Initiative for Science in Europe

Initiative for Science in Europe (ISE)
Response to the Consultation on the ERA Framework

November 2011

Science needs effective framework conditions to flourish and to maximise its contributions to achieving economic prosperity and solutions for global challenges. Scientific activity has always been international, therefore research policy needs to go beyond national borders as well. As such we appreciate the continuous efforts towards a fully-fledged European Research Area (ERA) and welcome the current policy initiative of an "ERA framework" and the current consultation of stakeholders.

The **Initiative for Science in Europe (ISE)**[1] is an independent platform of European learned societies and scientific organisations. We are committed to help with achieving this ambitious aim by providing strong independent scientific advice in European policy making.

SUMMARY

Our written response to the consultation on the ERA Framework is structured along the five proposed broad based subject areas. First, however, we would like to put special stress on three cross-cutting issues which are of high relevance for ERA and beyond:

- **Stronger involvement of scientists and scientific societies in the development of research and innovation policies at the European level is needed.** An inclusive approach leads to policies that are more balanced and also more widely accepted. The expertise of active scientists is needed to take into account the variety and complexity of the European research and innovation architecture and to make instruments more adapted to the way science operates.
- **There is a need for a better understanding of innovation as such and the contribution of ERA to innovation.** The innovation process is non-linear and more complex than just a chain from idea to market. Innovation is about a substantial positive change rather than only modest incremental improvement. Strong investment in curiosity-driven research is a driver to innovation and the only way to the real breakthrough discoveries that are needed.
- **We need to tackle inefficiencies resulting from fragmentation of research in Europe and the lack of coordination.** The focus of the European Research Area should be on raising the efficiency of the instruments and infrastructures and exploiting the strengths of Europe as a whole.

[1] http://www.i-se.org

1. Researchers. There is no way to create a knowledge-based economy and society without highly qualified scientists. To be attractive for the best brains, Europe needs to provide a stimulating and attractive environment and improve the work conditions for researchers. To that aim, many initiatives have been launched such as the European Charter for Researchers, the supplementary pension fund or the scientific visa package. However, not all researchers are reached by these measures and progress with implementation is slow. ISE recommends to improve these instruments and in particular to extend their scope. There is a broad consensus on the overall aims in human resources policy in R&D. Now it is time for action.

2. Cross-border Operation of Research Actors. Science does not know borders. Much of its potential is lost if funding puts restrictions on scientists by allowing them to collaborate within one country only. First priority should be given to science-driven solutions at the European level, following the example of the European Research Council (ERC) which has proven to be highly effective. As a second approach, cross-border national research funding and increased efforts to harmonise application rules should be developed further. Instruments that are set up in a top-down approach such as the Cooperation or Grand Challenges Programme and JPIs will highly benefit from complementing them with a bottom-up approach. ISE would like to see a focus on instruments and platforms that are thematically open and driven by researchers.

3. Research Infrastructures. ISE invites the consultative board to re-think and strengthen the involvement of scientists in the process of defining and developing the future research infrastructure strategy in Europe. Future challenges include prioritisation and implementation of research infrastructures, updates of the ESFRI roadmap and synergies between European and national actions. The focus should be on raising the efficiency of research infrastructures and on sustainable funding commitments. ISE also sees a contribution of ERA in facilitating user access to research infrastructures in Europe. It is essential not to forget the human factor: without top, well-trained scientists, scientific managers and technicians, equipment cannot be used properly and large infrastructure investments cannot be exploited. Therefore attractive conditions and also high-quality training need to be provided.

4. Knowledge Circulation. Policies that can improve **knowledge transfer** should concentrate on the creation of appropriate environments for knowledge transfer, improvement of the understanding and application of the knowledge transfer process and development of incentives.

Several of ISE's members and their national member organisations are editors and publishers of scientific journals. ISE suggests that **advantage be taken of the expertise in scientific publishing that exists in the learned society publishers**. Debates about open access should not be disassociated from the many consequences that changes within the current publication system will have. Editorial costs have to be covered. Learned societies provide many services that are currently linked to journal revenues. In the absence of these revenues other funding, the sources of which remain unclear, would need to be found to maintain these services that are crucial for science.

5. International Dimension. Europe should develop a stronger framework for international cooperation to pool resources and participate in major global initiatives. Closer interaction of the Strategic Forum on International Cooperation (SFIC) with scientists and scientific societies is needed. Within the framework of development cooperation, when private sector involvement is expected to be marginal, the EU should not only engage in providing funding pure research activities, but also innovation and development.

GOVERNANCE OF ERA AND CROSS-CUTTING ISSUES

Stronger involvement of scientists and scientific societies in the development of research and innovation policies at the European level is needed. An inclusive approach leads to policies which are more balanced and also more widely accepted. The expertise of active scientists is needed to take into account the variety and complexity of the European research and innovation architecture.

Consultation of stakeholders helps with identifying and preventing potential problems and finding innovative solutions. That way, implementation of measures will go more smoothly and instruments will be more effective and more adapted to the way science is run today.

The most successful initiatives at European level, such as the European Research Council (ERC), have been developed in a joint effort of policy makers and the scientific community. **A partnership of all stakeholders and scientists is essential to convince decision makers when European solutions are needed.**

Increased cooperation and political action at the European level require in particular a strong role for pan-European stakeholders. Stakeholder involvement should commence with forward-looking activities, play a major role in the design of policies, the implementation phase and also accompany the evaluation phase to assess whether instruments are effective.

One example is evidence-based policy making: The way a study is conceived and questionnaires are designed has an influence on its results as much as the interpretation of the results has on outcomes and conclusions. Therefore studies relating to science policy should always be developed in interaction with scientists.

There is a danger that those stakeholders with stronger voices, more money and better organisation are more present in the political debate than other communities. A particular concern is the financial scarcity of several of the key ERA stakeholders, in particular the grassroots organisations which puts serious limits on their ability to contribute to the policy development of ERA. To make use of the potential that these organisations have as the backbone of ERA, we need to find ways to allow them to organise themselves, for example through flexible financial support of policy workshops or other policy related activities.

Also stakeholder involvement needs to become more transparent. It is important that a register of Commission expert groups will be comprehensive and kept updated without exceptions. It should also become explicit which groups the Commission is planning to set up and on which grounds experts are selected.

Innovation has become central within EU's policy and the Innovation Union is one of the seven flagship initiatives within the EU's overall strategy Europe 2020. Different definitions and approaches to innovation have been suggested[2]. What they have in common is that innovation is about a substantial positive change rather than only modest incremental improvement.

It should be recognised that the innovation process is more complex than just a chain from idea to market. Research in ERA as elsewhere is thought of only as part of the innovation

[2] See for example: Creation and Transfer of Knowledge – The Critical Need for Closer Ties Between the Academic World and the Private Sector. Report of the Royal Swedish Academy of Sciences, Committee for Research Structure, 2011.
OECD Oslo Manual, Proposed Guidelines for Collecting and Interpreting Technological Innovation Data
http://www.oecd.org/dataoecd/35/61/2367580.pdf

chain. This policy incorporates a view of innovation in response to societal challenges which is very limited in scope. It adopts what is called in Science and Technology Studies the "linear" approach, in which basic research leads to applied research, then to inventions and finally to innovation. According to a long and broad base of evidence on how science is useful to society, this is not how innovation normally uses science[3]. In contrast, most research shows that the mechanisms of translating research into practical applications are non-linear and not predictable at the funding stage. In this context, there should be a general recognition of the importance of good basic research for the economy and a focus towards funding the strongest in intellectual terms. It is important that funding be directed toward the long-term future health of research and not only toward short-term goals.

The grand societal challenges will not be solved by incremental improvement of established methodology and knowledge. Strong investment in curiosity-driven basic research is the only way to real breakthrough discoveries that are barely needed.

The research and innovation system is heterogeneous and has many levels and dimensions. Innovations often emerge from practical experiences, and research contributes only afterwards to help select and identify those that merit further elaboration, modelling and diffusion. In other cases, discoveries of basic research give rise to unexpected innovations and needs for further development. This heterogeneity is even more complicated in social policy, where objective criteria of what is a desirable innovation is often controversial.

Currently much of Europe's potential is not harnessed because of the fragmentation of the research landscape. Funding bodies and economic strategies are still nationally oriented and barriers to international collaboration persist. Research institutions and companies are often primarily encouraged to cooperate at the national level which may not always lead to the best and most productive pairings.

The focus of the European Research Area should be on raising the efficiency of the instruments and infrastructures and exploiting the strengths of Europe as a whole.

1. RESEARCHERS

There is no way to create a knowledge-based economy and society without large numbers of highly qualified scientists. By 2020, Europe needs at least one million more researchers[4] if it wants to be the most competitive knowledge-based economy in the world.

The reality is that the working conditions of a research career are often unattractive. From the very early stages, recognition of the profession is lacking. For instance, PhD candidates often do not have work contracts, are inadequately paid and lack the basic social security and protection of a full-time professional. Research is a demanding creative process and, for it to yield innovative outcomes, adequate working conditions constitute the first step towards ERA.

More needs to be done to ensure the compatibility of family and professional life. Also the increasing phenomena of dual career couples must be taken into account to retain and attract the best researchers for careers in Europe.

---

[3] See for example: Salter, A.J, and Martin, B.R. The economic benefits of publicly funded basic research: a critical review. Research Policy 30(2001) 509–532

[4] Innovation Union Competitiveness Report, European Commission 2011; page 88

One of the most important features in making a science career attractive to talented individuals is that it offers good prospects for long-term career development. Key to a unified career structure is the necessity for a competitive and transparent selection process for academic appointments with the steps required for career progression clearly outlined from the start. The point at which independence as a researcher is achieved should also be clearly defined. Furthermore, it is imperative that available positions are announced publicly all over Europe and not only at a regional or national level.

We would like to highlight the importance of Marie Curie actions and the European Research Council as integral components of the ERA. They have been highly successful in promoting good practice and play a key role in making the ERA more attractive.

In the last years, a number of non-funding instruments have been developed to address structural weaknesses of the ERA. However, these instruments have yet to bring about the results sought. They need to be improved and their scope expanded:

- The **Scientific visa package** is designed to attract foreign researchers work in the EU by introducing a fast-track admission procedure, but it explicitly excludes those who come in as doctoral candidates[5]. The EU should re-consider amending this measure if it wants to attract researchers from abroad.
- **Open recruitment:** The EURAXESS-Jobs database is unfortunately limited in its uptake. It is not yet sufficiently user-friendly for recruiters and group-leaders. Considerable improvement is necessary. Increased coordination with institutional and national job-databases should be sought.
- **Pensions:** The initiative of a European supplementary pension fund is limited to researchers from the participating institutions. A broader solution is necessary to ensure that highly mobile researchers on short-term contracts can all claim their pension rights for entire work period.
- **European Charter for Researchers and Code of Conduct:** It is still not well diffused and not sufficiently recognised. The Charter should be discussed in all research institutions, funding agencies, ministries and administrative bodies and should be used as a guide to institutional reforms.
- **Portability of Grants:** Some of the main funding agencies have agreements to allow portability of grants, but it is not yet established as a universal principle. Much more needs to be done. Accompanying measures are needed to prevent adverse effects caused by brain drain (for example a compensation fund if mobility patterns turn out to be uni-directional).

2. CROSS-BORDER OPERATION OF RESEARCH ACTORS

Science has always been international. The success with the European Research Council shows that effective funding at pan-European level is possible with bottom-up mechanisms that are recognised and established in a joint effort of policy makers and the scientific community. As such, we would like to see more research funds be redirected at the European level.

The overall political reality is different: EU level funding is just a small part of all research funds and a substantial shift cannot be expected in the coming years. Cross-border operation of national research funders, therefore, seems a reasonable way to overcome some of the bar-

[5] Eurodoc Recommendations for admitting non-EU researchers.
http://www.eurodoc.net/files/2010_Admission_Non-EU_Researchers_Recommendations.pdf

riers researchers are confronted with when they wish to work on joint projects with colleagues from different countries.

Almost all existing mechanisms for trans-national science cooperation are set up as a top-down approach and restrict the science questions that can be addressed. Well-known examples are the FP7 Cooperation Programmes, ERA-Nets, and the more recent Joint Programming Initiatives. These instruments are appropriate for overall coordination of research activity of immediate societal relevance.

However, we should be warned that these instruments tackle only part of the problem. A much more open and comprehensive approach is needed to address the needs of science. Experience shows that programmes are most effective if scientists cooperate for scientific reasons and not only for monetary reasons. Europe would most benefit from a **tool allowing bottom-up cross-national science cooperation**.

We envisage a mechanism which does not restrict the science topics or disciplines and which makes use of existing national peer-review evaluation procedures to guarantee the quality of the projects. Activities could be launched in rather short time frames, and participants funded. Productivity would be increased and overlap across Europe reduced. In that model, research would be funded nationally. The overhead for trans-national cooperation and meetings could come from a top-up through European funds, but it could also come from a common pot of the national funding agencies or from one of the country which hosts the coordinator and is responsible for a larger share of the project.

Lead agency agreements of research funding agencies are first examples in that direction. However, their impact has been limited so far. A broader, European solution is needed.

In the medium and long term Europe should seek to harmonise the national application and selection procedures in order to facilitate nationally funded cross border activities. For this, we encourage even stronger collaboration of the funding agencies.

3. RESEARCH INFRASTRUCTURES

Research infrastructures of European relevance

European research infrastructures are a key pillar of ERA as they provide the critical level of scientific excellence that most EU countries cannot achieve by themselves and consequently also make an essential contribution to overcoming national fragmentation in specific scientific fields. In recent years, the European Strategy Forum on Research Infrastructures (ESFRI) has put research infrastructures on the political agenda and has lead to the launch of important European infrastructure projects. There is a continuous need for coordinated action regarding

- Prioritisation, site selection, implementation and construction of the ESFRI projects and their funding.
- Updates of the ESFRI roadmap list and sustainable funding strategies. The ESFRI roadmap is not yet comprehensive; there are still many scientific needs related to infrastructures that have not been addressed (for example in mathematics, chemistry, social sciences).
- Synergies between national and European actions which will be needed to be exploited in order to avoid unnecessary duplications of infrastructure in Europe.

However, to address these challenges in an effective and sustainable way, the current strategic approach and governance structure needs improvement. We recommend to re-think the ESFRI process with special consideration on the following principles:

- A key issue is the organisation of the consultation of science and scientific societies. Currently the ESFRI consists mainly of delegates who are representatives of national authorities (about three quarters in number); not all countries nominate practicing scientists (comprising one quarter of group members)
  Consultation of scientific stakeholders is not sufficient, mostly unstructured and predominantly focused on the national level. We think that structure can be improved. Ideally, representation of scientists in the process should be organised at European level through European scientific societies and platforms (such as ISE).
- A balanced representation of disciplines has to be ensured. We have to reinforce the idea that all stakeholders have the opportunity to participate in such a long-range and important program definition.
- It is important to draw on existing expertise on the management of research infrastructures to avoid reinventing the wheel for every new research infrastructure. In some areas Europe already has world-class infrastructures such as those operated by the members of the EIROforum. They serve both as models and sources of expert advice. Their governance structures are designed for international membership and operation and have sustainable, performance-based funding systems.

The delicate situation for many of the ESFRI projects within the present economic frame makes it fundamental to set up a commitment for sustainability both at national and European level. A major effort is required towards a long-term programme agreed among the different stakeholders in Europe.

Research infrastructures need a sound legal base for their functioning. There is no unique best solution; different options need to be considered on a case-by-case basis.

Another important aspect of achieving ERA is also to better integrate Central and Eastern European countries in existing and emerging pan-European research infrastructures. In particular, these countries should be supported in their efforts to set up new research infrastructures or to bring existing infrastructures up to a competitive level. One way to support the Central and Eastern European Countries would be to make a clear and coherent link between the ERA policy and the EU regional policy.

<u>Access to and efficiency of research infrastructures</u>

Limited access to research infrastructures and equipment, in particular at peripheral areas of Europe constitutes a serious barrier to competitive research. ISE also sees a contribution of ERA in facilitating user access to research infrastructures in Europe and thus ensuring the best outcome from large infrastructure investments. To that aim, a multi-factorial approach is needed, including measures such as:

- Training of scientists and administrators to establish and to manage large facilities,
- Development of efficient interfaces and services for remote access,
- Funding schemes and incentives which facilitate transnational access,
- Development of user access policies, reinforcing the open, excellence-based access to research infrastructures,

- Mapping the existing national infrastructures of pan-European relevance is desirable to provide researchers information on existing infrastructures and access policies in a transparent manner[6].

Without top, well-trained scientists, scientific managers and technicians, equipment cannot be used properly and large infrastructure investments cannot be exploited. Therefore, it is important to offer appropriate scientific careers, clear scientific recognition and incentives in order to attract proficient to run ERA infrastructures.

Addressing specific infrastructure needs for Social Sciences and Humanities (SSH)

Europe is a multicultural and multilingual society, in many ways heterogeneous and struck by unequal degrees of social and economic development. Responding to the Grand Challenges requires comparative studies of living conditions, cultural heritage, attitudes and values, institutional settings and policy efficiency. Comparative research requires specific infrastructure that cannot be provided from national resources alone. Examples of such infrastructures that have successfully met the needs of comparative research are the European Social Survey funded partly by the European Science Foundation.

A growing need for comparative qualitative and historical research in the SSH area must be met by establishing a network of social science laboratories in specific research areas, to collect and manage data archives, to host a sufficient permanent and visiting staff to make these data available to researchers, and to serve as centres of expertise to support new initiatives for comparative research projects. Such a network would be an indispensable resource for assessing research needs at the European level, and for dissemination of scientific results to policy-makers and the general public.

The Council of European Social Science Data Archives (CESSDA) is a social science project in the ESFRI roadmap which recently achieved progress in their legal establishment. Its further development would improve social science research across the ERA by providing, on a not-for-profit basis, a comprehensive and integrated social science data research infrastructure which will facilitate and support research, teaching and learning of the highest quality throughout the social sciences.

4. KNOWLEDGE CIRCULATION

Knowledge transfer

Scientific research has economic, social and cultural benefits. As stated in the introduction, EU policy with regards to research and innovation should not be based on a linear approach. The research and innovation process is more complex, where informal flows of information and networking play an important role, as do the interactions between societal development and science policy. Research is often divided into "applied" and "fundamental", and placed into competition for funding. EU policy should avoid this distinction, continue to concentrate on research excellence as the sole condition and create conditions in Europe that attract the world's top researchers, leading to a space where scientists are encouraged to take initiatives and leading to scientific excellence.

[6] Current approaches to mapping of research infrastructures have been unsatisfactory. The key challenge is to define common criteria on what is a research infrastructure of pan-European interest.

The circulation and transfer of knowledge between all innovation actors, including universities, academies, public research organisations and industry can certainly be enhanced. Focus should be on policies that:

- Promote the creation of appropriate environments for knowledge transfer
- Improve the understanding and application of the knowledge transfer process
- Develop incentives for universities, researchers and industries to actively engage in knowledge transfer.

Appropriate environments

Many good practice models exist to encourage exchanges between industry and academia. In France, for example, actions such as "Pôles de compétitivité" encourage clustering and networking by bringing together private and public research sectors. In Sweden, the Foundation for Strategic Research (SSF) organises Academia-Industry Meeting Days focusing on knowledge and competence available at the Swedish universities that might be useful to industry. The EU should be inspired by such examples in different countries and promote them throughout Europe.

The role of knowledge transfer to counteract disparities between regions in terms of research performance still has to be explored. Knowledge transfer to industry is much less developed in some countries compared to others, thus depriving the economy of these countries of a powerful instrument of innovation. The EU should make special and significant efforts to reduce the disparity in research and development within Europe.

Improved understanding of the knowledge transfer process

While researchers should be encouraged to learn basic notions regarding knowledge transfer and industrial property, the complexity of the issues involved requires well-trained knowledge transfer officers. The development of science-related careers in the areas of management, knowledge transfer and communications needs to be promoted. To accomplish that, training, funding and evaluation schemes for these professionals need to be developed, both at the European and institutional level.

The definition of minimum standards for knowledge transfer training as well as the support of professional knowledge transfer accreditation associations and the establishment of knowledge transfer bachelor/master courses is essential.

Developing incentives

Cooperation between the private and public sector can be improved through:

- Providing better access to information so that all actors are made aware of potential opportunities for cooperation,
- Better framework conditions such as career development opportunities including specific recognition of the efforts in knowledge transfer and
- Financial incentives and funding programmes.

Access to information on what research is being done in which universities and research institutions is not harmonised, nor is it collected on a European scale. This kind of information available centrally would stimulate research collaborations between universities and researchers, be helpful for students, as well as offering industries access to information on competencies of different laboratories and groups.

Universities should be encouraged to actively engage in technology transfer activities, such as the organisation of workshops, networks with local industries, publicly available descriptions of the research conducted locally. Mobility of researchers from industry to academia should be strengthened and provided with financial incentives to allow for such cross-fertilisation. A EU-wide funding mechanism should be created for "proof of concept" funding and translational funding to enable the further development of promising IP.

Open access to publications and data

Several of ISE's members or their national member organisations are editors and publishers of scientific journals – either on their own account, with dedicated subsidiaries or in cooperation with publishing houses. Learned societies and scientific organisations have a long tradition in disseminating scientific information. They have wide experience with different access models, ranging from subscription models and optional author-pay mechanisms[7] to open access with and without embargo periods.

We welcome efforts towards better access to scientific information because better access facilitates knowledge sharing, opens paths for collaborations which may otherwise not be considered, can help generate new ideas, increase the impact of the work of scientists, may reduce duplication of effort and may make science more inclusive.

However, services relating to access, editing, archiving, indexing and quality control all have cost implications. Therefore, overall monetary savings cannot be expected from Open Access.

A proposed change of system from a traditional subscription-based model to open-access models has wide implications for the research system as a whole. As such, it needs to be carefully thought through. In particular, we would like to bring to the attention of the consultative board the following challenges which have to be addressed:

- In a system with author fees, research funders are expected to cover the publication costs. Often author fees are eligible costs in project funding. However, with constant total budgets that means in reality that **less money can be spent for research expenditures** in a project – effectively reducing the research budget.
- It needs to be ensured that all research that is worth being published will be submitted and no research will be excluded from peer review because an author cannot pay fees.
- **Learned societies offer a large portfolio of activities, which are often linked to journal revenues.** That includes grants to young scientists, meetings, conferences, training and science policy activities. In the absence of revenues from journals, other funding, the sources of which remain unclear, would need to be found to maintain these services that are crucial for science.

We would like to suggest that advantage be taken of the expertise in scientific publishing that exists in the learned society publishers, and recommend support for a forum where the issues can be discussed and solutions can be developed.

Publication of data

The issues related to the publication of data resulting from scientific research include, among many others, ownership, right of (first) use, the volume of information, identification, archiv-

[7] For instance mechanisms in which authors can choose to pay to make their papers open access even if the journal itself is not fully open access

ing, and funding for preservation. The EU needs to recognise that electronic scientific databases are strategic resource and policies are needed to develop and maintain them.

Various initiatives in different fields have been developed, e.g. the online pre-print repository in physics ArXiv; the public/private collaboration in mathematics Zentralblatt-MATH, and ELIXIR, the pan-European infrastructure for biological and biomedical information which is being established.

It is important to note that these are successful community driven initiatives, demonstrating that the scientific community is aware of the issues and has developed successful responses. The EU is encouraged to make use of the experience that exists in the scientific community, and to create a forum with all stakeholders, including the learned societies and research institutions to discuss issues and develop solutions.

The main barrier to collecting, maintaining, and providing access to scientific data is funding. Existing pan-European e-infrastructures for depositing scientific data are insufficient. EU funding programmes providing adequate support for the development and operating costs of data infrastructures, such as ELIXIR, should be considered.

5. THE INTERNATIONAL DIMENSION OF ERA

Europe needs a stronger framework to pool the various national and possibly European funds to **enable Europe to participate in a timely manner in major global initiatives** and retain competitiveness. As appropriate, Europe should **take a leading role.**

To date there is no process or tool for European scientists to propose that Europe engages in key areas that require action at global level, and to propose which of these would be appropriate for Europe to lead. To create and develop this bottom-up process, we propose that

- SFIC, the Strategic Forum on International Cooperation (consisting of policy makers from the European Commission and the Member States), should in the future interact closely with stakeholders, such as scientific societies (directly or via ISE) and European Technology Platforms.
- SFIC should jointly with participating scientists prepare expert panels addressing grand challenges, develop appropriate recommendations, and jointly work to implement the recommendations.
- Such work could be started with pilot areas where seeding activities of the scientific community have already been developed, e.g. the Global Plant Council (GPC)
- Enlarge bilateral European Commission task forces through the involvement of scientific societies and the Member States and include the scientific community in partnerships with the SFIC and multilateral groupings.

For the jointly identified priority areas, research and innovation funds could be used to top up national funds and/or foundation funds to quickly react to, participate in and even lead major global initiatives. To a smaller extent coordination and partnering actions can bring existing initiatives closer together and increase their impact.

Example: *EPSO, the European Plant Science Organisation, is a founding member of the Global Plant Council (GPC http://globalplantcouncil.org). GPC started to identify and elaborate key areas and deployment strategies that require action at global level to address world hunger, human health and well-being, climate change, energy and biomaterials, sustainability and environmental protection. These key areas include for example i) the creation of a digital seed bank to make informed decisions on germplasm preservation and breeding strategies, ii) better utilisation of local germplasm, iii) develop-*

ment of new crops that are more nutritious, iv) understanding the plant-environment metagenome, and v) sharing of information and resources. Important partners in the plant sector are for instance India, China, USA, Latin America and African countries.

Another aspect of international cooperation is **development cooperation.** Most of innovation activities in key areas such as food security and pharmaceuticals for the benefit of developing countries have to come from the public sector when specific interest of companies is expected to be marginal.

Within the framework of development cooperation, the EU should therefore not only engage in providing funding for pure research activities, but also innovation and development. That could be done in a scheme similar to the Joint Programming Initiatives to pool resources. To provide an incentive for foundations or other entities to invest in development cooperation, EU programmes could offer matching funds when financial support has partly been secured by third parties.

Creative and novel financing mechanisms need to be developed between the European Commission, the Member States and the EIB, as the existing equity and debt-based financing available for innovation in the private sector is only possible for fully operational companies and is not an appropriate instrument for academic institutions and research organisations who are the main actors for innovation in the public sector in relation to for developing countries aid.

Facilitating employment conditions for non-EU nationals in general and easing the visa requirements for non-EU scientists in particular would be also an important policy step towards increasing international S&T cooperation. For example, the status of doctoral candidates in the scientific visa package should be revised[8].

[8] Eurodoc Recommendations for admitting non-EU researchers.
http://www.eurodoc.net/files/2010_Admission_Non-EU_Researchers_Recommendations.pdf