruitment, fair pay, proper training environment for researchers at all stages to be applied in direct funding mechanisms (e.g. Marie Curie) and indirect funding (e.g. researchers employed in FP 7 projects)
- To foster the implementation of the Salzburg Principles and the Salzburg II Principles (developed by the European University Association), especially in view of supervision and mentoring, career advice and planning, inter-sectoral mobility (with recommendation for public-private partnerships to govern IPR issues related to open access to and publication of results), gender equality and diversity.

Addressed to Member States:

- To monitor the implementation of the fixed-term directive and review possibilities to implement a labour law that allows open-ended contracts (including severance)
- To ensure adequate social security systems, especially in terms of family care responsibilities and support the availability for public childcare facilities, especially for children under 3 years.

Addressed to institutions:

- To observe the Fixed Term Directive and Working Term Directive with respect to regular research employment
- To review and adopt measures to eliminate potential gender pay gap in the remuneration of researchers
- To implement adequate human resources management structures, targeted particularly at the most precarious positions (contract research staff, persons with

stipends). In public-private cooperation, to provide researchers with assistance to stipulate the IPR conditions.

Realising the Fifth Freedom: the Essential Role of Mobility

While the Expert Group wants to underline the vital role of geographical mobility in the free movement of experience, knowledge and innovation, it also insists that mobility must be evaluated in context, not as a goal in itself. Therefore, the Expert Group advocates that at least four types of mobility be considered: geographical, intersectoral, virtual and mobility, related to change of topics or disciplines.

Addressed to the European Commission:

- To set up a *European clearing house* in view of creating transparency and harmonising or aligning the conditions for e.g. the portability of grants, administrative compliance, funding schemes, appraisal and evaluation systems
- To foster flexible forms of mobility (considering individual factors such as age, gender and family needs, health conditions).

Addressed to Member States:

- To introduce programmes to stimulate and recognise different types of mobility while ensuring the return options.

Addressed to institutions:

- To review mobility as a research performance assessment criterion to properly recognise different types of mobility while avoiding prejudiced attitudes against less mobile researchers
- To create and/or strengthen inter- and intra-institutional forms of mobility (long term, medium term, short term) and tailor them to the needs of the different career stages
- To develop a culture of mobility among PhD candidates and supervisors based on clear mutual expectations and to facilitate mobility by developing exchange networks with related public or private organisations.

Conditions for Career Development: Transparency and Open Recruitment

Addressed to the European Commission:

- Recommends that Horizon 2020 funded appointments and hiring contingent upon open and fair recruitment procedures, including gender balance of selection committees (apply the EU Code for recruitment or common set of principles defined by the SGHRM)
- To carry out periodic reviews of hiring and appointments under Horizon 2020 funded projects.

Addressed to Member States:

- Recommends to make national level research funding contingent upon open and fair recruitment procedures, including gender balance of selection committees (apply the EU Code for recruitment or common set of principles defined by the SGHRM)
- Make mandatory the use of the EURAXESS portal for the announcement of open positions.

Addressed to institutions:

- To implement fair, transparent and open internal and external recruitment with clear specification of skills and responsibilities and rules for appointments (e.g. in terms of duration, renewals) to be applied to all positions and fellowships (temporary or permanent)
- To introduce fair, transparent, merit-based and gender-balanced entry/promotion/exit procedures and align performance indicators to descriptors based on outcomes for researchers on temporary and permanent positions
- To avoid 'in-breeding' by requiring doctoral graduates and postdocs to gain outside experience before being allowed to re-apply to the institution of origin
- To address the composition of appointment committees (gender/objectivity).

Funding and awarding

Addressed to the European Commission:

- To make available individual-oriented funding for different forms of mobility, including short-term mobility options, as part of Horizon 2020
- To foster flexible and responsive funding for early career researchers to develop networks
- To develop large research and development funding mechanisms using pro-innovative parts of cohesion funds to stimulate growth and rising excellence in research in European regions that are less advanced, but with large education and human potential
- To introduce awards and prizes that are built into all thematic programmes and restore large prizes such as the abandoned Descartes Prize (which could be administered externally, similarly to the Nobel Prizes awarded by the Nobel Foundation with the assistance of the Royal Swedish Academy).

Addressed to Member States:

- Guarantee adequate block grants for institutions in order to avoid the danger of fragmentation and assure the ability to address broader subjects, especially the grand challenges of our times
- Attract more private money to the public sector, e.g. by setting up joint doctoral programmes, shared positions, flexible remuneration schemes and research institutions operating at the borders between sectors
- Implement 'return grants' to facilitate return of researchers after career breaks (e.g. due to family reasons or inter-sectoral mobility).

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