EMBL

European Molecular Biology Laboratory

EC Green Paper Response

9 May 2011

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I. Introduction and general comments on the CSF / ERA

EMBL is Europe's intergovernmental organisation for molecular biology research. It is funded by 20 European member states and one associate member state, Australia. EMBL's mission is to perform basic research in molecular biology, provide services and infrastructure, provide advanced (post-graduate) training, develop new instrumentation and methods, engage in technology transfer and promote integration with the European biomedical science community. EMBL's annual income in 2009 was €156 million, €34.3 million (22%) of which came from external competitive funding and €11.7 million of that from the EU Framework Programme (FP). To date EMBL researchers have coordinated 40 and participated in more than 200 projects funded by FP6 and 7.

The following are answers to a subset of questions in the Green Paper by the European Commission "From Challenges to Opportunities: Towards a Common Strategic Framework for EU Research and Innovation funding" on which EMBL can provide input.

Q1: How should the Common Strategic Framework make EU research and innovation funding more attractive and easy to access for participants? What is needed in addition to a single entry point with common IT tools, a one-stop shop for support, a streamlined set of funding instruments covering the full innovation chain and further steps towards administrative simplification?

EMBL welcomes the development of a Common Strategic Framework (CSF) as a means to bring together science and innovation and envisages it as an opportunity to create an even stronger and more sustainable financial backbone for European research.

From practical experience, simplification is an issue that EMBL considers to be key for the next CSF. The current and previous EU FPs have imposed complex and constantly changing rules and procedures on public research institutions, for example in the area of auditing. This has created a large and unnecessary administrative burden and negatively affects both the way science is done and the productivity achieved through FP funding. Steps have been made towards simplification. Unfortunately, these measures have fallen far short of their goals and the application and management processes remain fragmented across the FP with different sections using different procedures and access points.

Q6: How could the Commission ensure the balance between a unique set of rules allowing for radical simplification and the necessity to keep a certain degree of flexibility and diversity to achieve objectives of different instruments, and respond to the needs of different beneficiaries, in particular small and medium-sized enterprises (SMEs)?

Rules that cover who is eligible to participate in a particular funding scheme and how that participation will be funded must be clear, which in turn can mean that the description of the rules is long. Simplification of the rules does not necessarily mean that they should be shorter but it does mean that they should be more clearly described, changed less frequently and interpreted in the same manner across all projects and funding schemes. Having clearly defined, consistent rules that allow potential applicants to easily see the benefits and drawbacks of participation before applying would be of great value to everyone.

One of the most important measures that could be taken to simplify participation in and reporting on EU-funding schemes would be to have the rules for all parts of the CSF defined and publicised well in advance of the first call. Wherever possible, revisions to the rules should be avoided unless absolutely essential and should then occur on predetermined dates set out in advance.

The applicability of the current FP7 rules concerning the participation of European Research Organizations, which are defined legally as international organisations (such as CERN, ESA, ESO and EMBL), should be extended on the same basis to all other sub-programmes of any future FP. The special clause no. 2 applicable to FP7 Grant

Agreements, which governs some specific conditions for the participation of international organisations, should continue to be used in the next programme period.

Q27: Which key issues and obstacles concerning the ERA should EU funding instruments seek to overcome, and which should be addressed by other (e.g. legislative) measures?

Despite the fact that considerable progress has been made with the budget increase from FP6 to FP7, EMBL feels that research in Europe still does not have the priority that it deserves. This is also mirrored in the member states' and the EU's budgets for research and innovation. For example, for 2011 only 9.5% of the EU budget is dedicated to heading 1A "Competitiveness for growth and employment", of which research funding forms part. Also, the average EU27 R&D expenditure as a percentage of GDP is only at 1.85%, whereas Japan spends 3.4%, and the US 2.67%.[1] In comparison to other areas of the world, EU27 spending is growing much more slowly. In order to accomplish the renewed Lisbon Strategy and the EU 2020 goals, the EU should aim at further increasing the research budget, in particular to facilitate pooling resources from individual member states to avoid fragmentation and thereby foster and complete the establishment of the European Research Area (ERA). This is essential for shaping the EU as a global leader with world-class research policy, cutting-edge research institutions and a vibrant knowledge economy.

Lack of financial support for research is not the only obstacle to the ERA. Previous FPs suffered from great complexity and red tape. The CSF is an excellent opportunity to streamline diverse funding programmes and instruments and reduce administrative red tape, both of which have been major obstacles to completing the ERA.

II. Basic research as a driver for innovation

Q2: How should EU funding best cover the full innovation cycle from research to market uptake?

EMBL welcomes the European Commission's approach to covering the entire innovation cycle and is aware that research cannot be an end in itself. EMBL maintains close ties with industry and actively engages in technology transfer through its commercial subsidiary EMBL Enterprise Management Technology Transfer GmbH (EMBLEM). This facilitates the translation of basic research discoveries into practical applications that benefit the European society and economy.

[1] Eurostat 2010

However, the importance of basic research must be sufficiently acknowledged in the CSF as should the proof-of-principle stage of taking new discoveries and inventions towards the commercial marketplace. The latter currently forms a major bottleneck in the innovation cycle and is where EU funding could have a significant impact in helping towards the application of basic research results in both industry and medicine.

Basic research

Basic science – elucidating the fundamental principles of life – is the very first step in the innovation cycle, even though it is not immediately targeted at producing commercially exploitable applications. Basic research contributes to the knowledge base and applications arising from it in the long term are often unpredictable. For example, the curiosity-driven molecular biology research at EMBL often provides mechanistic explanations for diseases, which is the first step towards identifying potential drug targets. These results are often of interest to pharmaceutical companies especially if a proof-of-principle step has been achieved, for instance by testing the efficacy of small molecule inhibitors that could be further developed into new medicines. For example, EMBL researchers obtained high-resolution images of proteins of the influenza virus, and they subsequently identified small molecules with the ability to bind to these proteins and potentially inhibit their function and influenza virus growth. On the basis of these findings, a start-up company was founded to develop new influenza drugs. Worldwide, commercial hubs for innovative technologies primarily grow up around renowned basic research institutes. The Rhein-Neckar region around Heidelberg, Germany, where the EMBL headquarters are located, hosts a vibrant network of more than 100 biotechnology and pharmaceutical companies focused on developing new diagnostics, drugs or technology platforms; the area around Cambridge, UK, where EMBL-EBI is located has a similar commercial community. In this way basic science lies at the very heart of innovation and acts as a motor for progress. Owing to the lack of predictable profitability or outcome, the funding of basic research, however, lies outside the scope of industry. This is why it is extremely important that a substantial fraction of the funding of the CSF is allocated to basic research.

Q5: What should be the balance between smaller, targeted projects and larger, strategic ones?

Balance between small, large and strategic projects

EU funding should take the synergy between larger, strategic initiatives and smaller targeted projects into account and ensure that both types of research are sufficiently supported. To avoid an imbalance towards larger projects, sufficient resources should be set aside to support small projects as they arise. A possible way to do this is by earmarking a percentage of funds for smaller studies at the beginning of the CSF and to

allocate them in several rounds of independent calls throughout the funding period. This would allow good ideas to be funded outside of the strategic plan on an *ad hoc* basis.

Q7: What should be the measure of success for EU research and innovation funding? Which performance indicators could be used?

Evaluating the success of research

It is difficult to obtain an objective measure of the value of research – especially basic research – as different stakeholders (the scientific community, the economy, politics and society) value research in many different ways. Part of the problem is that basic research is not directly geared at producing commercial applications and often generates unforeseeable impacts on a longer timescale. A purely output-based assessment system is not suitable for evaluating the success of research projects as the real value might only become apparent in conjunction with other results or experiments and materialise only many years later. For example, bringing a drug from bench to bedside frequently takes more than 20 years. EMBL is evaluating its output in many different ways: bibliometric measures are only one component as are, for example, the number of scientists trained, the users served and the spin-off companies created. Some of these may also be useful measures for EU-funded projects but the short timelines have to be taken into consideration. The current system, whereby deliverables are set during the application and negotiation stages, is widely applicable across all types of projects and subjects and is in our view a valid and balanced method for the evaluation of research success.

Q9: How should a stronger focus on societal challenges affect the balance between curiosity-driven research and agenda-driven activities?

Curiosity- and agenda-driven research

The CSF should strike a wise balance between curiosity-driven research and agenda-driven research. Making financial support contingent on research that addresses societal challenges is a useful instrument to ensure Europe's scientific community collaboratively works on those questions that promise the most tangible benefit for society. However, especially in the life sciences, research outcomes are often unpredictable. By limiting our scientific efforts to pre-defined thematic areas, Europe risks losing out on the unforeseeable applications and implications of high-risk projects that have the potential to break current boundaries. For instance, many of the drugs we routinely use today, including all recently developed cancer treatments, were discovered initially as by-products of basic research. Also the internet, which has had an enormous effect on societies throughout the world, was developed as a tool for communication between scientists at CERN. An entirely agenda-driven approach carries the risk of suppressing scientists' creativity and limits their flexibility to pursue unforeseen avenues as they open up.

Q10: Should there be more room for bottom-up activities?

Extent of bottom-up activities

Whilst it is important to have targeted research funded by the EU to fulfil identified objectives for Europe, it is also of prime importance that the overall research funding strategy allows for new ideas and research directions. The current extent of bottom-up research funding is mainly restricted to the two People and Ideas Programmes, through which any research topic from any discipline can be tackled. These programmes cover projects by individuals and teams led by individuals and also projects in which the goal is to train scientists within Europe. Collaborative research, one of the fundamental targets of EU funding, is however missing. Maintaining the current bottom-up funding initiatives whilst adding bottom-up collaborative research within the main funding strands (alongside other targeted approaches) would provide the best opportunities to promote innovation in all areas of EU funding.

Q21: How should the role of the European Research Council be strengthened in supporting world-class excellence?

European Research Council

The European Research Council (ERC) is the most important and influential funding body for basic research in Europe and EMBL would like to see a strengthening of its role and budget. Since its creation in 2007, the ERC has become one of the most important players in shaping the future of European science and its actors especially in areas that are at the frontier of research. In particular, the bottom-up approach linked to competitive funding supports excellence in Europe and attracts and retains outstanding researchers. EMBL suggested some practical changes to the Annerberg Commission on the occasion of the FP7 interim evaluation such as splitting the funding scheme into three clear streams (beginner, consolidator and advanced grants), to help cutting-edge researchers find the right funding for their science. EMBL strongly supports the ERC's independence with a budget commensurate with its role in order for it to continue to be a success.

Proof-of-principle

Funding for proof-of-principle studies should be made broadly available within the CSF because suitable results can be obtained in all research projects, not just those supported by the ERC. We are concerned that the ERC has now taken on the task of providing proof-of-principle funding. Linking frontier research with proof-of-principle experimentation requires expertise that goes beyond the skills of the primary researcher, and therefore is usually carried out in collaboration with other academics or with industry. The application process for proof-of-principle funding should be separate from the initial research proposal

and, rather than being allocated to individual principal investigators, it should be granted to a group of collaborators with a solid proof-of-principle proposal.

III. Research infrastructures

Q25: How should research infrastructures (including EU-wide e-infrastructures) be supported at EU level?

Challenges for life sciences research infrastructures

EMBL is a unique example of a successful European research infrastructure in the life sciences with sustainable funding from its member states. It is a working model for coordinating life science research infrastructures, integrating European research communities and fostering synergies and collaborations. EMBL coordinates two out of ten European Strategy Forum on Research Infrastructures (ESFRI) biomedical projects – ELIXIR and Euro-BioImaging – and it participates in five other projects – Infrafrontier, BBMRI, INSTRUCT, EMBRC and EU-OPENSCREEN.

The life sciences comprise particularly dynamic and fast-moving fields that are evolving from 'small science' into global team efforts that sometimes, for example in the case of the Human Genome Project, involve industrial-scale equipment and staff. New technologies and large-scale "-omics" approaches have further transformed biomedical research. Fairly young disciplines such as systems biology and synthetic biology are likely to rapidly change the landscape of life science research and its infrastructure requirements. The ever-increasing rate and complexity of data generated in the life sciences are leading to more and more demands on compute power, data storage, network bandwidth, and staff to handle, curate, integrate and serve these huge data volumes.

The EU has recognised these challenges and has provided substantial funding to the EMBL-European Bioinformatics Institute (EMBL-EBI); in 2009 for example, 28% of EMBL-EBI's external funding was from the EU FP. In the context of the ESFRI project ELIXIR, which is completing its EU FP7-funded preparatory phase, a new model has been developed that will distribute the burden across several organisations and countries in Europe by the creation of a distributed research infrastructure. ELIXIR will become one of the main pillars of the European Research Area. It will provide the foundation for innovative research necessary to develop solutions for the Grand Societal Challenges in Industry and Academia. It will make a major contribution to building the link between basic research and medical, agricultural and environment applications, thereby contributing to the objectives of the Europe 2020 Strategy to increase European competitiveness and to build a new economy based on knowledge and innovation. EU funding will be required for the integration at the European level to ensure connectivity not only between the different ELIXIR sites but also with other biomedical research infrastructures, all of which will be handling data that will have to be linked and integrated with the core biomolecular data resources.

Euro-BioImaging is the second ESFRI project coordinated by EMBL and it is in its EU FP7-funded preparatory phase to become the European research infrastructure for biomedical imaging technologies, stretching from basic biological imaging to medical imaging. The mission of Euro-BioImaging is to provide access, service and training to state-of-the-art imaging technologies and foster the cooperation and networking between all stakeholders at the national and European level including multidisciplinary scientists, industry, and regional, national and European authorities. Euro-BioImaging will deploy the distributed imaging infrastructure in Europe in a coordinated and harmonised manner and again this will require support from the CSF.

User access

Increased European funding through the Integrated Activities (I3) scheme is essential for providing user access to the main research infrastructures in Europe. The I3 scheme was heavily oversubscribed in FP6 and FP7 and more EU funding is also needed to broaden access to new types of research infrastructures particularly in the life sciences, for example for access to electron and light microscopy facilities. Coordination of user access through research infrastructures is in principle a good idea but should not increase administrative overheads by duplicating selection and reporting procedures at the level of the coordinator and the individual organisations that are providing the facilities.

e-Infrastructure

The data generated in the life sciences require the design, construction and operation of novel e-infrastructures. EMBL-EBI has received significant EU FP funding for the development of new e-infrastructures and will continue to require financial support to develop solutions of European added value. This will not only benefit ELIXIR but also all other ESFRI biomedical infrastructures by enhancing the capacity of the existing compute infrastructure, integrating all data available, offering storage of data and allowing open access to central databases such that the collective expanding capacity across the continent is utilised optimally.

Support of research infrastructures in new EU member states

New EU member states should be supported in their efforts to create new research infrastructures or to bring existing infrastructures up to a competitive level. EMBL is open to the participation of all EU member states not only in the existing research infrastructures but also in new distributed infrastructure projects such as ELIXIR and Euro-BioImaging. Such projects provide a unique opportunity for these countries to participate by hosting nodes at national research organisations. One way to support the new EU member states

would be to channel a larger proportion of the Structural Funds to research and innovation, and in particular towards capacity building and international scientific cooperation.

IV. Value added by EU funding of research

Q 3: What are the characteristics of EU funding that maximise the benefit of acting at the EU level? Should there be a strong emphasis on leveraging other sources of funding?

The largest benefit that EU funding of research has generated is the opportunity to engage in transnational projects that bring together the best scientists from any EU member state to work together on projects of European added value. EMBL researchers have coordinated 40 and participated in more than 200 projects funded by FP6 and 7 and so as well as being a direct beneficiary, it has also been able to build a network of hundreds of collaborators across Europe, which is of great benefit to all EU member states. Collaborative research activities should continue to be funded through the CSF.

Q 8: How should EU research and innovation funding relate to regional and national funding? How should this funding complement funds from the future Cohesion policy, designed to help the less-developed regions of the EU, and the rural development funds?

EU research and innovation funding should be complementary to regional and national funding. It represents only a relatively small fraction of the overall public investment into research and development and should be used for activities that are of European added value and that require transnational funding. A larger proportion of structural funds should be dedicated to research and development activities.

Q 22: How should EU support assist member states in building up excellence?

Supporting training of researchers is an excellent way to build capacities and excellence in all EU member states. EMBL has received funding from the Marie-Curie Programme and has been able to train a large number of young scientists as PhD students or postdoctoral fellows. In FP7, EMBL coordinates one and is involved in four other initial training networks (ITNs) and we would like to see this scheme strengthened and better funded in the next CSF.

In FP6 EMBL coordinated two Marie Curie Host for Early Stage Research Training programmes (Biostar and E-star) that provided funding for short-term placements for PhD students to participate in specialised training activities, for example in bioinformatics at the

EMBL-EBI. These schemes were excellent and it is unfortunate that they are no longer available.

Q 23: How should the role of Marie Curie Actions be strengthened in promoting researcher mobility and developing attractive careers?

In general EMBL finds the Marie Curie host-driven and fellowship programmes extremely valuable in training excellent researchers and promoting strong independent research careers for trained scientists in Europe.

EMBL is concerned about the requirements for ITN funding. In particular, having a pre-defined training structure and work plan at the level of individual PhD fellows is in conflict with the idea of allowing a PhD student to provide input into their own research programme, a central feature of the EMBL International PhD Programme (EIPP), and to react to the unexpected developments that routinely occur in basic research projects. Defining research goals and desirable outcomes prior to the appointment of the fellows may lead to “box ticking” as a means of measuring progress throughout the course of these PhDs, thus reducing the opportunity to acquire skills important for their future careers as independent researchers.

As in previous years, the current People Programme has underlined an obligation for ITN proposals to have the highest possible industry involvement. EMBL acknowledges the importance of cooperation with industry and has many initiatives in this field. However, mandatory industrial placements pre-planned for those undertaking a PhD thesis in basic life science research are not a useful way to encourage academic-industrial exchange. These should only be part of the PhD if they make sense in relation to the research project being undertaken by the student.

Finally, EMBL would recommend a rethinking of certain features of the International Outgoing Fellowships (IOFs) within the People Programme. In these fellowships there is a period of work outside the European Commission followed by a mandatory return period. Failure of the fellow to complete this return period can lead to severe financial penalties for the fellow and this should be clear to those applying for such fellowships when they read the applicant guidelines. However, the remote host institution has no obvious legal obligations towards the EU. This has led to some misunderstanding by these remote hosts of their role, their financial rewards and obligations, and also their relationship with the European Commission and EMBL. Making the remote host a full partner in IOF grant agreements would be a simple and easily implemented change in the negotiation procedure, a change that would greatly ease this situation.

Q24: What actions should be taken at EU level to further strengthen the role of women in science?

Women in science are still under-represented. Despite the efforts made, there has been no dramatic increase in the number of women in higher positions in industry and in decision-making positions in academic science, and the gender gap, in terms of both position and salary, remains a challenge.

EMBL is helping to tackle this challenge by providing excellent working conditions for women scientists at EMBL, creating and driving initiatives that raise public awareness of the inequality issues faced by women scientists and finally by encouraging society to rethink and review the situation of women in science and in professional life in general. For example, the conference “Women in Science”, organised together with EMBO in 2007 in the context of the EU-funded SET-Routes project, shed light on many issues that would have to be addressed in order to increase female participation in science. Many best-practice examples are now available from the US and the UK to initiate institutional change that could be transferred to research institutions throughout Europe. EU start-up funding might be helpful to initiate a top-down reform for institutional change in this crucial area.

V. Joint Programming

Q4: How should EU research and innovation funding best be used to pool member states’ resources? How should Joint Programming Initiatives between groups of member states be supported?

ERA networks (ERA-NETs) and Joint Programming have been excellent initiatives under FP7 that support the establishment of the ERA. They help to re-focus common efforts in the area of research, development and innovation on the main challenges faced by society.

Joint Programming

Joint Programming Initiatives (JPIs) were initially used as a means to tackle urgent societal challenges. European member states have the lead role in this process. The role of the EU is to "make the whole more than the sum of its parts". So far intergovernmental organisations such as EMBL have not been involved in the process but they will be eligible for applying to calls to carry out research projects in the framework of the JPI once their strategies have been agreed by the member states. Several of the initial set of ten projects that have been launched or are in advanced stages of preparation have a link to life sciences research and therefore EMBL would be an obvious partner in many research projects.

At a more strategic level it may be desirable to better coordinate the activities of the JPI and large research infrastructures and to ensure that synergies are used and efforts aligned at least in some cases. In general, EMBL supports the idea of Joint Programming. Basic research is key for tackling societal challenges and the data generated within the JPIs need to be stored in an accessible and user-friendly manner. Molecular biology and bioinformatics can without doubt help in tackling societal challenges and EMBL can offer to take over a coordinating role in this field.

ERA-NETs

EMBL is involved in several ERA-NETs in Germany and France and the basic principle of coordinating national and EU-wide funding strategies is a good idea. However the staged application and award processes at European and then national levels has turned out to be both time-consuming and frustrating. On occasion an agreement to fund a project at the EU level was not upheld at the national level, making the projects concerned untenable. Agreement to fund projects should combine European and national levels in one process, reducing the time to funding and other problems encountered.

VI. Innovation – strengthening competitiveness

Q15: How should industrial participation in EU research and innovation programmes be strengthened? How should Joint Technology Initiatives (such as those launched in the current Framework Programme) or different forms of 'public-private partnerships' be supported? What should be the role of European Technology Platforms?

Through its Industrial Programme, EMBL maintains close ties with industry. The collaboration between basic research and industry has provided our scientists with both insights into potential end use of results and also new avenues for future research and, as such, we appreciate the value of continuing this valuable partnership. Within the current Framework Programme, Joint Technology Initiatives (JTIs) such as the Innovative Medicines Initiative (IMI) are an example of strenuous efforts to increase the involvement of industry in European R&D in Europe. However, the dominance of industry in the control of intellectual property rights (IPR) coming from JTIs has led to many problems, rendering the programme unattractive to potential non-industrial participation. To encourage strong partnerships between industrial and non-industrial partners, the requirement of equal funding from industry and the EU to finance JTIs should also come with equal control over the rules and regulations governing IPR and other financial issues. Shortening the time between application and award would also be a great benefit as the current time to award (330 days for FP7) is still too long for many potential industrial partners.

The role of industry in enhancing the competitiveness of Europe is clear but without equal input from the research community it is unlikely that a sustainable ERA can be created.

The control and direction of European Technology Platforms (ETPs) should be shared equally by industrial and non-industrial partners, allowing for both the fulfilment of long-term strategic objectives and the possibility to find and exploit new areas of research and commerce.

Q16: How and what types of small and medium-sized enterprises (SMEs) should be supported at EU level; how should this complement national and regional level schemes? What kind of measures should be taken to decisively facilitate the participation of SMEs in EU research and innovation programmes?

Financial support should be made available for those SMEs that are active in translating basic research findings into applied developments and products. This specifically includes small companies whose activities will have a significant impact on society but face a high risk of failure. This is particularly the case for “technology leap” projects in the fields of pharma, med-tech, engineering, chemistry and physics. The access of companies carrying out such projects to high-quality research as well as to market knowledge and market access on the level of the EU are of particular importance.

SMEs with limited resources lack the manpower and experience to apply for EU funding, nor can they afford consultants to support them in this matter. To lower the entry barrier for SMEs a two-stage application process could be adopted in which the first stage is a simple “quick application” step. Applicants that are short-listed will usually be more prepared to invest the time and effort required for a full application.

As venture capital for SMEs is not widely available in Europe, they are often pre-financed and/or owned by big industry. Such involvement of big industry should not automatically disqualify these SMEs from EU funding.

Q20: How should intellectual property rules governing EU funding strike the right balance between competitiveness aspects and the need for access to and dissemination of scientific results?

Competitiveness is the engine of research, development and economics, and all three fields should benefit from the success of EU-funded projects. It is mandatory to give the funded parties the possibility to gain advantage from their work by protecting their research findings and limiting access to the results generated in the project to the collaboration partners for a certain period of time. It is important to distinguish between protectable intellectual property (IP) and knowledge. Protectable IP must be protected whenever possible and related costs should be covered by the CSF. Nevertheless, such protection financed by the EU should force the funded partners to make use of the protected IP and to show that there has been development. If this cannot be shown by the IP holder, then the IP should be offered on the open market on a non-exclusive basis to promote better use of EU-funded IP.

In terms of knowledge, a publication rule, such as the current FP7 open-access pilot scheme, is key in order to avoid the results of EU-funded research being hidden within a company or institution. Knowledge gained from an EU-funded project should be published within a certain period of time (at the latest one year after the end of the funding period) to make it accessible to others. Such measures enable the funded partners to protect their IP as well as to use the protected knowledge for a certain time, which grants them a competitive advantage without preventing dissemination of knowledge.

VII. International cooperation with non-EU countries

Q26: How should international cooperation with non-EU countries be supported e.g. in terms of priority areas of strategic interest, instruments, reciprocity (including on IPR aspects) or cooperation with member states?

EMBL particularly agrees with the three principles identified in the Commission Communication on international science and technology cooperation: 1. Define research topics; 2. Guarantee of critical mass of resources; and 3. Distinguish between scientifically advanced and not-so-advanced partners, although cooperation with both is important.

EMBL would welcome support for international cooperation in the field of basic biomedical research. EMBL maintains collaborations with both highly developed and developing countries. The most prominent collaboration with a highly developed country is Australia's associate membership in EMBL and EMBL recently signed a Memorandum of Understanding with Russia to strengthen scientific links.

International cooperation with non-EU countries played a minor role in FP6 and became more important in FP7. This trend should continue in the next CSF and non-EU countries that may form part of some of the large European research infrastructures should be eligible for funding. In this regard, a strategic approach to expanding the ERA to future EU members is needed.

Further instruments – e.g. within bilateral Science and Technology Agreements that the Commission has concluded with different countries– would bring benefits to all parties involved. Collaboration with the US could be improved within the EU-US Dialogue in Research and Education.

There is also considerable potential for increasing research-based interactions with developing countries. This includes intensified collaboration in the biomedical sciences in close cooperation with countries such as Russia (within the Common Space for Research and Education) and India (within its Scientific and Technology Agreement).

Another instrument to support international cooperation with developed and developing countries would be mobility schemes for scientists from non-EU countries to take part in EMBL programmes.

VIII. Outreach and education

Q13: How could EU research and innovation activities attract greater interest and involvement of citizens and civil society?

The challenge of communicating complex ideas on several digestible levels to as wide and diverse an audience as Europe's general public takes serious and committed effort.

EMBL has several long-standing programmes in public engagement, some of which would not have been possible without funding from the EU FPs. The European Learning Laboratory for the Life Sciences (ELLS), a very successful EU-funded programme for teachers, is a best-practice example. ELLS illustrates how science works, but it also introduces an engaged audience of science communicators to a large research facility to see what a intergovernmental research organisation looks like and what kind of people work there.

To maximise impact, these events need to be organised with strategic partners from the media and from local industry. When they are professionally prepared and run, they have ripple effects, spreading information and encouraging interest in the wider public.

Unfortunately, in the face of financial constraints, science outreach activities are often the first to go; this has a serious impact on the continuity of science communication and accordingly on the attitude of the public in general towards science. Europe's citizens would be best served by efficiently integrating the existing European activities (i.e. ESOF, EUCYS) and various ‘World disease days’ with more local events such as open days (also called 'Researcher Nights'), science festivals and other national events. The formation of an umbrella organisation could also be helpful in promoting and securing funding for collaborations between formal and informal science education initiatives over the longer term.

School children would benefit greatly from established mechanisms that secure the quality of their science education and experience; this is crucial, as school children who are not engaged with science by adolescence are likely to become science skeptics and are unlikely to pursue careers in science and technology. If the next generation is to keep our technology infrastructure running and make progress in rising to the serious challenges our society faces, they need to be engaged with science effectively and at an early age. We would do well to roll out more education mechanisms such as the UK's pilot '21st Century Science' curriculum, which shows the relevance and application of basic research in our lives. In addition, supporting and increasing playful and family-oriented efforts such as hands-on science exploratoriums – and getting science into high-throughput indoor play areas – would engage communities in science in an easy and rewarding way and would furthermore enrich their personal lives.

IX. Concluding remarks

EMBL welcomes the initiative of the European Commission to engage in a broad public consultation to identify the main issues in the preparation of the next CSF. We hope that the investment into research and innovation will increase so that the EU2020 goals can be achieved and the ERA completed. For EMBL the continued support of basic research is an essential component in the innovation cycle. Increased support for the development and integration of new infrastructures including e-infrastructures and more funding for transnational user access would provide significant added value to the European research communities. Training and mobility of researchers is an essential component of the CSF and should receive a larger budget. We are hoping that simplified rules will reduce administrative overheads for research organisations such as EMBL.