In March 2003, a series of brainstorming meetings took place at the European Commission, addressing many different aspects of the profession/career of a researcher within the European Research Area. Given the vital importance that the MCFA attaches to this topic, the association was represented in Brussels by three of its current Board members, Magda Lola, Dagmar M. Meyer and Gian Mario Maggio. During the weeks following the brainstorming meetings, the issues that had been brought up were discussed in depth among the members of the association and six different sets of questions (based on those discussed in Brussels) were sent to MCFA members for feedback. A total of 64 members replied to the questionnaires, providing valuable information on the situation in different parts of Europe and on the views of fellows from different scientific and professional backgrounds. The current document is a summary of the received feedback and will serve as the basis for future work of the Science Policy Panel on the career prospects for researchers in Europe.
Section 1: A European employment market for researchers: prospective needs

In March 2000, at the Lisbon European Council, Heads of States and Governments set the goal that Europe becomes “the most competitive and dynamic knowledge-based economy, capable of sustainable economic growth with more and better jobs and greater social cohesion”. Two years later, at the Barcelona European Council, it has been agreed that research and technological development (R&D) investment in the EU must be increased with the aim of approaching 3% of GDP by 2010, from 1.9% in 2000. An increase of the level of business funding, from its current level of 56% to two-thirds of the total R&D investment (a proportion already achieved in the US and in some European countries) has also been requested.

What is the perspective for Human Resources in research in terms of offer and demand to reach the Barcelona/Lisbon objective by 2010? Is this a realistic goal?

Can the Barcelona 3% investment target be achieved without simultaneously meeting a corresponding target in terms of Human Resources in Europe?

Several doubts have been expressed about the feasibility of the Barcelona/Lisbon objective in terms of Human Resources. Despite countries such as Finland having already reached this goal, and others being competitive enough to do so, Southern countries are still very far from the target. In this latter case the real problem could be offer rather than demand, and that, even with fresh money, the research infrastructures could not be modified fast enough to achieve the Barcelona/Lisbon objective. The trends are often in an opposite direction, even in countries with a strong tradition in research (for instance, the German national grant agency (DFG) had to stop financing about 2000 scholarships, as decided by the Ministry for Education and Research).

However, everybody agrees that setting ambitious goals will contribute towards an overall improvement of R&D in Europe. Even if the 3% target is not fully achieved, the undergoing process will be helpful in reconfiguring existing resources and ensuring an optimal use of the available budget. Along these lines, the following observations have been made:

- A healthy growth of R&D investments in Europe should be accompanied by a corresponding steady increase in research personnel, both in the public and private sectors. Training and employing researchers for a short period of time is not enough: a solid long-term basis of research personnel is needed, in order to create a sufficient critical mass in key research areas. At the moment a waste of human capital is taking place due to a lack of long-term perspectives for researchers.

- The EU enlargement process will introduce a vast pool of scientists in the European job market: this opportunity to grow in terms of HR should not be missed. However, attracting first-class scientists on short-term agreements without longer term career options would be a mistake.

- The EU should consider investing more efforts to promote scientific professions and develop strategies for attracting researchers from non-EU countries. The so-called “brain drain” trend should be stopped or, even better, transformed into a balanced bi-directional flow of researchers. As of today, many talented European young researchers
are moving to the US, where they find more attractive working conditions.

Possible ways of improving the working conditions of researchers in Europe are to:

- Increase the salary levels in order to boost researchers’ motivation
- Set clear and uniform recruitment policies across Europe
- Promote a better and less bureaucratic funding system for research
- Promote global framework conditions for international mobility of researchers

- The increase of HR should not be indiscriminate but should follow an overall plan, where strategic areas where Europe has a clear lead are reinforced, while at the same time becoming stronger in areas where weaknesses have been manifest.

- An important contribution to the Barcelona/Lisbon objective is expected from the private sector. In this context, it is essential to understand the role that the business world can play both for research and for creation of wealth. Scientists should be able to move freely from one environment to the other (which of course requires increased flexibility from the researchers’ side as well). Despite the current trends on globalisation, enterprises should be encouraged to concentrate a larger portion of their R&D investment in Europe.

*Which concrete actions are required to meet the Barcelona and Lisbon objectives at Member State and EU level? Are there examples of "good practice"?*

Suggested priority actions regarding HR in research are the following:

- Prevent brain-drain towards the US; this requires an answer to why top researchers leave Europe, and what can they get in the US that is not available here. Is it money, better equipment, a different (organisational) culture or all these together? These reasons should be clearly identified in order to offer improved conditions in Europe as well. In addition, researchers from non-EU countries ought to be attracted by establishing appropriate immigration and administrative procedures.

- Provide better conditions for researchers wishing to return to their home countries after years of mobility. Although the benefits of researchers’ mobility are widely recognised and even promoted by the EU, in practice researchers who stay in their country seem to have better possibilities to make a long term career.

- Pay particular attention to young researchers and enable them to develop their creative ideas and an early autonomy. Early stage researchers are responsible persons who want to prove themselves and should be given the opportunity to do so.

- Encourage the businesses sector to invest in R&D, for instance through fiscal benefits for demonstrated R&D expenditures. The 3% target is heavily dependent on the funding from enterprises, and on achieving the aim for a 2/3 contribution towards research from the private sector. This however cannot be imposed by political decisions, and the only way is to create conditions that will fuel the increase of business funding for research.

- Create industry/academic joint research centers. The governments could provide the infrastructures and equip such centers, while business funding would contribute in running costs. A good practice example in this direction is the European Institute of
Molecular Biology in Heidelberg.

- Strengthen entrepreneurship by financing critical phases of enterprises, fostering academia-industry collaboration and favoring long-term foreign investment in Europe linked to R&D.

- Undertake concrete and large-scale initiatives in order to improve the quality standard of the R&D Process and Management (for instance, organizations that apply for EU funds should be able to demonstrate a genuine effort and ability to meet high standards of quality in this direction).

What steps have been (and will need to be) taken at Member States/EU level to reach a balance between supply and demand of researchers and highly skilled workers in Europe?

Broadly speaking, supply depends on a good education system (universities, research institutions, etc.), while satisfying the demand for researchers will require providing attractive working conditions. The education/career system is like a pyramid, with a large number of openings for students and early stage researchers, but a restricted number of long-term research positions. Starting from a sufficiently broad pool of researchers and performing a good selection for the higher-level positions are essential factors of success. While competition is needed for positions of increased responsibility, the job market should nevertheless provide opportunities for all researchers, and ensure that the skills they acquired through several years of training are put to the best possible use.

The following actions at the EU/national level (discussed in detail in subsequent sections) will contribute towards reaching a balance between HR supply and demand:

- Promote careers in science and technology, with special focus on women who are currently under-represented in many areas.

- Minimise conflicts between science and society, by actively promoting science in public and explaining the benefits of scientific research. At the moment, society is very suspicious towards certain scientific areas.

- Achieve a fair and uniform treatment (across Europe) for recruitment and career progression for researchers. In view of the problems arising in several countries, but also of EU enlargement, ensure that recruitment procedures are free of discriminative practices. (For instance, even in Finland, a country with exceptional records in this area, it has been pointed out that foreign researchers are kept on short-term contracts, until they can be replaced by a Finnish citizen, in contrast to the principle of equal job opportunities across Europe).

- Make serious plans regarding the reintegration of mobile post-doctoral researchers back to their home country, in a way that the return from the resources invested for their formation is maximized. As of today, there are far too few positions for young post-docs especially in the Mediterranean countries.

- The recognition of the importance of research jobs is one of the keys for the future development of the European economy. Young people cannot be encouraged to enter research, unless the role of the latter is adequately recognized and supported by society. The income of many European researchers being much lower than the one of their US colleagues is indicative of the fact that at the moment their contributions are significantly lower.
undervalued.
What big changes are lying ahead of the knowledge society/economy and how can Member States/EU policies better anticipate and reply to these changes?

In a knowledge-based economy it is essential to promote the role of research (both fundamental and applied) among the general public. At the moment, R&D investments are strongly dependent on the political agenda of the Member State Governments, which in turn reflect mainly the short-term societal needs and lack a long-term strategic vision.

Several changes will be required (some have already been discussed above):

- The present number of researchers is by no means sufficient and more people, including those from non-EU countries should be attracted. In addition, and in view of the EU enlargement, it is essential to integrate the research apparatus of the new member countries into the European Research Area.

- The above statement implies the establishment of a supportive administrative framework, as well as of a common set of criteria that measure academic qualifications and credits in a scientifically unified EU.

- Life-long learning needs to be introduced as a standard practice. Researchers must also be encouraged to take part in soft and transferable skill training (on management, communication, principles of successful team work etc).

- Researchers ought to make every possible effort to effectively communicate with the general public. Society will not support research unless it understands its importance. Technology Transfer must receive particular attention, while people working on socio-economic disciplines ought to better communicate and collaborate with decision makers. As the EC Commissioner Philippe Busquin said: 'In the socio-economic field, more than in any other, it is urgent for academics not to consider themselves as members of an ivory tower in which the policy makers are not allowed. As for the latter, it is also vital [...] to understand how research results can help them to achieve the right solutions'. What we need is a group of people working between science and praxis which would support knowledge transfer in both directions and raise awareness of the need for more research funding.
Section 2: The public perception concerning visibility and recognition of a researcher's profession/career: which realities, which needs?

What is the perception of a "career in research" in different countries and how is it determined? What is its relation to societal changes/privileges?

The replies received regarding these questions indicate that there are significant geographical differences within Europe:

- In Western and Northern European countries such as Germany, Belgium, France and the UK, the career of a researcher is commonly associated to a certain prestige and social standing, especially among the older generation. Having one's children become researchers can definitely be a social promotion. It has been mentioned, however, that one reason for this rather positive image could lie in the fact that for many people the terms “researcher” and “university professor” are synonymous, and that traditionally the latter enjoys a rather high social acceptance, since it is associated to the transmission of ethical values and cultural identity to the younger generations. In many countries researchers within the public system are civil servants, thus “serving the public good”, which may also contribute to their relatively high social acceptance. However, this connotation is slowly disappearing, and the above considerations are gradually becoming less important for younger people.

- The situation is quite different in Eastern and Southern European countries (such as Bulgaria, Italy, Greece, Spain and Portugal). Here the replies paint quite a different picture, with the public perception and appreciation of careers in research being rather low. Scientific research and scientific questions in general are described as being rather far from the public’s concern. There are few public events related to science or other activities aimed at increasing the public awareness of scientific issues, while the realities of scientific research are not at all well presented in the media. The lack of research that is conducted outside academia implies that career opportunities for researchers are very limited, and that the above-mentioned synonym of “researcher” and “university teacher” becomes an actual reality. In contrast to Northern and Western European countries such as Germany, France or the UK, university professors are often underpaid in Eastern and Southern European countries (in the first case to such an extent that they have to take on a second job in order to be able to support a family). It is clear that this does not add to the attractiveness of a career in research.

Another observation that has been made was related to the choice of subject:

- In general, it is considered more sensible to pursue studies and research in applied fields such as engineering, medicine or economics, where the potential usefulness and relevance of the research results can be easily recognized by anybody with or without a strong educational background. In Western and Northern European countries it is understood that applied or applicable research is the key to innovation and technological development, and that these are the driving forces of the economy. Research in more abstract areas such as theoretical physics or pure mathematics is much harder to justify to the general public, and a person pursuing a research career in such a domain will often have to face the question “what this is supposed to be good for”. Very abstract subjects are also often perceived as simply too hard or demanding, reflecting serious
shortcomings in many areas of secondary education.

Is there a public mistrust towards core scientific issues from the ethical point of view?

Has science failed to meet the public expectations for improving the quality of life?

Is the public aware that most technological innovations are brought about by the process of discovery and the imagination of scientists?

The question whether there is a public mistrust towards scientific issues such as cloning, genetic engineering, nuclear energy, etc. does not necessarily seem to be the right one to ask:

- There is public concern regarding safety and ethical issues related to these subjects, but if one makes the effort to discuss these issues with “common people”, it soon becomes apparent that the questions are really more of a political nature, regarding the effective control and responsible use of the scientific results achieved in these areas.
- Media reports that are authored by people with little scientific background and aimed more at “selling a story” rather than informing the public also contribute to a certain level of (mostly unjustified) public mistrust against science and scientists.

The core problem, however, (which is not only restricted to controversial issues, such as cloning) is the lack of communication between scientists and the public. Most people would admit that scientific progress and technological innovation generally increase their quality of life, if they were more aware of the role that science plays in the world that surrounds them.

It is the responsibility of the scientists themselves to explain to the public (in a way that can be understood by people of all educational levels) what is the contribution of science to the many aspects of everyday life that the majority of people simply take for granted. Among the major challenges, is to communicate the following principles:

- Scientific endeavour has to be looked at from a long term point of view – scientific research will not always produce immediate (or immediately applicable) results; this however does not make it less important for the creation of a solid knowledge base.
- Many technological innovations are the product of research carried out for completely different purposes, where it may or may not have had any success.

In order to remain credible, scientists should address issues in a more global context when engaging in public debate, instead of from the more usual position of narrow self interest.

Which instruments could be used to foster a positive image of the career of a researcher (media, etc)? Are there examples of “best practice”?

Obviously, scientists and researchers themselves have an important share to contribute in the attempt to make scientific careers more attractive.

- “Open days” where school children, but also the general public can visit laboratories and research institutions (both in the public and private sector), ask questions and get understandable answers are a good means for showing the public what scientific research is all about.
Scientific contests where high school students work on small projects under the supervision of university teachers or researchers from industry are another way to raise students’ interest in science and to transmit some of the enthusiasm that is so indispensable in order to succeed in science.

Public lectures on scientific issues but also on issues related to “Science and Society” should be regularly organised by the research institutes and universities, in collaboration with other stakeholders such as sociologists or (local) politicians. The idea of these lectures should not be to tell people what they have to do, but rather to contribute to the development of shared goals.

Science Cafés where scientists meet with the general public in a relaxed atmosphere should be organised on a regular basis.

Every university and every research institute of a reasonable size should have a unit in charge of “Dialogue with the Public”, that would initiate activities like those enumerated above and coordinate their realisation, and that would also be a contact point for the media if there is no separate PR department.

Problems related to attractiveness: What are the specific reasons for the current attractiveness problem (demographic reasons, pay, long time necessary for acquiring qualifications, conflict with family commitments, social image etc)?

Among younger people who have just finished their university studies and are at the point where they should decide whether they want to get a PhD and afterwards possibly stay in research, the attractiveness or inattractiveness of a research career seems to be governed primarily by questions of job security, income level and attached social benefits. Since these appear to be significantly better in the private sector, research careers in applied areas tend to be more attractive to the younger generation than the scholarly pursuit of very abstract knowledge, where the most obvious career prospects lie in academic research. There are various problems related to this:

- In some countries where the research intensity is low, there are not all that many opportunities for researchers in industry and business, and those jobs that exist are often in development rather than actual research.
- On the other hand, in many countries (especially in southern Europe) the PhD still receives too little recognition by companies as a “label of quality”. This certainly indicates a need for reform of the doctoral programmes which are often very far removed from the needs of industry, but it also shows a lack of appreciation of the knowledge, research experience and general human qualifications acquired by young researchers during their PhD training.

The following points were mentioned as reasons why careers in academia are not as attractive as they used to be:

- An important factor is the lack of long-term job opportunities in the public sector and the almost inevitable coupling of research with teaching and administration.
- The long qualification times leading to a completely unplannable future and the high job insecurity with short term contracts up to the age of 45 or longer make research careers not very attractive especially to young researchers who are planning to build up a family
at the same time.

- Long working hours with a salary well below that of researchers in the private sector and a forced mobility due to lack of job openings are not very conducive to a healthy family life.

- Career advancement is still governed by too rigid rules, the whole system is too inflexible and does not allow the optimal use of human resources.

- Recruitment procedures still lack transparency in many places and being friends with the right people is sometimes still more important than scientific quality.

One key factor that still makes an academic career very attractive in many places is the perceived and to a large extent realistically existing academic freedom that researchers at universities and public research institutions enjoy. In times of tight budgets and increased dependance on external funding the autonomy of these public institutions is increasingly cut down. This is not only dangerous in itself since it can lead to a situation where subject areas that are not of immediate economic relevance are neglected despite their fundamental importance for scientific progress (which is at the basis of any technological progress), it can also lead to academic research careers loosing one of the few aspects that today still make them reasonably attractive, despite the many problems associated with careers in research enumerated above.

**Which measures should be launched in order to attract into scientific fields those who have not yet chosen their field of studies?**

**Which areas should be specifically targeted in order to attract a sufficiently high number of potential researchers or keep them in employment?**

The foundations for a scientific career or more specifically a career in research are already laid in the early childhood days, and definitely during secondary education. Missed opportunities during these stages are almost impossible to make up for later on. In order to be able to convince the students that science is fascinating and thrilling, and that a scientific career can be very rewarding and satisfying in many respects, a teacher has to fulfil two conditions: he or she must know the subject, and (just as importantly and closely linked) he or she must possess a real enthusiasm for the subject area and know how to transmit it. Unfortunately in many places neither of these two requirements can be guaranteed nowadays:

- Students who decide to become teachers are not usually those with the best academic record, while at the same time the academic requirements for teachers are in many places going down continuously.

- Being enthusiastic about a subject means to be at ease with the material which is often not the case for young teachers, especially in the so-called “hard subjects” such as mathematics or physics.

- Large classes and stressful environments further contribute to suboptimal teaching.
Breaking this vicious cycle is hard but seems to be indispensable in order to increase the number of students interested in scientific subjects. This means

- more funding for teacher training during their university education but also later on while they are already on the job,
- smaller classes (i.e. more funding for primary and secondary education),
- a more rigorous selection of teachers which is not only based on the grades obtained in the final university exams.

The teaching itself also has to improve:

- High school education should involve the study of complex and interdisciplinary systems (which are still accessible to the students). This would help the students to develop conceptual thinking which can be applied in many different areas afterwards, but in particular is absolutely necessary for any kind of scientific endeavour.
- Teaching must be more than just the drill of recipes without any deeper understanding of the concepts that are behind them.
- Experimental work should be an integral part of science education, starting already from primary school. Reasonably equipped laboratories and at least a basic supply with computers and the necessary software are an absolute prerequisite if such experimental work is to enhance students’ interests rather than having the opposite effect.
- Science education at school could be made even more interesting by inviting researchers from industry and academia from time to time to talk about their work in a manner that is appropriate to the age level of the students present.
- Project weeks or summer schools where groups of students work on an interdisciplinary problem, possibly with some relation to issues currently discussed in the media, would be another possibility to actively engage students in more science related activities.

The role of the teacher should also be more than just that of someone who transmits knowledge. He or she should be a mentor and someone who guides the student, someone with whom the student can discuss her or his plans for the future in a relationship of trust and understanding. The science teachers at school should be the best advocates of a scientific career for their more gifted students.

Education is not only the responsibility of schools and teachers, but also of the parents, who should spend more time with their children in general, but in particular also on activities related to science and technology: spending a Sunday in a “hands on” museum, setting up simple experiments at home, attending “science festivals” with their children, organising science related activities at school together with the other parents etc.

In some countries there also exist associations whose mission it is to make school children interested in scientific issues, such as “Les petits débrouillards” in France, which guide children through small projects thereby allowing them to understand scientific concepts little by little and in an intuitive way.
How can greater synergies be generated between researchers and education?

Should every researcher be responsible to play a role in this respect?

Should European funding bodies make outreach and synergy with higher education a necessary component of each research project?

Creating greater synergies between education (at all levels) and research is indispensable in order to counteract the current attractiveness problems of scientific careers.

- University students should be involved in research projects already at an early stage, in order to foster their interest and give them the opportunity to acquire a deeper understanding of the relevance of the subject they are studying.

- In some places there is a tendency to dissociate higher education from research – universities are effectively converted into technical colleges while the actual research activity is concentrated in a few elite research universities only. While there are some good arguments for the creation of centers of excellence this should not mean that all other institutions of Higher Education are completely stripped of their research departments. Research and teaching are complementary and can mutually benefit from each other.

Improving the dialogue between science and society is essential for an increased social acceptance of scientists and their work, and for ensuring that scientific endeavour is actually employed for the benefit of society. Therefore:

- Outreach activities should be taken into account for the career advancement; they are not a “hobby” that people should take care of in their free time if they feel like it. Not everybody is gifted to give public lectures or to work with school children, but if somebody shows a special commitment in this area, then this should be rewarded. On the other hand, science communication is something that can be learned and that should in fact be part of the curriculum of every science student.

- Funding of research projects through bodies like national research councils and similar should require that certain minimal conditions regarding outreach and communication of results are fulfilled. This should not be overstressed though, since it is after all the scientific quality that determines whether a project gets funded or not, but again there should be a special reward for projects that take these aspects into account.

Awareness raising campaigns: how effective could they be? By which means and with which partners?

What kind of concrete steps have been/are being taken and how effective have they been?

The media play of course an extremely important role when it comes to raising the public’s interest in scientific issues.

- Science programmes for children, documentaries for older students and adults, but even TV dramas with a science-related content can all contribute to an increased interest in scientific questions.

- The media also have a big responsibility when it comes to the image of scientific careers
that they convey to the public: instead of continuously broadcasting the image of scientists who are pursuing their research in their little dark chamber with evil intentions of controlling the world, or of the socially handicapped weirdo who is incapable of surviving in the real world outside his laboratory, media should make an effort to show what the life of a researcher is really like: the joy and satisfaction that comes with every new discovery, but also the frustration that is inherent in scientific research.

- Biographical films and publications can provide role models for students thinking about a career in science, especially for girls in subjects where there are not many women. Besides, such biographical films, articles, exhibitions etc. can help people to understand the historical context of scientific discoveries, which many people are absolutely lacking and which is not emphasized enough in schools and at university, mostly for lack of time.

When it comes to awareness raising campaigns, an important role is also played by professional associations.

- They are usually organised on a national or transnational level and can coordinate activities that are not confined to one location only, thus having potentially more impact. Exhibitions that move from one city to the next, showing researchers at work, are just one example that has been realised in the past by various organisations at European level. Interactive web sites or online scientific contests are other simple examples. Professional associations are also asked to coordinate activities nation wide during the national science weeks and at similar occasions. They are well placed to organise public debates between scientists, the public, policy makers and other stakeholders, which could benefit from adequate media coverage.

- On the other hand they can and should also act as a voice for their members when it comes to transmitting their views on issues related to science policy to the relevant decision makers, including such issues that have a bearing on the attractiveness of scientific careers (for example recruitment policies or issues related to the mobility of researchers).

- Professional associations should also have an open ear for questions from the general public, concerning either scientific issues or queries concerning the career prospects of a researcher in the specific domain. Some professional associations have created special mentoring programmes for young researchers or specifically for women (e.g. the EWM, European Women in Mathematics) which can also contribute to the attractiveness of a research career.

There is a general feeling that there are very few or no steps taken in the direction of recruitment policies. Obtaining a permanent position seems to be getting more and more difficult, given the budget cuts at all levels. This was pointed out in particular for Greece, Portugal and Italy. In some countries initiatives are taken in order to increase the early independence of researchers in the academic system (for details see *Section 6: the contractual dynamic in research*).
Section 3: The opening of the national systems at European and international level for recruitment, evaluation and further development of the career

What are the procedures and review systems for recruitment and career advancement?

Are the evaluation criteria based on local/national/international standards?

Are there any "Green card policies"?

There are large variations in the recruitment procedures and evaluation criteria of different national states, both regarding appointments and career advancement. In particular:

- Even within the same country, different systems may exist between the various research sectors. University positions are typically allocated by local committees (although applicants from abroad can also be eligible) and the same is true for recruitment in the private sector. However, competitions at a national, and in rare cases international level, do exist. A typical example is France, where (i) for research positions under the CNRS system both the decisions on job openings and the competition for them, take place globally within the country, while (ii) despite the fact that decisions on university positions are taken by local committees, eligible candidates have to first obtain a "qualification", through an evaluation procedure at a national level. For many openings at a local or national level, international standards may also be informally considered. A common observation, however, is that, for public research positions, often personal connections, as well as internal dynamics play the decisive role. Moreover, in certain countries there are often internal procedures, not open to everybody.

- Job but also fellowship openings are typically announced through the press, official government journals, scientific journals, Internet. Candidates are invited to apply for a given post, submitting a Curriculum Vitae (containing information on qualifications, professional experience, publications, citations, conferences attended, etc.) often accompanied by a research proposal. Letters of reference from established scientists in a given field are an important element in the evaluation. For positions in the private sector, the matching of the profile of the candidate with the job requirements is a key factor, while for academia the job descriptions tend to be rather generic. The best candidates are short-listed and invited to interviews, where they may also give a presentation on their work. A committee of experts (local, national, and, occasionally, international) ranks the candidates and takes the final decision. For positions of high responsibility in distinguished institutes, it is common to ask for external opinions or even involve external experts in the decisions.

- Researchers carry a certain weight and reputation according to their contributions to science and technology, which, to some extent, can be parametrised by certain objective criteria, such as: level of degree, years of experience after a university diploma, publications, citations, number of papers as first author, conference attendance, presentations, invited talks, teaching experience, official responsibilities including duties as thesis supervisor, time spend abroad, international collaborations, prizes or other special distinctions obtained, letters of reference by established scientists, access to European funds, patents. Fellows observe that the “selection rules” at the postdoc level, as well as for obtaining a permanent job are rather strict: if a scientist is not productive, he or she will most probably not make it to the next step.
• Provisions for green card policies are made only by certain countries and institutes. In this item, useful input can be gained from international organizations, which had to develop consolidated administrative frameworks and procedures in order to facilitate the recruitment of researchers from all over the world. Specific procedures, but also services are set in order to provide adequate information and facilitate the interaction of researchers with the local authorities.

**What measures are taken to reduce obstacles to mobility for researchers?**

**How is transnational/international mobility taken into account for career development?**

• Researchers consider that one of the biggest problems towards international and intersectorial mobility is the lack of concrete regulatory frameworks, guidelines and appraisal schemes that would adequately account for the added value of mobility. The approach to mobility depends too much on the institute, university or company where one is working. International experience is often important for the highest level positions (especially when these are determined by national or even international competitions and committees), but not so much for university positions decided at a local level. In fact mobility is often a problem, as people move out of their national systems, and find it very difficult to get reintegrated (as can be seen clearly in Section 6: The contractual dynamic in research).

• Administrative issues and practical problems in everyday life, are additional obstacles to mobility, and are clearly more pronounced for researchers from non-EU member states. This item, including examples of best practices is addressed in subsequent sections.

• The different financial situation between EU countries and the particularly low payment of researchers in certain countries both discourages mobility, and leads to a brain-drain to more developed regions of the Community. The special provisions made by the Commission’s Framework Programmes to address this problem, especially within the “Development Scheme” of the “Transfer of Knowledge” Marie Curie Actions are acknowledged as extremely positive, but it is believed that not much is done by other bodies.

• Mobility between different sectors is also difficult, as often there is not sufficient communication and information flow between academia and industry. The “Industry-Academia Strategic Partnership Scheme”, as well as initiatives to enhance long-term collaborations between the two sectors (discussed in Section 5: Public/private research) are concrete steps towards facilitating this type of mobility as well.

• International mobility after recruitment in a long-term position in academia or industry is not always facilitated and often teaching, or other type of regular work that has to be processed can be a problem. Sabbaticals do exist in academia, but not in industry. Nevertheless, if one is heading for a position of higher responsibility in an industrial environment, it is quite common that the companies send their staff abroad. Finally, mobility from academia to industry seems to be one way: once in an industrial environment, it is very difficult –and often impossible- to return to a position in a university or a public research institute.
What measures exist to secure sufficient recruitment into research training?

Despite the fact that, in order to achieve the Barcelona objectives, a large number of researchers will have to be recruited between now and 2010, a significant reduction in the number of university students entering research is observed in many countries and disciplines. Sufficient recruitment would therefore have to be ensured, and this could be done in the following ways:

- **Recruitment policies:**

  The reduced number of people entering research is closely linked to a generic lack of prospects (long term career possibilities, lack of framework conditions and a family-supportive professional environment, inadequate definition of the profession of the researchers, lack of visibility and awareness of their role, etc). These items will be addressed throughout this paper, but the ability to provide appropriate solutions within the ERA will be a crucial factor towards attracting people back into research. Recruitment policies should, among others, ensure:

  - Optimal use of available resources. In doing so, it is important to identify the future needs in R&D and the domains where priority should be given, keeping in mind that an appropriate balance between fundamental and applied research should be ensured, since today’s fundamental is tomorrow’s applied research. We should avoid a proliferation of the current situation, with over-abundance of researchers in certain domains and “voids” on others.
  
  - Promotion of appropriate fellowship but also long term recruitment programs, with links to industry, education and society has to become a priority. These programs ought to have a well-defined administrative framework, as well as concrete provisions for training, mentoring and career development. Early stage researchers must be adequately supervised, and by no means seen as humanpower only.
  
  - Selection on grounds of excellence (following a wide publicity of openings).
  
  - Equal opportunities (ensured by regular gender and nationality statistics). Appropriate representation of women in statutory committees and selection boards, but also concrete provisions to guarantee that the number of female candidates interviewed is at least proportional to the corresponding number of female applicants.
  
  - Existence of appropriate framework conditions and administrative procedures (especially regarding employment status, social security, visas for non-EU nationals, etc).
  
  - Facilitating integration, offering assistance with practical problems.
  
  - Simplifying and unifying administrative procedures as much as possible, for all partners.

- **Recruitment strategies:**

  It is equally important to invest in adequate ways to promote the various openings (grants, fellowships, jobs), beyond national borders. Along these lines, the pan-European researcher’s mobility portal is seen as an excellent initiative and is strongly supported by Marie Curie Fellows. Recruitment strategies, in addition to the standard job advertisements can involve active outreach programmes (through career fairs, exhibitions, visits to technical
schools, colleges, universities and job centres, with presentations, posters and other informative material). In addition, brochures for the various openings can be distributed on a regular basis to universities and technological institutes, while well-constructed web-sites, with concrete and well-structured information, linked to global facilities such as the mobility portal will be an asset.

To which factors are remuneration systems for researchers linked to productivity?
What elements may influence remuneration in order to take account performance/merit?
How is performance and merit evaluated for recruitment and for career advancement?
What is the relation of personnel evaluation processes with promotion policies?

- In order to reduce arbitrariness in remuneration and evaluation procedures for researchers, there are certain elements that can be used to objectively take into account scientific performance or merit:
  - level of degree
  - years of experience after a university diploma
  - number of publications in scientific journals, citations, impact factor of journals where articles are published
  - in certain disciplines, number of papers as first author (while in others the practice is that authors are listed alphabetically)
  - conference attendance, presentations, invited talks
  - teaching experience
  - official responsibilities within an academic or industrial environment, including duties as a supervisor
  - time spend abroad, international collaborations
  - prizes or other special distinctions obtained
  - letters of reference by established scientists
  - access to European funds
  - patents
  - any additional qualifications and training certificates (including transferable skills)

- The above criteria, however, seem to be more relevant for selection into a given position, rather than for subsequent remuneration and career advancement: once in a permanent job of a given type, in academia or public research institutes, the basic remuneration tends to be fixed according to years of experience and merit plays a less important role. Even a poorly evaluated individual will receive a regular financial promotion.

- The situation is clearly different when we address the issue of a promotion to a different type of position (ie from junior to senior staff, or, in academia, from lecturer to different levels of professorships). Here, we have a competitive process where the scientific record plays an important role. Nevertheless, there is some suspicion for locally decided promotions inside academia. In particular, fellows observe that there are often large differences between the guidelines and what is really happening, while personal connections are sometimes more important than scientific merit.

- In private research institutes or companies, promotions seem to be more dynamic and linked to productivity, as well as the accomplishment of predefined objectives.
Individual researchers but also teams are evaluated regularly (through annual reports and ranking, as well as attribution of research credits). This practise seems to be common in international organisations as well. However, the available opportunities for merit-oriented promotions are often not sufficient to reward the majority of over-performing researchers. Here, one should certainly distinguish between short and long term advancements (the first have fixed quotas, however appraisals also aim at identifying high potential staff, who, at some stage of their career, will be promoted to positions of high responsibility).

- The balance between individual and team work, also in evaluation procedures, is very important. It is clearly very good for a team to have some strong individuals, and an individual is counting on a good collaboration to be able to get good results. However, it is often the case that the individual contributions of junior researchers are not visible enough within a big team, which certainly has negative career implications for them.

- Many fellows from certain Mediterranean countries remarked that recruitment in universities is often based on nepotism and not on a real evaluation of the potential of the researcher in terms of scientific qualifications. Often, the main parameter which is considered in the evaluation process is whether the candidate fits into the local system. Posts in a given department of a given university are preferably assigned to people who have already been working at that particular institution for many years, typically since graduation.

Are any reforms of remuneration systems underway? In which sectors?

Most fellows are not aware of any changes on remuneration systems. However, in certain countries and disciplines a lot of effort is invested on this subject, as it is considered an important factor towards attracting high-level researchers in rapidly developing disciplines. In particular:

- It has been realised that the link between performance and remuneration has to be reinforced. This has been already the case in private institutes and companies, where one can get a bonus for good performance. In certain countries there is an effort to introduce more dynamic career structures in public research institutes and academia as well, in a way that seniority and remuneration is largely based on merit. However, changes along these lines meet strong resistance from researchers who have been used so far to more traditional structures, where seniority is mostly determined by years of work experience.

- Moreover, there is a strong danger that one may exaggerate in the opposite direction, abolishing in practice fundamental rights of employees, including researchers. The demand for increased productivity often leads to work outside the standard schedules (often unpaid), as well as in undertaking tasks and responsibilities beyond what is officially demanded by the contract and recognised during appraisals. The lack of jobs in certain areas and the fierce competition for a position, make researchers very vulnerable when it comes to these issues.

- Transparency and fair treatment are considered essential factors for the success of any merit-oriented career structure. In addition, it is essential to have well-defined procedures, which also take into account the constraints that may exist within a system. For instance, the number of researchers that over-performs is typically significantly larger than the available “rewards” or possible promotions, and inadequate decisions
may lead to big disappointments and demotivation.

**Do researchers working in public bodies benefit from complementary social security systems and under which conditions?**

There has been a surprising large number of fellows who do not have sufficient information on the social security system of their own country. Nevertheless, the following observations are made:

- Most countries try to make adequate provisions regarding health insurance. There are of course variations on the level of coverage and complementary schemes may have to be subscribed to for obtaining full reimbursements, dental and optical care, special surgery, private hospitalisation costs, etc.

- The situation becomes worse when we pass to pension schemes, where, transferability of rights is a big obstacle. Often, mobile researchers have never been integrated to any pension scheme, as is also evident from their replies to MCFA surveys (“I am about 40 years old by now and between the various moves I never participated in any pension scheme”, “my host institute does not want me to join the pension scheme here and I can’t join the one in my home country because I’m not taxed there”, “pension contributions were heavily taxed when I tried to move them out of the host country”…).

It is also common that fellows may contribute financially to pension schemes from which they are not going to get any return. A good practice here comes from certain international organisations, such as CERN, where researchers can either transfer pension fund contributions to maintain previous pension schemes, or get fully reimbursed for all non-transferable payments.

- Maternity leave is usually not taken into account for young researchers, while there are additional problems with social security and unemployment benefits, often related to interruptions between contracts.

- Researchers seem to agree that, despite the many problems, social security coverage in the public sector is better than in the private one (where one has to pay a lot, for returns that are not always adequate).

- The need for an appropriate policy framework at a European level has been identified, based on transferability of rights (both regarding eligibility and entitlements), as well as global guidelines rather than individual arrangements. The development of information panels, with databases and help links can facilitate an appropriate information flow, which is currently missing. The MCFA is very active in this direction, which is seen as one of the main areas of responsibility of the National Groups.

**Are there any new trends and practices in career development processes?**

In view of the Barcelona objectives, it is surprising and rather disappointing that not many new trends and practices in career development seem to be initiated.

- Most fellows reply either that there are not really new trends, or that they do not know
of any. There have been some changes, however they are seen as “renaming” of old practices rather than new trends.

- To make matters worse, in certain countries there seem to be significant cuts in research funds and public spending, which clearly create negative trends that affect career development for researchers. The problem is more enhanced in fundamental research, where it is difficult to attract private funds, while in countries with low R&D there are no complementary opportunities in industry either.

- Proposals for changes that are put forward often face strong resistance from researchers themselves (mainly people who have made a career within the old systems and are trying to maintain their influence, but sometimes, also young researchers, who are suspicious of isolated changes that do not respond in a global and consolidated way to the need for reforms).

There are also positive steps, but mostly on a limited and rather slow scale. In particular:

- Although there is still no clear professional identity for researcher, the postdoctoral status is becoming recognised, and certain provisions are made. For instance, in the Netherlands, the national science policy council is setting up a kind of long-term track for scientists (veni-vidi-vice), while independent grants for different experience levels have been established (giving young scientist a fair chance).

- Concrete actions aiming at enhancing self-sustainability of research institutes and promoting links to industry are also being initiated (see Section 5: Public/private research).

- There is a very slow progress towards opening up the national career systems at a European level. In certain countries however, language, but also very low remunerations as compared to the rest of Europe are posing serious obstacles in this direction.

**Are there any quality assurance systems to improve the efficiency of research training?**

- Several fellows reply either that there are no quality assurance systems (except of the standard examinations) for obtaining an established degree, or that they are not aware of any. However, the fellows also acknowledge the effort made by the Commission to stress the importance of qualitative and quantitative indicators that could be used to monitor the successful implementation of training projects within FP6.

- A good set of practices has been established by certain institutes and international organisations with a long-lasting experience in the training of researchers. These for instance include:
  - Induction interviews, where training and work objectives (including those related to soft and transferable skills) are clearly agreed, defined and recorded.
  - Regular tutoring, but also access to a wide set of training courses (including academic, technical, language and management training).
  - Appraisal reports following regular contacts between the fellow and the supervisor; fellows are also asked to provide feedback on the quality of the training.
  - Internal reports, presentations and poster sessions (complementing the opportunities for participation in international conferences and of making
- Importance is given towards providing adequate technical, administrative but also social infrastructures which facilitate the integration of the researcher, while the rights and obligations of research fellows are clearly specified in the Institute’s rules and regulations.

It has also been found that maintaining strong links and collaborations with the home institute of the fellow ensures not only high training standards, but often, also career continuity.

- There are also few cases where concrete steps are taken at the national level. For instance, in France ethical contracts defining the Institute’s and the trainee’s rights and obligations have been introduced (“Charte des Ecoles Doctorales”, “contrats de thèse”), while new doctors are encouraged to reflect on what they gained from their research experience (“nouveau chapitre de la thèse”).

### Necessary new skills and competencies for researcher of all ages:

**How, when and where should they be acquired?**

A lot of importance has been given to the acquisition of new skills and competencies, especially transferable and soft skills that will enable a researcher to be adaptable and productive in any environment.

- The ability to be open-minded and flexible within different and rapidly developing research subjects is particularly underlined. This is closely linked to the capacity to collaborate within an international team, on multi-disciplinary projects and environments, while maintaining a strong independence and scientific personality. Familiarity with new technologies and modern infrastructures is an additional aim, including software skills (which are often an essential component in intersectorial interaction and technology transfer).

- Management and leadership skills are a top priority item, which will among others encourage an early independence for researchers. Patenting and appropriate exploitation of discoveries, but also the management of small budgets are considered very crucial.

- Presentation skills are also essential, not only for delivering well-structured scientific talks but also in order to better communicate with the general public and enhance the links between science and society (see Section 2: The public perception of a researcher’s career), including decision making bodies for funding and recruitment. In addition, excellent technical knowledge can be greatly enhanced by basic communication, presentation and language skills.

Concrete proposals were made regarding when, where, and how these skills can be acquired:

- This can be done via courses (internal, but also by external institutions, bringing together people from different environments), colloquia, seminars and workshops. On-the-job training and mentoring are extremely important.

- Life-long learning is essential since the needs within a knowledge based society develop constantly. However, new skills and competencies (especially management and
presentation skills) should be acquired early in the career, with further development at future stages.

- However, it has also been pointed out that it is difficult to acquire all these skills and competencies on short-term contracts (often host institutes do not see the need to make such an investment on a person that will soon leave, while fellows are often fully occupied with their projects and the search for the next job). The timescale and duration of the courses should therefore be adapted to the needs of the researchers.

**New and enhanced international training schemes (e.g. Marie Curie fellowships):**

**What is their impact for the career of a researcher?**

**What is the role of "mentoring" for the training of junior researchers?**

- The vast majority of fellows agreed that the impact of international training schemes (and in particular of Marie Curie Fellowships) on their career has been extremely positive. The opportunities that these schemes offer for pursuing ambitious projects while being integrated in a research environment outside their own country are considered invaluable, especially within a knowledge based economy and in view of a European market for research. Without these schemes, many fellows would not have access to the research facilities and infrastructures required for making important progress in their fields.

- Fellows consider appropriate mentoring for early stage researchers essential, both from the point of view of training itself, but also regarding contacts and career prospects. However, they consider that the amount and quality of the mentoring one gets depends too much on the institute and research group where one is working. Many of them believe that mentoring was “insufficient” and “unstructured”, while there were also cases where the fellows felt isolated.

- The main worry that fellows had, however, was “what comes next”. It has been pointed out by the majority of the people who replied, that while fellowships provide invaluable training and learning opportunities not otherwise available, they may leave people in an unclear career situation. A successful continuation depends on the project but also the strength and the contacts of the group where the fellow is working. However, a common problem is that the added value of mobility (international but also intersectorial) is often not recognised, both for reintegration but also for career advancement. Fellows would therefore like to have some provisions for support after the fellowships. Return grants are a good step in this direction, while the opening of FP6 at an international level is considered as a crucial improvement.
Section 4: Taking into consideration the profession/career of a researcher within the administrative systems: is there a need for a European regulatory framework?

The need for a European regulatory framework has been underlined by many fellows, and is seen as the only way to efficiently address the frequent lack of appropriate framework conditions, but also reduce the currently very large diversities among different national states. A common observation is that many problems are related to the fact that being a researcher is not considered as a profession, while it should be taken as such.

"Career systems" versus "systems of specific employment": what are the advantages/disadvantages for the career development of a researcher?

Within a knowledge based economy, there is an evident need for skilled, trained and well-equipped researchers, who can respond to the real needs of the society. This by itself indicates that there has to be a balance but also a pathway, between “career systems” and “systems of specific employment”. In other terms, we have to optimize between theory and practice, short and long term needs and career objectives, but also between the different demands in the various research sectors and the importance all types of research, namely fundamental, applicable and applied.

Career Systems:

▪ Their big advantage is that they allow researchers to exploit different areas of interest, thus gaining a more comprehensive view of the target, its results and its use. The researcher develops a broad knowledge and sense of cooperation, which can be transferred in different environments.

▪ Career systems tend to focus on longer term objectives, which, by their nature are more difficult to accommodate within systems of specific employment.

▪ However, there is also a danger that a researcher may lose focus and 'shoot off' wild targets, without obtaining a particular area of expertise.

Systems of specific employment:

▪ They have a focused area of expertise, allowing the researcher to excel and delve into it.

▪ They respond directly to the evident needs of a knowledge based economy.

▪ However, often the researcher may be unaware of the 'complete picture', especially given that some research fields are too specialised. Not all the skills of the researcher can always be put to use, while the “service” character of his profession may be too pronounced.

It has also been underlined that, in both systems, a major disadvantage is the uncertainty of finding an appropriate position. The lack of jobs in the research sector, caused mainly by irregular investment from governents into science, leads to a big waste of human capital. The problem is particularly evident within career systems, and often researchers try to build a future without having sufficient knowledge of the odds they are facing from one step to
Are there any regulations that govern the recognition of qualifications, seniority and professional experience of a researcher?

Is the issue of intellectual property taken into account?

The following observations have been made:

- There seem to be very large variations between different national states, regarding the recognition of qualifications, but also seniority and professional experience. In certain countries well-defined procedures do exist (often including exams or competitions at a national level), while it is in general stated that it is easier to recognise professional experience in applied disciplines.

- There are nevertheless certain criteria which are used (although with a different weight and degree of objectivity), as quoted in Section 3, namely: level of degree, years of experience after a university diploma, publications, citations, number of papers as first author, conference attendance, presentations, invited talks, teaching experience, official responsibilities including duties as thesis supervisor, time spend abroad, international collaborations, prizes or other special distinctions obtained, letters of reference by established scientists, access to European funds, patents, etc.

- There are no global guidelines regarding the issue of intellectual property, which is usually regulated internally within a local employment group. The patenting issue is also regulated between the institution/company and the inventor/employee.

- Fellows from certain Mediterranean countries made very strong comments against the lack of transparency and strict criteria, when it comes to academic positions. Local dynamics and personal connections often seem to prevail over qualifications and scientific integrity, while regulations are still frequently bypassed.

- It has also been pointed out that the distinction between research and other duties (such as teaching), including the specific qualifications required in each case ought to be clarified. A good researcher is not necessarily a good teacher and vice versa, thus there should be different selection requirements, as well as rules for career progression. A peer-reviewed teaching habilitation would also prevent false teaching merits.

How transferable is the recognition of seniority/merit between different institutions and sectors? What mechanisms exist? What needs to be developed and how?

Are there examples of "best practice"?

As underlined in the previous item, there are large variations in the recognition of seniority and merit between different countries, but also sectors and institutions. The need for global frameworks has been raised. In particular:

- There is a need to develop a system of recognition of seniority and merit, which will be based on transparent laws, rules, regulations, policies, practices and/or guidelines (which option will be chosen, would depend on the item under discussion, and to what degree it can be made specific). This system ought to apply to everybody and be
respected by everybody.

- A priority item along these lines is the correct equivalence between the university degrees of different countries. For instance there is often a paradox that a certain degree does not give access to postgraduate studies in a given country, but does so in another. An appropriate comparison and matching between the content and level of lecture programs would also have to be made.

- On many occasions there is no clear recognition of the added value of mobility, on the contrary a researcher is effectively penalised for having been outside his national system. The establishment of global guidelines will help towards resolving this problem as well.

- There is often a lack of communication between different research sectors, which makes it more difficult to appropriately appreciate the level of qualifications, especially regarding transferable skills. This, results in a downgrading of researchers when they move between different environments, implying that a large part of their skills will not be put to use. Bridging the gap between the different sectors (see Section 5: Public/private research), and emphasising the need for interdisciplinary and inter-sectorial research will significantly ameliorate the situation.

- Regarding examples of best practice, it is clear that in certain countries there exist well-defined procedures that could be studied in a more global context. Moreover, international organisations have a long-lasting experience in recruiting researchers from different countries but also disciplines, and as a result have already developed some comparative criteria and even frameworks, which can be very useful.

Is there a need to define the "researcher" or the "profession of a researcher"?

Would this be realistic and for which purpose should it be done?

The fact that researchers so far do not have a clear identity gives rise to a series of problems, which can be resolved by defining a transnational "researcher" status, which would specify both the profile and the profession of a researcher. Given that researchers have well-defined responsibilities, while their work boosts the economy within a knowledge-based society, such an approach seems realistic, although, especially for some countries, it would imply radical changes (which are however required).

A change along these lines can be justified by the following facts:

- The profile of a researcher must be clearly defined, especially given that more research needs, fields and specialisations are created every day. Such a definition will promote the understanding of the role of the researcher and the need of society to invest in R & D. Governments will be forced to establish a serious and long-term funding policy, while common situations where people are funded to "stay" and not really to "work" abroad, will be prevented.

- A professional identity for researchers will also allow them to have more control and responsibility on their work. It will also facilitate their access to research funds, which at the moment is limited and very dependent on their supervisors. The added value of mobility will be easier to recognise and reward.

- Recruitment practices, promotions and salaries will also become more adequate, uniform
There are currently many administrative obstacles associated with the lack of a clear professional status for researchers. Transferability of rights is a great problem by itself, and the same is true for issues of taxation and health insurance.

Private sectors that employ researchers who are still pursuing postgraduate degrees tend to abuse this by offering lower pay levels, not counting overtime, not providing appropriate access to costly equipment and all this while they still expect researchers to be highly involved in projects and deliver results by certain deadlines.

**When does a researcher stop being a student and become a professional?**

*(i.e. after his/her undergraduate degree, or doctorate, or equivalent level of experience)*

For most fellows, a researcher stops being a student and becomes a professional upon completion of the undergraduate degree. Nevertheless, the importance of ‘on the job’ training, but also life-long learning is essential within a knowledge-based economy. It is also clear that the experience level required in order to be considered as a fully-developed professional depends on the discipline but also the sector where one is working (academia, industry).

In particular, the following has been pointed out:

- Researchers have clear professional responsibilities, both in academia and industry. PhD students and post-docs often account for a very large part of the research production in universities, laboratories, but also companies, while they often have teaching and tutoring duties. It would be unfair therefore not to consider them as professionals.

- Having said this however, hierarchies and different levels of seniority clearly exist, and these also depend on the discipline and the sector where one is working. In applicable research, where the responsibilities are more well-defined, researchers reach more rapidly the lever of expertise required, while fundamental research is a slow process. Nevertheless, on the job-training and life-long learning are essential, in all professional environments.

- The establishment of appropriate employment and framework conditions for researchers will be greatly facilitated if their professional identity is recognised, already after obtaining their first university degree.

- However, researchers must also give constant proof of professionalism already from the early stages of their career, and offer to society enlightenment and new visions. This will promote in practice the establishment of an appropriate status and professional identity for them (which should be such as to address the current problems, rather than staying a name or title).
Do politicians fully understand the situation regarding Human Resources in Europe?

Is there a need to improve awareness at this level and how might it be done?

It is widely believed that politicians do not have a good understanding of the current situation and the future needs for human resources in research in Europe. This lack of understanding is evident by the following problems:

- Irregular investment in research in most of the national states. Despite the Barcelona objectives, funds for science are cut in many countries.
- Lack of concrete plans and visions, in alignment with the needs of a knowledge based economy, fueled by research and innovation. Many politicians tend to express only vague (and often controversial views) on research policy.
- Emphasis mainly given on short-term objectives, forgetting that today’s fundamental research is tomorrow’s applicable and applied one. This puts severe obstacles in stopping the brain drain to the USA and creating a competitive and strong research base in Europe instead.
- Lack of long-term job perspectives, leading to a huge waste of Human Capital.
- Lack of appropriate policies and framework conditions for research (evident especially by the problems that researchers face when moving from one country to another, or try to get reintegrated, after years of mobility).
- Most politicians tend to be concerned only about their own country (and voters) and neglect European issues. Unless this changes, we will not be able to speak about a European Research Area, but rather about mobile researchers moving around Europe according to several funding programmes.

The need to establish a better communication both with politicians, and decision-makers, but also with non-science specialists and the public has been pointed out as a fundamental condition to ameliorate the current situation. Ways to improve awareness have been discussed in Section 2: The public perception of a researcher’s career. Here, we would like to emphasise the following:

- The problems that have been observed are not easy to solve. For many fellows, this can only be efficiently achieved through a central body, such as the European Research Council, which should have direct contacts with the ministries of Research and Education in each of the national states.
- However, a big role falls on scientists themselves. We have to break the isolation that often exists from the rest of the society and try to explain what we are doing and why it is important (see Section 2 for concrete ways to do so). Public awareness of the importance of science and research is the key to also convince politicians of the importance to invest in it.
- The need to nevertheless find ways to put some pressure to politicians (through reports to European Institutions but also letters to the press) denouncing the current situation and emphasizing how imperative the need for a change has become, has been pointed out by several fellows.
Section 5: Public/private research - creating and reinforcing pathways for the development of the researcher's career

Are there differences in the working conditions and practices between public and private sector?

Generally speaking, there exist marked differences between the working conditions in these two sectors.

- From an economic point of view, the private sector usually offers better conditions, especially after a few years of working experience. In exchange for higher remuneration, however, the researcher often has to accept cutbacks on academic freedom and a working environment that is driven more by economic principles rather than the quest for knowledge.
- Industrial labs are often better equipped than those in academic institutions depending on public funds, and industrial researchers will usually not be asked to spend their time on loads of administrative work that is not related to their research (in contrast to what is common practice in academia).
- While in academia scientific productivity and quality is usually measured in terms of publications, in the industrial context the first thing that matters are patents. Intellectual property rights play a much more important role than in academic research.
- Once a researcher has obtained a permanent position in academia, it will be a position for life (although it may take a very long time to reach this level, passing through years of short term contracts and complete insecurity). On the other hand, the job security in the private sector very much depends on the overall economic situation and may not always be very well correlated to the actual performance of the person concerned. Difficult market conditions can potentially lead to cost reduction measures and layoffs.

Are such differences hindering inter-sectorial mobility? What kind of instruments could be introduced to create more career pathways between the two sectors?

How could personnel exchanges between academia and industry be enhanced? How could exchanges or training periods be mutually recognised and valorised?

The main obstacle to inter-sectorial mobility seems to be the lack of interaction between the research environments in the public and private sectors. More precisely, the following points were emphasized in the replies received:

Mobility from the Public Sector to the Private Sector

- Although there are noticeable geographic differences, overall there is a lack of true research positions in European industry, especially in SMEs.
- Given the long qualification periods in the academic system, researchers who have
managed to establish themselves at a public institution are usually not inclined to move
to the private sector, thereby giving up their job security and privileges that they had to
work for very hard, often making substantial sacrifices.

- In many countries (e.g. Spain, Germany) academic researchers are civil servants and
  therefore subject to restrictions when it comes to setting up spin-off companies or
  participating in the activities of private industry.
- There are also "cultural" obstacles: academic research is sometimes not very well
  perceived in industry since it may be considered too theoretical.

Mobility from the Private Sector to the Public Sector

- Current recruitment procedures in the public sector put a lot of emphasis on the number
  and quality of scientific publications, while they do not take into account achievements
  in industry in an appropriate way.
- Working in the public or in the private sector often requires rather different mentalities:
  while industry often hires scientists mainly because of their problem solving capabilities
  (especially SMEs), in the public sector researchers tend to be engaged in long-term
  research projects where the deliverables are not necessarily well defined from the outset.

Possible instruments to create more career pathways between public and private sector

- By introducing temporary exchanges of research personnel from the public to the private
  sector, especially for researchers at the early stages of their career, a greater awareness of
  the possible career pathways in an industrial environment could be achieved. For
  instance, in disciplines like physics, chemistry, engineering, etc. an optional stage in
  industry could be introduced in undergraduate as well as postgraduate study
  programmes, for a time period of at least 6 months (this is already reality in some
countries). The nature of the work ought to be clearly defined in order to avoid problems
  of IPR. At the post-graduate level such a programme would be feasible, provided that
  the research carried out in industry has some scientific value that the academic
  researcher may benefit from. The EU could play an important role in terms of financial
  assistance in order to make the programme attractive for the applicants and cover some
  overhead expenses to the participating industries.
- Similar measures could be implemented to stimulate stages of young researchers
  temporarily moving from the private to the public sector, perhaps for a shorter period of
  time (at least 3 months), with the idea to collaborate on specific research projects.
- At more senior level career changes (even temporarily) are usually more difficult,
  especially from industry towards academia. Nevertheless, a researcher at university with
  an excellent academic record could potentially be quite interesting to industry if he or
  she can convincingly explain the relevance of his or her work for the company.
  Exchanges could be facilitated if academic institutions could permit their staff to take up
  industrial posts on a part time basis whilst maintaining their academic careers.
- Personnel exchanges will be difficult unless both sectors change the way of recruiting
  people. Academic scientists have as priority the publication of scientific papers, and the
  relevance of the activity in the private sector is not always recognized for applying to an
academic job. The recognition of training periods or personnel exchanges is more a “cultural” aspect rather than a practical problem. Once a trend of collaboration to joint projects between academia and industry is initiated, the problem of recognition will be automatically solved, or at least attenuated.

**Are there other obstacles that hinder the creation of mixed careers?**

**Are there any examples of "best practice"?**

Apart from the issues already pointed out above (recruitment procedures that do not take into account experiences made in the other sector, lack of research positions in the private sector outside of large high-tech oriented companies) one further aspect distancing the two worlds is that not enough applied research is carried out in academia. Changing this situation could not only open ways for researchers willing to work for industry to find a job more easily, it could also help universities and research institutions to finance themselves, rather than being exclusively dependent on funding from public sources.

It has been noted that in certain Mediterranean countries, such as Italy and Greece, inter-sectorial mobility tends to zero, except perhaps in the medical field. In general academic careers, especially at their early stages, are unrelated to the “real world” of economic production or social development. However an effort to overcome these problems is made in Italy: Towards the end of their degree, Italian students must undertake certain projects: (For a 4/5 year Laurea these are typically in research and last for about 6-12 months, while for a 3-year Laurea, the projects are often very practical and last for about 3 months. Three-month projects are not necessarily paid, while longer ones may be financed through scholarships). The student’s work is usually based at the company itself, which facilitates the transfer of knowledge to industry. The students typically gain some experience and useful contacts for future jobs.

**Are issues such as patenting, IPR issues, fear of losing know-how, lack of valorisation, etc. affecting the communication and a closer co-operation between academia and industry? What could be done to solve this?**

- IPR issues and confidentiality definitely limit the communication between industry-academia, especially in the direction from industry towards universities and research institutes. In the opposite direction, a structural problem exists due to the lack of high-tech industries, which could benefit from academic research.
- Industry and even society as a whole do not pay enough attention to the generation of knowledge and technology transfer. The USA are world leading in this respect, simply by valourising the role of universities and recognizing the potential of research (including fundamental research) for the benefit of a private enterprise.
- In academia there is still a lack of information regarding IPR issues and how these aspects relate to industry. There also exist some common misconceptions in this respect.

Possible measures to enhance academia-industry cooperation

- Technology transfer offices should be created in all major universities and public research centres. They must play a proactive role in promoting innovation and its
A legal framework needs to be established which would allow the filing of joint patents by researchers in industry and academia.

Round table discussions and workshops involving researchers from academia and R&D personnel from industry could help to foster collaborations and partnerships.

An additional measure could be to involve industry in the sponsorship and the implementation of specific research projects, for examples by financing PhDs or post-docs.

Is there a lack of entrepreneurship in academia/industry? Possible new approaches?
How can strategic partnerships between academia and industry be best promoted?

It seems that there is indeed a certain lack of entrepreneurship in academia, perhaps also as a consequence of the “good old times”, when full time permanent research positions were plentiful and guaranteed. Nowadays, the new generations of researchers should be much more flexible and committed to entrepreneurship while pursuing their careers.

Academia suffers from a lack of information about spin-off opportunities and enterprise incubators. Consistent efforts should be made in order to simplify as much as possible the administration process for launching spin-offs from universities and public research centers. This is especially important in certain disciplines such as engineering or biology.

Researchers in academia should be better educated about “practical industry” problems and start to pay more attention to the needs and time frames of the private sector. A possible way to promote this aspect would be through meetings in universities bringing together academics and representatives from the private sector. Researchers should also be given the opportunity of "apprenticeships in industry". Prizes could be offered to the best student with the most brilliant ideas of industrial relevance, and so on. Another good example are job fairs, that is companies coming to universities to recruit prospective graduates and speak with students about the requirements of industry and the opportunities it has to offer.

A typical example of good practice in this direction exists in the UK. In particular, an initiative sponsored by the South East England Development Agency (SEEDA) includes the development of an “Innovation Centre” that encourages the creation of spin-off ventures by current and former students. For more details, see:

http://www.ukc.ac.uk/student-office/annualrpt/res.htm and

On the contrary, in Mediterranean countries there are very few cases of new enterprises created by academic scientists, and the flourishing of small biotech companies that has occurred in the USA and other European countries (Germany and Scandinavia mainly) is almost completely missing.

application/commercialization.
Opening senior posts of the public sector to private sector researchers and vice-versa: What is the reality? What are the trends?

What is the role of SMEs within this context? Are they more open to dialogue with academia than large enterprises?

- Undoubtedly, public-private career pathways at a senior level would provide a unique way to culturally enrich both academic and industrial research environments. Academia could benefit from a pragmatic view and re-focus part of the research to projects more likely to have a practical impact. On the other hand, by hiring affirmed academic researchers, industry could acquire important reference points in terms of rigour and depth of analysis.

- Openings of the public sector to private sector researchers are very limited, the main reason being that quite often the researcher coming from the private sector does not hold an extensive list of publications (even when he/she has a solid reputation). Furthermore, in some countries academia requires a whole set of procedures (such as the Habilitation) which can make it very difficult for a researcher to obtain such a position in the public sector. There are currently reforms under way in a number of countries which could potentially help to counteract such resistances.

- At the age of 35, a researcher can be considered already too old for changing his career path from academia towards industry. Private companies are often not ready to recognize that experiences gained within universities and public research institutes could be of some relevance for their specific needs.

Regarding the role of SMEs:

- Because of their small size, SMEs often cannot afford their own R&D activity, thus are more open to collaboration with academia, especially for medium-long terms programs. Also, SMEs may need support for short-term programs, but these typically are less attracting for academia as often they reduce to pure development.

- Only “high-tech” SMEs have the need to employ PhDs and they are generally more open to employ people who do not necessarily have the skills needed but are prepared to learn them (for instance a physicist with little or no experience in software). Larger companies make safer bets, also because they probably can choose from a wider pool of applicants, as they offer better conditions (salary, benefits, etc).

How can we increase the mutual trust between the world of industry and academia?

Should opportunities for researchers to attend trade and recruitment fares be created?

What ought to be the role of professional societies and are there examples of best practice?

- Everybody agrees that forums where academic researchers can meet with their industrial counterparts would be extremely useful in creating mutual trust and consequently favor the birth of collaborations/partnerships. Job fairs with active participation by industry should also be encouraged, although they might be more limited in scope since they typically involve Human Resources personnel, rather than
technical staff. However, it is also noted that, in general, academic researchers are not very keen on meeting people from industry; they are sometimes diffident and not well-educated about the needs of industry.

- Professional societies can play a very important role in helping researchers in their career paths. In particular, they act as a source for information, and they are especially effective in providing new contacts for future job opportunities, often worldwide. Some examples are the following:
  - IEE in the field of Engineering has recently launched the initiative “Professional Networks”. The idea of the PNs is to bring together professionals from the same areas of expertise, and to inform them about latest innovation, research results, etc. They also provide professional forums, which can help researchers to better understand the requirements of industry that are often the driving force behind innovation. Moreover, IEE provides a recruitment advertising service which can also help the researcher to get a feeling of the job market. For more information see http://www.iee.org.
  - DPG (Deutsche Physikalische Gesellschaft): To their annual meetings they invite researchers from academia and industry, head-hunting companies, etc. These are great shows of PR, which still may provide occasions for graduates/researchers to interact with people from the industrial or financial world.
  - Marie Curie Fellowship Association: The MCFA counts among its members top researchers both in the public and private sector. It is therefore uniquely positioned to address the career needs of researchers from many different backgrounds. The association has launched several initiatives aimed at promoting researchers’ careers.

**Are researchers equally well prepared for careers in industry as well as academia?**

**Is there a need for industry to take greater responsibility for the training of researchers?**

- The first question is rather controversial, depending on geographical factors and the discipline(s) considered. Moreover, the role of the lab/supervisor seems to be relevant in preparing a researcher for a career in industry. There seems to be consensus, however, on the fact that researchers who spend even a short period in industry during their academic training are better prepared for a future career in industry and certainly the transition from public to private sector will be smoother in such case. On the other hand, the opposite is not necessarily true, that is industrial experience is not always well appreciated in academic environments.

- Universities must play the primary role in the training of researchers. However, the private sector should be invited to contribute, even indirectly, to making the study programmes more relevant. In particular, the industrial/economic agents could be involved in defining the contents and methods of academic courses, which would also have the advantage of keeping the study programmes up to date. Furthermore, through in-kind donations, such as lab equipment, industry can support training programmes in academia and, at the same time, ensure that prospective employees will be better prepared to take up their working duties in industry.
Training at industrial sites is also important and already occurs, but the question is what direct benefit can a company gain from an inexperienced undergraduate (or even postgraduate)? In this context some incentives, like EU subsidies, might help. An indicative best practice example exists in England, namely the EPSRC industrial case-award. In this programme the formation of the trainees is carried out both in academic and industrial labs (with a minimum period in industry from 3 to 6 months).
Section 6: The contractual dynamic in research: from a predoc/postdoc fellowship towards an independent position. Possible evolution?

What measures are taken in the different countries to stimulate the development of Centres of Excellence, Graduate Schools and interrelated research training programmes?

Most fellows were not aware of any specific measures in their country in order to create Centers of Excellence, while Graduate Schools that provide a structured framework for postgraduate training don't seem to exist all over Europe. Some examples that were mentioned were the following:

- In the Netherlands Centres of Excellence are especially promoted and financed. On the other hand, the concept of graduate schools has not been fully developed in the Netherlands despite some initiatives that have been started in this respect.
- In Austria there exists a research funding programme called “K+”. Competence centres are founded for interdisciplinary research in places where there are already several complementary research institutions, combining and extending the existing potential. One example is the “KNOW Center” in Graz (www.know-center.at).
- Various EU Centres of Excellence are currently developing in Slovakia, among them a number of institutes of the Slovak Academy of Sciences. A new national Centre of Excellence “Slovak Biotechnology Center” is under construction.
- In Britain, there are quite a number of special Graduate Programmes and universities which are well known Centres of Excellence.
- The German Research Foundation (DFG) has an ongoing project of creating Graduate Schools (“Graduiertenkollegs”). There is now also an international version where German PhD students work side by side with students from other EU countries. The International Research Schools of the Max Planck Society have a similar concept. In a recent communication the German Science Council (Wissenschaftsrat) has proposed that doctoral training within structured graduate schools should become the norm rather than the exception.

Which alternatives exist at postdoctoral level to the limited permanent research positions?

How could they be better promoted?

What will be the evolution in this respect at Member State and EU level?

In most European countries the message has arrived by now that there is a need for change in the career structures for researchers, but change is happening very slowly. Mostly young researchers after their PhD are still forced to move from one temporary position to the next, often for a whole number of years, always hoping that one day they may be able to obtain a permanent position somewhere.

The replies received did not make reference to any true alternatives to the currently
available opportunities or mention any particular examples of best practice. However, it was suggested to radically change the system of postdoc/short term contract vs. permanent position as civil servant, as explained below.

Advantages and disadvantages of the presently available types of post-doctoral positions:

- Pure research fellowships (such as the Marie Curie fellowships within the EU’s framework programmes, or fellowships by many national funding agencies):
  - Since the fellow has no other obligations, she or he can concentrate completely on the actual research project, enabling her or him to achieve a high level of productivity in terms of results and subsequent publications.
  - However, this can also be a disadvantage, especially if a fellow survives on this kind of funding for a long time after the PhD: applications for permanent university positions usually require the applicant to have at least some teaching experience, some familiarity with administrative tasks normally also appreciated.
  - Fellows benefitting from pure research grants are usually not only freed from such responsibilities, they are often even excluded, thus making it very difficult for them to acquire the competencies that are later expected of them, should they ever manage to obtain a permanent position at an institution of higher education.

In order to remedy this problem, funding bodies should allow their fellows to take on a limited amount of non-research related duties (teaching, supervision of students, administrative tasks, all together not exceeding a few hours per week), and encourage them to do so (without making it compulsory). If this means that the fellow will receive an additional income from the hosting institution, this should not be a hinderance, and this extra incentive should not be removed by cutting down the original fellowship by the corresponding amount.

- Short term positions involving teaching and administrative duties from the start:
  - These kinds of positions have the disadvantage that they often don’t leave enough time for independent research.
  - Teaching tends to be on a very elementary level and often doesn’t allow the researcher to develop any creativity or to experiment with new teaching methods. Instead rigorous curricula have to be followed that leave little room for innovative approaches.
  - The administrative tasks that are expected of the researchers often consist in jobs that should normally be taken on by secretaries, accounting staff, etc.. In many institutions there is a constant lack of adequately trained non-scientific support staff for this kind of duties.

There is a third alternative, namely that of a post-doc position outside of academia:

- Temporary positions in industry or commerce, consisting of research and “training on the job”:
  - Such placements give the young researchers the opportunity to get a first hand impression of what industrial research is all about.
  - However, it is not so easy to return to a career in the university system after
a prolonged period outside of academia.
Post-doctoral experiences abroad

A postdoctoral experience abroad is becoming quite normal and, depending on the discipline, even more and more expected. The international experience gained through such research stays in a foreign country during one or two years is certainly most beneficial for the future development as a researcher, as far as scientific knowledge, contacts within the broader scientific community etc. are concerned. However, from the point of view of the actual career development it can also create serious problems when the researcher tries to establish her- or himself back in the home country. Naturally, these problems are more noticeable in countries where the recruitment procedure is such that local candidates and candidates who have close ties with the local staff get preferential treatment.

A number of funding organisations now offer return grants or reintegration measures to the researchers that they have funded for a stay abroad. Such measures can provide an incentive to research centers and universities to host returning researchers and thus give them a chance to find their place back in the system of their home country.

The following points have been raised in this context:

- In the case of individual return fellowships there is usually no problem to find an institution willing to act as a host, provided that the institution has no additional costs.

- The situation is different for measures such as the new reintegartion grants within the 6th framework programme. Here the idea is a lasting (re-)integration of the researcher into the national research system, and the reintegration grant (which doesn’t cover the researcher’s salary) only provides an incentive to favour the returning applicant over the locals, thereby providing a counter balance to the usual preference of local candidates in many instances. However, especially in countries where there is a real need for such incentives the legal framework or the realities of the system often make it difficult for applicants to fulfil the conditions for the application: institutions have to make a commitment to employ the candidates for at least two years which in some countries is legally impossible or very difficult, unless it is a permanent position.

- One example that was explicitly mentioned was the Ramon y Cajal programme in Spain, which was essentially designed in order to allow researchers who had left the country for PhD or postdoctoral studies to return and obtain a 5 year research contract. While the basic idea of this programme is not bad, there are a number of problems related to the selection procedure which is perceived as promoting endogamic practices and lacking transparency. There is also a big question mark regarding the future of the young researchers holding these positions after the end of the contract, since there are not enough permanent or long term positions available for all of them.

Lack of transparency of the recruitment procedures

- Another point that was mentioned in this context was the lack of transparency of the recruitment procedures for the academic system in many countries (as discussed in Section 3). Information about postdoc positions is often not advertised very much but only distributed among colleagues and friends, sometimes through subject specific mailing lists. The candidates for short term positions are normally decided on by a handful of people only, without the presence of a balanced recruitment committee, and
departments normally don’t have to justify their decision to any other entity higher up in the hierarchy.

- These comments apply equally well to positions that are funded from local sources, through national agencies and research foundations, but also through EU funding. For example, Research Training Networks are completely free in their decision who should be employed on network money.

How can a more continuous transition from temporary post-doctoral appointments to permanent positions be achieved?

The concept of “early independence of researchers” has been mentioned as a desirable goal in many replies. Independence should be gained gradually starting already during the PhD training and continuing through the postdoc phase.

- Young researchers during their PhD and postdoctoral training should be involved in the life of the department or the lab as full members, at least from a philosophical point of view.
  - Modulo technical limitations, they should get integrated in the running and the management of all projects just like their more senior colleagues, without, however, getting drowned under administrative tasks.
  - PhD students and postdocs should be allowed to apply for funding for their own projects.
  - They should be given permission to (co-)supervise students if they wish to do so and have the capabilities required.
  - If they want to teach subjects related to their research (and not only first year service courses), they should be allowed to do so.
  - The necessary administrative and legal support should be supplied for the organisation of scientific events or the initiation of collaborative projects with local companies.

- Learning to work in a team is of key importance for the development of a researcher career. Graduate schools that bring together PhD students, post docs and more advanced researchers to work together on a common theme are a good idea to achieve this goal. The German “Graduiertenkollegs” go in that direction and also allow for training in transferable skills.

- It goes without saying that the salaries of PhD students and postdocs should be appropriate, i.e. the importance that their research work has for the track record of the whole department or lab should be taken into account properly. Payment should be on the basis of work contracts including all elements of social protection that more senior colleagues benefit from, unless the person concerned prefers to receive a grant instead. In that case the amount of the grant should be high enough to allow the person to take out the necessary insurances, pension schemes etc. Grants can be an interesting alternative in the case of a short term placement abroad for a couple of months only in which case being subscribed to the national pension scheme of the host country, for example, would not make much sense.

- Another example that has been mentioned as an instrument towards earlier
independence of young researchers within the academic system is the newly introduced concept of the “Junior professorships” in Germany, a species of temporary positions for up to six years. While their teaching load is lower than that of their senior colleagues, Junior professors still have the status of “professors” within the university system. They can teach at all levels, supervise students up to PhD level, and they have the same voting rights as full professors in all committees. There are, however, a number of serious problems associated to the introduction of the Junior professorships. Having had an appointment as Junior professor has now replaced the "habilitation" as the standard eligibility criterion for a permanent professorship (instead of the habilitation), but there is no clear transition mechanism from the old system to the new one. As a consequence, a whole generation of young researchers who are now in the middle of the preparation of their habilitation are working for a qualification which has officially become worthless for an academic career. A further point of criticism is that the total number of positions at the research assistant/junior professor level has been drastically reduced in the course of the transition to the new system.

- There are also certain schemes for example from the German Research Foundation DFG that allow young researchers to apply for funding in order to build up their own research teams. This kind of funding is usually restricted to five years, which should be just about long enough for the person to get established and find a permanent position somewhere.

- Many post-docs at universities and public research institutions eventually decide to look for a permanent position in the private sector. A lot could be done in order to facilitate this transition. Researchers thinking of making the quantum leap out of academia could benefit from short term placements in companies or with other prospective employers during the summer months (when there are no teaching duties to take care of) in order to get acquainted with the different culture and to get a taste of “what it’s like”. Such “practicals” are usually offered only for people at an earlier stage of their career (at most PhD students), and they are normally not paid much if anything at all. Universities could support such schemes by allowing postdocs to take on such short placements while continuing to receive their regular salary, possibly reduced by the amount that the postdoc receives from the company or institution hosting her or him for the short stay.

At which point of the career should researchers enter permanent or semi-permanent employment?

Should the US system of tenure track positions be adopted in Europe? Are there similar systems in Europe?

Most respondents agreed that researchers should be in stable employment three years after the PhD at the latest. Many talented young researchers eventually leave the academic system against their will because they see no chance to obtain a permanent position within a reasonable time frame. On the other hand, positions are sometimes occupied by colleagues who are not active in research any more and whose overall performance is not excellent. While there is too much insecurity and uncertainty at the start of the career, the current system in many European countries assigning the status of “civil servant for life” to university professors may hamper the development of a career system that is truly based on performance.
The current situation could be improved by abolishing the status of civil servant for university professors while at the same time introducing a system of unlimited contracts that are subject to evaluation every five years. In case of a negative evaluation an adequate mechanism would be launched comprising various steps of reevaluation after shorter periods of time, and which could eventually lead to the person in question being downgraded or even laid off. If such a system were in place, universities could give unlimited contracts to advanced postdocs who have already spent two or three years in different places (possibly abroad or in industry) without running the risk of giving a permanent position to someone who later turns out not to be performing very well, since there would always be the opportunity to end the contract in case of negative evaluation.

Such a system would give young researchers the possibility to make long term plans for the future just like any employee in a company, it would allow them to engage in long term research projects and apply for funding running over various years. Of course such a system would not be without any risks, especially regarding the evaluation process. However, it appears that the advantages of such a system would outweigh the possible disadvantages that it might bring about.

A more flexible system should also allow researchers to change their employment profile over time. There may be times when a member of the department would like to work less (at less pay) while someone else would like to take on a few hours more. Over time someone might change her or his profile from that of a 80% researcher/20% teacher to that of a 40% researcher/30% teacher/30% administrator. Within the possibilities of the individual department all such changes should be possible. A system where each individual can decide (within certain overall limits) whether he or she wants to concentrate more on research, teaching, or administrative duties would lead to more job satisfaction and an overall improved work atmosphere and higher output.

**Should researchers be strongly discouraged from undertaking a string of postdoc positions (for their own good)? Should prolonged employment on temporary posts be illegal?**

The fixed term working directive at European level has been integrated into national legislation in many European countries. In the area of research it means that it is not normally possible to move from one temporary employment to the next (“postdoc hopping”) for an unlimited number of times.

In this context the following points have been mentioned:

- Exceeding the maximal duration of temporary employment is usually possible under certain conditions. However, universities and research institutions are often reluctant to issue contracts in such cases for fear that they could be obliged to issue an unlimited contract to the person concerned in case the reasons for making it a temporary contract are not legally “water tight”.

- In Germany, the introduction of the new law on temporary work contracts in the public sector has led to massive protests from the side of the research community, because the new law basically means that a person who has not found a permanent position within 6 years of the PhD has to leave the academic system for good (the period of 6 years can be
extended depending on how long the person has taken to finish the PhD or has been employed on temporary contracts before the PhD). There are ways to circumvent the new law, but the basic philosophy is that young researchers should either get a permanent position rather quickly after the PhD or get out of the public sector and try their luck elsewhere.

The overwhelming majority of fellows who have replied to the questionnaire are against legal measures limiting the maximum total duration of fixed term contracts. Instead of introducing yet another law making the system even more rigid than it is already, more efforts should be spent on increasing the supply of unlimited contracts, while at the same time researchers should be well informed about the risks that a long sequence of short term contracts could bring about. Instead of telling young and talented people to leave the system simply because their time is up, alternative career pathways should be shown up. Training in complementary skills should be provided that would allow people to move to a different area if they themselves decide that the risk of continuing their career on insecure short term contracts is too high.

How does the transition from post-doctoral to permanent position influence the readiness of researchers to start a family? Are women more affected by this than men?

In most countries in Europe, the transition from post-doctoral positions to more stable employment situations occurs at a time when young researchers might want to start a family. Researchers in general (just like many other professionals who have very demanding and time consuming jobs) tend to postpone the creation of a family until their late 30s or even later than that. The reasons for this situation are multiple:

- Eligibility criteria for appointments based on physical age (as for example at the CNRS in France) rather than experience can make it rather "dangerous" to have a child before having obtained a secure position.
- Moving from place to place, never knowing where the next job will become available (and often not even in what country) is not very conducive to a partnership, let alone the raising of small children. Many partnerships do not survive the years of uncertainty and the impossibility of any long term planning, especially if both partners are interested in pursuing their own career.
- Even on a long-term or permanent position can it be very hard to raise a family, especially for a women. Entire nights spent in the lab or in front of a computer screen belong to the past when there is a baby to take care of, unless a supportive partner is prepared to make concessions as well. However, many men still believe that it is in the nature of things that women take care of the offspring while they take care of their own career advancement.
- Universities and companies should provide a favourable environment that makes it possible to combine a research career with the joys and obligations related to family life. Dual career services should help young couples to both stay in adequate employment if one of the two moves to a new job. Flexible working hours for both mother and father would allow parents to spend a reasonable amount of time with their children. Part time arrangements as long as the child is small could also help. The presence of a child care
center on campus or near the premises of the company would allow parents to spend some time with their children during extended lunch breaks or in between experiments. The opening hours of these child care centers should be adjusted to the work schedules of researchers and not follow the usual 8-5 schedule.