Internationalization of Research and Graduate Studies and its Implications in the Transatlantic Context
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Internationalization of Research and Graduate Studies and its Implications in the Transatlantic Context
Dear Friends,

GLOBALISATION is a reality. It changes many facets of our lives, especially the way we produce, share and use knowledge. Globalisation has also thrown up new challenges such as climate change and possible pandemics. It also increasingly affects research, education and innovation, the pillars of the knowledge society. This is now further compounded by turbulent financial markets. To meet these challenges we realise that the European research community and policy makers need to work better with our international partners, especially the United States. I am strongly convinced that by working together we can achieve much more.

The European Commission has recently published a proposal for a new strategic framework which will improve international cooperation in science and technology including specifics in information and communication technologies. The proposed framework consists of a number of core principles and orientations for joint and coordinated European actions in our relations with the international community. This entails sharing objectives, formulating and implementing common European research agendas, engaging in joint activities and pooling efforts and resources. Many of the proposed actions should be of great interest and benefit to you also. Let me briefly mention three of them:

FIRST of all, it is the joint development of and access to global research infrastructures for tackling scientific and societal challenges: there are already some very good examples of international cooperation with the creation of global research infrastructures such as the Global Earth Observation System of Systems (GEOSS) and CERN. I strongly believe that a more structured international approach is needed. Using international fora such as the G8 and the OECD, we can facilitate cooperation, mutual access and cost sharing where appropriate.

SECONDLY, we need to build better global networks, particularly through increased mobility and interchange between Europe and the U.S.—both for working researchers and for University students. Such mobility helps to build and maintain international networks between individual researchers, students and between institutions. The ERASMUS MUNDUS programme helps set up exchange programmes, joint courses at Masters Level and two- way scholarships. We have increased funding for the Marie Curie programme to help European post doc researchers to go to the U.S. and for U.S. researchers to undertake research in Europe.

Recently we have launched the network of European scientists and scholars working abroad, now known as EURAXESS. This has become a valuable way of keeping European and U.S. research communities connected. But there are currently many more EU scientists working in the U.S. than the other way around. And I would definitely like to see more U.S. scientists come to Europe for at least part of their career.

THIRDLY, the step-by-step mutual opening of our research programmes in well defined research areas with key partner countries on a reciprocal basis: the recent agreement with the National Institute of Health to mutually open our health research programmes, providing funding to selected transatlantic research partnerships, will open up new opportunities for the international scientific community. I sincerely hope that this is a first step that will lead the way to further promising mutual opening initiatives between Europe and the U.S.

Janez Potočnik
Dear Friends,

During the next two days, you will study the developments of transatlantic relations in higher education and research.

Figures show clearly the strength of the long-established transatlantic partnership in those fields. Indeed, the United States is the first scientific partner of Europe with more than 32,000 joint publications per year, which means nearly a hundred a day. Further, more than half of the U.S. international publications are written together with European scientists.

Beyond figures, our partnership is also illustrated by the impressive network of delegations of our national higher education and research institutions within the EU or the U.S.: most American universities have offices in Europe, European research bodies send regularly their staff for short stays in the U.S. Those links have also created dozens of Joint International Units, such as the one created in 2006 by Georgia Tech, the French Universities of Besançon and Metz, Supélec and the ENSAM.

Our partnership is based on excellence, and recent progresses on the issue of intellectual property rights should facilitate its development. After the U.S. and the EU signed two agreements in 1999 and 2004, France and the U.S. have just signed last month an agreement to better organize a fair sharing of the results of joint works of research.

But we still have progress to accomplish together, for example in the area of large research infrastructures. The involvement of the U.S. and the EU in large projects such as ITER in the south of France or CERN at the border between Switzerland and France, where I met Dr. BEMENT (Director of the National Science Foundation) a few weeks ago, paved the way for future developments. I think the U.S. and the EU share the capacity of leading cooperation at the global level. We ought to do it to build jointly the answers of research to today's main societal challenges such as climate change, loss of biodiversity, need for new energy or the ageing of our populations. International mobility of our scientists, joint degrees between our universities and meetings of the youngest generations of our researchers such as the ones organized by the program “Frontiers of Science” are also key elements to help us develop new fields of cooperation.

But to ensure the efficiency of those new fields of cooperation, we need renewed tools to better organize it. That's the reason why the French Presidency of the European Union has strongly supported the idea of a new strategy for the international cooperation of the European Research Area: and this will be one of the main issues on the agenda of the next meeting of European Research Ministers, on the 2nd of December in Brussels. In the same perspective, the EU will adopt within the next weeks the second phase of the Erasmus Mundus program, extending its scope to PhD students.

There was maybe no better time for a seminar on our partnership in higher education and research because I am convinced that those new tools will foster our cooperation for the sake of both partners. I then wish you a fruitful meeting and you can feel assured that I will look very carefully at the results of your discussions.

Valérie Pécresse
According to Dr. Peter Agre, despite common stereotypes, “scientific research may be among the most human of all of mankind’s endeavours.” Using his own scientific career as an illustration, he emphasized the key role mentorship, friendship, and collaboration plays in lab's discoveries. To highlight the international nature of science, Dr. Agre said that his passion for biomedical research grew during his early career years partly due to his cooperation with a disparate and fascinating group of scientists from all over the world.

Further, Dr. Agre pointed out the importance of public investment in research and referred to the Sputnik’s launch which was followed by an unprecedented effort to educate young Americans in science, engineering and mathematics. For this reason, he argued that the popularity and the basic understanding of science needs to be more widespread among young Americans. As he said, science is really important in our lives and the Nobel Prize is actually nothing more than the way by which “public celebrates science.”

Over the past decades, Dr. Agre’s laboratory developed key collaborations with outstanding laboratories in Europe and generated more than 100 publications. His research resulted in the discovery of the aquaporins, a family of proteins implicated in multiple clinical disorders. For this work, Dr. Agre shared the 2003 Nobel Prize in Chemistry with Roderick MacKinnon of Rockefeller University.
Message of Helen Routh, Vice President and General Manager of Philips Research North America

A private sector business executive, Dr. Routh shared with the audience her experience with Philips, a global multi-sectoral high-tech company with an annual number of 1.5 patents per research staff. Dr. Routh highlighted that almost all multinational companies recognise the strategic importance of innovation as a means to achieve sustainable growth. Philips is committed to create new products and businesses based on an open innovation model that brings together people from different national, cultural and educational backgrounds.

In the context of open innovation, Philips promotes exchange of people and exchange of researchers between industry and academia by supporting open innovation centres, such as the high-tech campus in Eindhoven, and temporary staff exchanges. The majority of Philips researchers are hired early in their careers (most of them are post-docs with 1–2 years of post-doc research experience) and many of them participate in joint projects with EU and U.S. labs.

However, we should not forget that innovation stems from research and education and cannot be separated from them. As Dr. Routh says, in multinational companies such as Philips, “our job is innovation, we need research but without education we are not going to get that.“ Working together in multi-national labs, engaging in joint activities and cultivating employees’ entrepreneurial and human interaction skills will be essential for the success of corporations on the markets worldwide.
Session I
Transatlantic Science and Engineering Graduate Curricula

CO-CHAIRS:
US Madeleine Green,
American Council on Education
EU Ivan Wilhelm,
Government of Czech Republic

SPEAKERS:
Topic A: Strategies to create transatlantic synergies
US Ishwar Puri,
EU Andrejs Rauhvargers

Topic B: EU-US partnerships to attract young talent
US John Grandin,
EU Manfred Hampe

Topic C: Obstacles to a harmonized transatlantic approach
US David Allen,
EU André Siganos

Key Issues for the Session

What are the success factors for attracting more talented young students to science and engineering? How to increase students’ perception to view science and engineering curricula as a gateway to an exciting and rewarding international career?

Where does the transatlantic dimension fit in the overall international strategy of universities and other key players?

What are the main obstacles to transatlantic cooperation (e.g., accreditation of new degrees, credit transfers, differences degree duration and structures in the U.S. and in Europe, language barriers, fee structures) that prevent the further development of transatlantic science and engineering curricula? Which obstacles are specific to transatlantic cooperation?

What is the potential/interest and scope of setting up transatlantic joint/double degrees at different levels in higher education (undergraduate, masters, and doctoral level)? How can joint/dual degrees at the Master’s level contribute to joint research projects?

What are the success factors for ensuring the sustainability of those joint/dual degrees, and partnerships (e.g., alternative sources of funding, specifically developed curricula, institutional exchange of faculty)?

What policies are needed from government and public authorities, at international, national and regional levels to enhance the development of new transatlantic curricula for preparing the next generation of scientists and engineers? What role should the private sector play?

RAPPORTEURS:
US: Frank Frankfort,
U.S. Department of Education
EU: Petr Kavan,
Embassy of the Czech Republic in Washington DC
EC: Diego Sammaritano,
Directorate General for Education and Culture, European Commission
Recommendations
A general recommendation that emerged from presentations and discussion was the need to reinforce existing programs that promote transatlantic cooperation in higher education and research. Cooperation programs like the EU-U.S. Atlantis managed by the European Commission and the U.S. Department of Education, or others administered at the level of individual European countries, do respond to a real demand from the higher education community and are instrumental for stimulating long term partnerships on collaborative programs, joint/dual degrees and balanced mobility of students and faculty. However the programs are small compared to the size and the importance of the EU and U.S. higher education systems and meet only in part the large untapped potential of a mutually beneficial cooperation.

In addition, other specific recommendations aimed at developing Transatlantic Science and Engineering Graduate Curricula were identified. Most of these recommendations are valid also for other fields of study.

- Promote dissemination of good practices in joint/dual degrees and strengthen information about funding opportunities offered by programs like Atlantis and others operated bilaterally by individual EU countries and the U.S. The existing support programs funded by the U.S. government, the European Commission and by individual European countries are not well-known in the higher education community and more should be done by funding agencies and stakeholders to promote them especially among institutions less familiar with international cooperation activities. Also good practices and successful projects in transatlantic cooperation can be very useful for other universities interested in starting or improving collaborations across the Atlantic. The European Commission has started work in this direction and published a brochure on good practices in terms of joint mobility projects with industrialized countries.
- Create multiple and gradual entry points into international experiences, starting early in post secondary study and complement this with support opportunities for joint/double degree programs at PhD level. Students should be given the possibility to gain an international experience from the very early stage of their postsecondary study up to the PhD level. These study abroad experiences are likely to be for periods of time of increasing length as long as students progress in their program of study. The added value that European and American universities can gain by working together is distinctly high not only at the graduate level but also at the PhD level. Funding agencies could consider extending to the PhD level existing support programs currently operating at the graduate level.
- Embed international cooperation into the core mission of the institution; develop a strategic plan for institution-wide implementation and coordination. This is essential to ensure the success and the sustainability of transatlantic collaborations and joint/double degrees.
- Develop recommendations to facilitate convergence and compatibility of ECTS and U.S. credit systems. Hundreds of universities in Europe and in the U.S. are exchanging students and are doing so on the basis of self-made arrangements for the recognition and transfer of credits earned on the other side of the Atlantic. A number of workable solutions are found and applied on the ground. It would be useful, however, if broader comparative analysis of the

Students should be given the opportunity to gain an international experience from the very early stage of their postsecondary study up to the PhD level.
U.S. and EU credit systems be made with a view to elaborate a generalized conversion method. This may lead to convergence and more transparency and comparability of credit systems in Europe and in the U.S.

- Develop reliable statistics on transatlantic mobility of students, faculty and researchers. Open Doors statistics released in 2008 on U.S./EU flows of students revealed that the number of U.S. students studying in Europe is more than double the number of Europeans going to the U.S. However, these statistics do not distinguish between very short-term stay abroad and study abroad and longer terms one. If only study abroad periods of one academic semester or longer are taken into account than the U.S./EU flows of students are reversed with many more European students and scholars going to the U.S. than American ones travelling to Europe. There is in general, however, a need for developing more detailed and reliable statistics on transatlantic mobility of students, faculty and researchers.

- Reinforce the language component in transatlantic cooperation and exchanges. U.S. students should be offered extensive training in the language of the European countries where they are planning to study before their departure. While most of the courses/research work during the study period in Europe will be in English, advanced training in the local language should also be foreseen. European students should possess an adequate level of proficiency in English before starting their study in the U.S.

Introduction to Session I
At the beginning of the morning session, the two co-chairs introduced the objectives of the session and described some recent trends. Madeleine Green opened the session with general comments on the nature of institutional partnerships and why they are so difficult to maintain. She noted that Europe has many institutional networks, some including industrial partners. U.S. institutions also have many partnerships but the key difference is that in the EU there is a much greater emphasis on developing and maintaining a strategy for partnerships. Green noted that partnerships must be flexible enough to adjust for the unexpected and that they must contain a robust evaluation mechanism to select on strengths and eliminate weaknesses. Equally important was the need to be on the lookout constantly for new activities that have the capacity to invigorate and sustain partnerships. The other co-chair Ivan Wilhelm announced that on November 17, the Czech Republic, Slovakia, Hungary, Estonia, Lithuania, and Latvia joined the U.S. Visa Waiver Program. He said that this was a very important step forward in the relations with the U.S. for the EU countries concerned, because visas constituted one of the barriers to cooperation and exchanges in education as well as in many other areas. The session featured six presentations each followed by a lively discussion. The main highlights of the session discussions are presented below.

Lessons from Past and Current Practices
In an increasing globalised world international cooperation is a must for universities that want to constantly improve their educational offer. By confronting and working together with partners in other continents, European and U.S. universities can innovate their curricula and teaching methods, identify common solutions, be more effective in cutting edge research projects, and become more competitive towards other parts of the world. Europe and the U.S. are natural partners in higher education and research.
Transatlantic cooperation works best when it is based on partnerships that are well thought through and that are balanced in terms of number and type of institutions, flows of students/faculty, and funding.

The EU-US Atlantis program, run jointly by the European Commission and the U.S. Department of Education/FIPSE, has since 1995 supported 152 balanced joint projects involving over 800 European and U.S. institutions and some 6000 students exchanges for at least one academic semester. In 2006 the Atlantis program has been refocused towards joint and double degrees and as a result 23 new transatlantic degree programs were launched.

The Bologna process has triggered unprecedented large scale reforms and the convergence of degree structures throughout Europe. This has been instrumental for the development of joint and double degrees in Europe and the U.S. The University of Darmstadt together with Virginia Tech has set up one of these transatlantic double degrees at undergraduate level within the framework of the Atlantis program. The project partners have successfully integrated a 4-year degree at Virginia Tech and a 3-year at Darmstadt University and are exchanging students for a full academic year plus a summer term. Building on the success of this project the partners created another dual degree at master level and managed to leverage funding also from DAAD, Fulbright and industry.

Another successful example of transatlantic partnership presented in this session was the Double degree program that the University of Rhode Island is managing together with the Technical University of Braunschweig in Germany. Since 1995 over 430 students participated in two-way exchanges. A study abroad period typically consists of six months of coursework and six months of special project work. The students are exchanged on a one-to-one basis and they pay the fees to the home institution. Students in the particular program do not receive specific mobility scholarships or grants. This demonstrates that well-designed student mobility programs can be self-sustainable. The University of Rhode Island has also similar dual degree arrangements with institutions in Mexico, Spain, France, Canada and China.

The University of Nebraska at Lincoln offered a third example of a current successful practice in transatlantic higher education and research cooperation. The UNL has developed over the years a strong commitment towards internationalization in particular in the field of engineering. This translates into about 20% of undergraduates gaining an international experience through partnerships with eight countries on three continents and three dual degree programs. One success factor for UNL has been ensuring the support from the administration and top management. This has been realized by making evident to stakeholders the return on the investment in terms of more and better quality enrollments. Another feature of UNL approach was the creation of multiple entry points towards international mobility where students were offered a range of study abroad possibilities of increased duration linked to the progression in their studies (Freshman level short winter program, Upperclassman month long program, senior level international internship, Graduate level dual degree program).

Obstacles to Transatlantic Cooperation
International cooperation, and in particular between European and American universities, is widely recognized as the natural approach to address global challenges, to deal with complex research projects and to advance the quality of curricula. Communication and cooperation are greatly facilitated by modern technology which has reduced the cost and time for
Language barriers constitute another natural obstacle especially for U.S. students travelling to Europe. However, following the Bologna reforms thousands of new Master courses in English are operational in Europe. English is also the common language used for research collaborations. Successful transatlantic mobility or joint/double degrees combine courses/research in English with advanced learning of the local language when this is different from English. Language preparation before departure is also essential to allow students and researchers to fully profit from their academic and cross-cultural experience abroad.

The tuition fees in the US are much higher than those in Europe. Thus, it is essential for University administrations to neutralize these differences in order to design and implement more Joint/double degree programs.

Sustainability after external financial support has ended has been highlighted as a serious obstacle to transatlantic cooperation. This problem, however, is common to many publicly funded collaborations in higher education and research. The financial support provided by the Atlantis program should be seen as seed money to stimulate EU and U.S. universities to team up and set up a framework of cooperation that can be used in the longer term. The initial investment for agreeing on a joint program of study and the modalities for recognizing the study or research periods abroad is considerable. However, once the framework is in place and it has proven its value to the exchange students and researchers, it can be used as a marketing tool for attracting talented students with limited mobility grants as it has been done for instance by the University of Rhode Island with their several self-sustainable dual degrees in operation since 1995.
Key Issues for the Session

› How can we re-structure our international research collaborations so that they more effectively integrate enhanced curricular opportunities for our students to work in multinational teams on common large-scale interdisciplinary challenges?

› How can we structure our international curricular opportunities so that they are more effective in attracting and retaining a diverse set of graduate students?

› How can we best educate and train doctoral students to be effective in applying interdisciplinary knowledge and skills to solve complex real-world problems, while retaining significant professional immersion in their respective disciplinary fields? What role can international partnerships play in addressing this challenge?

› How can we balance awareness in global complex problems, acquisition of interdisciplinary knowledge, and mastering of a collective interdisciplinary approach of scientific problems at all stages of preparing students to be productive members of multinational, interdisciplinary research teams?

› How do we create more effective collaborations between the humanities and social science communities, on the one hand, and the physical sciences, engineering, agriculture, health sciences communities, etc., on the other, in building new multinational curricular opportunities for our students?

› How can we structure international partnerships in graduate education such that the benefits are truly reciprocal and sustainable, particularly in cases in which there is a significant resource imbalance between nations/institutions?

CO-CHAIRS:
US Gretchen Kalonji, Director of International Strategy Development, University of California system
EU Jean Chambaz, Vice-President for Research, Faculty of Medicine, Université Pierre et Marie Curie

SPEAKERS:
Topic A: Universities in a globalized world—roles and responsibilities to shape innovative curricula for global R&D careers
US Maresi Nerad, EU Léopold Demiddeleer

Topic B: Building non-technical skills into innovative curricula
US Michael Adewumi, EU Alexandre Quintanilha

Topic C: Shaping, implementing and assessing innovative curricula for global R&D careers
US Karen Holbrook, EU Dieter Leonhard

RAPPORTEURS:
US: Jeanne Narum, Project Kaleidoscope
EU: Michel Israel, Embassy of France, Washington DC
EC: Astrid-Christina Koch, Delegation of the European Commission, Washington DC
Recommendations

A central recommendation that emerged from presentations and discussions was that innovative curricula should consist of modules for intercultural and interdisciplinary preparation and should integrate “non-technical” skills, which need to be implemented by the creation of a U.S./EU joint program to provide support for exploration of multiple approaches to innovative collaborative doctoral programs and a balanced transatlantic student mobility instrument. Sustained substantial bilateral funding is needed to enable all of the above.

In addition, other specific recommendations aimed at developing Innovative Curricula were identified. Most of these recommendations are valid also for other fields of study.

- Embed innovative curricula for global research and development early. They need to begin at the undergraduate level and be integrated with collaborative doctoral collaborations. Engage graduate students themselves in planning their role as global citizens to solve complex problems along with colleagues who can add to their vision because of a different culture or discipline. Assure that students develop also humanistic, intercultural and communication skills though integrated training.

- Undertake a systematic analysis of current “promising practices” in various countries and universities by the transatlantic funding agencies and develop an easily accessible repository/database of information about practical issues in each others’ systems, e.g., curricular constraints, faculty reward structures, funding models.

- Develop a module of an at least 3-month stay in an overseas lab as a prerequisite of a Ph.D. program. Modules for intercultural and interdisciplinary preparation, involvement with scientific methods will add value to the research and the quality of exchange. Create joint transatlantic programs which are a lasting contribution to international R&D careers, e.g., through reinforcement and promotion of EU/US summer schools (two or three weeks of full immersion work in a multidisciplinary area, such as nanotechnology).

- Institute a joint program by the U.S. and the EU to provide support for exploration of multiple approaches to innovative collaborative doctoral programs, which have the following characteristics: address complex common challenges which are inherently interdisciplinary; address/attract students with heterogeneous interests and diverse backgrounds; provide freedom for students to choose topics/supervisors; multi-facettled mentoring, including career development; include innovative approaches to language study; integrate “non-technical” skills into collaborative research. Collaborations should be structured to take advantage of and build on emerging technologies, establish a competitive process to garner proposals, and include common criteria for assessment.
Introduction to Session II

The two co-chairs introduced the objectives of the session, alerting the assembled group with the reminder that the outcome of the discussions were to be specific recommendations in regard to ‘innovative curricula’ that enhanced transatlantic collaborations for emerging STEM professionals.

In her opening comment, co-chair Gretchen Kalonji suggested that sustainable and effective collaborations will only happen when there is effective coupling of institutional transformation and curricular transformation efforts in ways that serve a common vision of an internationalized community of scientific and engineering practitioners. Her remarks centered on the student learning experience, detailing how current curricular efforts focus on individual students and individual ‘content.’ Her idea of innovative, international curricula for the future would be one that has been transformed to deal with large societal issues on which multi-national, multi-sector and multi-disciplinary teams are working. Kalonji argued that student creativity needed to be brought into the process of shaping new programs, and made a compelling case about the power of research teams in undergraduate and graduate science and engineering programs as a means to broaden participation, encouraging teams that are more diverse in terms of professional goals, incomes and backgrounds.

The 2nd co-chair, Jean Chambaz, described the current fragility of transatlantic collaborations that are still based more on one-on-one arrangements between colleagues with transatlantic connections. In his remarks, he laid out a series of challenges, considering: how to ‘refit’ institutional graduate programs that are embedded in particular institutional contexts (understanding the huge diversity of institutions of higher education); how to arrive at a better understanding of the strengths of institutions on each side of the potential partnership—particularly the organization of the curriculum. He discussed the organization and consequences of the Bologna Process and the consequences on the doctoral level: 3 years of bachelors, 2 years of masters. Chambaz reflected on a key lesson learned—that diversity is a key strength and that from an overall framework in principle we can work on different solutions for joint and double degree.

He emphasized Kalonji’s remarks, that we must be seeking shared solutions to common problems, that we need to be preparing Ph.D. students for the need to gain different kinds of skills than taught to and learned by past generations, and that we will need an innovative and flexible curricula in which students develop their capacity for innovation. Chambaz ended with a suggestion that we should be looking for models that could catalyze a ‘snowball’ effect, that it is important to know what is already succeeding and build from that, rather than to reinvent the wheel. That was an appropriate introduction to the presentations that followed.

Lessons from Past and Current Practices

Theme-based interdisciplinary programs like that between the NSF Integrative Graduate Education and Research Traineeship (IGERT) and the German-DFG funded Graduiertenkollegs are good examples of what can be done through the use of innovative curricula and internships that are centered in a robust institutional home (not one-on-one). By focusing on problem-centered training, such programs give their graduates the edge needed to become leaders in their chosen fields.
In some universities, such as the University of Porto, mentoring of students was described as a factor that plays a key role in increasing and sustaining students’ interest in science fields. A small program involving 15 graduate students in biology several years ago has produced over 100 graduates, many of whom are now professors. The key emphasis made here and throughout the session was the need for faculty to be role models for students—emphasizing that this was particularly critical (and perhaps difficult) in the context of preparing students for careers as international scientists and engineers.

The Franco-German University (FGU) consists of a group of affiliated member universities from both France and Germany. It has a decentralized campus, with the administration located in Saarbrücken. The university is an international institution which was established by means of an intergovernmental agreement in 1997 (“Weimar Agreement”). The agreement provides the legal basis for this international university, defining both its governing bodies and responsibilities. The agreement concerning the establishment of the FGU came into effect in September 1999.

Pennsylvania State University has internationalization as one of twelve priorities connected to strategic planning for institutional transformation. One reason for this priority was pressure by students, who are interested both in serious questions of their time and in graduating with skills that make them competitive for well-paying jobs. Faculty are one barrier to achieving the internationalization priority, as they outline lock-step major course sequences that preclude adding an international dimension. Penn State is currently offering a range of international interdisciplinary engineering experiences for their faculty as one incentive to take a leadership role in becoming involved in shaping Penn State’s internationalization efforts.

**Best Practices:**

- Theme-based (trans-, multi- or inter-disciplinary) team-based research/education programs that have significant external support, in which student funding is tied to the program rather than to the professor
- Programs that provide significant access to professionals in the field, emphasizing the development of skills needed by such professionals, offering career symposia
- In both undergraduate and graduate programs, agreed-upon expectations for the collaboration, with annual theme-based workshops on research and with opportunities for social contacts
- Actively involving administrators early-on to help ease some of the bureaucratic complexities
- Transforming how students learn by involving them in a problem-based learning curriculum
- Using the process of developing a new problem-centered or interdisciplinary program (i.e., biomedical education) to build transatlantic partnerships that shape the planning without reference to historical or current practices
- Piggy-backing on current efforts to internationalise the undergraduate STEM learning environment, adding graduate students to those opportunities
- Incorporating ‘soft skills’ (team-building, listening, and conflict resolution) into the curriculum
- Remembering that change at the level we are discussing takes a long time.
Obstacles to Shaping Innovative Curricula for Transatlantic S&T Collaborations

A: STUDENTS
- Poor quality of pre-college math/science preparation of entering undergraduate students, who thus are not motivated or prepared to pursue a STEM major generally
- That the U.S. undergraduate academic programs are mono-lingual, giving students no experience with other languages/cultures
- Different and competing expectations for students (length of time to degree, level of involvement in interdisciplinary research, transitions from technical institutions/BA/MA/PhD)

B: FACULTY/PROGRAM
- Lock-step, inflexible programs that have no room for pilot international initiatives
- S&T curricular so ‘tight’ that intercultural training is eliminated

C: INSTITUTIONS
- Lack of widespread discussion of promising practices in transatlantic collaborations
- Few continuing opportunities for communication across international boundaries about the cornerstones of such programs
- No networking of leaders in innovative S&T curricula that parallel that of leaders in S&T research communities
- Programs, particularly those dealing with small numbers of elite students, not intentionally designed to become part of the institutional structure (to be scaled-up when successful)
- Graduation requirements that do not recognize the value of global learning opportunities, on the home campus or abroad
Session III: Brain Circulation Schemes for Developing Lasting Networks of Excellence

Key Issues for the Session

 › Do researchers need additional programs or initiatives to increase transatlantic collaboration and integration (i.e., creating specific schemes with grants for collaboration, identifying areas needing collaboration of societal needs (top-down), arranging scientific workshops to identify areas of common interests (bottom-up), etc.) or do scientists manage to integrate research in areas of interest and needs by themselves?

 › Which are the main factors enhancing mobility of young researchers? Is the identification of scientific areas and creation of interactions between researchers more important than grants? Are exchange programs to excellent research environments an attractive approach? Should mobility schemes be linked to PhD scholarships or even research schools where networks could be continued within the program during the PhD period?

 › Are there different needs in various scientific domains, i.e., do we need to think differently when speaking about for example life sciences, physical sciences, engineering, humanities or social sciences? Should each scientific domain have its own type of arrangements or should we try to homogenize the actions that could be initiated?

 › Are there existing obstacles preventing research integration that need to be removed or improved (i.e., language problems, cultural differences, visa issues, help in facilitating mobility like courses in cultural and societal issues that are done in the private sector, IPR issues, etc.)?

 › Are schemes to access large infrastructures an attractive way? Would there be an increased usage of the infrastructure if there would be a single, e.g., software standard etc.? Are the needs for travel costs and arrangements underestimated and should the EU open a program where it would be easy to get financial support?

 › How can we increase the attractiveness of Europe for U.S. students? Why do European students show a higher degree of mobility towards the U.S. than the opposite?
Recommendations

A central recommendation that emerged from presentations and discussion was that researcher mobility ought to be driven by the need for higher quality science. In addition to addressing the important issues raised in the previous sections, the Session participants recommend the following actions:

- **Create a web-based portal to consolidate information about existing opportunities for support of transatlantic mobility.** The complexity of systems on both sides (due to funding bodies being very different entities, university, regions, counties or union of countries), results in that the opportunities are poorly known by the scientific communities. Each participant (U.S. and EU) should produce an inventory of existing opportunities (and evaluate them) to be made easily accessible to the research communities via a centralized information system.

- **Identify incentives for U.S. research institutions to include mobility in research as an asset on their faculty record.** This long term goal could be supported with an extensive analysis of the impact of mobility on research careers and on research productivity as assessed by publications, patent generation and production of innovation enterprises.

- **Promote the concept of “sustainable mobility schemes.”** One way to achieve this might be to promote “alumni networking” of existing schemes. Another way might be to expand the number of “repeated short events” to facilitate networking of early stage promising scientists on frontier research fields. These activities were considered important to foster lasting scientific networks.

- **Scale up successful existing schemes and develop new complementary ones.** With respect to the development of new schemes, short term recurrent symposia, workshops and summer programs as well as programs for reintegration after mobility periods should be taken into consideration. Different programming modes can also be particularly valuable; for example, young scientist workshops on emerging topics can be linked to follow-on funding for joint research activities, and thus cement long-term collaborations that involve international mobility. Finally, more funding should be injected into these schemes to achieve continuity.

- **Large infrastructures required for facing global problems are often not affordable by one country alone.** However the mechanisms for funding these projects are not sufficiently transparent. In a world where new research opportunities are emerging more frequently, faster and easier mechanisms to finance such large projects should be established.

- **The points raised in the obstacle section should be taken as recommendations for improving mobility, namely:** (1) an attractive salary that takes into account social security, health insurance and researchers’ pension; (2) packages for dual career families; (3) simplifications and implementation of the procedures for obtaining visas; (4) common approach for international intellectual property rights.
Introduction to Session III

At the beginning of the morning session, co-chairs Linda Katehi and Pär Omling introduced the objectives of the session. In a globalized economy education becomes increasing international in content and context. Academic and research institutions worldwide try to internationalize their activities by setting formal or informal collaborations. An education that is enhanced by international experiences leads to mobility of the science and technology workforce. Existing academic cultures and research structures at times are at odds with efforts to internationalize education. Despite a number of both federally and privately supported programs: efforts to scale up the numbers of participants have not been satisfactory. While the national discussions on the need to prepare the future science and technology workforce for a flat world have intensified, few institutions have attempted systemic change.

The session featured six presentations each followed by lively discussion. The main highlights of the session discussions are presented below.

Lessons from Past and Current Practices

Brain circulation is no new topic. It started several centuries ago and is abundant today. While in the past researchers have been mobile on a personal basis, it is now becoming clear that in a globalised economy, brain circulation becomes a more systematic necessity. The benefits of mobility are not yet fully recognized on both sides of the Atlantic.

Indeed, with political leadership, brain circulation is a common practice in many European countries (in some countries even essential for career development), while in the U.S., the incentive to move is of a lower degree, or even viewed negatively. So the problem is unbalanced when coming to EU-U.S.

exchange as U.S. researchers move less to Europe in their career. While the quality of research centers might explain partly this unbalanced phenomenon, the actual structure of the U.S. research career certainly shares responsibility.

In fact, it has been pointed out that in certain stages of the typical U.S. research career, mobility seems extremely difficult. Upon PhD graduation, many U.S. students get their first job in the U.S. in order to pay back their loans while others are able to obtain postdoctoral positions in academic research environments. At a later stage, untenured faculty fear leaving their host institution as they might miss important career opportunities while being away and as the perceived value of research appointments abroad is often low. Furthermore, local academic staff often does not rate positively such moves.

It is a daunting task to sum-up all the possibilities of funding that exist in the EU and U.S. due to the fragmentation of structures offering these possibilities: EU/U.S., national, regional, university and even laboratory level. It was beyond the scope of this workshop to list them. However, some examples were discussed where good practice was recognized: Fulbright, Marie Curie, ERC (European Research) and some types of NIH grants.

The recurrent concerns regarding those schemes are:

Where to get the information? Due to the diversity of funding bodies (Universities, Funding agencies, Regions/States, Countries, Union of counties, sometimes bilateral exchanges) sponsoring mobility programs and the variety of the types of funding opportunities, it becomes extremely difficult for researchers to find the most suitable schemes for themselves. Anecdotal information from colleagues and mentors is not adequate guidance for career-determining decisions on working in another country.
How to scale them up? Some existing schemes for mobility are doing a great job, but they still represent a tiny percent of all research possibilities. The issue is to increase the number of mobile researchers. A straightforward way to tackle this issue would be to increase financial support dedicated to these types of schemes.

How to make the schemes sustainable? In addition to creating programs that promote mobility it is important to ensure that the collaborations created via those schemes are long-lasting.

A specific need was identified for brief, recurrent and frequent networking events and workshops.

Undeniably, the current problems facing society (energy, global warming, health, transport, water, terrorism) demand multi-disciplinary approaches that can be dealt with by using large research infrastructures. These large infrastructures require financial resources and experts from many different fields that can be found more frequently in the international community. The complex nature of the research that these structures are used for, along with the global dimension of some of the problems, set the stage for researchers from both sides of the Atlantic to work together. There are numerous examples, of successful international infrastructure dedicated to tackle such global problems (among them are CERN, ITER and others).

Obstacles to Transatlantic Cooperation
The mobility of researchers has increased in the past decades due to development of new technologies such as the internet and the growth of cheaper air transportation. However there are still many obstacles to mobility. Apart from the ones discussed above (fragmentation, U.S. career system, lack of centralized information) there are various types of issues that play an important role in the decision making mechanism of researchers:

Salaries have to be attractive to cover not only living costs but also mobility costs. Furthermore they should cover social security costs, health insurance as well as contributing to a researcher’s pension. How can these issues be taken into account in the home country?

Dual career families present additional complexity. How is the family (partners and/or children) taken into account in such mobility path? The integration of the researcher in a new environment can be difficult but the integration of the partner (e.g., get a position in the other country) and of the children (e.g., find the appropriate schools) may be even more difficult.

Although there has been some progress on visa issues, much more needs to be done to address these time-consuming procedures. From the EU side, a directive on the “scientific visa” package has been adopted in 2005 (which aimed to allow fast-track admission and residence of third country researchers) but these policies have not been uniformly implemented by all EU Member States. In a communication paper published in May 2008, it is foreseen that this directive should be implemented by all European Member States by the end of 2010.

Intellectual property rights concerns might also prevent mobility as these differ greatly among countries and even institutions.

There is a substantial imbalance in the transatlantic exchange of scientists for long-term research. Many Europeans are eager to go to the U.S. while Americans often are reluctant to leave the U.S. at a pre-tenure stage of their careers or for extended periods of time.

1 Better careers and more mobility: A European Partnership for researchers COM(2008)317
Session IV: Transatlantic Mobility of Researchers and Innovation

Key Issues for the Session

› What are the main factors enhancing innovation opportunities through increased mobility of researchers (e.g., IPR strategies, entrepreneurship awareness, public-private partnerships) and how different is the situation on both sides of the Atlantic?

› What are the main obstacles (e.g., social security or pension regimes, visa regulations, family-related constraints) that prevent the development of more transnational research careers, particularly mobility between the public and private sectors, and what policies are needed from government and public authorities, at international, national and regional levels?

› What are the successful programs for recruiting and retaining more scientists and engineers into research and development positions in the private sector (tax incentives, young researchers for industry programs, university-industry partnerships)?

› How will the expanding global networking of knowledge centers (e.g., university-university partnerships, establishments of offshore campuses, novel information and communication means) best build upon the development of local creative ecosystems (e.g., competitiveness clusters, science parks, incubator centers)?

› What impacts will the development of open innovation models have on the global research workforce (e.g., localization, mobility, training needs, funding)?

› How can universities contribute to transatlantic mobility (joint research opportunities, joint conferences, hiring international graduate students, establishing off-shore campuses, having industry funded research opportunities)?

CO-CHAIRS:
US John McIntyre, Georgia Institute of Technology
EU Radojka Vercko, Slovenian Ministry of Higher Education

SPEAKERS:
Topic A: Global science and technology careers
US Susan Butts, EU Philip Shapira

Topic B: Obstacles which prevent innovation
US Jarrod Goentzel, EU Jean-Luc Clément

Topic C: Innovation stimulators
US Cynthia McIntyre, EU Per Eriksson

RAPPORTEURS:
US: John Krige, Georgia Institute of Technology
EU: Andrej Berginc, Embassy of Slovenia, Washington DC
EC: Laurent Bochereau, Delegation of the European Commission, Washington DC
Recommendations
Several recommendations that would contribute to promote research and innovation through enhanced mobility were identified.

Whereas innovation generally requires the availability of a critical mass of multi-disciplinary skills and public-private interfaces at a given location, the networking of centers of excellence can greatly facilitate the flow of ideas and stimulate innovation. Priority should be given to problem-solving type of networks including partners and mechanisms for transferring the knowledge created.

- Strengthen long-lasting transatlantic investigator-driven and problem-focused networks including public-private linkages. Complex, unclear or incompatible IPR regimes have prevented transatlantic networks to perform joint research and development work. More efforts are needed to disseminate best practice and simplify legal, financial and administrative cooperation procedures. Particular attention should be placed on the portability of international grants and the development of transatlantic commercialization strategies for university start-ups abroad.

- Promote intellectual property charters respecting joint ownerships and clear distribution of royalties. The mobility of scientists and technologies is often hampered by rules and regulations which lead to very significant delays and complications in the execution of research and development projects. Multinational companies and leading universities and research centers are developing new schemes to address the international mobility needs of their S&T workforce.

- Improve, and simplify when possible, administrative procedures including visa requirements, family-related mobility constraints and export control regulations. Innovation processes build on a variety of public-private pathways which differ greatly from sector to sector. More recently, open innovation models have opened new avenues for the private sector to innovate globally without travel. Traditional innovation indicators are often inadequate to address the complexity of innovation processes.

- Foster multidisciplinary research which would help improve existing innovation indicators, particularly those related to mobility.
Introduction to Session IV

At the beginning of the morning session, the two co-chairs introduced the objectives of the session and described some recent trends. They noted that the literature on the interactions between mobility and innovation remains fragmented. Europe has historically had a less mobile workforce than that of the U.S. For instance, between 2000 and 2005, 1% of employees changed countries among the EU15, whereas 2.8–3.4% of the workforce move from one U.S. State to another. The European Union has established several university and research programs to encourage intra-EU and EU-U.S. mobility and launched recently the ljubljana process to revive the concept of a European Research Area open to the world.

The morning session allowed the selected speakers to present some of their key messages while providing an opportunity for all participants to share their experience. The afternoon session was more structured including a series of presentations followed by questions and a final general discussion. The main highlights of the session discussions are presented below.

Lessons from Past and Current Practices

The Project on Creativity Capabilities and the Conduct of Highly Innovative Research in Europe and the United States (CREA) investigated research environment features which encourage highly creative and unconventional research and analyzed highly creative scientists in human genetics and nanotechnology both in the U.S. and Europe. The results identified several key organizational and institutional factors, including small group size embedded in larger research environment, multidisciplinary linkages, flexible research funding and independence at early career stages. Mobility (across disciplines, institutions, countries, and continents) was also a key factor in the career trajectories of highly creative scientists.

Several transatlantic early career mobility programs provide alumni-type monitoring mechanisms which have proved very beneficial for fostering long lasting networking opportunities among creative individuals. Building on pre-existing transatlantic researcher-to-researcher collaborations, employers are increasingly trying to expand and formalize those relations through various kinds of multi-annual partnerships which could deepen existing cooperation and facilitate new ones.

Long-standing international collaboration is often built on the foundation of permanent faculty members and researchers who work in foreign countries. The path for personal livelihood (salary structures, social security, employment for spouse/partner) is critical to establishing and sustaining this foundation. The Georgia Tech Lorraine campus in France includes a joint Georgia Tech/CNRS laboratory, hosts several high-tech companies and provides various education programs in engineering and management. The organization of international PhD summer schools bringing together students, faculty and alumni around key S&T challenges, the location of companies next to university campuses and the establishment of university antennas within industry parks stimulate creativity and innovation.

Tools now commonly available (internet-based open innovation brokers, e-mail, use of common servers to exchange large documents or datasets, inexpensive telecommunications) make it much easier for scientists to cooperate and innovate internationally without travel. The high cost of international assignments involving relocation of employees and their families has driven multinational companies to explore alternatives such as extended business trips which are less expensive but can still meet the needs of employee-based technology transfer, expert problem solving, and leadership development. Faculty professors and researchers travel regularly overseas. In average, 10% of CNRS scientists spent at least two weeks in the U.S. every year.
Multinational companies are adopting new modes of organization, based on functions or business activities rather than geographic areas, which are more prone to innovation. They are also adapting their recruitment policies encouraging new S&T recruits to work in several R&D services and locations during the first year. Links between academia and industry seem to differ between Europe and the U.S. as European companies tend to offer less attractive positions but host or sponsor a significant number of PhD students whereas U.S.-based students tend to have more short-term internships in industry.

**Obstacles to Transatlantic Cooperation**

In the increasingly globalized knowledge-based economy, all groups of actors (industry, academia, policy makers) are striving to adapt their activities at international level. The main obstacles to transatlantic cooperation leading to innovation can be regrouped into several categories including the intellectual property rights, the mobile workforce (visa, social benefits, family constrains) and the transfer of materials, money and equipment.

Differences in the treatment of intellectual property resulting from company-sponsored research at universities can either promote or discourage such international collaborations. In general, European universities offer more sponsor-friendly IP terms so U.S. companies are increasingly attracted to such research partnerships with universities in Europe. There are also many regulatory differences between U.S. States which makes it even more complex.

Universities rarely encourage the entrepreneurial initiative that often requires multiple disciplines and skill sets to take ideas to market. Increasing modularity in curricula enables development of multi-disciplinary interests and broad skill sets (entrepreneurial, human interaction, foreign languages). The pace, timing and scope for developing and applying innovative ideas across academia and industry are often not aligned.

Cooperation between university technology transfer offices remains limited and prevents the spinning off of start-up companies abroad.

International mobility of workers transferring to another country but remaining with the same employer could be enhanced if the host country would “fast-track” processes for visas and work permits and simplify approaches to healthcare and other social benefits.

Barriers to international research and innovation also include export control regulations and the high cost of obtaining patent protection in multiple countries (due to lack of international patent system harmonization and cost of detecting and prosecuting infringement). These barriers are not diminished by worker mobility.

In spite of recent progress towards the mutual opening of research programs and transatlantic networking of innovation support systems, funding streams across countries are rarely aligned to facilitate collaborative timing and scope.
Message of Pierre Vimont  
Ambassador of France to the United States  
The world has changed and Europe needs to meet future challenges such as climate change, sustainable energy and security. The European Union leads by example in many of these areas and it is determined to cooperate with its partners around the globe to move forward. The current crisis of the global financial system demonstrated that only cooperation among countries will get us out of the current situation. This is true for science and innovation as they fuel economies.

For this reason, investment in research and education is close to the heart of the French Presidency. Following up on the European Commission Green Paper “The European Research Area: New Perspectives,” the French Presidency, in collaboration with the Czech and Swedish Presidencies, are committed to achieving success in implementing the proposed policies and enhancing international cooperation and transatlantic mobility of researchers.

Message of Lars Leijonborg  
Minister of Higher Education and Research of Sweden  
Scientific results are almost always achieved in a process of interaction. Science is, in its basic character, international. The people involved must know about and understand findings that are made by others. Scientists themselves are often excellent at networking and creating international communities.

We must promote international research cooperation. Sweden, France and the Czech Republic have founded a trio of consecutive EU presidencies dedicated to making European Research Policy a competitive advantage and a real force for the Union. One of the most important goals is to facilitate scientific cooperation and joint research programming.

Public investment in research and development needs to increase. In times of globalization knowledge is the most important factor of production. In my vision for the coming years, the EU has reviewed its budget priorities. Sweden calls for a shift in the budget from the past to the future. And for the future, R&D investment gives more added value than agricultural subsidies.

In addition, research investment needs to be more focused on research of the very highest quality. This is especially valid in the European context, where resources are sometimes still allocated without peer review or competition.

At this juncture in history, in the midst of a financial crisis, we must remain far-sighted. The opportunities for cooperation have never been greater. Let all of us who are responsible for national research policy live up to that responsibility to make reality of those opportunities. To mismanage research policy in our time would be a historical mistake. We must rise above nationalism and protectionism in this time of crisis. And if we manage, as we sometimes do, to gather our political resolve in these issues, I am convinced that the future is bright at the horizon.
Alan Leshner  
Chief Executive Officer of the American Association for the Advancement of Science and Executive Publisher of the Journal Science

MODERATOR

Globalization is accelerating, and this has an impact on the way we collaborate, share and disseminate knowledge. For this reason, any barriers in international collaboration are counterproductive. Integrating all aspects of the scientific enterprise and creating platforms and rules for international cooperation are essential conditions for building transatlantic partnerships. A first step will be to reduce the administrative burden on the collaborating scientists who, frequently, have to get through multiple different regulatory environments in order to participate in international research and education projects. By working together, American and European researchers can confront the various obstacles such as the issue of non-uniformity across countries and across agencies within countries and create long-term synergies to promote transatlantic and international cooperation in research and education.

John Rennie  
Editor-in-chief of Scientific American

MODERATOR

Although the U.S. remains a colossus of scientific research, the rise in both the quality and the quantity of outstanding research in Europe needs to be duly recognized by policymakers, administrators and researchers alike. In particular, young American scientists (and those in even earlier stages of their training) need to be made more aware of the professional advantages that can accrue to them from spending at least some time abroad in laboratories where they can pursue their interests at least as well as they might on U.S. soil. Some barriers to this are a simple lack of information, but others are more institutional and educational (such as the sorry state of second-language training). Nevertheless, with application, these obstacles can be overcome—and indeed, they must.
To maintain research excellence and develop links between American researchers and institutions in Europe and worldwide, the U.S. should continue to support cutting-edge research by increasing the public investment in science, enhancing international collaboration in research and education and reengineering the U.S. innovation ecosystem. For this reason, the NSF has established programs that encourage brain circulation and create synergies by bringing together international investigators and scholars to carry on collaborative projects (e.g., PIRE program). Moreover, to boost innovation, the NSF funds the Industry-University Cooperative Research Centers Program with the aim to leverage the complementary expertise of academia, industry and government, the so-called “triple helix”, to facilitate innovation processes and create new schemes for collaboration.
INTERNATIONALIZATION OF RESEARCH AND GRADUATE STUDIES AND ITS IMPLICATIONS IN THE TRANSATLANTIC CONTEXT

Gary Schuster
Acting President of the Georgia Institute of Technology

ROUND TABLE PANELIST

Historically, most innovations occurred in famous ports, cultural crossroads and trading centers where people from all over the world had the opportunity to meet, interact and exchange ideas. Universities are the current “trading centers” of knowledge as they play a key role in generating innovations and building partnerships. Sound partnerships are based on mutual interest. Where there is common interest and mutual benefit, creative long-term partnerships can be built. On this basis, the Georgia Institute of Technology is developing its internationalization strategy to establish itself as a leading global institution. The Institution’s strategic plan includes promoting an excellent diverse student body, and building multi-institutional educational and research communities. As knowledge is the main driver of economic growth in industrialized countries, policy makers and administrators need to develop some framework conditions under which international research will be conducted and to facilitate cooperation by addressing obstacles such as immigration, researchers mobility and intellectual property issues.

Ivan Wilhelm
Academy of Sciences Assembly of the Czech Republic and plenipotentiary of the government of the Czech Republic for European R&D

ROUND TABLE PANELIST

Research and Education lie at the heart of the Europe’s vision to become the most dynamic knowledge based economy in the world. For this reason, the European Commission and the Member States are working together to create a European “internal market” for knowledge circulation, the European Research Area (ERA) and the European Higher Education Area (EHEA). Such a development will enhance the attractiveness of European research and higher education and increase the level of mobilization and coordination of the Member States. As the world is becoming a “global village”, Europe moves to deepen transatlantic and international cooperation by encouraging student and researcher mobility and launching joint degree programs.

John Wood
International Relations Adviser at Imperial College, UK, and Chairman of the European Research Advisory Board

ROUND TABLE PANELIST

Europe is working to define the research priority areas and modernize European universities to draw the most benefit from globalization. In order to build a sound research area, focus should be placed on addressing challenges at crucial career stages such as the post-doc and young faculty populations. The European Union (EU) is investing in research and research mobility through various programs such as the Marie Curie Actions and the development of institutional entities such as the European Institute of Technology. Moreover, another important issue is the interface between private and public funded research and how to make it more effective to facilitate innovation process. Finally, with respect to internationalization of research and education, the EU and its international partners should work on facilitating researchers’ mobility and cooperation by providing firm guidance in issues such as IP, immigration and standardization of processes.
Why cooperate?
State-of-the-art infrastructures, well educated individuals and multidisciplinary research are crucial for innovation. Europe and the U.S. have a long and mutually beneficial partnership in research and education. However, inconsistent rules, intellectual property issues and lack of information on existing mechanisms, sometimes hinder this partnership. In the emerging multi-polar world of science, Europe and the U.S. should work closely together to remove any barriers and address global challenges around the world.

Sustainable development and innovation
Progress towards a better future for the world can not be achieved without implementing a roadmap to address global challenges such as climate change and sustainable development. Dr. Fedoroff believes that Europe and the U.S. can help the developing countries to build capacity, educate and develop their human capital. For this reason, cooperation is needed to build innovation ecosystems that would promote sustainable development while preventing environmental resources.

More transatlantic cooperation and dialogue
During the past decades, the transatlantic partners worked together to resolve a number of challenges. The EU and U.S. Research and Education Workshop was an excellent opportunity to foster the transatlantic cooperation in research and education and provide policy makers with recommendations on how to improve it. For this reason, Dr. Belloc recommended organisers should build on the Workshop’s first successful showing by creating a website which will serve as a platform for dialogue and possibly organising a similar workshop in the coming year to follow up the implementation of the proposed recommendations.

Simplicity and pragmatism
Priorities for promoting transatlantic cooperation should include reducing bureaucracy and simplifying procedures related to researchers’ mobility. Initiatives should be launched to improve the coordination of programs and facilitate exchange of students, researchers and administrators by developing a more harmonized transatlantic approach. Knowledge transfer mechanisms should be also developed to accelerate innovation and improve transatlantic and international collaboration.
The workshop was organized by the French Presidency of the European Union in cooperation with the U.S. Department of State, the U.S. Department of Education, the National Science Foundation, the Georgia Institute of Technology, the Delegation of the European Commission, the French, Czech, Slovenian and Swedish Embassies and the other 23 EU Embassies in Washington, D.C.

In an increasingly globalized economy, science careers are becoming increasingly international and the marketplace for science and technology talents goes beyond national boundaries. Universities and research institutes worldwide are addressing these developments by setting-up exchange programs, double and/or joint degrees as well as foreign campuses. Several EU-U.S. cooperation schemes are already promoting the training and mobility of researchers and are likely to be developed further in the future.

The workshop aimed at addressing issues relating to the internationalization of research and higher education. The objectives were: to achieve a common understanding of the current situation and the main trends; to identify key obstacles to increasing transatlantic mobility of students and researchers; to identify ways and means for strengthening the exchange of scientists and engineers between the EU and the U.S. in quantitative as well as qualitative terms.
The Presidency of the European Union, under France’s leadership from the 1st of July to the 31st of December, 2008, plays a vital part in the organization of the work of the institution, notably as the driving force in the legislative and political decision-making process. In accordance with a pre-established rota, each Member State of the European Union takes turn for a period of six months.

The French Presidency has drawn up its work program in continuation of the work carried out under the Slovenian Presidency in the 1st half of the year and within the wider context of the program agreed with the forthcoming Czech and Swedish Presidencies. The plans also take account of the work program of the European Commission for 2008 and they have been the subject of close consultation with the European Parliament.

On the topics of Education and Research, the objectives of the French Presidency are focused on fostering an innovative and competitive Europe by promoting mobility of students, teachers and researchers; stepping up the construction of a true European research area; and taking opportunities in space.

Ensuring higher education quality throughout Europe is a topic that the French Presidency wishes to stress in order to foster exchanges of students, teachers and researchers. To this end, it will work to finalise the decision on the “Erasmus Mundus” program for 2009–2013.

Accelerating the construction of the European Research Area and making it more effective will be a major objective of the French Presidency. It also aims to reach conclusions on the joint program strategy, the mobility of researchers and a strategy for international cooperation in the European Research Area. It intends to reach an agreement on the legal framework for a new pan-European research infrastructure. On the issue of major research infrastructures, it will also undertake to bring about a shared strategic vision.

Space is a significant driver for growth and competitiveness for European industry. The French Presidency therefore seeks to encourage development and progress in this promising sector. The French Presidency aims to enhance the role of the European Union as a major player in space policy, embodying an ambitious, independent and coherent policy.

The French Presidency will also launch activities aimed at defining a “vision for 2020” for the European Research Area. In this context, ministerial debates will be held on the main challenges confronting European research, in order to define the position to be taken on priority issues such as energy and climate change, food and agronomy, health and ageing, and the information society.
On 24 September 2008, in his speech held at Harvard University, the President of the European Commission (EC) José Manuel Barroso said that “globalization is a fact” and “even if this is not the first wave of globalization the world has ever seen, it is by far the broadest and deepest, sustained and driven by accelerating progress in communication and technology.”

In this rapidly changing world, the European Union (EU) is at a crossroads where only effective policy actions and investment in a European knowledge society can ensure the route towards economic growth and prosperity. Under the Lisbon Growth and Jobs strategy, the EC and the Member States are building on a set of key principles to create the European Research Area (ERA). The initiative aims to develop an “internal market” in research to facilitate the free movement of knowledge, researchers and technologies. Such an area is going to attract and retain the best talents to enter research careers in Europe and incite investors to increase research funding in Europe.

However, existing national and institutional barriers prevent the implementation of the policies needed to create the ERA. For this reason, the EC has published a Green Paper on ERA reviewing progress made. According to this Green Paper the main features of a fully realised ERA include: an adequate flow of competent researchers, world-class research infrastructures, excellent research institutions, effective knowledge sharing, well coordinated research programs and priorities, and a wide opening of the ERA to the world.

With respect to the opening of the ERA to the world, the EC has developed a strategic framework for international science and technology (S&T) cooperation. Actions under this framework include: strengthening the coordination of Member States and EC’s actions in order to reinforce strategic S&T cooperation with international partners, facilitating European researchers and universities to cooperate with top scientists and research infrastructures worldwide, and improving access to knowledge, resources and markets internationally.

Currently, the U.S. and the EU have an S&T Cooperation Agreement, originally signed in 1998 and renewed in 2004. This Agreement brings a Pan-European dimension to transatlantic S&T cooperation. Besides having and S&T Agreement with the EU, the U.S. has S&T Agreements with individual Member States: Bulgaria, Czech Republic, Finland, Greece, Hungary, Italy, Poland, France, Romania, Slovakia, Slovenia, Spain and Sweden.

The U.S. Department of Education and the European Union have also developed a transatlantic education program, the Fulbright-Schuman fellowship. It provides scholarships to highly qualified professionals for undertaking studies or training on the opposite side of the Atlantic, in areas of specific relevance to the EU-U.S. relations.

Finally, the EC and the Member States are working towards the development of a European Higher Education Area (EHEA) through the Bologna Process. The goal of the Bologna Process, is to make EHEA more competitive and attractive for Europeans and for students and scholars from other continents. The EC supports these efforts with programmes like Erasmus, Tempus, and internationally, through Erasmus Mundus (Erasmus Mundus promotes European top-quality master’s courses with the aim to enhance the attractiveness of European higher education in other countries).

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4EC Communication to the Council and the European Parliament
In this new era of globalization, the United States recognizes that science diplomacy and international Science and Technology (S&T) collaboration are essential elements for progress and prosperity, and thus need to be important components of U.S. foreign policy. Various federal agencies within the U.S. Government play an important role in fostering this collaboration with other countries.

The Office of Science and Technology Policy (OSTP) guides and oversees the U.S. administration’s international S&T strategies and portfolio. It has a pivotal role in setting priorities for and coordinating interagency collaborations, including those that are international in nature.

The U.S. Department of State is responsible for assuring that science and technology considerations are taken into account and integrated into U.S. foreign policy, and that opportunities for fruitful international cooperation involving the U.S. science community are identified and exploited. The Department of State’s Office of Science and Technology Cooperation (STC) works to establish binding bilateral and multilateral umbrella S&T agreements with foreign governments.

While, the Department of State is responsible for establishing U.S. diplomatic priorities, research agencies such as the National Science Foundation (NSF), the Department of Education (DoE), the National Institutes of Health (NIH) and the National Aeronautics and Space Administration (NASA) support cooperative S&T research activities that also benefit U.S. diplomatic objectives. Those collaborations enable U.S. scientists to work with the best scientists and access the best research sites around the world, or leverage foreign funds to build world class research facilities. Participation in the ITER project (International Fusion Energy Infrastructure) is an example of U.S. involvement in a large international infrastructure project. The U.S. is a partner with the EU, China, India, Japan, South Korea and the Russian Federation in the construction and research operation of this large fusion energy experiment, aimed at demonstrating the scientific and technological feasibility of fusion energy.

The U.S. Department of Education also promotes intergovernmental cooperation. Thus, the U.S. and the EU have renewed in 2006, for another eight-year period, the long standing EU-U.S. cooperation program on higher education and vocational training that was established in 1995. “Atlantis” is a grant competition program funded and managed jointly by the European Commission and by the U.S. Department of Education. The program aims to promote understanding between the people of the EU and the U.S. and to improve the quality of their human resource development.

Non-governmental organizations such as the Institute for International Education (IIE), the American Council on Education (ACE), the Council of Graduate Schools (CGS) and the Association of International Educators (NAFSA) also play a critical role in international collaborations.
The National Science Foundation (NSF) is an independent federal agency that supports research and education in all fields of fundamental science and engineering, except medical sciences. The NSF was founded by U.S. Congress in 1950, and since then it has funded projects in multiple disciplines. Over the past 50 years, research supported by the NSF has been translated into innovations which boost the economy by creating growth and jobs.

Currently, NSF, with a budget of 6 billion USD, is the funding source for approximately 20 percent of all federally supported basic research conducted by U.S. colleges and universities. The NSF has established a strategic plan to allocate these investment funds effectively. According to the 2006–11 plan, some of the NSF’s priorities include: promoting transformational and multidisciplinary research, furthering U.S. competitiveness, building strong foundations to improve K–12 teaching, and developing state of the art research infrastructures.

Recognizing the challenges that globalization brings in its wake, NSF works collaboratively across national and international organisations to apply research results, identify opportunities and explore potential partnerships. For this reason, the NSF launched the Partnerships for International Research and Education program (PIRE). The PIRE program seeks “to catalyze a cultural change in U.S. institutions by establishing innovative models for international collaborative research and education.” PIRE’s objectives are to enable U.S. institutions to partner with international institutions, to provide U.S. faculty and students with international research experiences, and develop models for international collaborative research.

This workshop was supported by NSF through grant with principal investigator Mary Lynn Realf and coprincipal investigator Steven McLaughlin of Georgia Institute of Technology.

One of the most visible features of the emerging globalized world is the internationalization of education and R&D. As global competition increases, research and educational institutions intensify their internationalization strategies. Georgia Tech is an active research institution that strongly encourages its students to participate in study or work programs abroad.

The Institute has set up a strategic plan that targets to establish itself as a leading global institution and its vision is “to define the technological research university of the 21st century.” The strategic plan includes promoting an excellent diverse student body, and building multi-institutional educational and research communities. For this reason, Georgia Tech states that at least fifty percent of its 19,000 students should have, by the time of graduation, an international educational or work experience. Over the last couple of years, students from Georgia Tech have participated in study and work programs in 13 European Union countries, as well as all over the world, from India and Malaysia to Kenya and Australia. Another dimension of Georgia Tech’s international strategy includes research and learning platforms in Europe (France and Ireland) and in Asia (Singapore and Shanghai). These platforms provide U.S. and foreign students with access to Georgia Tech curricula, with the opportunity to study in highly innovative and integrated programs abroad.

As knowledge is the main driver of sustainable economic growth in industrialized countries, universities are called upon to champion internationalization strategies to meet future challenges. Georgia Tech leads by example, and puts emphasis on driving economic growth at local, national and international levels.
US: Michael Adewumi is Vice Provost for International Programs and Professor of petroleum and natural gas engineering at Penn State’s College of Earth and Mineral Sciences. Adewumi joined Penn State’s faculty in 1985 following a postdoctoral research fellowship at Chicago’s Institute of Gas Technology. Adewumi holds a PhD in gas engineering from the Illinois Institute of Technology.

US: Peter Agre is Director of the Johns Hopkins Malaria Institute and member of the Johns Hopkins Bloomberg School of Public Health. Agre’s research resulted in the discovery of aquaporins. For this work, he shared the 2003 Nobel Prize in Chemistry with Roderick MacKinnon of Rockefeller University.

US: David Allen is Dean of the College of Engineering at University of Nebraska and a member of the IAESTE United States Advisory Committee. Prior to becoming Dean, Allen was professor of Aerospace Engineering and Director of International Student Experiences at Texas A&M University. He holds a PhD in Aerospace Engineering from Texas A&M University.

EU: Bernard Belloc is Higher Education/Research Adviser to the President of the French Republic Nicolas Sarkozy. Prior to that appointment Belloc was Professor of Economics and President of the University of Toulouse 1. Belloc has also served as Scientific Counsellor of the French Embassy in Beijing.

US: Arden Bement is the 12th Director of the National Science Foundation and member of the U.S. National Commission for UNESCO. Bement served as director of the National Institute of Standards and Technology of the Department of Commerce. He holds a PhD in metallurgical engineering from the University of Michigan.

EU: Andrej Berginc, Embassy of Slovenia in Washington DC.

EU: Karim Berkouk is the as the head of sector for the Marie Curie Individual Fellowships in the Directorate General for Research at the European Commission. Berkouk holds a PhD from the University of Warwick (UK) in bio-fluid mechanics.

US: Richard Bissell is the Executive Director of the Policy and Global Affairs division at the National Academy of Sciences in Washington, D.C. He previously served as head of the interim secretariat of the World Commission on Dams, as chair and member of the Inspection Panel of the World Bank, and as the senior administrator of the Science and Technology Bureau in the US Agency for International Development. Bissell holds a PhD in international economics from Tufts University.

US: Susan Butts is the Senior Director of External Technology at The Dow Chemical Company. In this capacity she is responsible for Dow’s sponsored research programs at over 150 universities, institutes, and national laboratories worldwide and also for Dow’s contract research activities with U.S. and European government agencies. Butts holds a PhD.

EU: Laurent Bochereau is head of the “Science, Technology and Education” section at the Delegation of the European Commission in Washington DC. Prior to that appointment, he served as Head of Unit in the European Commission with responsibilities for agriculture, forestry, agro-industry and food safety research. Bochereau holds a PhD from the University of Paris VI.

US: Olga Cabello-Henry serves as the Life Sciences Specialist and Academic liaison in the Office of the Science and Technology Adviser to the US Secretary of State. Cabello received her undergraduate degree in Biomedical Engineering from the Universidad Iberoamericana in Mexico City, and a Doctoral degree in Molecular Biophysics from the Baylor College of Medicine in Houston, TX.
EU: Jean Chambaz is professor of cell biology at the Faculty of Medicine of University Pierre and Marie Curie (UPMC) in Paris. He is also director of the Institute of Doctoral Training at UPMC and vice-president of the Scientific Council of UPMC. He also chairs the steering committee of the Council on Doctoral Education of the European University Association launched in 2008. Jean Chambaz, MD holds a PhD.

EU: Jean-Luc Clément is Professor of Biology at the University of Tours and Adviser to the Director of European and international relations, on Research affairs, in the French Ministry of Higher Education and Research. Prior to that appointment, he was Director of International Affairs of “Le Centre National de la Recherche Scientifique” (CNRS). Clément holds a PhD from the University of Paris.

EU: Léopold Demiddeleer is executive Vice President and co-chairman of the New Business Board of Solvay, a large pharmaceutical & chemical company based in Brussels. From 1981 to 2001, he was responsible for several research and development initiatives and is currently President-Elect of the European Industrial Research Management Association Board. Demiddeleer holds a PhD in Physical Chemistry from Brussels University.

EU: Per Eriksson is Director General of VINNOVA, the Swedish Governmental Agency for Innovation Systems that was founded 2001. Previously, he was President of the Blekinge Institute of Technology and Dean and Chairman of the Board of Undergraduate Studies in Electrical Engineering, Technical Physics and Computer Engineering at Lund University. Eriksson holds a PhD in Telecommunications and a professor chair in signal processing at Lund University.

EU: Pavel Exner is head of the Doppler Institute for Mathematical Physics and Applied Mathematics in Prague, Vice President of the European Mathematical Society and Member of the European Research Council. He has also served as a professor of theoretical physics at the Charles University. Exner holds a Doctorate from the Charles University and a DSc from the Joint Institute for Nuclear Research, Dubna.

US: Nina Fedoroff is the Science and Technology Adviser to U.S. Secretary of State Condoleezza Rice. She is also Willaman Professor of Life Sciences and Evan Pugh Professor in the Biology Department and the Huck Institutes of the Life Sciences at Pennsylvania State University.

US: Frank Frankfort is the coordinator of the European Union-United Atlantis program at the US Department of Education’s Fund for the Improvement of Postsecondary Education (FIPSE). The Atlantis program is funded jointly with the European Commission’s Directorate for Education and Culture and supports program development for dual international degrees, academic term exchanges, and public policy projects.

US: Jarrod Goentzel is the Executive Director of the MIT-Zaragoza International Logistics Program, leading MIT’s role in developing novel education, research, and outreach programs through its partnership with the Zaragoza Logistics Center in Zaragoza, Spain. He is also a Research Associate at the MIT Center for Transportation & Logistics. Goentzel holds a PhD from the Georgia Institute of Technology.

US: John Grandin is Professor of German and Director of the International Engineering Program at the University of Rhode Island, an interdisciplinary curriculum through which students can complete simultaneous degrees (BA and BS) in German, French, Spanish, or Chinese, and in an engineering discipline. Grandin holds a PhD from the University of Michigan.
US: **Madeleine Green** is Vice President for International Initiatives of the American Council on Education (ACE). Green leads internationalization initiatives at ACE and its Center for International Initiatives. Her work in this area includes research on the internationalization of U.S. higher education and U.S. higher education in a global context. Green holds a PhD from Columbia University.

EU: **Manfred Hampe** is Professor of Chemical and Process Engineering in the Department of Mechanical Engineering at Technische University Darmstadt. As Dean of Studies in the Department of Mechanical Engineering, Hampe, worked to develop Bologna-type Bachelor's and Master's degree courses. In addition, he has served as one of the 15 German Bologna promoters. Hampe holds a PhD from Technische Universität München.

EU: **Magnus Harviden** is since September 2006 the Science Counselor and Head of the Institute for Growth Policy Studies (ITPS) at the Embassy of Sweden in Washington D.C. Before coming to the Embassy, Harviden has had different management positions in private sector consulting firms as well as in the public sector. Harviden has a M.Sc in Electrical Engineering from the Royal Institute of Technology (KTH) in Stockholm, and Institut National des Sciences Appliquées, Lyon, France. He has also studied Russian language at Stockholm University and Chinese language at Lund University.

US: **James Herrington** is the director of the Division of International Relations for the Fogarty International Center at the National Institutes of Health (NIH). Herrington works to develop new and strategic partnerships between U.S. scientists and researchers abroad to advance translational research and training. He holds a PhD in environmental health and epidemiology from Colorado State University.

EU: **Michel Israël** is the Counsellor for Science and Technology of the French Embassy in Washington, DC. Before this appointment Israel served as Counsellor for Science and Technology of the French Embassy in Japan. He has also served as Dean of the Faculty of Fundamental and Applied Sciences at the University of Evry, France. Michel Israel holds a Ph.D in Computer Science from the University of Paris 6.

US: **Karen Holbrook** is Vice President for Research and Innovation at the University of South Florida and a member of the Washington Advisory Group (WAG). Before coming to the University of South Florida, she served as president of the Ohio State University for five years. Holbrook holds a PhD in biological structure from the University of Washington, School of Medicine.

US: **Gretchen Kalonji** is Director of International Strategy Development for the University of California system and is responsible for creating the first coordinated and comprehensive international strategy in UC history. Before this appointment, Kalonji was Professor of Materials Science and Engineering at the University of Washington and director of the University of Washington Worldwide, a program that promotes research and study between students in the United States and abroad.

US: **Linda Katehi** is the Provost and Vice Chancellor for Academic Affairs at the University of Illinois at Urbana-Champaign and Professor of Electrical and Computer Engineering. Prior to joining the University of Illinois, she served as Dean of Engineering and Professor of Electrical and Computer Engineering at Purdue University. Katehi holds a PhD in Electrical Engineering from UCLA.

EU: **Petr Kavan** is First Secretary and Economic Officer at the Embassy of the Czech Republic in Washington, DC, where he also serves in the capacity of the Counselor for Science and Technology. Kavan joined the Czech Ministry of Foreign Affairs in 1997. Since then, he has served as Assistant to the Deputy Minister of Foreign Affairs, was posted at the Czech Embassy in Havana, Cuba in the capacity of Political Secretary of the Embassy and Deputy Head of the Mission. He graduated from Charles University in Prague and holds a Master’s degree in Economics.
EU: Astrid-Christina Koch is Science Counsellor of the "Science, Technology & Education" section at the Delegation of the European Commission (EC) in Washington DC. Prior to this assignment Koch worked as Programme Officer for Advanced Materials in Research Directorate of the European Commission, which resulted in EC-NSF coordinated actions in Materials Science. Before joining the Commission she worked as senior managing scientific officer in the German Ministry of Finance in Bonn and as Customs Chemist and lecturer at the German Science & Training Center in Hamburg. Koch holds a Ph.D. in Natural Sciences from Kiel University.

EU: Lars Leijonborg is the Minister for Higher Education and Research of Sweden. He has undertaken various public appointments such as member of the Swedish Parliament committees on Foreign, European Union and Finance Affairs.

US: John Krige is the Kranzberg Professor in the history of technology at Georgia Institute of Technology. His research focuses on science and technology as instruments of foreign policy. His most recent book is entitled American Hegemony and the Postwar Reconstruction of Science in Europe (MIT Press, 2006).

EU: Dieter Leonhard is President of the Franco-German University, Saarbrücken and President of Mannheim University of Applied Sciences. Leonhard holds a PhD in Sanitary Engineering from the Faculty of Civil Engineering of the University of Karlsruhe. He is active in the transnational quality assurance field.

US: Alan Leshner is the Chief Executive Officer of the American Association for the Advancement of Science (AAAS) and Executive Publisher of the journal Science since December 2001. Before joining AAAS, Leshner was Director of the National Institute on Drug Abuse (NIDA) which is one of the scientific institutes of the U.S. National Institutes of Health. Leshner holds a PhD degree in physiological psychology from Rutgers University.

US: Cynthia McIntyre is Senior Vice President for strategic operations, planning and development for the US Council on Competitiveness. She came to the Council from Rensselaer Polytechnic Institute, the nation's oldest technological research university, where she served as chief of staff to the president, Associate Vice President for policy and planning, and Assistant Secretary of the Institute. McIntyre holds a PhD in physics from the Massachusetts Institute of Technology.

US: Steven McLaughlin is Vice Provost for International Initiatives of Georgia Institute of Technology (Georgia Tech). He joined the School of Electrical and Computer Engineering at Georgia Tech in September 1996 where he is now the Ken Byers Professor of Electrical and Computer Engineering. He was previously Deputy Director of Georgia Tech Lorraine—the European Campus of the Georgia Institute of Technology—in Metz, France. He has published more than two hundred papers in journals and conferences and holds twenty-six US patents. McLaughlin holds a Ph.D. degree in electrical engineering from the University of Michigan.
US: Jeanne Narum is the founding director of Project Kaleidoscope (PKAL), an informal national alliance working to strengthen undergraduate learning in mathematics and the various fields of science and mathematics. With 20 years of support from the National Science Foundation and other public and private funding agencies, PKAL’s attention is on building campus-based leadership teams to engage in systemic reform, to be responsible for ensuring that the 21st century STEM learning communities reflect 21st century STEM communities of practice.

US: Maresi Nerad is the founding Director of the Center for Innovation and Research in Graduate Education (CIRGE) and Associate Professor for Higher Education in the Educational Leadership and Policy Studies Program College of Education, all at the University of Washington, Seattle. Prior to that, from 1988 until 2001, she directed research in the Graduate Division at the University of California at Berkeley. Nerad holds a PhD in higher education from the University of California at Berkeley.

US: Sabine O’Hara is Executive Director of the Council for International Exchange of Scholars (CIES) and Vice President at the Institute of International Education (IIE). Prior to joining CIES/IIE, O’Hara was President of Roanoke College in Salem, Virginia, where she served as the institution’s tenth president. O’Hara holds a Doctorate in environmental economics from the University of Gottingen.

EU: Pär Omling is Director General of the Swedish Research Council and President of Eurohors (European Heads of Research Councils) which is the association of the heads of research and research funding organizations in Europe. He has also been consulted for prize evaluation reports by the Nobel committee. Omling holds a PhD in Solid State Physics from Lund University.

EU: Valérie Péresse is Minister of Higher Education and Research of the French Republic. Previously, elected in 2002 and re-elected in 2007, Minister Péresse was a member of the National Assembly for Yvelines, where she belonged to the Cultural, Family and Social Affairs Committee, and the National Assembly delegation for women’s rights and equal opportunities for men and women. Minister Péresse graduated from the Ecole des hautes études commerciales (HEC) and from the Ecole nationale d’administration (ENA).

EU: Janez Potočnik is the European Commissioner for Science and Research. Prior to that appointment, Commissioner Potočnik was Slovenia’s Minister of European Affairs. In addition, between 2002–2004, he served as Minister Counsellor at the Slovenian Prime Minister’s Cabinet and between 1998–2004 he headed the Negotiating Team for the Accession of Slovenia to the European Union.

EU: Alexandre Quintanilha is Director of the Institute for Molecular and Cell Biology (IBMC) at the University of Porto, Portugal, and Chair of the European Commission’s External Advisory Group for Human Resources and Mobility. From 1972 to 1991 he was professor at the University of California, Berkeley. He has also served as the Dean of Science at the University of Porto. Quintanilha holds a PhD in solid state physics from Witswaterstrand University and Porto University.

EU: Andrejs Rauhvargers is Secretary General of the Latvian Rectors’ Council and Professor of Education Management at the University of Latvia. Internationally he is a Bologna Follow-up Group member and a Bureau member of the Council of Europe Higher Education and Research Committee. He has participated in a number of European committees and working groups dealing with issues of higher education policies and recognition of qualifications.

US: Ishwar Puri is Professor and Department Head of Engineering Science and Mechanics (ESM) at Virginia Tech, where he also directs the Multiphysics Research Group. He is also a Professor at the Virginia Tech-Wake Forest University School of Biomedical Engineering and Sciences. Puri holds a PhD from the University of California, San Diego.
US: Mary Lynn Realf is an Associate Professor of Polymer, Textile & Fiber Engineering at the Georgia Institute of Technology and she teaches graduate and undergraduate courses in the mechanics of fibrous structures and polymer science areas. In addition, she is a Co-Director of the Center for the Study of Women, Science and Technology and Vice President for the Center for Leadership and Diversity and a Fellow of the American Society of Mechanical Engineers. Realf holds a PhD in Mechanical Engineering and Polymer Science and Technology from MIT.

US: John Rennie is Editor-in-Chief of Scientific American. He joined the staff of Scientific American as a member of the board of editors in 1989, having previously worked as a science writer covering biology, technology and medicine for a variety of publications.

US: Kathleen Robichaud is Director of Communications for the Georgia Research Alliance. Robichaud earned her Bachelor’s degree from Duke University, her Master’s from Ohio State University and her doctorate from the University of Georgia.

EU: Helen Routh is Vice President and General Manager of Philips Research North America. Before that appointment, Routh worked at Philips Ultrasound as Senior Director and leader of the Flow and Functional Imaging group. Routh holds a B.Sc. Honours degree in Physics and Music and a PhD from University College Cardiff, U.K.

EU: Diego Sammaritano is policy coordinator of education cooperation with industrialised countries, Directorate General for Education and Culture, European Commission. In this capacity he supervises the EU-US and EU-Canada cooperation programmes as well as the new cooperation programme with Japan, South Korea, Australia and New Zealand. Together with the U.S. Department of Education, Sammaritano has developed the new EU-US Atlantis programme focusing on transatlantic joint and double degrees. He holds a MA Degree in European Integration and Development from Vrije Universiteit, Brussels.

US: Gary Schuster is the acting President of the Georgia Institute of Technology, and Georgia Tech’s provost and executive vice president for Academic Affairs. Prior to being named Georgia Tech’s provost in 2006, he served as Dean of the College of Sciences for twelve years. Schuster holds a PhD in chemistry from the University of Rochester.

EU: Philip Shapira is Professor of Innovation Management and Policy with the Manchester Institute for Innovation Research at the Manchester Business School and also Professor of Public Policy at the Georgia Institute of Technology, Atlanta. He currently directs an international project (sponsored by NSF) on the measurement and analysis of highly creative scientific research in the U.S. and Europe.

EU: Andre Siganos is Director-General of Agence Campus France. Siganos has served as President of the University of Grenoble 3 and has also occupied the position of Cultural Counsellor in Tokyo. Before becoming Director General of Campus France, André Siganos was the deputy director of Scientific and Cultural Cooperation at the French Ministry of Foreign Affairs. He is also the author of books on literary theory.

EU: George Tsarouchas works in the Science Section of the Delegation of the European Commission in Washington DC. Prior to that, he worked as a consultant on health issues in Athens, Greece. Tsarouchas holds a Master of Public Health from Johns Hopkins University.

EU: Andrej Umek is Professor of Engineering Mechanics at the University of Maribor and Councelor to the Slovenian Minister for Higher Education, Science and Technology on Human Resources. He is also chairing the Advisory committee on Lisbon strategy to the government of the Republic of Slovenia. He held a Fulbright scholarship and received his PhD from the Illinois Institute of Technology. He interrupted his academic career twice to serve as Minister for Science and Technology and the Minister for Ecology and Spatial Planning in the government of the Republic of Slovenia.
**EU: Radojka Verčko** is Undersecretary of the Ministry of Higher Education, Science and Technology of the Republic of Slovenia, Department for International Cooperation and European Affairs. The majority of her responsibilities in the international cooperation department are linked to the issues of researchers’ mobility and development. Verčko is also a member of the Steering Group on Human Resources and Mobility of the European Commission of scientific careers. Verčko completed her doctoral studies at the Faculty of Arts at the University of Ljubljana.

**EU: Pierre Vimont** was appointed Ambassador of France to the United States by President Nicolas Sarkozy on August 1, 2007. Prior to his present appointment, Vimont was chief of staff to the minister of foreign affairs, a position he had held since 2002. Ambassador Vimont holds a degree in law and he is a graduate of the Institute of Political Studies and the National School of Administration (ENA).

**EU: Martin Wikstrom** is Science & Technology Attaché at the Embassy of Sweden to the United States and Senior Analyst at the Swedish Institute for Growth Policy Studies. Before that appointment, he was research scientist and group leader at the Department of Neuroscience of Karolinska Institutet. Wikstrom holds a PhD in Neurobiology.

**EU: Ivan Wilhelm** is a member of the Academy of Sciences Assembly of the Czech Republic, permanent guest of the government Council for R&D and plenipotentiary of the government of the Czech Republic for European R&D. From 2000 to 2006, Wilhelm acted as rector of Charles University and participated in the committee of European University Association. Wilhelm graduated from ČVUT’s College of Technical and Nuclear Physics.

**EU: John Wood** is the International Relations Adviser at Imperial College, UK, and Chairman of the European Research Advisory Board. Wood was previously Chief Executive of the Council for the Central Laboratories of the Research Councils. He has a strong background in engineering, with a career comprising numerous public and industrial appointments in the UK and worldwide. Wood holds a PhD from the University of Cambridge.