Postdoctoral Career Paths: International Perspectives
1st Forum of the AvH International Advisory Board

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Statements and Recommendations
Young scholars and scientists are driving forces behind innovative research around the world. Yet, academic careers are challenging and not always attractive. In November 2007, the International Advisory Board of the Alexander von Humboldt Foundation met in Washington, D.C. to discuss current developments in international research careers and postdoctoral career planning. The forum featured expert reports from the OECD and European Union, from the United States, Portugal, Germany, Great Britain, China, and India, and explored strategic issues relating to global academic markets and international mobility. The following pages document the session and provide summaries of the reports and recommendations.
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Expert Reports
1. Esther Basri
The Demand for Human Resources in Science and Technology: An Overview

Esther Basri, Senior Policy Analyst for the Science and Technology Policy Division at the OECD Directorate for Science, Technology & Industry in Paris, presented current OECD data on global developments in the demand for and supply of human resources in science and technology (HRST) and discussed how policy-makers are responding and ought to respond to current challenges.

Key theses:

1. The global demand for HRST is increasing. Countries worldwide are moving towards knowledge-based economies. Research and development expenditures are growing and expected to grow further. At the same time, demand for HRST is becoming increasingly competitive. Science and innovation systems are generally expanding while demographic changes are reducing the supply of HRST in some countries and opportunities are improving in others.

2. As a consequence, countries face recurrent concerns about a range of HRST issues. With respect to the supply side of HRST, national policy-makers can respond – and are currently responding – through measures such as (1) increasing the levels of enrolment in science and engineering courses, (2) raising the attractiveness of research careers, (3) boosting participation by women, (4) promoting and facilitating international mobility.

3. Foreign talent contribute significantly to the supply of science and technology personnel in many OECD countries because highly skilled people are now highly mobile. Countries are increasingly implementing policy measures to attract foreign and expatriate researchers. However, competition for researchers and the highly skilled is increasing, and there has been an increase in return flows to some countries, especially to non-member OECD economies such as China, India and Chinese Taipei, as well as to OECD countries which are actively courting expatriate researchers.

4. Mobility is a complex phenomenon that takes many forms. Researchers are motivated – among other things – by specific research opportunities and opportunities for career advancement, by the availability of and access to research infrastructure, as well as the quality of working and private life. Policies to attract talent should reflect this broad range of factors. Rather than focusing on monetary incentives, they must reach across ministerial portfolios from economic incentives to immigration policy and social as well as cultural support mechanisms.
Conclusion:

International mobility is a key factor in the global competition for HRST supply. Countries need to strengthen their efforts to attract foreign and expatriate researchers. Rather than treating mobility as a substitute for building capacities at a local or national level, however, policy makers need to promote the development of human capital in science and technology and to ensure that attractive research environments are provided. Human resources cannot be separated from wider dimensions of support for science and innovation.

2. Alyson Reed

The Situation of Postdoctoral Careers in the United States: Demands and Opportunities for Early Stage Researchers

Alyson Reed, Executive Director of the National Postdoctoral Association (NPA) in Washington, D.C., presented data on recent career trends in the United States and discussed specific policy recommendations and initiatives to enhance the professional development opportunities of postdoctoral scholars.

Main theses:

1. Statistical data on the situation of postdoctoral scholars in general – and the biomedical sciences in particular – reveal a troubling trend: The number of PhDs awarded has steadily increased while the proportionate number of tenure track positions available at academic research institutions has decreased. As a recent survey revealed, however, the majority of postdocs still aspires to achieve tenure-track faculty positions at research universities.

2. Given this potential 'mis-match' between the number of PhDs and the availability of faculty positions, between career aspirations and outcomes, advocates for postdoctoral scholars are increasingly focusing their attention on professional development programming and counseling for the broadest possible range of careers.

3. There is an emerging national consensus within the United States that postdocs ought to receive the training they need to succeed in a broad range of potential careers. Such training ought to be delivered through courses, seminars, workshops, online resources, and mentoring focused on research, communication, management, and leadership skills as well as transition strategies for flexible career development options.

4. The National Postdoctoral Association, along with postdoctoral offices and associations at research institutions, are working to deliver this type of programming more broadly. The NPA has called on institutions to provide access to professional development resources, to implement training and development plans
and offer more "structured oversight" for postdoctoral scholars, including the implementation of postdoctoral policies and the establishment of postdoc offices.

5. In response to the debates over postdoctoral career development opportunities, the National Institutes of Health and the National Science Foundation have begun to adjust their sponsorship programs, providing mentoring and encouraging professional development on research grants.

3. Alexandre Quintanilha
Postdoctoral Career Planning in Europe: Efforts of the EC to Make Research Careers More Attractive and a Report from Portugal

Alexandre Quintanilha shared his expertise both as director of the Institute for Molecular and Cell Biology at the University of Porto, Portugal, and as chair of the Advisory Group "People" of the European Commission.

Key theses concerning the European Commission's policies on research careers:

1. The postdoctoral stage of researchers is one of the most critical periods in their professional lives. Young researchers have to prove that they can think and work with increasing independence and that they have leadership potential in their area of knowledge. While very diverse, many European institutions fail to recognise that in order to attract the very best postdocs they need to change significantly the process of selection and promotion, to remove barriers to mobility and to strongly encourage scientific independence as early as possible.

2. In 2005, the European Commission adopted a European Charter for Researchers and a Code of Conduct for the Recruitment of Researchers. These two documents, addressed to researchers as well as to employers and funders, are key elements in the European Union's policy to make research careers more attractive, a central feature of the EC's strategy to stimulate economic and employment growth within the EU.

3. The European Charter and Code identify and establish a set of responsibilities and entitlements. Three central principles/policy goals are: (1) transparency in the promotion, selection and appointment of candidates; (2) early scientific independence; (3) employment standards that facilitate mobility and secure an adequate standard of living. The Charter defines postdoctoral researchers and scholars as professionals who are entitled to contracts with adequate social security and pension plans. The EC aims to make all research funding conditional on institutions following the Charter and Code.

Key theses concerning scientific careers in Portugal:

1. Portugal is a young science nation. In the last ten to twelve years, however, there have been strong investments in science and technology and concerted national
efforts to promote 'knowledge' as a key factor of economic growth. National spending for science and technology increased by 61% in 2006. The budget will reach 1% of the Gross Domestic Product (GDP) for the first time in Portuguese history in 2008.

2. The national priority given to a vigorous scientific and technological development has been accompanied by a strong contribution of the scientific community, with perceptible outcome at an international level. Currently there are about 10,000 researchers with a PhD degree working in R&D centers (calculated in terms of "equivalent full time"), representing a 20% increase in the last two years. Over the last 2 years an increase of 18% of PhD degrees was carried out and recognized by Portuguese Universities. For 2009, the goal is to reach 1500 new PhDs per year. The increase in demand for researchers has attracted a growing number of international scholars and former expatriates are returning to Portugal. More than 50% of all professionals in science are women.

3. The Portuguese government has supported the development of science and technology through several large-scale programs. Since the launch of the Program "Compromisso com a Ciência" in March 2006, four new Associate Laboratories have been created, in the areas of Biotechnology (1), Energy and Transports (1), and Nanotechnology (2). There are now 25 Associate Laboratories in Portugal. The Program "Ciência Viva" has worked to promote scientific culture and foster the public perception of science on a broad national scale. In the last year about 1,100 new projects were approved to reinforce the experimental education of sciences in schools of basic and secondary education. 856 secondary school students received traineeships in 70 research institutions; and thousands of Portuguese were mobilized for vacation activities in Astronomy, Biology, Geology and Engineering in the summer, involving 136 institutions that assured more than 2,300 outreach actions.

4. Portugal has worked to foster international research cooperation and internationalize its scientific community. Current collaborations include the "MIT-Portugal Program" and the "CMU-Portugal Program"; a "Harvard-Portugal Program" in medicine is scheduled to begin in 2008. The International Iberian Laboratory of Nanotechnology will be built in Braga during 2008. It is the first International Research Organization of the Iberian Peninsula that will have about 200 researchers from Portugal, Spain and other countries, with an annual budget of 30 million Euro and an additional investment of the same amount assured by both countries.
Stefan Hornbostel, Director of the Institute for Research Information and Quality Assurance (IFQ) in Bonn, presented data on research careers in Germany and discussed results of his study of young research group leader programs.

Key theses on research careers in Germany:

1. International comparisons reveal a special feature of the German higher education system. After completing their doctorate (Promotion), a large proportion of young researchers go on to gain a postdoctoral qualification (called the Habilitation), which is the traditional prerequisite for appointment to a professorship. This system has been in flux for several years now. The introduction of so-called junior professorships created the status of non-tenured professors, while the funding of junior research group leaders opened up an alternative route to professorial appointment. This funding aims to give junior research group leaders the earliest possible opportunity to demonstrate through independent research (and corresponding publications) that they have the qualifications needed for professorial appointment, even without a Habilitation.

2. According to current statistical data, German universities award approx. 25,000 PhD degrees per year, approx. 2,000 scholars complete habilitations, approx. 120 junior professorships and 120 research group leader positions are funded, and there are approx. 1,000 appointments to full professorships. The prominence of the habilitation depends on the field: Within the natural sciences the habilitation has become a mere ritual; the habilitation is still an important qualification for careers in the humanities, social sciences and mathematics.

3. One of the most renowned junior research group leader programs in Germany is the Emmy Noether Program, launched by the German Research Foundation (DFG) in 1999. By 2006 this program had funded some 380 young researchers. The other major research funding organisations in Germany operate similar funding instruments: the Max Planck Society, Volkswagen Foundation, and Helmholtz Association. The program goals are to fund excellent researchers, to lower the age average on first professorship, to facilitate early independent research, to encourage international networking, and to raise the proportion of women by improving the compatibility of career and family. In contrast to junior professors, however, junior research group leaders do not, generally, have the legal status of a professor. While universities are responsible for selecting and funding junior professors, junior research group leaders are reviewed and recommended by referees from the funding organisations that finance the programs in question.

Since 2006, the Institute for Research Information and Quality Assurance (IFQ) has conducted an evaluation study on young research group leader programs. Among the
methods used to evaluate the Emmy Noether Program are an online survey, face-to-face interviews, analyses of review documents and bibliometric data. The study is conducted among Emmy Noether fellows as well as those whose applications were not successful. Some findings:

1. The general approval rate for applications in the Emmy Noether program is 52.5%, though this figure varies from field to field. Funding programs aiming at the promotion of excellent young scientists have to deal with a high rate of self-selection by the applicants. Therefore it is quite difficult to shortlist the best.

2. Many of the rejected applicants perform very well after the funding decision even without being funded. Differences between approved and rejected Emmy Noether candidates become apparent, if one compares the positions they hold three years after the decision date and – in the case of successful candidates – the completion of funding: 48.1% of those sponsored as junior research group leaders hold full professorships but only 9.8% of those whose application was rejected. (Figures based on those who participated in the survey.)

5. **Ekhard Salje**

**Postdoctoral Careers in Great Britain**

Ekhard Salje, Head of Department of Earth Sciences at the University of Cambridge and President of Clare Hall College, reported on postdoctoral career paths in Great Britain, focusing on the situation in Cambridge and Oxford.

Key observations:

1. Although Great Britain has a long history of academic scholarship, the history of postdoctoral careers is relatively short. In Cambridge PhDs became popular only about 40 years ago, previously a 3 year MA was deemed sufficient for appointments to full professorships, nobel prizes and Fellowships of the Royal Society. Consequently, the term post-doc made little sense but Research Fellowships existed then and exist now.

2. Fellowships are highly competitive and often lead to permanent positions in good universities worldwide or in government. They are funded by research councils, the Royal Society or Oxbridge Colleges. Fellowships awarded by the Royal Society are portable and highly flexible. Fellows receive extra funding for research costs and infrastructure and are eligible to apply for Research Council grants as principal investigators. British fellowships should not be confused with Research Fellowships allocated by the European Union, in the latter case the job prospects are much less clear.

3. In addition to fellowships, the UK provides a multitude of postdoc positions. Cambridge houses ca. 3000 postdocs of this type, roughly the same number as PhD students and academic staff. 80% of the postdocs in Cambridge are foreign
nationals; the largest group comes from the U.S. followed by Australia, New Zealand and continental Europe. The career prospects for these post-docs are similar to the situation in the US with similar success rates.

4. Academic career paths in Britain are impacted by the British "cascade system": Excellent young scholars and researchers become fellows in Oxford and Cambridge; those who do not make it there turn to the next group of universities and so on. In terms of career planning, it is important for young scholars not to start too low in the system.

5. British universities in general and Cambridge and Oxford in particular have had to deal with dual career problems and have acknowledged the need to provide services for partners of scholars they wish to appoint. In Cambridge, partners with backgrounds in academia can be given postdoc positions. In addition, universities are actively working to increase the numbers of female scientists employed at all career stages.

6. **M.S. Ananth**
   **Postdoctoral Careers in India**

   M.S. Ananth, Director of the Indian Institute of Technology Madras, reported on the situation in India, providing data on the development of science and technology and opportunities for postdoctoral fellows.

   Key theses:

   1. India has 330 universities and approx. 11 million students, approx. 4 million students are enrolled in science and engineering programs. Most PhD students are affiliated with research institutions of national importance such as Indian Institutes of Technology (IITs), the Indian Institute of Science (IISc) and National Institutes of Technology (NITs). Graduate students contribute the most to India's research output in many disciplines. Over 100 IT and science-based firms have located R&D labs in India in the past five years. The growth of the IT sector has had a remarkable impact on the Indian economy.

   2. India has a shortage of PhDs, faculty and other scientific personnel. As a result, there are very few postdoctoral fellows. They are hired as Laboratory Assistants, Teaching Assistants, and Scientific Officers; and most central funding agencies promote postdoctoral fellowship opportunities under different names. The importance of postdoctoral fellows for the advancement of science and technology is recognized in institutions like the Indian Institutes of Technology. Postdoctoral fellows are seen to broaden research interests, teach independence, and add scientific perspective. Here, India is beginning to follow international developments where a PhD degree is no longer sufficient for appointments to permanent faculty positions and young researchers are expected to have 3-5 years of experience as postdoctoral fellows, preferably abroad.
3. Funding opportunities for postdoctoral fellows are provided by scientific councils and governmental departments. The Council for Scientific and Industrial Research awards research associateships based on well defined research proposals and identified mentors in recognized institutions. The Department of Science and Technology runs a Fast Track Program to provide independent research support to postdoctoral scientists; 600 fellowships are awarded annually under this scheme. Other fellowships are provided by the Department of Biotechnology, the Department of Electronics, the Department of Atomic Energy, the Ministry of New and Renewable Energy, the Indian Council of Medical Research and other government organizations.

4. National investments in science and technology are increasing rapidly and government initiatives are under way to promote science education. Current government plans include funding for eight new Indian Institutes of Technology (currently seven), seven additional Indian Institutes of Management (currently seven), twenty new Indian Institutes of Information Technology (currently four), and twenty additional Central Universities (currently ten).

7. PEI Gang
Postdoctoral Training in China

PEI Gang, President of Tongji University, Shanghai, presented facts on the postdoctoral system in China, discussed its strengths and weaknesses and shared his thoughts on the imbalance between the outward mobility of Chinese postdocs and the inward flow of international postdocs.

Key observations:

1. China's postdoctoral system was established in 1985 with 102 postdoctoral stations in 72 institutions. In 1994, postdoctoral working stations were established in the Chinese industry. The system is primarily funded by the national government, although there are some other funding resources, such as local governments, industries and foundations. It is an independent system with centralized planning and management through the Ministry of Personnel and the Post Doc Management Association.

2. Although the system has been very successful, it needs to be improved. It currently lacks flexibility, is too centralized and its time restrictions are too rigid to mobilize additional resources. Qualification and evaluation standards need to be adjusted and it is necessary to counter the imbalance of international exchange.

3. The Chinese system lacks mechanisms of and incentives for a two-way international exchange in the training of postdocs. It provides strong incentives and support to encourage postdoctoral training abroad, but it lacks mechanisms and support for international postdocs in China. Tongji University, for example, has 520
postdocs, only three of them are foreign nationals. The Shanghai Institute for Biological Sciences (SIBS) sends 200 Chinese postdocs abroad annually, but only five international postdocs work in Shanghai. This imbalance needs to be overcome in the future.

PEI Gang ended his talk with a call to promote two-way international exchange and see postdoctoral careers in international rather than national contexts.

8. Kenneth Prewitt
Closing Remarks

Kenneth Prewitt, Carnegie Professor of Public Affairs at Columbia University and co-chair of the International Advisory Board, closed the session with a summary of some of the major issues discussed and raised further questions to consider.

His main points:

1. Forum discussion revealed that the present historical moment is marked by a global expansion of scientific markets. There is an increasing global demand for new discoveries that is accompanied by an increasing global demand for human resources in science and technology. The forum dealt mostly with this issue of human resources and focused on a specific group on the supply side: postdoctoral researchers and scholars.

2. It makes sense to look at this specific group in the context of expanding global markets since postdoctoral researchers are an important asset of expanding science systems. As a rather recent phenomenon in the history of science, the postdoctoral system helps improve the supply side of ST personnel. Mobility is an additional solution to the global disequilibrium between the demand and the supply side of HRST and is facilitated by the postdoc system. The forum discussions revealed that it is necessary and possible to improve the system both in terms of incentives and in terms of quality control.

3. If we look at postdoctoral careers on the basis of such an argument, an issue that needs to be given more thought is the question of power asymmetries that are bound to arise as systems compete on a global scale. How do we not accelerate or exaggerate such patterns of asymmetry if we are to agree that a strong international community is an international public good? At the same time, there is a need to address the tension between the international public good (scientific discovery, increase in knowledge) and the national public good (economic growth, return on investment). Nation states are in competition for R&D personnel because they are in competition with each other. This tension between the national and the international public good is bound to affect debates over the internationalization of research and mobility of researchers.
Recommendations
The reports from different countries and organizations underlined the diversity of academic systems and postdoctoral career paths around the world. At the same time, they identified common developments and challenges. Specific questions, themes, and suggestions for improvement continued to surface during the discussions among Board members, speakers, and forum participants as well as during the second part of the meeting, when the Board reconvened on its own. The following five observations summarize general findings of the Board's discussion and provide the basis for five recommendations which are aimed at – but not limited to – raising the attractiveness of postdoctoral careers in Germany.

Observations

1. The present historical situation is marked by a global expansion of scientific markets. There is an increasing global demand for new knowledge and inventions that is accompanied by an increasing global demand for human resources in science and technology.

2. Postdoctoral researchers are an important asset of expanding science systems. Defined as highly skilled professional workers with doctorates who have not yet reached tenured positions in research and teaching, they are a rather recent phenomenon in the history of science. The establishment of a postdoctoral system, which encourages young scholars to gain several years of research experience before being appointed to permanent faculty positions, has helped improve the supply side of personnel in science and technology in many countries. Young science nations tend to have fewer 'postdocs' of this kind. Their numbers increase as science systems expand and become internationally competitive.

3. Progress and innovation in science, technology, and engineering increasingly depend upon postdoctoral researchers. Young scientists contribute to the advancement of science with new ideas, creativity, curiosity, motivation, and perseverance. They broaden the scope of scientific knowledge and constitute a highly trained workforce that carries out research, runs labs, and instructs the next generation of students and research personnel.

4. Mobility is an important factor for the personal and scientific development of postdoctoral researchers. It is key to the advancement of science and academic scholarship, which increasingly depends on the international exchange of knowledge and ideas. The postdoctoral system encourages mobility among young scholars and scientists. It facilitates the circulation of knowledge and lays the foundation for lasting international partnerships and research collaborations. Many countries have come to see international mobility as a solution to the global disequilibrium between the demand and the supply side of highly-skilled research personnel. Global competition between countries seeking to attract foreign and expatriate researchers is therefore increasing.
5. The current situation raises a number of questions concerning the relationship between science and academia on the one hand and society on the other. As national science systems compete on a global scale, power asymmetries are bound to arise between countries. How should the international community deal with such patterns of asymmetry? There is also a need to address the tension that exists between the advancement of science as an international public good on the one hand and the advancement of science as a national public good on the other. In the first instance, the aim is to promote scientific discovery and foster human knowledge; in the second instance, the aim is to spur national economic growth. The tension between the two will affect public debates over mobility and the internationalization of research. How will the science community deal with taxpayers’ demands for a return on investment?

The Board did not answer these questions. It singled them out as key to current public debates on science and technology and agreed to address them in the future.

Recommendations

Current global developments raise a number of questions concerning the attractiveness of academic careers, the status of postdoctoral researchers, and the quality of postdoctoral training. The Board believes that it is necessary and possible to improve the current system and issues the following recommendations:

1. Address the tension between the number of doctorate holders and the number of permanent positions available in traditional academic careers
   The increase in global demand for human resources in science and technology has been accompanied by an increase in the demand for postdoctoral researchers. In countries with highly developed science systems, the number of tenured faculty positions has not increased by the same proportion, creating a tension between the number of doctorate holders on the one hand and realistic job opportunities in traditional academic careers on the other. The Board advises science administrators and academic policy-makers to address this tension, since it lessens the overall attractiveness of research careers.

2. Create more positions in science and academia
   One way to address the tension is to create more positions in science and academia. This is an indispensable claim for Germany, where professors supervise 63 students on average, more than twice as many as the average at top-rank international universities. Germany needs more professors; at the same time, Germany needs to make academic careers more attractive by creating lasting positions for scholars and researchers beyond the classical professorship and reviving the German 'Mittelbau'.

3. Diversify postdoctoral training and broaden career perspectives
   The Board believes that it is equally important to differentiate between postdoctoral training as excellence training and postdoctoral training as advanced professional career development. Excellence training is vital to the development of exceptionally talented young scholars and scientists who will eventually become principal investi-
gators and contribute to the advancement of science with innovative new ideas. This kind of training ought to remain flexible and encourage scientific independence at an early stage. The majority of postdoctoral researchers will eventually resume professional careers beyond classical professorships, however. It is necessary to support this group and to improve their job opportunities outside academia. To this end, it is important to conceive postdoctoral training as advanced career development with more professional support in the acquisition of a variety of soft skills.

4. **Remove obstacles for mobility**
   Mobility is highly important with respect to both academic excellence training and professional career development. Obstacles for mobility such as the non-transferability of pensions need to be removed. Given the increasing internationalization of science and research, it is necessary to provide postdoctoral researchers with visas that allow them to participate in their groups' extensive research collaborations worldwide.

5. **Create attractive working environments for excellent scholars and researchers**
   Nations worldwide are competing for the best brains. To attract excellent postdoctoral scholars and researchers, it is necessary to offer dual career support and provide tenure track options. Portable grants and flexible budget options are attractive funding schemes as they support early scientific independence. Selection processes and appointment procedures need to be open and transparent. In general, excellent researchers are attracted by excellent conditions for research. These depend on a variety of factors, including the availability of funding, thriving academic networks, and the overall standing of researchers and support for science within society. To win the best, local investments in knowledge and innovation are needed on the largest possible scale.
Annex
The International Advisory Board and Its Members

The International Advisory Board is an independent, international expert group sponsored by the Alexander von Humboldt Foundation. Members of the Board meet once a year to discuss developments and strategic issues relating to the global mobility of researchers. A day-long forum features reports from international experts and opens the Board's discussions to a larger group of scientists and scholars, science administrators, and science policy-makers. The Board then reconvenes on its own to draw conclusions and issue recommendations. These serve the Alexander von Humboldt Foundation as well as its German partner organizations and German academic policy-makers.

Chairs

Wolfgang Frühwald  
President of the Alexander von Humboldt Foundation

Kenneth Prewitt  
Carnegie Professor of Public Affairs, Columbia University

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Speakers

M. S. Ananth is Director of the Indian Institute of Technology Madras. He holds a Ph.D. degree in Chemical Engineering from the University of Florida, USA (1972). He has been on the faculty of IIT Madras since 1972 and has been consistently rated as an excellent teacher. His research interests are in Molecular Thermodynamics and Mathematical Modelling. A Fellow of the IICHE and the INAE he has been awarded the Herdillia prize for excellence in basic research and the R.W. Fahien Alumni Award for 2003 by the University of Florida. He has been a Visiting Professor in Princeton University (1982-83), the University of Colorado (1990-91), NIST, and Aspen Tech, USA and RWTH, Aachen, Germany. He is one of the architects of ‘The Strategic Plan of IITM’ and the Principal Coordinator of the National Programme on Technology Enhanced Learning (NPTEL).

Ester Basri is Senior Policy Analyst for the Science and Technology Policy Division at the OECD Directorate for Science, Technology and Industry in Paris. She is responsible for the Ad Hoc Working Group on the Steering and Funding of Research Institutions (SFRI). This group is currently analysing the demand and supply of human resources in science and technology, the attractiveness of research careers, women in science, the international mobility of researchers and the governance, financing and evaluation of public research organizations. Prior to joining the OECD she managed the Innovation Analysis Section at the Australian Department of Industry, and was part of the Prime Minister's Mapping Science and Innovation Taskforce at the Education and Science Ministry. Ester also managed an academic research centre, the Australian Expert Group in Industry Studies (AEGIS) at the University of Western Sydney before moving to the Ministries. AEGIS worked on issues of innovation and technological change. Ester is an Australian national and holds a PhD from the Australian National University.

Stefan Hornbostel is Professor at the Department of Social Sciences (science studies) at the Humboldt University of Berlin and Director of the Institute for Research Information and Quality Assurance (iFQ) in Bonn. He studied Social Sciences at the University of Göttingen. He did his PhD at the Freie Universität Berlin. After his studies, he worked at the Universities of Kassel, Cologne, Jena and Dortmund, as well as at the Center of Higher Education Developement (CHE – Centrum für Hochschulentwicklung). Stefan Hornbostel is a member of the Alexander von Humboldt Foundation's Evaluation Advisory Board.

PEI Gang took office as the 25th president of Tongji University on August 16, 2007. Previously, he had served as president of Shanghai Institute for Biological Sciences, Chinese Academy of Sciences since May 2000. Professor Pei received his B.Sc. degree in Pharmacy from Shenyang Pharmaceutical University, Shenyang, China in 1982 and his master's degree in Pharmaceutical Sciences from the same institution in 1984. He obtained his Ph.D. in Biochemistry and Biophysics in 1991 from the University of North Carolina at Chapel Hill. Professor Pei then undertook his post-doctoral training in Cell Biology and Signal Transduction at Duke University until he was recruited as a Research Group Leader at Shanghai Institute of Cell Biology, cosponsored by the Chinese Academy of Sciences and the German Max-Planck Society in 1995.
**Alexandre Quintanilha** is Director of the Institute for Molecular and Cell Biology at the University of Porto, Portugal, and Chair of the Advisory Group "People" of the European Commission. He graduated in theoretical physics at the Witwatersrand (Johannesburg) University and devoted to biology in Berkeley where he was director of the Environmental Study Centre until 1991 and director of the Biosphere Technology Study Centre from 1987 to 1990. He went back to Portugal in 1990 and became director of the Experimental Cytology Study Centre and professor at the Biomedical Science Abel Salazar Institute (ICBAS). In 1994 he was elected member of the European Academy. He is currently professor at ICBAS, director of Molecular and Cell Biology Institute, and President of Board of Directors of Instituto de Engenharia Biomédica.

**Alyson Reed** is the Executive Director of the National Postdoctoral Association, providing staff leadership to this newly-formed professional society representing postdoctoral scholars. Ms. Reed is an experienced non-profit manager and executive, having previously served as the Executive Director of the Maryland Commission for Women and of the National Committee on Pay Equity. She has also worked in senior management and policy posts at the National Kidney Foundation and the American College of Nurse-Midwives. Early in her career, Ms. Reed worked as a radio news reporter for an NPR affiliate in upstate New York, and also as a Project Manager for the League of Women Voters. In addition to her professional experience, Ms. Reed earned a Masters degree in Public Policy and Women’s Studies from the George Washington University and a Bachelor’s degree in English Literature from SUNY-Binghamton.

**Ekhard K.H. Salje** is President of Clare Hall College and Head of the Department of Earth Sciences at the University of Cambridge. He has held positions as Professor of Physics, Mineral Physics and Crystallography at the Universities of Hannover, Paris, and Cambridge and has served as Advisor to the Wissenschaftsrat and German Research Foundation (DFG) on German university reform. He is a Board member of the Parliamentary Office for Science and Technology, House of Commons, UK. Professor Salje is a member of the AvH International Advisory Board.

**Forum Participants**

**Andrea Adam**  
Executive Director, German University Alliance, New York

**A.J. Arduengo**  
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**Megan Brenn-White**  
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**Robert Grathwal**  
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**Astrid-Christina Koch**  
The Alexander von Humboldt Foundation

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