

THE RISE OF THE POST-DOC AS PRINCIPAL INVESTIGATOR?
HOW PHDs MAY ADVANCE THEIR CAREER AND KNOWLEDGE CLAIMS IN THE NEW
EUROPE OF KNOWLEDGE

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Abstract

The European Research Area and the European Higher Education Area are still under construction. Their foundations, however, are visible and already affect what the next generation of researchers can and cannot do. While it is unclear when, and to what standard, construction will be completed, the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers clarify the expectations of policy makers and major stakeholders. One significant scenario is the rise of the post-doc as principal investigator. This would signal profound change in the governance and funding of research since hitherto the post-doc has been understood primarily as an assistant (to a professor's chair or on a research project).

It is outlined which new knowledge and skills PhDs and post-docs need to advance their career and projects more independently – in science and engineering as well as the social sciences and humanities. Potential changes in funding and status are discussed as well as changing relations with supervisors and mentors. Because of European flagship awards for post-docs as well as mobility fellowships, a significant number of post-docs are already principal investigators. Details of these flagship post-doc awards and fellowship are outlined. The report then discusses what doctoral students and post-docs might do individually and collectively to follow in the footsteps of the pioneers. A list of the most valuable online resources is provided.

Keywords

Post-Doc, Early Stage Researcher, Principal Investigator, Tenure, European Charter for Researchers, European Research Council

Table of contents

1. The rise of the post-doc in Europe
 - 700 000 researchers missing, says the European Commission
 - The post-doctoral labour market: on the brain drain from Europe and career prospects in the USA
 - The European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers

2. The post-doc as principal investigator
 - Moving upwards: mobile and immobile post-docs
 - Getting funded: critical issues
 - Flagship awards: European Starting Independent Research Grant, European Young Investigator Award, Marie Curie Excellence Grant and National Programmes
 - Mobility awards: ERA Careers and ERA MORE, Marie Curie and Max Weber Fellowships

3. Corporate agency, individual action and collective mobilisation: options for post-docs in Europe
 - Corporate agency by self-organisation and representation: Eurodoc, the Marie Curie Fellowship Association and the US National Postdoctoral Association
 - Individual action by mentoring and personal development planning: the value of alumni and the UK GRAD initiative
 - Collective mobilisation to push for reform: the example of the German Scholars Organisation

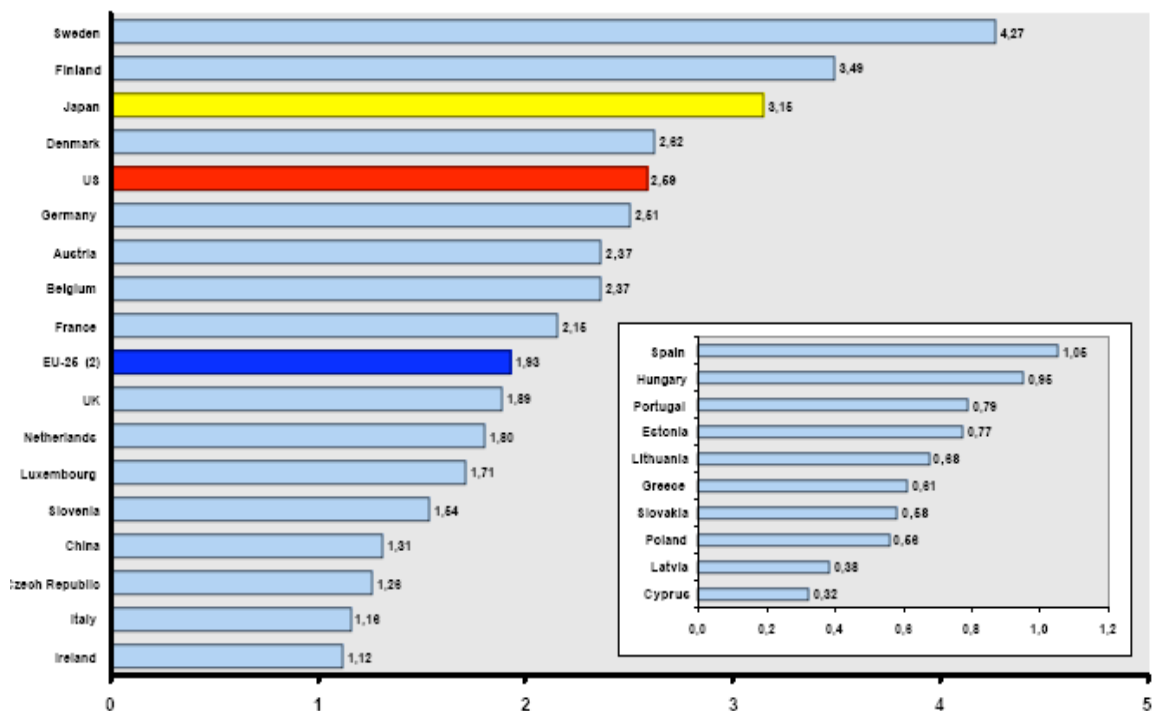
URLs for post-docs

References

1. The rise of the post-doc in Europe

This is an optimistic headline.¹ It could be that by 2020 'the rise of the post-doc in Europe' has become a story of failed reform and dashed hopes. Yet, the logic of the situation provides for strong competitive constraints from North America and East Asia. The European Union member states have committed themselves to raise their R&D spending to 3% GDP by 2010, an increase of more than 50%. It is unlikely that this goal will be achieved, however, it has already helped to redirect policy and may serve to reverse the trend of a widening gap between Europe and North America or East Asia. In January 2006 the European parliament rejected the EU budget deal for 2007-13 reached by heads of state and government in late 2005 because it felt that the proposed cuts for research, education and youth were wrong. This illustrates not only the continuing difficulties of the EU and its member states in sustaining their own commitment, but also the determination of some actors to realise the ambition of becoming a more competitive knowledge society. It needs to be acknowledged that, in the first instance, it would be a success for the EU if the gap to its major competitors ceases to widen and then, gradually, could be closed. A restructuring of academic careers and a substantial increase in funding for post-doctoral researchers will be crucial.

Figure 1 - R&D intensity (GERD in % of GDP)



Source: European Commission Research Directorate-General: Key Figures on Science, Technology and Innovation (July 2005)

Notes: (1) LU 2000; SE 2001; IE, IT, NL 2002; BE 2004; AT 2005

(2) EU 25 was estimated by DG Research and does not include LU and MT

(3) Data from OECD and Eurostat

On the European level there are a number of independent actors pushing for reform. The European Research Area is the project of the European Commission. The Bologna process (European Area of Higher Education), with 46 participating states, extends beyond the European Union. Reform of the doctorate in Eastern Europe and the Russian Federation is part of the process (Axer 2004). The Commission has been relying on various High Level and Expert Groups as well as on the European Research Advisory Board (EURAB), but the European Science Foundation (ESF) has also independently brought together experts. There is broad agreement among experts and actors, including the European University Association (EUA) and EIROforum, about the rising importance of the post-doc. The newly established European Research Council made the Starting Independent Researchers Grant (SIRG) a priority in 2007, planning to award 200 to 250 multi-year principal investigator awards annually to post-docs in Europe and coming to Europe. With the shift to a knowledge society, increasing global competition and retiring incumbents, post-doctoral researchers need to be enabled to become principal investigators, to access greater resources and to move more freely and securely, both trans-nationally and between different kinds of public and private research organisations.

The rise of the post-doc in Europe may also signal the rise of the post-doc as principal investigator, applying for a research grant and working with paid research assistants. Becoming a principal investigator requires the advanced doctoral student and the new post-doc to manage reflexively the interrelation between the anticipated contribution to science and the desired career progression. Although these two aims are complementary, it would be naïve to assume that their realisation is always easy and natural. Increased post-doctoral autonomy may not be in the interest of others, including doctoral supervisors. Indifference and hostility may be incurred in the process. A post-doc needs to manage not only her or his own development, but also the network of mentors, supporters and competitors.

This report has been written for doctoral students and post-docs considering an academic career. The transition to principal investigator is essential to an academic career. In spite of this, the decisive promotion of independence and the conscious mentoring of post-docs to become principal investigators is new. The historical context is the vast expansion of higher education and scientific research in the 20th century. Furthermore, with the emerging European Areas of Research and Higher Education a new, trans-national dimension emerges. To date, however, academic research into the roles, functions and career prospects of post-docs has only reached an exploratory phase (Akerlind 2005, Davis et al. 2005).

A clearer picture of the post-doctoral condition emerges if one draws together the scattered knowledge that exists - worldwide – in the form of surveys and statistics, stakeholder reports and policy recommendations. On this basis, one may describe and analyse a trend for the post-doc to become principal investigator. There is a normative dimension insofar as this analysis seeks to aid post-docs and interested stakeholders. The following aims are pursued:

- Create awareness of the enabling and constraining conditions for post-docs;
- Clarify options for becoming a principal investigator;
- Show examples of what junior researchers are doing to help each other in the process.

700 000 researchers missing, says the European Commission

The European Commission estimates that 1.2 million additional research personnel, of which 700 000 must be FTE research positions, are required to meet the goal of spending 3% of GDP in Europe on R&D (COM(2003)226 final). In 2001 EUROSTAT counted about 1.8 million R&D personnel, of whom less than one million are considered FTE research positions (COM(2003)436 final). By comparison, Japan has 9.14 FTE researchers per 1000 workforce and the USA has 8.08. Germany and France have only 6.55 and the UK 5.49. Finland boasts 13.77; the EU-15 average is only 5.7 and the new EU member countries only 3.5 FTE researchers per 1000 workforce. While it may be expected that in absolute numbers most of the new research positions will emerge in the larger European countries, the European Research Area does in principle aid the agglomeration of research facilities. By this reckoning the Nordic countries could extend their leadership if they attract more funds, facilities and researchers.

The looming boom of emeriti also highlights the need for increasingly more highly qualified researchers. During the 1960s and early 1970s higher education and public research expended significantly. Consequently, many of the professors and senior researchers are baby-boomers (birth years 1946 to 1955) that will retire from 2011 to 2020. These numbers add up: A significant portion of the currently active professors and senior researchers must be replaced while the Commission is calling for the funding of an additional 700 000 FTE research positions.

However, money and numbers are not all explanatory. A High Level Group on 'Increasing Human Resources for Science and Technology in Europe', sponsored by the Commission, has criticised the public research career, in particular the structure for post-doctoral career progression (2004: 92-6). According to the report, the combination of state funding and national research system has led to the following situation:

1. Not only is remuneration for post-docs too low, but insufficient material rewards and resources also hinder the development of new research agendas.
2. University education with its focus on disciplinary specialisation induces early stage researchers into well-established fields, in which post-docs often find themselves 'locked in'. Post-docs are then without the time and resources to move into other fields and thus often are unable to reach the inter- and trans-disciplinary research frontiers.
3. Positions for post-docs are temporary, if not short-term, thus impeding long-term career planning, which, in turn, further hinders the development of new research agendas.

The post-doctoral labour market: on the brain drain from Europe and career prospects in the USA

By 2000, more than 50 000 post-docs had a position in the USA, where research universities annually award around 40 000 doctorates. In Europe the number of awarded doctorates had risen to more than 70 000 in the old EU-15 alone, but post-doc positions were not counted (Moguerou 2005). New PhDs may also be employed as lecturers, research assistants and associate professors, in Europe and the USA, but the gap in funded post-doc positions is significant because post-docs may devote their time wholly to research and personal development.

Undoubtedly there is a significant net outflow from Europe to the USA. Among post-docs in the USA, foreign temporary residents outnumber US citizens and permanent residents (Moguerou 2005). The overwhelming majority of foreign temporary residents, however, are not from the EU-15 or the EU-25. Yet, the European Economic Advisory Group (2003: 118-30), using US census data, did infer that

'European expatriates have much more human capital than the average employee in both their home country and the United States. They earn more than US workers with similar human capital and, in the case of Italy and France at least, they are more likely to be exceptional performers' (123).

Already among the arrivals in the 1980s a disproportionate number held a doctorate: 3.1% of the Italians, 4.2% of Germans, 4.9% of Spanish, 5.0% of British and 9.1% of French. Moreover, US National Science Foundation data reveals that on average 50% of Europeans obtaining a PhD in the US stay on in the long term. From the EEAG's point of view this is bad news for Europe because of the following effects (2003: 124-6):

- Lower returns to public investment in higher education;
- Decreased competitiveness in advanced technology sectors;
- Reduced rents from innovation;
- Negative effects on entrepreneurship and business creation;
- Pressure towards a more unequal distribution of income.

However, the American Association of Universities (AAU) commissioned a Postdoctoral Education Report (1998), which found that the post-doc may not only be a required credential, but also a holding pattern on the way to tenure-track, with appointments potentially being repetitive and unsatisfactory from the viewpoint of the post-doc. When investigating practices in leading research universities it was found that many had no policy concerning quality, grievances and misconduct or job placement. Moreover, practice was in violation of law when foreign PhDs earned less. The AAU committee could have recommended strengthening the independence of the post-doc while calling for legislation and regulation to ensure a more conducive environment. Instead it proposed that universities assume central oversight and post-docs be supervised by faculty.

However, Freeman et al. (2001) examine the disconnection in US bioscience between rapid scientific progress and post-doc career progression (cf. Davis et

al. 2005 for confirmation based on a representative post-doc survey). US bioscience is a crucial case, since it is viewed as one of the most exciting research fields and public and private research spending has risen faster than the number of researchers. Yet, any assumption that this would have led to more favourable conditions for post-docs would appear to be mistaken.

Current conditions in bioscience are structured by an alliance of senior state bureaucrats and senior academics. The deal allows the federal government, and in particular the National Institute of Health, to spend less, while senior academics increase their recognition on the basis of the work done by their post-doctoral lab hands. Eligibility for funding tournaments is restricted to faculty (permanent staff in research organisations) and awards provide incentives to rely on cheap postgraduate labour. If this labour cannot be recruited nationally, it may be recruited internationally (easily, given the global wealth disparities). Relying on cheap post-doctoral labour is seen as a way of maximising 'the bang for the buck'. The fact that time-to-degree has increased for doctoral students (even though the biotech industry provides a labour market with good terms of employment) is indicative of an institutional policy to retain cheap labour as long as possible.

Whether tournaments are the best way to fund science cannot be considered here. Rather, the crucial question is: Who is eligible to participate in the tournament? Freeman et al. (2001) indicate directions in which solutions might be found:

1. Collective bargaining: If and when junior researchers come together to bargain for an improvement of their situation, they have a chance to enlist the necessary political support to alter the terms and conditions of funding tournaments.
2. From assistant to principal investigator: If post-docs are in receipt of fellowships from funding agencies that designate them as their own principal investigator, this shifts the balance of power far enough towards post-docs for them to co-determine working conditions, advance their career and publish independently.
3. Portable fellowships and grants: Funding agencies might consider granting post-doc recipients more autonomy and authority by making their grant portable. In this case research organisations and tenured faculty would have incentives to radically improve conditions to attract these new principal investigators.

Any of the above would improve the situation for post-docs. In combination these measures would go a long way towards creating a situation in which the economic incentives to pursue an academic career will improve. Freeman et al. (2001:14-15) took the example of two Boston University graduates, one opting for an academic career in bioscience, the other undertaking an MBA and heading for business. They calculated that the lifetime earnings of the MBA would exceed that of the researcher by one million dollars, before stock options. Harvard University biology undergraduates interviewed for the study had an accurate appreciation of these differences and were not making plans for a research career.

The European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers

Efforts of the European Commission to push for further spending and reform culminated in 2005 in the *European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers*. It states that

'Europe must dramatically improve its attractiveness to researchers and strengthen the participation of women researchers'

and that

'new instruments for the career development of researchers should be introduced and implemented, thus contributing to the improvement of career prospects for researchers in Europe.'

For post-docs the relevant provisions of the *European Charter for Researchers* are:

Funding and salaries

Employers and/or funders of researchers should ensure that researchers enjoy fair and attractive conditions of funding and/or salaries with adequate and equitable social security provisions (including sickness and parental benefits, pension rights and unemployment benefits) in accordance with existing national legislation and with national or sectoral collective bargaining agreements. This must include researchers at all career stages including early-stage researchers, commensurate with their legal status, performance and level of qualifications and/or responsibilities.

Career development

Employers and/or funders of research should draw up, preferably within the framework of their human resources management, a specific career development strategy for researchers at all stages of their career, regardless of their contractual situation, including for researchers on fixed-term contracts. It should include the availability of mentors involved in providing support and guidance for the personal and professional development of researchers, thus motivating them and contributing to reducing any insecurity in their professional future. All researchers should be made familiar with such provisions and arrangements.

Value of mobility

Employers and/or funders must recognise the value of geographical, intersectoral, inter- and transdisciplinary and virtual mobility as well as mobility between the public and private sector as an important means of enhancing scientific knowledge and professional development at any stage of a researcher's career. Consequently, they should build such options into the specific career development strategy and fully value and acknowledge any mobility experience within their career progression/appraisal system.

In the *Code of Conduct for the Recruitment of Researchers* it is stated:

Postdoctoral appointments

Clear rules and explicit guidelines for the recruitment and appointment of postdoctoral researchers, including the maximum duration and the objectives of such appointments, should be established by the institutions appointing postdoctoral researchers. Such guidelines should take into account time spent in prior postdoctoral appointments at other institutions and take into consideration that the postdoctoral status should be transitional, with the primary purpose of providing additional professional development opportunities for a research career in the context of long-term career prospects.

2. The post-doc as principal investigator

The notion of principal investigator implies, for example, that a researcher conceives and conducts funded projects, writes monographs and articles and has the right and possibility to be supported by research assistants and supervise doctoral students. There is no strict definition of the post-doc or principal investigator. The US National Postdoctoral Association sees the post-doc period as a transition to independence and tenure. Beyond that, there is “[s]ubstantial and often unacknowledged variation in the nature of a postdoctoral position” (Akerlind 2005: 38). What does seem evident is that post-docs have about 5 to 6 years to make a career choice (or have it made for them).

The idea of the post-doc as principal investigator refers to the process of becoming independent as researcher and author. This report is written on the expectation that there is a trend in Europe towards more funding for post-doc researchers and that more funds will be available for post-docs as independent researchers and authors. In the following we therefore cover:

- Moving upwards: The variance of desired post-doc mobility between institutions in different European countries;
- Getting funded: The issues that require attention on the way to becoming a principal investigator;
- Flagship awards: A selection of new European and national programmes that explicitly aim for post-docs to be principal investigators, often with a budget of more than € 1 million;
- Mobility awards: A selection of new European fellowships that make post-docs more independent by making them mobile.

Moving upwards: mobile and immobile post-docs

“The French system of permanent positions in research may not be the best strategy for scientific research, because it results in a rigid system with no clear alternatives between a PhD and a permanent position and does not promote mobility between laboratories” (Franzetto 2003: 1111). It is common practice to

“prefer to recruit someone they know and thus the rate of ‘inbreeding’ or ‘favouritism’” is high (Soler 2001). In France, the percentage of staff holding a position in the institution where they were trained is: 65%. Even higher: Italy 78%, Spain 88% and Portugal 91%. By comparison: UK 5.2% and Germany 1%. The assumption is that mobility increases competition and that competition makes for better research as signalled by breakthroughs and innovations (cf. Dillon 2003).

“In Germany, you can be as good as possible but, after some years, you have to leave for another university”, says a former Junior Professor at Bayreuth University, on the forced mobility of German post-docs. “Why should we go through all these efforts to find the best, when they leave after a few years?” comments the Vice-President for Research at Humboldt University (Breithaupt 2005: 18, citations *ibid.*). Since European law requires that contracts have to be made permanent after 5 years, German universities must lose outstanding post-doctoral researchers – for German universities mostly still require the habilitation for a tenured appointment and the rule is that the institution that awarded the ‘*venia legendi*’ may not offer tenure. Costs are incurred by mobility and immobility. However, researchers, institutions and ‘science’ incur these differently. Depending on location, post-docs will want and have to use their time differently to gain tenure in academia, employment elsewhere or start up a venture of their own.

Getting funded: critical issues

Gaining funding as a principal investigator requires attention to four interrelated issues (adopted from Gill et al. 2004):

1. Writing a career development plan. This plan should persuasively sketch how the transition to principal investigator will be accomplished. It should state the research aims over the coming years and how they will be achieved. Any further acquisition of knowledge and skills should be outlined. Articles (and books) should be anticipated and time reserved for writing. On the way to independence possible future grant applications should be considered.
2. Enlisting the support of a suitable team of mentors. Potential mentors should be carefully screened (inclusive of interviewing ex-collaborators and ex-mentees) and selected for the scope and quality of support available. While the relationship will be one of give-and-take, the post-doc must be confident that authorship and status as principal investigator will be enhanced by the relationship.
3. Finding a fitting institutional environment. Infrastructure and staff should be screened as to whether they are conducive to the research objectives. The institution needs to be an asset in securing funding and its senior members must be capable of writing glowing letters of reference.
4. Developing a research plan. The anticipated advancement and refutation of knowledge claims needs to be staked. It then needs to be demonstrated in the usual fashion that the plan is sound and feasible. Attention should be spent on ensuring that the enactment of the research plan is consonant with the career development plan.

Flagship awards: European Starting Independent Researcher Grant, European Young Investigator Award, Marie Curie Excellence Grant and National Programmes

Award schemes in which post-doctoral researchers have the status of a principal investigator offer substantively more freedom and responsibilities. As of 2007, the Starting Independent Researchers Grant (SIRG) of the European Research Council is the new flagship award in Europe. This initiative builds on the European Young Investigator Awards (EURYI), sponsored by the European Heads of Research Councils in cooperation with the European Science Foundation (ESF). 9167 applications were received by the European Research Council in 2007 for the Starting Independent Researcher Grant. 559 of these applicants were invited to submit full proposals and about 250 applicants may expect to receive a multi-year grant. However, for SIRG no evaluation has been undertaken, whereas for EURYI this is the case. As SIRG builds on EURYI, the focus is here on the latter.

For EURYI anyone, worldwide, with between two and eight years of postdoctoral experience may apply. The application must be made in conjunction with a research institution that is recognised by one of the participating research councils (i.e. in one of 16 European countries). Awards of 5 years will cover the salary and expenses of the principal investigator and that of supporting postdoctoral researchers and doctoral students. Awards may be in excess of €1 Million. Meeting the peer review criteria of EURYI requires several years of preparation, i.e. the sustained career development that the Commission imagines in its preamble to the European Charter for Researchers. The criteria are:

1. Applicant
 - Potential to become a world-class leader in the respective field of research;
 - Scientific background and track record;
 - Quality of publications;
 - Abilities as an independent researcher;
 - Potential for research team leadership and project management;
 - Extent and quality of international research collaboration.
2. Research Proposal
 - Originality, ground-breaking nature and forward oriented character;
 - Potential to improve the competitiveness of European research at world-level;
 - The positioning in the international context of the field of research;
 - Feasibility;
 - Appropriateness of the chosen methods.
3. Research unit within the host institution
 - Internationally recognised level of excellence
 - Capability and commitment to host the applicant and the proposed research.

The EURYI Awards Scheme was evaluated after the 1st round (Langfeldt/Brofoss 2005). This monitoring may give junior researchers confidence that the selection process will be transparent and harmonised, so

that over time no discrimination according to gender, age or location will occur. However, for the 1st round, two issues were raised:

- Langfeldt/Brofoss (2005) concluded that EURYI panels preferred 'low-risk' proposals that would result in good science while eschewing 'high-risk/high reward' projects. Those with a truly novel idea that might lead to a breakthrough were not served by EURYI in the first round (but panels were briefed accordingly for the 2nd and 3rd round).
- Watson et al (2005), on re-examination of the data, found the relatively lower female success rate worrying, suggesting that panel members selection practice might have been nepotistic and sexist, with Spain not nominating a single female applicant for the European round (it remains to be seen whether in subsequent rounds the successful number of female applicants has increased).

'Low risk' science and the 'leaky pipeline', i.e. discrimination against women in academic careers, are known European issues. They are not particular to EURYI. Moreover, the European Science Foundation is monitoring the composition of selection panels as well as decisions in an effort to specifically address both issues and have more successful female applicants as well as bolder research proposals. A second evaluation of EURYI (Langfeldt and Solum 2007) indicates that female applicants were more successful in the 2nd and 3rd round and that more forward-looking criteria were employed in the selection process. The evaluators conclude that there is improvement but maybe not as much as is desirable.

Marie Curie Excellence Grants, sponsored by the European Commission, are a similar scheme open to researchers worldwide in conjunction with a host institution in a EU Member State, Associated State or country with candidate status for EU accession. Equivalent national arrangements with awards of 5 or more years exist or, alternatively, awards of at least €200,000. Table 1 offers an overview of some European and national award schemes.

These flagship awards also present a set of problems regarding the overall development of R&D in Europe. Post-docs need host institutions that must commit resources while having their autonomy respected. Given the fixed hierarchies in many European institutions, post-doctoral principal investigators are likely to encounter resistance. To date, the scale of these kinds of awards has not been sufficient to create the critical mass needed for a change in culture, but the number of applications received for the Starting Independent Researchers Grant of the European Research Council indicates that this might change may occur.

Table I - European and national post-doctoral award schemes

Name of the organisation	Name of the programme	Type of institution	Disciplines
EUROHORCs/ESF	European Young Investigator Award (EURYI)	International	All
European Research Council	Starting Independent Researchers Grant (SIRG)	International	All
European Commission	Marie Curie grant for excellence team	International	All
Human Frontier Science Program (HFSP)	Career Development Award	International	Interdisciplinary approach to the life sciences
FWF (Austria)	START	National Public	All
The Danish Research Councils (Denmark)	Young Principal Investigators	National Public	Life sciences
Academy of Finland (Finland)	Academy Research Fellow	National Public	All
CNRS (France)	Action Thématique et Incitative sur Programme (ATIP)	National Public	Life sciences, chemistry and related
INSERM (France)	Avenir	National Public	Life sciences and related
Ministère de la Recherche (France)	ACI jeunes chercheuses et jeunes chercheurs	National Public	All
DFG (Germany)	Emmy Noether	National Public	All
BBSRC (UK)	David Phillips Fellowship	National Public	Life sciences
EPSRC (UK)	Advanced Research Fellowships	National Public	Engineering and physical sciences
PPARC (UK)	Advanced Fellowships	National Public	Particle physics and astronomy
SNF (Switzerland)	SNF Professorships	National Public	All
Max Planck Society	Independent Junior Research Groups	Private Foundation	All
Volkswagen Foundation	Lichtenberg Professorship	Private Foundation	All
Robert Bosch Foundation	Junior Research Group Leader	Private Foundation	Agriculture and forestry

Source: Martin-Rovet (2003), updated for the European Research Council

Mobility awards: ERA Careers and ERA MORE, Marie Curie and Max Weber Fellowships

“Physical and virtual mobility (whether across boundaries or between university and industry) and innovation leading e.g. to university spin-offs should be encouraged and rewarded” (COM(2005)152: 6). For post-docs willing to move to another country, support, information and awards are available. Fellowship awards make the post-doc more independent. The European Researcher’s Mobility Portal offers information about research fellowships, grants and job vacancies. Since late 2005, the database offers reliable information about fellowships, grants and job vacancies associated with EU programmes as well as with international organisations and EIROforum members. It would be desirable to have a single, efficient European portal – but there isn’t one as yet. However, for each national context the portal provides an entry point for contacting the Mobility Centres. ERA-MORE is a network of Mobility Centres, launched in May 2004. It covers the 33 countries participating in the Framework Programme (currently FP6, FP7: 2007-2013). For questions related to mobility any researcher may make contact by email, phone and in person. Typical mobility issues are:

- Finding the right host institution and securing funding
- Meeting legal requirements, including visa and permit.
- Clarifying social security, tax and any family issues.
- Anticipating further career development.

Marie Curie Actions have become a mechanism by which the Commission promotes European talent. Given the comprehensiveness of Marie Curie Actions for early-stage as well as experienced researchers, it offers the opportunity to create networks and contacts for a European career. Even if post-docs happen to be situated at an institution that is not very well versed at obtaining EU funding, it is still possible to join European mobility schemes by selecting an individual-driven Marie Curie Action.

The European University Institute (EUI) in 2006 welcomed the first Max Weber Fellows, financed by DG Education. The programme has the character of a pilot and, if successful, is expected to serve as a model for similar programmes across Europe. For social science post-docs in their first five years the EUI offers a semi-structured programme (up to 2 years) with the following objectives:

- Developing a ten-year plan with objectives and milestones;
- Research management skills, including proposal writing, budgeting and reporting;
- Teaching skills such as curriculum and course design and pedagogy;
- Science communication training to reach a broader, interdisciplinary and non-specialist audience.

Post-docs may also be mobile by moving to industry: “Encouraging links between industry and academia is widely supported as an effective mechanism for addressing some of the current pressures experienced in both sectors, and mobility of researchers between the sectors is perceived as an effective mechanism for encouraging these links” (IEG 2003: 67). However, a

comparative evaluation of the Canada, the UK and the USA indicated that career development services and advice are still insufficient, with academic culture biased against non-academic post-doc opportunities (Akerlind 2005:39).

As the direct academic route to tenure is not open to very many, universities and public research organisations should enable their doctoral students and post-docs to acquire the entrepreneurial attitude and tacit knowledge needed to succeed in commercial R&D. For post-docs the commercial route is much more likely to result in adequate financial rewards. However, to date European higher education “remains largely insulated from industry, with limited knowledge-sharing and mobility. As a result, too many graduates – even at the highest level - lack the kind of entrepreneurship and skills sought on the labour market. Most universities are strongly dependent on the state and ill prepared for worldwide competition over talent, prestige and resources” (COM(2005)152: 4).

3. Corporate agency, individual action and collective mobilisation: options for post-docs in Europe

ERA, EHEA and the Charter promote the Europeanization of post-doc careers just as much as their rationalisation. The expectation is that transparent international recruitment and fair contractual relations will gain ground. While PhDs and post-docs enjoy broad political support, there is increased scope for

1. Corporate agency by joining a post-doc association;
2. Individual action by engaging in systematic career development;
3. Collective mobilisation by pushing for the reform of research systems, higher education and the university.

The advancement of the collective interest of doctoral students and post-docs may be to direct personal benefit. Investigation of the post-doctoral experience in the US has indicated that structured oversight and professional development result in substantial and broad-ranging benefits (Davis, forthcoming). Structured oversight refers to practices such as written research and career plans that have been negotiated between institution, mentor and post-doc and detail the responsibilities and tasks of each party. Professional development refers to the ability of the post-doc to write a research and career plan as well as funding proposals and manage teams and projects.

There is no need to suffer the inadequacies of European systems in silence. Even if for some a career outside Europe will be the better choice, it is still possible to support reform in Europe. This keeps options open, including the option of returning home. On the other hand the European rationalisation of the post-doctoral labour market increases search costs and, over a longer period of time, will include problems of imperfect information. Therefore, there follow below some suggestions on how to enhance agency with respect to personal development and career in a situation where options multiply and search costs increase. We describe and analyse some important initiatives for the purpose of information and inspiration. There is also a list of useful and interesting online resources.

Corporate agency by self-organisation and representation: Eurodoc, the Marie Curie Fellowship Association and the US National Postdoctoral Association

Eurodoc is the European council of doctoral candidates and junior researchers. It is a federation of national associations in 21 countries, from Armenia to the UK. The case for joining a national association rests on:

- Being informed about relevant European and national policy initiatives as well as funding opportunities;
- Exchanging information and experience by way of mailing lists and local meetings;
- Insight into the changing culture of science and universities.

The idea of having an association to represent doctoral students and post-docs is spreading. For example, the Slovak PhD Students' Association (ADS) was founded in 2002, the Lithuanian Society of Young Researchers (LJMS) was registered in 2003, the Association of Young Researchers of Moldova (ATCM) is active since 2003, the Estonian Academy of Young Scientists (ENTA) was founded in 2005.

The protection of junior researchers' rights is still inadequate across Europe, even if developing. Eurodoc has developed a *Supervision and Training Charter for Early Stage Researchers* (see URLs). Eurodoc member associations may advise if there is a problem with inadequate or abusive supervision. For example, the UK National Postgraduate Committee (NPC) offers advice and support in case the relationship with the supervisor breaks down.

The Marie Curie Fellowship Association, like Eurodoc, is active in policy debates on the European level. On behalf of post-docs the MCFA has been calling for early independence of researchers and longer term positions for mobile researchers. There is a concern that post-docs often act as facilitators for larger research projects of which they may not be the principal for lack of tenure. The MCFA recognises that only long-term investment, public or private, and post-docs with a long-term strategic vision will contribute, be it to science or innovation. Membership in the MCFA, to date, is restricted to those holding (or having held) a Marie Curie Fellowship. Members have access to a variety of resources and mailing lists, as well as the opportunity to meet at the annual gathering.

In the USA there is a National Postdoctoral Association (NPA), founded in 2003 with a start-up grant of half a million dollars from the Alfred P. Sloan Foundation. The NPA has been able to influence both the National Institute of Health (NIH) and the National Science Foundation (NSF) – the world's largest research funding agencies – to change their practices in funding post-docs. More than 60 research organisations have adopted the NPA *Recommendations for Postdoctoral Policies and Practices*. 65 research organisations with 27 000 post-docs are institutional NPA members.

Individual action by mentoring and personal development planning: the value of alumni and the UK GRAD initiative

Alumni associations are predestined as platforms for the commencement of Mentor-Mentee relations. Whether fellowship association or graduate school, there will be a sense of community between alumni and current members. A mentor is not a patron, employer or supervisor. Mentors should be outside the institution of the mentee, in a position that minimises potential conflicts of interest. Insofar as alumni have moved on and are professionally independent, they are in a good position to mentor. The mentee gains access to an experienced and independent adviser, possibly acquiring a trusted friend.

The alumni association may be able to provide a matching service. If this is not the case, the junior researcher can individually look out for a mentor. The following should be observed (cf. Gill et al. 2004):

- The mentor should have achieved professional recognition in the field, but should not be a potential competitor of the mentee in the same specialisation;
- The relationship will be one of give-and-take, but the mentor needs to grant access to the relevant professional networks and promote the mentee, provide timely feedback on manuscripts and applications, give credit and support authorship.

The UK GRAD programme offers online resources for Personal Development Planning. UK GRAD is sponsored by the UK Research Councils and its mission is to aid early stage researchers in completing their degree and successfully moving on to a future career. Research management, personal development and career progress are the generic issues for which UK GRAD provides online resources as well as organising courses and hosting conferences. The online resources for Personal Development Planning (PDP) are freely available.

PDP empowers the researcher to think, study and write to a long-term plan. PDP must fit one's ambitions and circumstances. Ideally trusted colleagues, mentors and supervisors are involved in discussing this plan (also to maximise chances for the junior researcher to rise to the status of principal investigator), but the researcher must own her or his personal development planning. It may be detrimental if and when PDP becomes part of an institutional audit policy (as has happened in the UK). Researchers are likely to lose control over the learning process if they are required to demonstrate how institutional objectives are met. Typically, when institutions are mandated by funding agencies to increase completion rates while reducing time-to-degree, the pressure may be 'handed down' and hit the junior researcher, who is left struggling to meet deadlines and, possibly, lose funding or incur fines. Institutionally sponsored PDP that is not confidential is not in the interest of doctoral students and post-docs.

The Europeanization and rationalisation of the post-doctoral labour market makes PDP commendable, if not a requirement. It could become a requirement insofar as funders and employers will increasingly have to judge applicants that are unknown to them and potentially from another country. A PDP that has

been, in turn, executed and updated, will go a long way towards establishing the credentials and credibility of the applying post-doc (cf. working to a ten-year plan and meeting the selection criteria of awards). In doing so, however, one should make a clear distinction between a ten-year research plan for public consumption and a more intimate and confidential PDP, to be shared, if at all, only with trusted colleagues and mentors.

Collective mobilisation to push for reform: the example of the German Scholars Organisation

The German Scholars Organisation, headquartered in the Bay Area (California), has risen from association to collective actor by writing open letters to government ministries and political parties, thereby stirring public debate. Programmes that envision the post-doc as principal investigator have been started by the Federal State (Juniorprofessur), the German Research Foundation (Emmy Noether Gruppe) and the Max Planck Society (Nachwuchsgruppe). If post-docs are already principal investigators, this raises the question of whether the habilitation should be dropped. However, the professoriate, in its majority, refuses to nominate anyone for tenure without a habilitation. Conservative regional governments back the professoriate by maintaining the habilitation as requirement for tenure.

Members of the German Scholars Organisation are mainly post-docs in the USA, funded by German and European programmes and thus directly affected if they were to return home. Comparing the situation in the USA with that in Germany, they began pushing for the full recognition of the Junior Professorship (and similar post-doctoral positions), which they think should be converted into tenure track appointments. This, in turn, implies the abolition of the habilitation. They identified as structural problems:

1. A lack of transparency with regard to qualifications and appointments;
2. Insecurity in matters of employment and tenure;
3. Insufficient flexibility when it comes to the distribution of teaching and administrative duties.

As an association of German post-doctoral fellows in the USA, the GSO was well placed to stir public debate. As holders of prestigious post-doctoral fellowships they were recognised as scientists and scholars. Moreover, there was a credible threat to exit by remaining in the USA. This ensured that the GSO was heard and received wide and favourable media coverage. GSO members rightly anticipated that by launching their initiative they had only to gain in stature and reputation. So they have.

URLs for post-docs

EHEA - Bologna Process
<http://www.bologna-bergen2005.no/>

EIROforum
<http://www.eiroforum.org/>

ERA–MORE - European Network of Mobility Centres

<http://www.eu.int/eracareers/>

ESF – European Science Foundation

<http://www.esf.org/>

EUA – European University Association

<http://www.eua.be/eua/index.jsp>

EURAB – European Research Advisory Board

http://europa.eu.int/comm/research/eurab/index_en.html

Eurodoc - European Council of doctoral candidates and young researchers

<http://www.eurodoc.net/>

Supervision and Training Charter for Early Stage Researchers

<http://www.eurodoc.net/articles.php?lng=en&pg=169>

European Charter for Researchers and Code of Conduct for the Recruitment of Researchers

<http://europa.eu.int/eracareers/>

EURYI - European Young Investigator Awards

<http://www.esf.org/euryi/>

German Scholars Organisation

<http://www.gsonet.org/>

HERO (Getting Funded) – Higher Education & Research Opportunities in the UK

http://www.hero.ac.uk/uk/research/getting_funded226.cfm

Hochschulkarriere – WIKI portal Promotion, Habilitation, Juniorprofessur

<http://www.hochschulkarriere.de>

Life Sciences Mobility Portal (EMBO)

<http://mobility.embo.org/html/index.php>

Marie Curie Actions

<http://www.cordis.lu/mariecurie-actions/>

Marie Curie Excellence Grants

http://europa.eu.int/comm/research/fp6/mariecurie-actions/action/excellence_en.html

MCFA - Marie Curie Fellowship Association

<http://www.mariecurie.org/>

Max Weber Fellowships (and Jean Monnet Fellowships)

<http://www.eui.eu>

NPA (USA) – National Postdoctoral Association

<http://www.nationalpostdoc.org>

NPC (UK) – National Postgraduate Committee
<http://www.npc.org.uk/>

Reconstructing the Doctorate in the former Soviet Union and Eastern Europe -
http://www.ceu.hu/crc/rec_doct.html

Starting Independent Researchers Grant (European Research Council)
<http://erc.europa.eu/index.cfm>

Tomorrow's Professor Blog (MIT/Stanford)
<http://amps-tools.mit.edu/tomprof/blog/>

UK GRAD programme - Personal Development Planning
<http://www.grad.ac.uk/>

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