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Mobility of Researchers

between **Academia** and **Industry**

12 Practical Recommendations

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Directorate-General for Research
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In einstein's footsteps

There are only two ways to get ahead: invent something and sell it or set up your own company. Forget the other ones. Get your innovation onto the market.

But how? You're a professor in a forgotten ivory tower and you've found the magic formula but don't know what to do with it? You're a bright young spark in industry with a light bulb over your head that you don't know how to switch on? Want the missing scientific formula?

Easy! The answer lies in mobility. So move it! Take your idea and share it! Find someone who is looking what to do with it.

Albert Einstein, Europe's most famous scientist, had the magic formula with his theory of relativity. He had the academia-industry links, with a salesman-turned-engineer father and a job at the Swiss Patent Office to pay for his studies. He was a classic example of a scientist who took his bright ideas somewhere where it mattered. If all of Europe's research community followed his example, it would be streets ahead in the world innovation stakes.

New era, new spaces

That was the last century. This is the 21st century. Today's Einsteins are out there waiting for their lucky break in the European Research Area (ERA) - a wide open space spanning more than 30 countries with no room for closed-shop mentality anymore.

The ERA Mobility Strategy launched in 2001 has fostered a favourable environment in which to attract, develop and retain the necessary human resources in research and innovation and stop the brain drain of qualified scientists. Old taboos are going. National borders, socio-cultural barriers are being lifted; acquired rights, pensions, intellectual property rights and research findings today are just as portable as people, their ideas and careers.

In practice, there are still a few missing links in that magic formula, so the Commission has tried to nail them. In January 2005, the Steering Group on Human Resources and Mobility brought together experts from industry, institutions and research institutes from EU Member States and further a field from countries associated with the RTD Framework Programme to look at ways of improving mobility of researchers between academia and industry. They teamed up into four interactive working groups and spent a year compiling a 'must-have' inventory of best-practice examples to show just how it can be done and how easy it is when you know how.

Armed with these best-practice success stories, the experts have thought up some ground rules about how to foster a culture of long-term, structural interaction and cooperation between both sides of the coin in terms of transfer of know-how and development of cross-sectoral skills. The following synthesis report features a selection of their 'can do' recommendations to industry, academia and public authorities on how to encourage mobility and use it to cultivate that go-get-it spirit that is often just not second nature to Europe's would-be geniuses.

Freedom to move and to recruit

Freedom of movement is one of the European Community's golden principles. Just like goods and services or workers, researchers should be able to move freely whenever and wherever they want. All they need is a push in the right direction.

There is no shortage of opportunities nowadays to researchers on the move in the short term. Inter-sectoral mobility does not have to be a temporary solution, either. Specialised skills may often be lacking in one sector but not in the other – a gap that can be filled simply by recruiting more staff with experience from the other sector to permanent positions. Top management jobs are not the exclusive preserve of industry. All public and private sectors institutions have to do is open up their recruitment procedures a bit more to researchers from the other side.

Training the trainers

To foster the cultural change, both sides have first got to understand each other. Traditions and priorities differ considerably in academic circles and industry so mentality/image change is the first thing to work on.

The experts have unearthed a host of joint training programmes and courses, from entrepreneurship to research management, even to teach the teachers themselves modern-day research techniques, communication and networking skills that are more likely to meet future employers' needs. By focusing awareness on key employment skills at an early stage, researchers will be better prepared for a career in either industry or the academic world, whichever way they swing.

Give and take

Inter-sectoral mobility works both ways, of course. The object of the exercise is to exchange expertise and experience, helping industry to become more competitive while offering researchers better employability and career prospects.

Academia-industry partnerships, placements and internships in industry are really taking off now, especially for early-stage researchers and small ventures. They are already well organised in big industrial concerns but still need a boost elsewhere. Universities are working with local careers services and companies large and small to encourage placements, involve SMEs in curriculum development and university facilities.

Rewarding the collaborators

As modern science is all about team effort, inter-sectoral collaboration should be rewarded. Internal academic and career appraisal systems or performance indicators are essential to encourage researcher mobility, say the experts. After all, good marks now mean better career prospects later. Collaboration can be one of the criteria taken into account when appraising institutions and researchers, too. Prizes and awards are another way of repaying the more upwardly-mobile scientists for individual excellence.

Location, Location and Co-location

These days, academics and industrialists do not even have to go very far to find each other. If they are working together on the same site/complex, sharing common interests, a meeting of minds will come more naturally, say the experts. Campus networking and industry-researcher talk-ins are easy to arrange.

Freedom to innovate

For the more 'entrepreneurial academics', there is still that other option of setting up your own business. Many European states provide funds for spinning out companies from research bodies and the wide range of venture capital schemes has brought a sea change in business start-ups.

To sum up, the experts have one key message to research institutions, industrialists and public authorities, whether national, regional or local, alike: it is time to get moving towards a European labour market for researchers and here is how to do it...

Report of the expert groups on Mobility between academia and industry

Advancing on inter-sectoral mobility

This report is addressed to research organisations, universities, and private companies engaged in research, as well as to public authorities. It is based on a thorough analysis of insufficient cooperation between public sector organisation and private companies in the field of research, by a set of four dedicated working groups of experts from the Member States and States associated to the RTD Framework Programme. As a result of their work, the expert groups jointly put forward a coherent and powerful set of recommendations for improving mobility of researchers between academia and industry[1], as a means of enhancing a culture of longer-term, structured interaction and cooperation[2] between both sectors in terms of knowledge transfer and development of cross-sector skills and competence.

Inter-sectoral mobility is not seen as a goal in itself, but as an instrument that can effectively contribute to eradicating the so-called "European Paradox", i.e. that Europe is unable to sufficiently turn research results into globally competitive products. As such it fits with the Community policy on boosting research and innovation[3]. Inter-sectoral mobility at the same time adds to the employability of and diverse career development for researchers.

In the frame of the implementation of the Mobility Strategy for the ERA[4] structural barriers to inter-sectoral mobility have been identified. Obstacles include difficulties in the transfer of pensions and social security rights, the loss of acquired benefits and professional status, differences of cultures regarding, on the one hand, confidentiality of research results and intellectual property protection and, on the other, the pressure of publication for evaluation and career development. Furthermore, traditions and priorities differ between academia and industry: universities remain the main producers of scientific knowledge, and are one of the main training grounds for researchers, while industry focuses on market applications and commercial benefits.

1. The term "academia" as used in this document covers universities, public research organisations, and other publicly-funded bodies carrying out research and development work. The term "industry" refers to the business sector, i.e. private enterprises, SMEs, etc.
2. See conclusions of the thematic workshop "*Stimulating science-industry interaction through inter-sectoral mobility*", part of the Dutch presidency conference 2004 "*Investing in research and innovation*"; Handbook on Responsible Partnering developed by EIRMA, EUA, EARTO and PROTON Europe (2005). See also "*From science to growth*" by Stephen Allott (2005) where he explains the need for a "people centric approach" to increase the economic impact of research universities instead of "idea centric approach".
3. See Communication '*More Research and Innovation – A Common Approach*' COM(2005)488 Final. See http://ec.europa.eu/invest-in-research/action/2005_communication_en.htm
4. COM(2001) 331 final of 20.6.2001 *A Mobility Strategy for the European Research Area*.

The report by the high-level group on human resources for science and technology in Europe[5], chaired by Prof. Gago, expressed in one of its recommendations the need for "*incentives for transfer pathways for staff between industry and academia. This should also facilitate movement in both directions, enhancing the career structures of both organisations as well as ensuring better knowledge transfer. This culture needs to be promoted and can only be achieved by incentives to both organisations and staff*".

The recent Aho report "*Creating an innovative Europe*"[6] confirms that the main issues in inter-sectoral mobility are obstacles and incentives, by suggesting that the "*lack of movement is largely due to structural barriers and lack of incentives*". It also proposes that "*ten per cent of the workforce in each year should be moving*"[7] between both sectors.

Working approach

In January 2005, the Steering Group HRM together with 21 experts commenced the work leading to the present report by looking into "good practices" for enhancing inter-sectoral mobility, with a particular focus on strengths/weaknesses and impact of national initiatives[8]. In order to progress further and propose practical recommendations, expert groups were set up in four areas[9]:

- Knowledge and skills development
- Career appraisal
- Remaining legal and administrative obstacles to mobility
- Structuring initiatives

Each expert group held meetings between June and October 2005, resulting in an inventory of best practice examples and recommendations for possible actions, which was presented to the Steering Group HRM in December 2005.

The present report is a synthesis and condensation of this inventory formulated by the four expert groups, consolidated in a validation meeting on 21 February 2006. The recommendations are as concrete and operational as possible. As the report is intended as guidance for various stakeholders throughout Europe, the recommendations are made under two main headings: to research institutions and industry, and to public authorities (national/regional/and local).

5. Europe needs more scientists by the high-level group on human resources for science, and technology in Europe 2004.
6. E. Aho (January 2006). *Creating an Innovative Europe: Report from the Independent Expert Group on R&D and Innovation appointed following the Hampton Court Summit*.
7. *Ibid*, see page 21.
8. Legal and financial instruments facilitating inter-sectoral mobility (update March 2005).
9. The list of participating experts is attached in annex 2.

Recommendations to research institutions and industry[10]

1. Training content and environment

Training is often not adequate for working in industry. Future researchers are generally trained for a career in academia and do not always possess the necessary skills to find a job in the other sector. Researchers in academia also need skills to work efficiently with industry.

- In order to better **answer to future employers' needs**, graduates and early stage researchers should be trained adequately, providing them the appropriate skills for their future profession of researcher in both sectors, in particular the private business sector.

- Develop graduate and **doctoral programmes in partnerships with the business community**, including with SMEs, as programmes jointly developed will better suit future employers' needs. Industry involvement in defining and reviewing academic training programmes will also help adapting them to constantly changing market needs.

Example[11]: *following the review by Sir Gareth Robert, the UK government is allocating funds to academia for employability skill training. Key employment skills are mandatory in the UK for professional development for doctoral candidates and post-docs under contracts with the Research Councils. The training is equivalent to 2 weeks training given by professionals. Additionally, the new post-doc scheme proposed by the Research Councils UK, the "academic fellowship scheme", also includes employment skills training*[12].

Recommendation

Develop joint training programmes in order to better answer to future employers' needs.

10. Additional good practice examples referring to the various recommendations are presented in Annex 1. Note that the list in annex 1 is for illustration purposes and is not intended to be exhaustive.
11. See the 2005 EUA study for an inventory: *Doctoral Programmes for the European Knowledge Society* http://www.eua.be/eua/jsp/en/upload/Doctoral_Programmes_Project_Report.1129278878120.pdf
12. See http://www.rcuk.ac.uk/acfellow/

- Key **employment skills** should include industrial needs and experience, complementary to traditional academic training. This includes:
  - Research skills and techniques
  - Communication skills: including reporting and writing techniques, oral presentation skills, and effective support to teaching researchers (teaching, mentoring, or demonstrating activities)
  - Interpersonal skills: e.g. accepting responsibilities, working in teams, networking etc.
  - Awareness on intellectual Property Rights (IPR): i.e. patents, copyrights, designs and trademarks
  - View on private sector constraints: e.g. time constraints and engagements, mainly for delivering
  - Career management: e.g. writing a CV, applying for jobs, submitting funding applications, planning a career, etc.
  - Broaden scientific expertise with experience in other research domains, in particular for researchers who are likely to work in multidisciplinary teams

- Provide **entrepreneurship training**[13] to nurture a new category of researcher: the "entrepreneurial academic"[14]. Entrepreneurial skills allow researchers to exploit their knowledge and develop the commercial potential of their work. Senior researchers should also be trained or retrained in this sense.

- Set up technology, innovation and **research management training programmes** in order to equip experienced researchers with strategic and organisational skills.

- Recognize merits of early stage and experienced researchers in both sectors with for example a **"skills portfolio"**. The portfolio should record courses taken and experience acquired by the researcher, including in industry. For early stage researchers, such a portfolio approach could be considered as a valuable addition to the diploma.

Recommendation

Prepare early stage researchers for a career in both sectors with awareness on key employment skills. Experienced researchers should be offered entrepreneurship, and research management training. Recognize merits by adding to the diploma a record of courses taken and experience acquired.

13. COM(2006) 33 final of 13.2.2006 *Implementing the Community Lisbon Programme: Fostering entrepreneurial mindsets through education and learning*.
See also recommendation number 2.3 on "entrepreneurship education" in *Time to move up a gear*, The European Commission's 2006 Annual Progress Report on Growth and Jobs http://ec.europa.eu/growthandjobs/index_en.htm

14. See page 83. Lambert R. (2003). *Lambert Review of Business-University Collaboration*.
See http://www.hm-treasury.gov.uk/consultations_and_legislation/lambert/consult_lambert_index.cfm

2. Training supervision

Unilateral supervision from academic supervisors may lead to one-side view of research. Supervisors should also be trained to be more effective.

- Provide doctoral candidates with **two supervisors**, one from each sector or alternatively a supervisor from academia and a supporting mentor from industry and set up an agreement between the supervisors on their respective responsibilities towards the doctorate[15].
- Prepare supervisors for their **supervision** responsibilities with **ad-hoc training** by professionals including receiving an accreditation.

Examples: *supervisory skill training is mandatory in Sweden. In the United Kingdom, supervisors apply to become supervisors and follow two days training given by senior staff.*

Recommendation

Provide supervision quality insurance, in particular for early stage researchers. Researchers should be followed by two supervisors with adequate training, one from each sector.

3. Access to inter-sectoral mobility

Temporary mobility between sectors is often difficult or not possible: either the available positions are not largely publicised, or it is simply difficult to find the expertise needed.

- Develop inter-sector **mobility opportunities** via staff exchanges, part-time positions, sabbaticals, honorary positions, or financial or statutory incentives, offered to both early stage and established researchers.

Example: *industrial residents' concept in "research hotel" for researchers from industry who enrol in academia for refreshing their knowledge, as part of lifelong learning for researchers, in IMEC, Belgium.*

15. See recommendation number 5 on "the crucial role of supervision" in the Salzburg declaration http://www.eua.be/eua/jsp/en/upload/Salzburg_Conclusions.1108990538850.pdf

- Develop the concept of **consultancy by academic staff** as one of the simplest ways for academia to interact with industry and exchange research expertise. The legal arrangement terms of short employment contracts are relatively simple in comparison to other short term mobility. For large companies, consultancy offers a chance to get to know academic researchers, while SMEs can benefit from consultancy for a relatively low cost. Consultancy is often seen as a first step towards other collaboration. Much collaborative research in academia originates from consultancy relationships[16].

Examples: *Schlumberger, France, offers budgets of €25 000 to €100 000 to company researchers to be freely spent, without any restrictions, for research consultancy work outside the company. These generate cooperation with academia, and are seen to generate a positive return on investment to the company.*
At MIT (US) the employment contract covers only 9 months per year, the rest of the time can be filled by consultancy work. MIT provides strong financial incentive to academics to bring in industrial research income: it removes teaching responsibilities for those who bring more than $2m, and administrative responsibilities for more than $4m.

- Ensure transparency in recruitment procedures in both sectors by **advertising positions** through well-known channels such as the Researcher's Mobility Portal ERACAREERS[17].

- Organise placements and **internships in industry**, especially in SMEs. Such schemes already exist, however the aim should be to include placements/internships in researchers' curricula as it is the case with most engineer and business schools in Europe. A minimum period of six months should be ensured. Early stage researchers should be trained for being effective in their search of internship. Academia alumni could provide assistance for finding suitable internship positions.

Examples: *The University of Manchester & UMIST Careers Service, UK, is working with large companies and SMEs to develop placement but also to support local business by involving SMEs in curriculum development, by partnering with 13 other Careers Service in the region to offer a pool of 50 000 students placement and graduate jobs, and to help SMEs access resources at universities.*

16. Lambert R. (2003). *Lambert Review of Business-University Collaboration*.
17. http://ec.europa.eu/eracareers/

- Increase inter-sector mobility by providing researchers industry relevant **expertise online** in an easy accessible format, to allow industry to find appropriate contacts in academia, i.e. individual technical expertise or expertise of a group. This could help SMEs to connect with the academic world by finding the expertise needed, especially at the regional level. Alumni networks should be developed in order to tap researchers working in industry.

Recommendation

Increase inter-sector mobility possibilities for both early stage and established researchers, in particular through consultancy and internships. Advertise vacancy positions and provide access to researchers' industry relevant expertise online.

4. Appraisal of mobility

Inter-sectoral mobility is frequently not taken into account during appraisal, and can in circumstances even have an unfavourable impact. A transparent and fair career appraisal with appropriate feedback should lead to personal and professional development (lifelong training), and facilitate mobility between sectors throughout the career. To this end, large companies can provide many good practices.

- Provide **incentives for inter-sector mobility through** internal **academic appraisal systems**, or better working and salary conditions. However, inter-sector mobility shouldn't be enforced[18]. Criteria for appraising inter-sectoral mobility should be linked to the benefit for the host institution, the researchers' group, or the individual researcher. Example of criteria: co-publications with the industry partner (publications are important for industry reputation), list of contacts, launching of cooperation projects, commercialisation, IPR knowledge or IPR co-ownership, start-up or spin-off experience even for failures. A sabbatical can be appraised through a report written by the researcher that lists the added value of the mobility (this is common practice in many countries). A researcher pursuing a career in the other sector may need tailored criteria in order to benefit from the principle of equal opportunities.

- Develop fair and transparent **career evaluation processes** as recommended by *the European Charter for Researcher and the Code of Conduct for the Recruitment of Researchers*[19]. The career evaluation process should cover all stages of the research career, providing checks and balances, feedback, counselling and an appeal process.

18. See the European conference The European Charter for Researchers and the Code of Conduct for their Recruitment: turning policy into practice, 8/9 September 2005, London.
19. The Charter provides a framework of general principles and requirements for the roles, requirements and entitlements of both researchers and their employers/funders. The Code of Conduct sets out some specific guidelines around the recruitment of researchers. The Charter and the Code were formally adopted by the Commission as a Recommendation on 11 March 2005, see http://ec.europa.eu/eracareers/europeancharter/

The objectives as well as the list of criteria and their respective weightings should be defined and be well-known in advance, and should be gender and family neutral.

Example: *"3-leg contract" in the United Kingdom: research (number of publications, research projects applied and supervision), teaching (develop their own module that must be innovative and training) and administration (tutors for undergraduates, admission tutors, knowledge transfer with industry) among others.*

- **Regular career orientation** should occur (e.g. every 5 years).

- Provide **training and standardised procedures to evaluators**. Review effectiveness of the evaluation as a form of training. Develop transparency of the evaluation mechanism in a manner that evaluations are comparable and well-motivated.

- Include **various evaluator profiles**, gender balance, and external evaluators, including international experts, in the evaluation committees. The committees should also take part in the definition of criteria.

Recommendation

Incentive inter-sectoral mobility through adequate evaluation criteria, and a fair and transparent career evaluation process, including trained evaluators and researchers from both sectors in the evaluation committees.

5. "Permanent" mobility to the other sector

Often specialised skills are missing in a sector, while they exist in the other sector.

- **Academia should recruit professional managers** and experienced staff from industry. Provide leadership[20] at top managerial levels in order to foster efficiently the cultural change, and link it to an institutional strategy[21]. Different profiles should be included in the management committee, including industry representatives.

Examples: *Both Austrian and Irish universities benefit from autonomy for their recruitment policy. In the UK, the recruitment process is transparent and professionally conducted. Many institutions use outside recruitment consultants. Hence, vice-chancellors can be appointed from the private sector or abroad.*

20. See page 100. Lambert R. (2003). *Lambert Review of Business-University Collaboration*.
21. A recent review of higher education in developing countries concluded that while money and talent are important, what matters most in determining whether universities succeed or fail is how they are organised and managed.
See http://english.vietnamnet.vn/service/printversion.vnn?article_id=758122
See also the work of the Programme on Institutional Management in Higher Education (IMHE) of the OECD.

- Employ **staff specialized in industrial relations**. Partnership between academia and industry can only flourish with staff specially designed to take care of the relations with industry, while working in academic premises. This can take many forms such as Technology Transfer Offices (TTO)[22], or development or liaison offices. This is especially important for establishing cooperation with SMEs, which have not often established direct contacts with academia.

Recommendation

Recruit more staff on permanent positions with experience from the other sector.

22. TTO are often sub-critical, e.g. staffing is less than 5 people, see the technology transfer accelerator project by the European Investment Fund http://www.eif.eu.int/tech_transfer/

Recommendations to public authorities (national/regional/and local)

6. Administrative barriers and autonomy needed to overcome them

Administrative barriers hamper academia from undertaking the above mentioned actions, especially with regard to recruitments.

- Provide the necessary autonomy to institutions so that they are able to combine staff with experience in both sectors and to **recruit on a competitive basis**. Offer the possibility to recruit managers or researchers with experience in industry.

Example: *In Sweden and the United Kingdom, salaries are individually flexible which allows rewarding good performers.*

- Legally endorse the possibility of **part-time professorships** in academia for researchers working in industry. National legislation should allow researchers in academia to work for industry on a part-time, consultancy, or other basis. Legal status should permit and encourage **"posting"**[23] **researchers from academia to industry** and vice versa for a limited period of time. Researchers from public institutions should also be able to benefit from leave of absence such as a sabbatical leave to start-up a company.

Example: *In France, the National Institute of Health and Medical Research (INSERM) has introduced the "interface programme" which is designed for researchers with tenure positions. Researchers are offered mobility opportunities for 3 to 5 years with different partners in hospitals, universities or industry. The partner hosts the INSERM researcher and will pay 1/3 of the salary while INSERM maintain the researcher on its payroll for 2/3.*

Recommendation

Remove administrative barriers and provide the necessary autonomy to public sector institutions enabling them to undertake the above mentioned recommendations, especially with regard to recruitment.

23. The Directive 96/71/EC of 16/12/1996 of the European Parliament and Council concerning the posting of workers in the framework of provision of services guaranties a set of social rights for "posted" workers. See also articles 14 and 17 of the REGULATION (EEC) No 1408/71 OF THE COUNCIL of 14 June 1971 on the application of social security schemes to employed persons and their families moving within the Community.

7. Framework conditions for academia-industry partnerships[24]

Academia-industry partnerships can only materialize when interests are aligned between the two.

- **Favour co-location** of researchers from academia and industry where mobility will naturally occur due to proximity and alignment of interests.

- **Joint funding:** favour collaboration by providing jointly funded research grants and fellowships. Joint funding will foster collaboration. Experience shows that companies (both large and SMEs), which contribute financially to training fellowships, tend to become more committed in the training of researchers, incorporating them in core projects of the company.

Example: *in Spain, the Torres Quevedo programme aims at promoting research in SMEs by financing up to 75% of the salary of a researcher during 3 years. Researchers should have a doctoral degree or more than one year postgraduate experience. SMEs must commit itself to assure an indefinite contract to the researcher for obtaining the third year of financing and that financing is decreasing over the period.*

- **Awards and individual funding:** provide extra funding through **awards** for exceptional collaboration between the private and public sectors, e.g. rewarding "entrepreneurial academics". Develop new initiatives, e.g. **funding actions** for **retired people from industry**, who could bring their expertise to academia.

Example: *France will award in 2006 the label "Carnot"*[25] *to research in academia for their collaboration with industry. The financial contribution will be based on the number and the rate of increase of contracts with industry.*

- **Performance indicators:** parts of the national public funding for academia should be linked to performance *indicators* based on allocating public funding in relation to, among others, the number and size of industry collaborations.

- **Continuity of funding schemes:** a certain degree of continuity of funding schemes and programmes is needed to allow recognition by both sectors. Renaming or multiplying funding instruments should be avoided in order not to confuse the potential applicants.

24. See the dialogue conducted through the Technology Platforms http://www.cordis.lu/technology-platforms/home_en.html
25. See http://www.pactepourlarecherche.fr/presse/2005/aaccarnot.pdf

- **Knowledge transfer support:** support the establishment of interface offices between academia and industry that can take the form of knowledge transfer activities[26] or others (see recommendation 5). The interface offices will increase awareness about the importance of cooperation with industry. In order to ease the process, governments should provide guidelines and codes that set the relationship between academia and industry for commercialisation of research results and to address ethical aspects of research.

Example: *In the United Kingdom, the government introduced a specific stream of funding to support knowledge transfers: engage in networking with business; market of research and teaching to business; establish liaison and technology transfer offices to provide advice and to negotiate consultancy assignments, contract, collaborative research projects, and licence agreements; establish spinouts; provide entrepreneurship training for science and engineering graduates; and provide work placement for student in industry.*

Recommendation

Set the framework conditions for academia-industry partnerships by favouring co-location, collaboration through jointly funded research grants and fellowships, and the establishment of codes and interface offices between academia and industry.

8. Appraising institutions

When appraising institutions, collaboration between academia and industry is not always positively evaluated by the competent authorities.

- Conduct evaluation of teams/groups and institutions with a view to give **credit to academia-industry collaborations**. As science is more and more team-based, evaluation of groups, research teams or institutions provides incentives for joint experiences. Evaluate positively academia that includes industry representatives in its organisation structures and decision making-bodies, for example by participating in the management board, advisory committees, or in the design of programmes, etc.

Recommendation

Include academia / industry collaboration as a criterion when appraising institutions, including when academia involves industry representatives in its organisation.

26. See good practice and recommendations in the report formulated by the CREST expert group on "*Encourage the reform of public research centres and universities, in particular to promote transfer of knowledge to society and industry*".

9. SME-academia networks

Informal networks between SMEs and academia are difficult to create because SMEs have scarce financial and human resources to find research contact in academia. However, their development is essential for innovation in Europe.

- Use funding **schemes** to **develop informal networks** and activities **between SMEs**[27] **and academia**. Create informal networks with a view to respond to local needs. Informal networks will enhance inter-sector mobility by creating contacts through meetings, events, conferences, job fairs, etc. SMEs will be easier to involve through national industry federations, or other representative organisations, such as clusters of SMEs or forums.

Example: *"Friday afternoons" in Philips High Tech Campus Eindhoven, NL (composed of more than 40 other companies) which are devoted to network other researchers within the campus.*

Recommendation

Develop informal networks between SMEs and academia.

10. Funding for training academic staff

Academic staff is often trained for a career in academia and do not always possess the necessary skills to find a job in either the one or the other sector. They also need lifelong training to cope with their new environment (e.g. career appraisal) and changing functions (e.g. from professor to chancellor...). Researchers in academia also need skills to work efficiently with industry.

- As part of the package earmarked for research, provide funding **for setting up training programmes** in order to ensure adequate training for employability in both sectors and at all levels of responsibility.

Recommendation

Provide funding for training to further professionalize academic staff at all levels to become "on a par to industry" (administration, TTO officers[28], supervisors, evaluators, career appraisals, etc.).

27. See also the work conducted by the CREST expert group on *Design measures to promote growth of young research intensive SME's*
28. See also the work conducted by the CREST expert group on IPR, especially *Professionalizing Technology Transfer through education*

11. Legal instruments and awareness of EU instruments

Many EU relevant instruments ease obstacles to inter-sectoral mobility. These instruments are often not fully exploited.

- Introduce substitution to legal barriers such as **insurance** negotiated with private companies that can follow the researcher when moving (including pensions) or **"intermediary bodies"** (public or private) that can take financial, legal and operational responsibility for the mission of researchers outside their host institution".

- Raise **awareness** in the widest sense (e.g. information, training, etc.) among public and private research bodies and researchers, in particular in the New Member States, about the existence and impact of **EU relevant instruments** on inter-sector mobility (Directive on Fixed-term Contracts, Recommendation by the Commission on the *European Charter for Researcher and the Code of Conduct for the Recruitment of Researchers*, Entry conditions for third country researchers, social security rules, RTD funding schemes, etc.).

- Raise **awareness** on compatibility of **complementary pension schemes** between academia and industry in light of relevant existing and future EU legal instruments for the acquisition ("waiting and vesting" periods), preservation and transferability of such rights. Take into account inter-sector mobility in other EU instruments such as the current review of the Community Framework for State Aid for R&D[29] or the forthcoming communication defining guidance to bring about a more effective, stable and concerted use of R&D tax incentives across Europe[30].

Recommendation

Actively support the implementation of EU existing and future initiatives, schemes and instruments that remove obstacles to inter-sectoral mobility by raising awareness on their importance, e.g. social security rules, complementary pension schemes etc... If necessary, change national legislation so as to overcome obstacles.

29. See http://ec.europa.eu/invest-in-research/policy/state_aid_en.htm
30. See http://ec.europa.eu/invest-in-research/policy/tax_incentives_en.htm
See also the work conducted by the CREST expert group on fiscal measures and Research

Annex 1: additional good practice examples[31]

1. Training content and environment

Doctoral schools at the European University Institute (Italy); research schools in the Netherlands; graduate schools in Finland, the Nordic Academy for Advanced Study (NorFA), and the US; in Germany, Graduiertenkollegs established by DFG (36% pursue a career in public research and 36% in private research).

Mandatory employment skill training built in doctoral programme under the sponsorship of industry such as Bosch, Germany.

In the UK under the Science Enterprise Challenge, a network of 13 Science Enterprise Centres has been established involving 60 universities. Their mission is to stimulate scientific entrepreneurship, and to embed the culture of entrepreneurship within the culture of universities.

List of employment skills have been proposed by the joint skill statement in the United Kingdom (www.bbsrc.ac.uk/funding/training/skill_train_req.pdf), by the Expert Group on Future Skills Needs in Ireland (www.skillsireland.ie) and the shared Dublin descriptors (http://www.jointquality.org/content/descriptors/CompletesetDublinDescriptors.doc).

Norway offers a programme "master degree in management for health specific professions" partly through a sabbatical. So far, around 500 to 600 persons have attended the programme. See also the European MBA in Higher Education and Research Management[32] which is aiming at Strengthening Management in Higher Education and Research Institutions. This 2-year programme includes topics such as: strategic management and organisational change; financial management and resources; the European Higher Education and Research area; management of teaching & research; institutional governance and marketing; and leadership, management of professionals and innovation. See also the "UCL innovation management executive education program" in Catholic University of Leuven, Belgium which is designed for potential managers with scientific education and at least 5 years of experience.

31. Numbers refer to the No of the recommendation within the text. The examples are only illustrative not necessarily the most relevant, nor have they the ambition of being exhaustive.
32. See http://www.euroherm.org

2. Training supervision

The doctorate candidate is followed by 2 supervisors, one from industry and one from academia at Bosch (Germany), Schlumberger (France) and the Danish industrial PhD.

In Belgium, credit can be acquired based on the experience reported in the portfolio. It helps the researcher to undertake a training programme consistent with the aimed research career or position, hence taking better control of their future professional objectives. The portfolio can also support the evaluation: it makes explicit the achievement during the different steps in the researcher's career.

3. Access to inter-sectoral mobility

In Ireland, the personal in universities has the option to use one day a week to pursue their own interests/consultancy work. In the US, dual career paths for professors, i.e. spending time in private industry and in higher education institutions, are widespread.

Full and associate professor positions must be advertised internationally in Denmark.

Placements and internships in industry are well-organised for some big companies such as Bosch in Germany or NOKIA in Finland. There are also some good practices in countries such as Ireland; Denmark; Sweden; the United Kingdom; Spain and Greece. The EUI doctoral programme proposes training in view of searching for a placement.

In Ireland, Expertise Ireland provides research profiles on-line with a "search for expert" function (see www.expertiseireland.com). Research profiles include areas of expertise, information on published work, consultancy work undertaken and areas of specialist interest.

4. Appraisal of mobility

In Norway, professor II positions are professors that spend 20 % of their time in industry, e.g. mainly in university hospitals biotech, imaging and pharmaceutical industry, and in geology, and technical universities for oil industry. They are appraised for their work

with industry. They receive additional salary by industry corresponding to their services, often in addition to their regular salary.

For established researchers: annual performance management with a view of personal development in Ireland. Schlumberger (France), which in addition to evaluation, conducts career orientation exercise every 5 years.

Evaluation in the Marie Curie Actions. After each evaluator has made up his/her personal judgement, the evaluation team meets for a consensus meeting, confronts their respective opinions and form a consensus. This also permits benchmarking of evaluations by comparing each individual to a common level across the organisation.

5. "Permanent" mobility to the other sector

Extraordinary professors (*bijzondere hoogleraren*) in the Netherlands. They are doctorates coming from industry and are employed to work for the university. Their number has grown much during the 80s. For example, the University of Utrecht had about 430 ordinary professors and 120 extraordinary professors in 1998. These chairs are useful for promoting mobility between industry/interest groups and academia and furthermore represent a financial support for universities. In practice, the university board appoints a newly created third party (e.g. a foundation, group of founders) for the establishment of an extraordinary chair. The third party then appoints the person to the chair. Extraordinary professors mostly work part-time.

6. Administrative barriers and autonomy needed to overcome them

Autonomy of universities in Sweden allows recruitment from industry for management positions, provided that they fulfil the qualification requirements for being professors or senior lecturers.

In the United Kingdom universities, HEROBIC (Higher Education Reaching Out to Business in the Community) and middle management chief fellows are academic related positions, which aim at transferring knowledge. They work both ways, help academics to translate their work into common terms, while they provide feedback to academia about the needs of industry. They also discuss with regional authorities that are becoming very important actors involved in research projects at local level.

7. Framework conditions for academia-industry partnerships

Clusters, regional Competence Centres (e.g. Swedish Competence Centre and K-plus programme in Austria) and Science Parks (e.g. AREA in Trieste, Parc Cientific de Barcelona and Centres for Science, Engineering and Technology of Ireland, Science Enterprise Centres in UK, Cooperative Research Centre in Hungary), university hospitals.

In Ireland, most of the state funded research for universities is based on competitive grants and is aiming at collaborative research. This implies that universities are looking for staff members, often with industry experience, being able to attract research contracts.

The "Academic Fellowships" in the United Kingdom provides funding for 5 years in a flexible way with a view to attract additional external sources of funding (both private and public).

In Spain, the OTRI programme provides funding for setting up technology transfer offices at universities and public research organisations. More than 150 offices have been set up. In the United Kingdom, the government introduced a specific stream of funding to support knowledge transfers: engage in networking with business; market their research and teaching to business; establish liaison and technology transfer offices to provide advice and to negotiate consultancy assignments, contract, collaborative research projects, and licence agreements; establish spinouts; provide entrepreneurship training for science and engineering graduates; and provide work placement for student in industry.

The Irish Advisory Council for Science, Technology and Innovation has launched the National Code of Practice for Managing Intellectual Property from Public-Private Collaborative Research[33]. The Danish Confederation of Industries[34] has launched the "Contacts, Codex & Contracts – Guidelines for Research Collaboration between Universities and Industrial Companies". The United Kingdom has launched the Lambert Agreement – A Toolkit for Universities and Companies interested in Undertaking Collaborative Research Projects[35].

8. Appraising institutions

Quality assessment procedure for research teams and institutions in Austria, Malta, the Netherlands, Norway, the United Kingdom, and centres of excellence in Romania but also in industry (Schlumberger, France). Industry is also more and more conducting evaluation of units as part of the individual appraisal.

33. See http://www.sciencecouncil.ie/reports/index.html
34. See http://www.eirma.org/f3/local_links.php?action=jump&id=934&catid=72
35. See http://www.innovation.gov.uk/lambertagreements/

9. SME-academia networks

In Ireland, a joint conference between the Irish University Association and the Irish Business and Employers Foundation was held in November 2005 to increase collaboration on R&D between academia and industry. Its aim was to examine how the business community and academia could work in partnership to meet Ireland's educational and R&D needs. In Belgium, the Vrije Universiteit Brussel initiated "CROSSTALKS"[36], a platform where academia and industry meet. Offices set-up by Regional Development Centres and Communal Institutions promote collaboration between SME's, federations and higher education institutions, including research centres, with the particular aim of setting up professional networks combining different "worlds".

The so-called wagon wheel effect in USA consisting of weekly informal gathering of researchers from both sectors; events in existing Science Parks; and Innovation Relay Centres, a network for the promotion of technology partnerships, transfer mainly between small and medium-sized companies (SMEs).

10. Funding for training academic staff

Training network for managers in academia by the European Centre for Strategic Management of Universities (www.esmu.be or EUA), and TTO officers (e.g. PROTON[37] for Europe). In the UK, the Leadership Foundation offer development on leadership, governance and management to current and future leaders within higher education institutions (http://www.lfhe.ac.uk/). In the US, the Association of University Technology Managers (AUTM) offers courses to both academia and industry.

11. Legal instruments and awareness of EU instruments

A "go-between company" in Finland is an intermediary body that solves obstacles to the mobility of researchers, such as rigidity of (public) rules on their legal status & sectoral mobility. As an intermediary body, it takes financial, legal and operational responsibility for the mission of researchers outside their host institution. The intermediary body signs contracts on behalf of researchers and an independent/sub-contract is established between the researcher (or the original host institution) and the intermediary body for the "mission". The employment in the original host institution

36. http://crosstalks.vub.ac.be/about/
37. Pan-European network of technology transfer offices. See http://www.protoneurope.org/

is maintained (e.g. absence on holidays, sabbatical leave, leave of absence etc.). Intermediary bodies also exist in Austria.

Raising awareness and training initiatives organised by Mobility Centres (ERAMORE). Presence of a competent and recognised centralised body, which can ensure uniform legal advice and support to national authorities in implementing the new EU legislation/ recommendations such as the "*Fondation Kastler*" in France.

In Ireland, a cross disciplinary working group on pensions has been established to consider the relevant issues and to make recommendations.

Annex 2:
Member of experts groups

Working Group 1:
Knowledge and skills development to further develop intersectoral mobility

Meetings: 2 June 2005 and 29 September 2005, Brussels.

Experts: Rolan Sommer (AT, Federation of industry), Ingrid Fleischhacker (AT), Filip Callewaert (BE), Jean Luc de Meulemeester (BE), Janica Ylikarjula (FI), France Dantin (FR, Schlumberger), Maria Rimini Doring (DE, Bosch), Martin Hynes (IE), Ciro Franco (IT), Jesmond Xuereb (MT), Augustin Semenescu (RO), Joseph M Suris (ES), Jose Manual Fernandez (ES), Goran Blomqvist (SE), Mary Ritter (UK), Sandra Bitusikova (EUA)

Working Group 2:
Career appraisal to further develop intersectoral mobility

Meetings: 3 June 2005 and 30 September 2005, Brussels.

Experts: Ingrid Fleischhacker (AT), Filip Callewaert (BE), Isabelle Le Nir (FR, Schlumberger), Padraig Walsh (IE), Ciro Franco (IT), Jesmond Xuereb (MT), H.A.J. Hendriks (NL), Hans M Borchgrevink (NO), Aurelia Meghea (RO), Göran Blomqvist (SE), Graham Davies (UK), Sandra Bitusikova (EUA), Mario Cervantes (OECD)

Working Group 3:
Remaining legal and administrative obstacle to mobility

Meetings: 9 June 2005 and 13 October 2005, Brussels.

Experts: Marie Harmer (AT, Federation of Austrian Industry), Suvi Hiltunen (FI, NOKIA), Jenni Ryynänen (FI, NOKIA), Nathalie Colombel (FR, CEA, ANRT), Michael Vogel (DE), Argyroula Sigala (EL), Veronika Kürti (HU), Kathy O'Donoghue (IE), Isser Peer (Israel), A. Kwint (NL), Katarina Kostalova (SK)

Working Group 4: Structuring Initiatives to further develop Inter-sector Mobility

Meetings: 10 June 2005 and 12 October 2005, Brussels.

Experts: Milojka Gindl (AT), Jens Peter Vittrup (DK), Suvi Hiltunen (FI, NOKIA), Sylvie Regnier (FR, EADS, ANRT), Jean-Pierre Broyart (FR, Pasteur, ANRT), Christine Patte (FR, EDF, ANRT), Gyula Patkó (HU), Declan Hughes (IE), Isser Peer (Israel), Ciro Franco (IT), G. van Strien (NL), Radojka Vercko (SL), Laura Marín (ES), Konrade von Bremen (CH)

Validation meeting: Discussion on the final report

Meeting: 21 February 2006, Brussels.

Experts: Roland Sommer (AT, Federation of Industry), Filip Callewaert (BE), Jens Peter Vittrup (DK), Maunu Häyrynen (FI), France Dantin (FR, Schlumberger), Martin Hynes (IE), Francis Vella (Eurodoc), Martine Plompen (European Foundation for Management Development), John Smith and Lidia Borrell-Damian (EUA)

What is Europe doing for its researchers?

Charter and Code: the "European charter for Researchers" and the "Code of conduct for the recruitment of researchers": the Charter describes the rights and duties of researchers and research and funding institutions, the Code aims at ensuring equal treatment to all researchers in Europe and increase transparency in their recruitment. Myriads of very important research institutions have currently expressed their adhesion to the Code and Charter.

For further information: http://ec.europa.eu/eracareers/europeancharter

Scientific visa: the first legislative initiative in the world aimed at facilitating the mobility of researchers through the simplification and acceleration of the visa procedures for third country researchers. By applying the Commission recommendations, Member States will considerably shorten the delays and lighten the procedures for obtaining a visa for third country researchers, whose skills and experience is of utmost importance for the dynamism of European research.

For further information: http://ec.europa.eu/eracareers/europeancharter

Researchers' recognition: a series of initiatives, launched in 2005 under the heading "Researchers in Europe", all aiming at bringing large public and researchers closer to one another, offering them various opportunities to meet: various actions "researchers in Europe" in European countries, Researchers' nights, book "Portraits of researchers", website "Researchers in Europe"...

For further information: http://ec.europa.eu/research/researchersineurope

Marie Curie schemes: financial support for "mobile" researchers (from early stage–researchers to experienced ones) and hosting institutions allowing researchers to increase their experience and skills by working in other countries, to acquire further experience by collaborating with industry, and facilitating their re-integration when they come back in their country of origin.

For further information: http://ec.europa.eu/research/fp6/mariecurie-actions

Mobility centres network: 200 "mobility centres" offering "mobile" researchers, all over Europe, a personalised service helping them to settle in a foreign country; their assistance relate to all aspects of the establishment in a new environment, from social security, taxation, housing, visas, schooling for the children, vaccination for the cats and dogs...

For further information: http://ec.europa.eu/eracareers/era-more

European Portal for researchers' mobility: a centralised website offering researchers willing to be mobile and institutions searching for talent researchers constantly updated information about vacant positions, and candidate mobile researchers (about 1 000 announcements currently presented all over Europe), relayed by "national portals" in the different European countries.

For further information: http://ec.europa.eu/eracareers

European Commission

EUR 22573 — Mobility of Researchers between Academia and Industry, 12 Practical Recommendations

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This report is addressed to research organisations, universities, and private companies engaged in research, as well as to public authorities. It is based on a thorough analysis of insufficient cooperation between public sector organisation and private companies in the field of research, by a set of four dedicated working groups of experts from the Member States and States associated to the RTD Framework Programme. As a result of their work, the expert groups jointly put forward a coherent and powerful set of recommendations for improving mobility of researchers between academia and industry, as a means of enhancing a culture of longer-term, structured interaction and cooperation between both sectors in terms of knowledge transfer and development of cross-sector skills and competence.

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