



Reply to the Commission Communication “More Research for Europe - Towards 3% of GDP” (COM(2002) 499)

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Following the decision of the 2002 Barcelona European Council for an increase of the R&D investment in the EU from 1.9% of GDP in 2000 to ~3% in 2010, the Commission has identified the main objectives to be pursued in a wide range of policy areas. The resulting Communication has been studied within the Science Policy Group of the Marie Curie Fellowship Association by N. Brambilla, J. Dando, M. Lola, G. M. Maggio and D. M. Meyer. In this document we present our observations and a set of proposals which fall under the following headings:

- Optimal use of available resources
- Establishment of appropriate framework conditions based on equal opportunities and transferability of rights
- Stimulation of interest from the private sector in R&D
- Opportunities for life-long learning, information flow and development strategies

1. Optimal use of available resources

In order to further encourage investment in R&D it is important to demonstrate

- an optimal use of the already allocated resources, with a minimal percentage of “waste”;
- a significant long term “return” from the R&D investments.

However, our experience is that these criteria are not fulfilled. On the contrary, we observe that:

- (i) There is a significant waste of Human Capital in R&D, due to the lack of opportunities for either permanent or long term employment of researchers, both in the public and the private sectors. While short term fellowships encouraging mobility are a very good measure to promote the internationalisation of European research and the transfer of knowledge and technology, more opportunities for the long term career development of experienced researchers who are beyond their initial post-doctoral phase must also be created. The current lack of such opportunities leads to highly qualified scientists leaving their field of research at a relatively late stage of their career, which not only means a loss of investment but also a strong discouragement for the younger generation to consider a research career in the first place.
- (ii) This dilemma is aggravated by the fact that private companies usually give preference to younger applicants, meaning that more experienced researchers who have undergone long years of specialised training often have to compromise with options that are well below their capabilities and competencies, and where their scientific expertise and their transferable skills are not used at full potential.
- (iii) In some countries, and particularly those with the lowest R&D intensities, there are very few opportunities for employment outside of academia, especially in the private sector. This situation becomes even more worrying in view of the EU enlargement which will amplify the already existing big differences in R&D intensities throughout the Union.

- (iv) The need for immediate results (and returns) often leads to short term projects, while the long-term perspectives are lost. This happens not only to scientists pursuing research in an industrial environment, but also in academia and research institutes. Mobile post-doctoral fellows are often constrained in their research by the necessity to publish as much as possible in a short period of time in order to be able to obtain follow-up employment. In addition, many researchers do not enjoy sufficient freedom in the choice of their projects due to the restricted and unbalanced availability of funding, with negative long-term effects.
- (v) Researchers without a permanent position often do not have the opportunity to apply for funding of larger scale projects, even though quite often they effectively act as (unofficial) co-ordinators and driving forces for the success of such projects. This is a practice that is more than discouraging for the individuals concerned and counter productive to the career development and the professional establishment especially of younger researchers.
- (vi) We often observe a problem in the “duplication” of already existing work, due to the lack of proper information flow especially across scientific disciplines and subject areas. Interdisciplinarity and collaborations in a more global context need to be further encouraged. We also observe that funds are being concentrated on certain domains of research while other equally important areas receive little or no funding.

Proposals:

- *Encourage the long term/permanent appointment of experienced researchers in R&D both in academia and industry.*
This does not mean that we support academic systems where very early tenure is granted to young scientists immediately after their PhD, which tend to be especially discriminatory towards more senior persons. However, national Research Ministries have to realise that the lack of long term perspectives inevitably leads to a decreasing attractiveness of research careers, which ultimately will be detrimental also for the economic development and well-being of a country. Industry should become more aware of the high potential of experienced researchers that they miss out on by focusing too much on young applicants. Special programmes promoting the mobility of researchers between academia and industry especially for senior scientists could help to foster such an awareness. To some extent the Marie Curie Fellowships for the Transfer of Knowledge fulfil this aim. More programmes along these lines on national level should be implemented.
- *Initiatives to encourage the appointment of mobile scientists to longer term positions.*
The new reintegration grants in the 6th framework programme appear to be a step in the right direction. Other international funding bodies promoting the mobility of researchers (e.g. the European Molecular Biology Organisation, EMBO, or the Human Frontier Science Program, HFSP) as well as national organisations (e.g. Humboldt Foundation, Gulbenkian Foundation) might consider creating similar programmes.
- *Encourage early independence of researchers.*
Young researchers holding temporary positions should not be excluded from applying for funds for their research projects simply on the basis that they do not have a permanent position. On the contrary, young scientists should be encouraged to take over the responsibility for larger projects at an early stage, if they are ready to do so. More opportunities should be created for excellent researchers to build up their own research teams, which will enable them to construct a scientific career after an initial period of training and mobility. In this context the new Marie Curie Grants for Excellent Teams or the grants within the

Emmy Noether Programme of the German Research Foundation, DFG, should be mentioned as good examples that deserve to be copied not only by other funding bodies, but also by national governments.

- *Recognise that the performed research must have a fundamental scientific importance and a long-term strategic vision, in addition to its potential short-term return.*
In particular, institutions should provide working conditions that will allow researchers to invest in more ambitious and therefore longer-term projects, rather than working only on topics with immediate returns. The focus needs to shift from "projects and deliverables" to "programmes and milestones".
- *Identify areas where long-term investment should be promoted.*
From a first view, it appears that small enterprises will inevitably have to promote projects with a short-term return, while academia, public research institutions and larger companies have the capacity to also concentrate on longer term developments. There is a need for a careful mapping of the current situation in the different sectors and scientific domains, and for a strategic foresight regarding the future demands that are to be met.
- *Profit in the best possible way from the already existing knowledge, not only by stopping the drain of highly qualified people out of Europe or into non science related jobs, but also by a serious restructuring of research in Europe.*
Interdisciplinary research and large-scale collaborations should be further encouraged (as is already happening within the 6th Framework Programme). Exploratory projects that may lead the way to new developments but do not come with a guarantee of success deserve more support in order to foster an innovative spirit and a greater preparedness for risk taking among European researchers.

2. Establishment of appropriate framework conditions based on equal opportunities and transferability of rights

Statistics at an international level indicate that, while women are very well represented among university students and at the early stages of a research career, they seem to be dropping out as we pass from junior to senior categories. Regarding the mobility of women at the European level, data presented in the report on "The participation of women researchers in the TMR Marie Curie Fellowships" indicates that, for most countries, the proportion of women applicants was significantly smaller in category B30 (postdoctoral level), than in B20 (doctoral studies), with the exception of Belgium, France and Ireland (where however the B30 applicants are relatively younger, and therefore more mobile in comparison to those from other countries, such as Germany).

The leaking pipeline of women researchers should not be seen only in the context of gender as such. In many respects it is triggered by the difficult situation of researchers who have a family. The fact that women are often much stronger affected by these problems is mainly due to the traditional structures that we live in, where the responsibilities for child care and housework are not equally distributed among men and women. Improving the situation of researchers with family will also do a lot to keep more women in research. It will also increase the number of women participating in transnational mobility programmes, where single researchers are at a clear advantage as compared to those who need to take into account the well-being of their families.

Resolving problems of equality is in general imperative. As stated in a recent OECD report on industrial sustainability, 'no matter how wealthy, a society fundamentally lacking in social equity cannot be sustained'.

A further point that is not completely unrelated to the above are the problems associated with the transferability of rights (to be applied when researchers move between different countries or between the private and public sector) and the absence of a global framework on social benefits. Quite often the disadvantages that result from this situation are so discouraging that researchers abandon their work, which is by nature closely linked to mobility, and look instead for more secure solutions.

Proposals:

- *Reinforce equal opportunity policies.*
While the creation of fixed quotas for women may not be the right way to achieve the goal, recruitment committees should commit themselves to ensuring a fair representation of women in job interviews and on short lists for funding. An important step towards this objective would be a stronger representation of women in the selection committees themselves. A close monitoring of the percentage of women in the various sectors and on the different career levels should take place so that special measures can be taken if needed in specific areas.
- *Create more career opportunities for couples.*
While many companies and academic institutions in the US make an extra effort to find adequate employment for the partners of newly appointed staff, this is rarely seen to happen in Europe, especially in academia. More needs to be done in this respect. At the universities "Dual Career Advice Bureaus" should be created that help the partners of new staff members to integrate into their new environment not only socially but also professionally.
- *More family friendly working conditions.*
The working conditions of researchers should be made more compatible with family life. This includes the creation of more child care facilities whose opening hours follow the work pattern of the parents and are available already from the first year of infancy. Academic institutions and companies should be encouraged to offer such facilities on or close to their premises, especially in the case of very small children. This would allow the parents to spend some time during the day with their children, for example during an extended lunch break. Flexible working hours are a must in order to make a research career and family life more compatible. The provision of family friendly working conditions should become part of the selection criteria for the Marie Curie Host Fellowships.
- *Provide proper global frameworks that ensure the transferability of rights at an international level.*
On an intergovernmental level, a stronger harmonisation of the different national social security systems and a closer collaboration in matters of transferability and portability of social benefits must be encouraged. This applies in particular to the transferability of pension rights and the portability of unemployment benefits. Especially in the case of short term mobility, researchers should have the possibility to stay attached to their own national pension scheme. In the case of the associated candidate countries, more bilateral or multilateral agreements must be concluded in order to avoid the situation where mobile researchers from those countries are obliged to contribute to the national social security system of their host country without being entitled to fully benefit from it.

3. Stimulation of interest from the business sector in R & D

In order to persuade companies and industries to invest in R&D, it is important that the national governments take a leading role towards achieving the goals of the Barcelona European Council. It is clearly unlikely that industry will invest in research in a country where the importance of R&D investment is not properly recognised by the government, and where the knowledge infrastructure is under-supported and lacks entrepreneurial-driven innovation.

A feasible strategy therefore would be to try and involve all the different partners in the science funding system, namely industry, the national governments, and the EC, in a common effort to stimulate R&D and promote co-funding of academic centres of excellence.

Proposals:

As a first step, pressure must be put on countries with large deviations from the average R&D indices to start gradually increasing the contributions (implying that the various trends and “gradients” must also be carefully monitored). Based on the current state of affairs, national targets for R&D investment should be set up, together with concrete plans detailing the measures to be taken in order to achieve these targets. Once such investment plans have been drawn up, non-compliance could potentially involve the charging of fines by the European Commission as in the case of countries exceeding the deficit limit as fixed in the stability pact.

In addition, the following actions can be envisaged:

- *Creation of research centres co-sponsored by industry, national governments and the EU.*
These centres would be located within academic sites and conduct research programmes that are jointly discussed with industry and government representatives, under independent audit and assessment. These co-funded research centres should cover the whole spectrum of scientific activity and not be restricted only to applied and/or exploitable research priorities.
- *Creation of a programme which rewards companies hiring professionals with a demonstrated academic record in research.*
Such a programme could be supplemented by the establishment of a set of annual country-specific awards bestowed upon companies producing the best patents or publications.
- *Providing fiscal allowances for every Euro spent in R&D by the private sector.*
While in some countries programmes to promote investment in R&D through fiscal incentives are already in place, this is not the case throughout the Union.
- *Creation of an EU fund-matching program for private investment in academic research.*
In such a scheme, for each Euro spent by private enterprises in academic research, an equivalent amount would be given by the EU to the research institution.
- *Ensuring an appropriate distribution of funds between the public and the private sector.*
For instance, a possibility is that projects where the financial contribution of the private sector is significant also receive public funding.
- *Imposing strict audit control and accountability (as described in the ERA and FP6 documents).*
Strict financial control will ensure the optimal use of funds flowing from the public to the private sector in order to support R&D.

4. Opportunities for life-long learning, information flow and development strategies:

The first step towards addressing the growing contribution of science to our society and economy is the continued education of highly skilled graduates (a most important focus of knowledge transfer). This was highlighted in a recent report by UK Universities.

Obstacles to the transition of academic scientists into industry and vice versa, and to the ability of academics and industrialists to properly interact with each other, are often due to their vastly differing professional and cultural backgrounds. Academic scientists are often unfamiliar with the realities of customer-oriented product development (strategic development, necessity to protect the generated information, legal issues surrounding research), while researchers having spent a long time in an industrial environment often find it difficult to

understand the internal unwritten "laws" governing academic research. This situation of mutual lack of understanding may in turn prevent industry from investing in R&D, bringing us back to the previous section.

Cultures that successfully promote close interaction between industry and academia, commercialisation of information and continued generation of high quality research, are characterised by several key factors:

- Scientists recognise that their data and results can be of commercial value to outside private enterprises, and are aware of patent procedures and the necessity to patent-protect their inventions.
- Scientists are often educated and advised by independent bodies that provide professional support in matters of taxation, legal issues and business-development aspects, and that maintain close ties with academic centres.
- Scientists, where required, also have some qualification/training/experience in management strategy or business issues.

Proposals:

- *Creation of more Technology Transfer Offices.*
In some countries, such Technology Transfer Offices already exist. They are run by professional staff who can implement, understand and communicate the necessary information to the academic community. More such agencies are needed in order to stimulate the interaction between academic researchers and the private sector.
- *Distribution of Commission guidelines on IPR (Intellectual Property Rights) within academia.*
Academic researchers need to become more aware of IPR issues and know how they can protect their intellectual property. At the same time they should know what are the limits of such protection.
- *Financial incentives for the creation of high-tech spin-off from academia/industry, promoting the commercialisation of new technologies.*
Such incentives could be given in terms of start-up grants from national or European funds, or by granting a temporary tax relief.
- *Continued training of academic scientists in centres of excellence.*
Such training could consist in short term courses or block seminars, but also in distance learning modular courses. The areas covered should include subjects like business law, enterprise creation and development, financial and customer market driven strategy, and team management.
- *Creation of a sabbatical programme for researchers in industry and business.*
Such a programme would enable scientists working outside of academia to return to an academic environment for a certain period of time (with the option of working part-time), in order to conduct research and possibly pursue a PhD. The funding for such a programme should ideally come from both private and public sources.

Please send comments to:

Marie Curie Fellowship Association (aisbl)
c/o Bureau des Relations Internationales
Université Libre de Bruxelles
28 avenue Roosevelt
1050 Bruxelles
Belgium