

# International Research Collaboration: Just Nice to Have or Necessary?

Marion Müller

Director, North America Office, German Research Foundation (Deutsche Forschungsgemeinschaft, DFG)

Internationalization certainly is one of the most used buzz words of our time. Almost everything can and does get internationalized these days from marketing methods over iPhones, to efforts against combating kleptocracy. Internationalization has been the subject of much discourse and has profound effects on today's political, economic and cultural life. This wide-ranging process also has a major impact on colleges, universities, national laboratories and funding agencies; internationalization has become a challenge for higher education experts and science managers. And yet if we are to believe Goethe, who wrote "Science and the arts belong to the whole world. The barriers of nationality vanish before them", then science is per se international and international research collaborations are not just nice or necessary but intrinsically natural.

In fact, the internationalization of science is often taken for granted. The laws of nature transcend political, national and linguistic boundaries, and the international flow of knowledge rendered science global long before the world was declared flat and "globalization" became a fashionable commonplace for the growing interconnectedness of markets and the pervasiveness of new information technologies. Indeed, the virtual form of internationalization through the worldwide web assumes a natural and integral part of today's scientific processes and exchanges.

Nonetheless, an analysis of recent developments shows that the topic of internationalization of higher education and research ranks high on the agenda

of policymakers, higher education management and faculty. The German government not long ago published an internationalization strategy<sup>1</sup> and the US National Science Board recently released a study on *International Science and Engineering Partnerships: A Priority for US Foreign Policy and Our Nation's Innovation Enterprise*.<sup>2</sup> At the same time, German and American universities and funding organizations are also developing or rethinking their international activities and strategies. Internationality is, it seems, on the one hand a matter of fact characteristic of science, and yet, on the other hand, a prerequisite for its success, which can be actively shaped and influenced and hence plays a vital role in the national styles of organizing and funding science. Science and research

are international in scope and activity but when it comes to science education, organization and funding national social, cultural and political values and strategies enter into the picture and determine and shape international collaborations.

This paper aims to give some attention to an activity which is often assumed to be self-sufficient, and at the same time attempts to examine the role of international research collaborations with a special focus on research links between Germany and the United States. It claims that while international research collaborations are at the heart and core of any successful national internationalization strategy and are vital to give science the competitive edge which it needs to progress, they are not yet used to their full potential. It argues that in order to bring transatlantic research collaborations from an ad-hoc, random and self-sustaining mode to a new, more systemic dimension, it requires an understanding of the specifics of the two research (funding) systems, a seizing of opportunities as well as strategic thought. Transformation and new impulses are needed to optimize transatlantic research networks.

The paper has three parts. By way of introduction it presents a few facts and figures about the Deutsche Forschungsgemeinschaft (German Research Foundation, DFG) that are essential to understanding its international activities. In a second step, it looks at the aforementioned opportunities by discussing the need for internationalization in general, and by taking a comparative view on

“internationalization made in Germany” and “internationalization made in the US”; thirdly it examines the role of a national funding agency in enhancing international research collaboration.

The DFG is the central research funding organization that promotes research at universities and other publicly financed research institutions in Germany. Its current budget is approximately 2 billion Euros, roughly 58 percent of which comes from the federal government and round about 42 percent from the state authorities.

It is very important to note that the DFG is not a government agency – it is a self-governing association under private law. DFG membership is made up of German universities, non-university research institutions, scientific associations as well as the Academies of Science and Humanities. The members also elect the DFG president.

Unlike partner organizations in the UK, the US or Canada, the DFG serves all branches of science and the humanities. Its activities focus on funding research projects carried out by scientists and academics working at universities or research institutes and on selecting the best projects in a process of fair and transparent competition.

The DFG has a special focus on the advancement and education of young scientists and academics and encourages their early independence. The DFG advises parliaments and public authorities on questions relating to science and research; it fosters links between science and industry, and last but not least and of particular

importance for this paper, promotes international research collaboration.

The DFG sets strategic foci in selected countries by maintaining representations there. The foremost goals of the Sino-German Center for Research Promotion in Beijing and of the liaison offices in Washington, New York, Moscow and New Delhi (and as of 2009 Tokyo) relate to the promotion of collaboration between scientists and academics and cooperation with the respective national research funding organizations.

Our North America offices in Washington, DC and New York aim:

- to maintain and extend contacts with current and former DFG award holders and alumni in the United States and Canada,
- to inform US and Canadian universities and research institutions about Germany as a location of science and research and about opportunities for research collaboration,
- to support and expand cooperation with partner organizations in the USA and Canada in order to create or improve framework conditions that allow for international research collaboration,
- to follow and assess science and research policy developments in the United States and Canada in fields relevant to the DFG with respect to basic research.

Almost all of the DFG's funding schemes offer international components. In general, it is possible to apply for the funds needed for cooperation in addition to project funding itself.

Let us return to the initial question, whether international research collaboration is a luxury or a necessity. Vijayalakshmi Pandit, the first woman to be elected President of the UN General Assembly, claimed that the creation and advancement of knowledge has to be a collaborative international activity. "No nation," she said, "has a monopoly of knowledge, it has become the common heritage of civilized man, but its fruits are available to us only through cooperation." And Norman Augustine in his recent essay titled "Is America Falling off the Flat Earth" comes to a similar and even more poignant conclusion: sustainable competitiveness requires proactive engagement with what is going on around us. Contextualizing the US economic competitiveness he states: "Leadership is not an American birthright. ... Simply being an American does not guarantee a high-wage job anymore".<sup>3</sup> And I would claim the same holds true for the American science and research sector and, of course, equally applies to Germany and many other nations as well.

Several factors drive the growing need for the internationalization of science:

- the globalization of the world economy,
- increasingly international communication networks, career opportunities and choices, and interpersonal interactions and collaborations,
- a growing need for international recruitment of students, faculty, skilled workforce,
- the speed of knowledge creation,

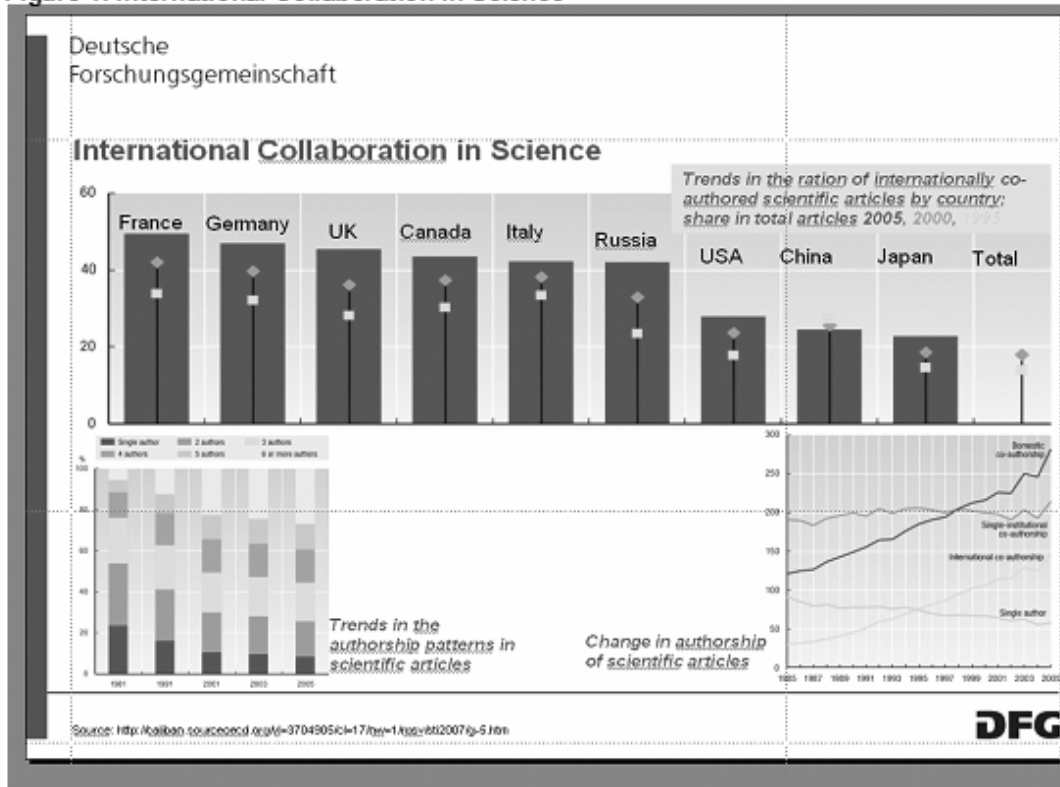
- the complexity of research questions,
- challenges that know no borders: SARS, AIDS, forest fires, energy issues, pollution, global warming, species extinction, terrorism, health care, and hunger need partnerships and collaborative efforts.

Answers to these and other global research questions will most likely be found in international science networks rather than in national science contexts. To mention just a few examples, think of

best infrastructure, wherever they may be located. An examination of the OECD statistics for international collaboration as manifested in co-authorship shows that the volume of international co-authorship has increased considerably over the years (Figure 1).

A report by Jonathan Adams et al.<sup>4</sup> published in 2007 likewise shows that the volume of international collaboration has gone up significantly between 1996-2000 and 2001-2005. This trend can be noticed across all countries and across all the main disciplines. Adams et al.

**Figure 1: International Collaboration in Science**



Source Analysis was conducted based on Science Citation Index on CD-ROM [1985-2005]; provided by Thomson Scientific; analyzed by National Institution of Science and Technology Policy in Japan. <http://caliban.sourceoecd.org/v1=3704905/cd=17/nw=1/rpsv/sti2007/g-5.htm>

the human genome project or the particle physics research at CERN.

Science can best advance when it draws on and utilizes all the best sources of knowledge, the best brains and the

demonstrate that for the US collaboration as a proportion of output increased by 5.3 percent, in absolute terms approximately 89,800 papers. The corresponding figures for Germany

demonstrate an increase in collaboration by about 40,000 papers or 8.6 percent.<sup>5</sup> Moreover, Adams' data and tables show that Germany, the UK and the US dominate world research links as the largest and highest quality research economies. 30 percent of Germany's collaboration is with the US but only 13.1 percent of US collaboration is with Germany.<sup>6</sup>

The international pooling of talents, ideas and techniques in pursuit of solving global research problems yields extra value that would not have been achieved otherwise. Looking at the citation performance of papers in *Nature* between 1994 and 2003, Gareth Roberts showed that co-authored papers were cited two or three times more frequently than the average nationally authored papers in the same journal.<sup>7</sup>

From the drivers of internationalization of science outlined above and the international co-publications we can see that communication and collaboration among scientists promote scientific progress. No one national group has a monopoly on good ideas. International collaboration and interaction is hence necessary and beneficial. And yet, it can be argued, that international collaboration is not used strategically and systematically enough to truly internationalize institutions of higher education and laboratories. Neither universities nor funding agencies in Germany and the US have fully embraced international collaboration as the key concept to research excellence, which in turn empowers a country's innovative capacity and safeguards its economic competitiveness.

It should be a strategic goal to build on, foster and enhance existing research networks and to endeavor to develop and sharpen new transatlantic collaborations. Increased interaction is mutually beneficial to US and German science and research. While the internet revolution and the aforementioned modern communication facilities have greatly reduced hurdles of geographical distance, the stumbling blocks still to be overcome are pride, prejudices, misconceptions and clichés that undoubtedly exist about each other's science and research systems.

Internationality needs people who collaborate, programs that encourage them to do so and institutional policies and framework conditions that make collaboration work. However, notions and mechanisms of internationalization function quite differently in Germany and the US. Core elements of internationalization policies are still curiously national.

Knowledge is mostly transferred through people. But what exactly do we mean when we talk of internationality with regard to people? The concepts differ greatly on both sides of the Atlantic. Internationality in science needs both mobile people and open doors. And it is in the areas of mobility and open doors that a fundamental difference between "internationalization made in Germany" and "internationalization made in the United States" manifests itself.

In the case of Germany, one can speak of a "push" or export/ re-import-based internationalization strategy. Germany "pushes" students and young scientists to spend an extensive time

period of their academic career outside of Germany, it encourages them to become immersed in laboratories, universities and research institutions abroad, and also offers various sources to fund these times abroad.

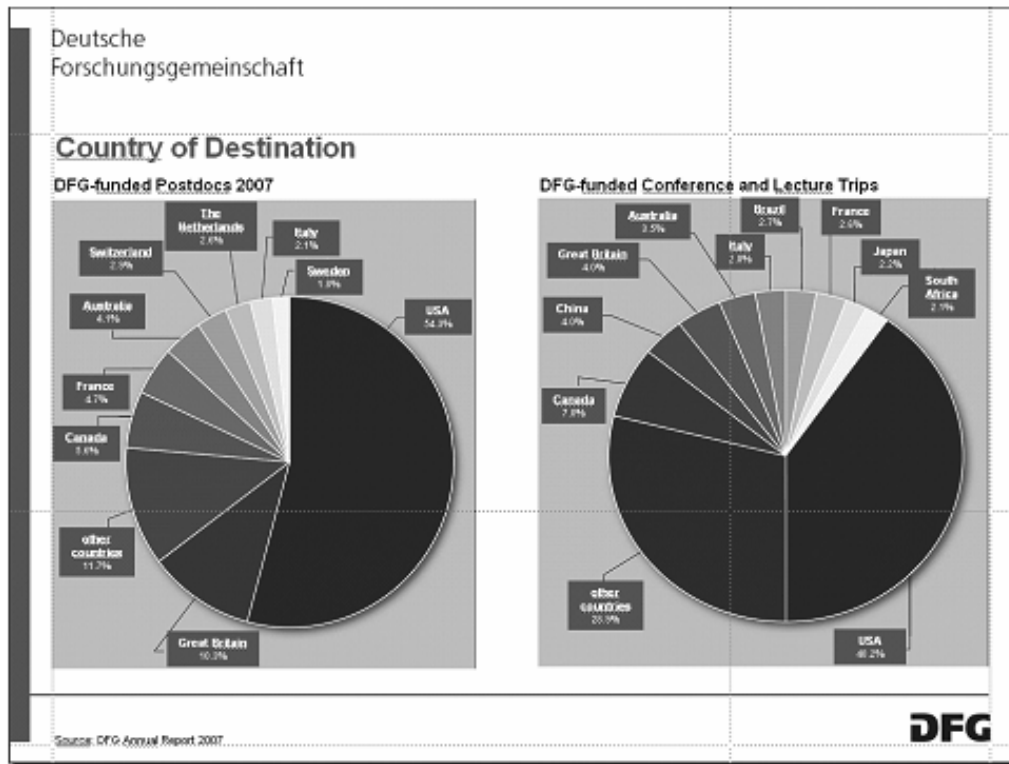
With regard to the openness of the national higher education and research system, Germany's universities have come a long way. Germany now ranks third among host countries for international students. However, more endeavors are needed to increase the proportion of international graduates and postdocs.

German students are on average more mobile than many of their international peers. The target for the years to come is to raise the number of

to two in three. Internationality thus requires mobility. The rationale behind it is that international modules within academic vitae are on the one hand regarded as essential for the successful career of the individual researchers, and that on the other hand internationally trained or experienced young scientists also enrich the national system and their immediate work environment when they return home. Moreover, many German researchers continue the US research links and contacts they established during their postdoc time, which often lead to an exchange of students or visiting professorships.

The DFG statistics clearly show the direction of this mobility: the US is the leading destination of choice for DFG-

**Figure 2: Country of Destination**



Source: DFG Annual Report 2007

students with significant international academic experience from one in three

funded postdocs as well as for conference and lecture trips (Figure 2).

There are currently about 350 DFG-funded postdocs in the US. The most popular host institutions include the country's top research schools, Yale, Princeton, Rockefeller University, the National Institutes of Health, Johns Hopkins University, and MIT to name but a few.

To sum up: mobility is a chorus for German policymakers, faculty and postdocs. A postdoc period abroad constitutes an essential building block in the careers of young researchers, tests and sharpens their skills, helps to build a sustainable network of colleagues and friends, deepens their understanding of the science system of the host country and is generally considered advantageous for their academic CV.

Americans, on the other hand, seem to fear that going abroad means at worst going into a "scientific" desert or at best taking a little detour in one's career. Postdoctoral studies abroad are often considered as removing talented young scientists from the scientific mainstream and making it harder for them to compete on a difficult US job market after returning. Faculty members, academic advisers and graduate students across all disciplines seem to share the perception that tenure-track ambitions are incompatible with doing a foreign postdoc. And yet, despite this obvious reluctance to embrace an extensive research stay abroad as a worthwhile or even beneficial undertaking, the American research scene can rightly be classified as very international.

In the case of the US, one could speak of a "pull" or "import" internationalization strategy. Internationalization happens mainly and automatically within its borders,

internationalization happens through opening doors.

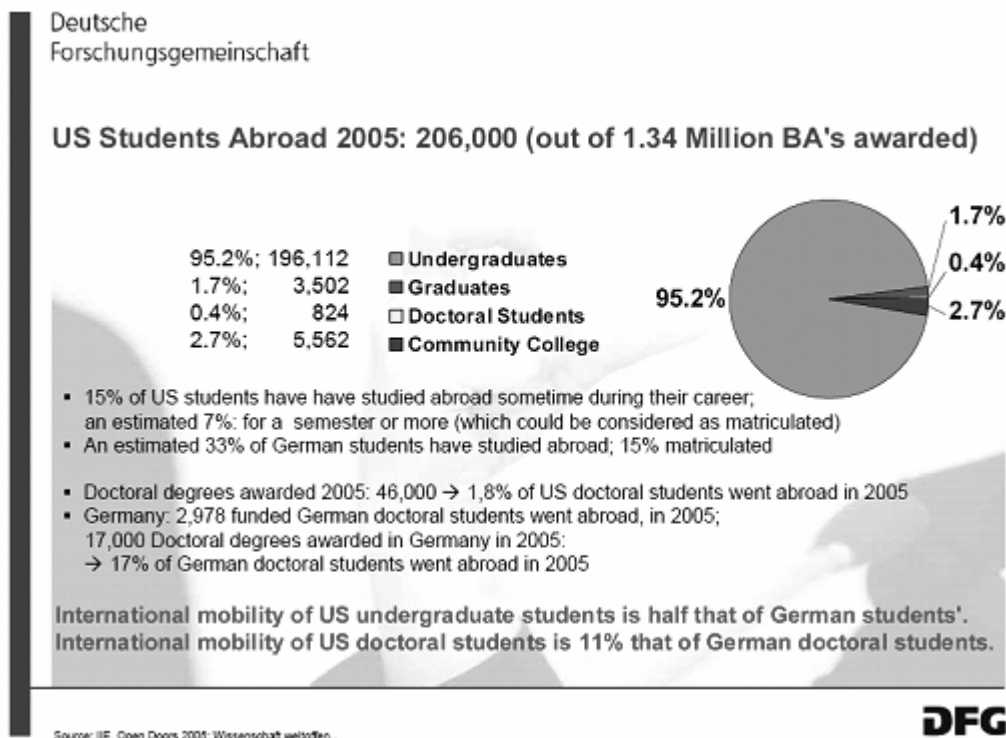
Figures show that the United States pull foreign talent to their labs, universities and research institutions and offer incentives to attract the best minds. It is the presence of these students that makes the campuses international. If one looks at the internationalization strategies of US institutions of higher education, one of the prime targets is to further internationalize their student body. It is an internationalization of the domestic research environment through the import of foreign talent. International students constitute an important element for doctoral studies in the United States. Almost half of all international students are studying at the graduate level, with a majority in doctoral programs. International students account for 13 percent of all graduate students, significantly higher than the approximately 3.5 percent of all undergraduate students that are international students. There has been a significant rise of foreign-born doctoral/post-doctoral scientists in the US. With a growth rate of 10.9 percent in the period 2002-2006 the increase in S&E doctorates awarded to non US-citizens was almost three times as high than that to US citizens (3.7 percent).<sup>8</sup> In the social/behavioral sciences, the physical sciences, and engineering, the representation of foreign PhD recipients is particularly striking; among doctorate recipients in 2005, those from outside the US accounted for approx. 20 percent in social/ behavioral sciences, 38 percent of degrees in the physical sciences and almost 67 percent in engineering.<sup>9</sup>

Although the vast majority of US students still graduate without any study abroad experience, it is true that there is an increasing tendency on the part of American universities to nudge their students towards international experience; but often this is being done in the form of study abroad programs based on exported US courses taught

206,000 young US academics going abroad only about 0.4 percent are at the doctoral level and only 0.2 percent spend a full calendar year abroad (Figure 3).

Among the most cited reasons and most prominent goals to be pursued through an international experience are language study, cultural learning or

**Figure 3**



from American textbooks and by American staff and awarding American credit points. Some American universities establish campuses abroad where mostly undergraduates enjoy American education in a European setting. Some even say that an American student's time abroad is more of a chaperoned field trip than an immersion into a foreign academic culture.

The statistics published by Open Doors<sup>10</sup> show that out of approximately

public diplomacy. It is very seldom that university programs or political rhetoric highlight an excellent research environment abroad as a reason to seek international research experience. On the whole, the international mobility of US undergraduate and graduate students is half of that of their German peers. A glance at the countries that graduates, postdocs and established researchers prefer going to shows that for German scientists the US is the most common



destination for research experience whereas Germany ranks between second and fourth among the destination of choice for American scientists and researchers.

A recent analysis from the Center for International Initiatives at the American Council on Education (ACE) states that internationalization is not a high priority on most US college campuses. The survey found that “many institutions do not see internationalization as integral to their identity or strategy. Less than 40 percent of institutions made specific reference to international or global education in their mission statements. The percentage of colleges and universities that require a course with an international or global focus as part of the general education curriculum dipped from 41 percent in 2001 to 37 percent in 2006. Fewer than one in five had a foreign-language requirement for all undergraduates. The majority of institutions do not have a full-time person to oversee or coordinate internationalization. Although the proportion of institutions offering education abroad opportunities has grown sharply to 91 percent in 2006 compared with 65 percent in 2001 student participation has remained low. 27 percent of institutions reported that no students graduating in 2005 studied abroad.”<sup>11</sup> “Overall, internationalization doesn't permeate the fabric of most institutions,” said Madeleine F. Green, vice president of ACE's Center for International Initiatives and co-author of the survey. “It is not sufficiently deep, nor as widespread as it should be to prepare students to meet the challenges they will face once they graduate.”<sup>12</sup>

And this, it can be argued, is partly the case because going abroad is not deeply enough entrenched in science proper.

As generalizing as the short analysis of “internationalization made in Germany” and “internationalization made in the US” may sound, it yields lessons to be learned on both sides.

Germany can no longer afford to simply market on demand, but most choose a more systematic approach. It needs to understand how important it is to step up to the plate and show its wares, which is to say to market its strong science reputation and raise awareness within the United States of the strength of German research.

In the face of the gathering storm and a weakening economy, the US on the other hand might also have to refocus and see internationalization more from an active outward-looking perspective.

The following section proposes to examine the role that a national funding agency plays in facilitating international research collaboration by looking at what the DFG does.

The support for international collaboration is an integral part of the DFG's mission. The DFG promotes international project collaboration, international mobility of scientists and researchers and the internationalization of German universities by internationalizing research activities, showing presence in foreign countries, and by cooperating with European as well as international partners. The DFG is also represented as an institution in various scientific and science policy organizations and bodies at an

international and a European level. However, research collaboration functions primarily through people in a bottom-up mode, not through institutions. The promotion of international research collaboration is not and can never be an end in itself, but is meant to create added value for science and research in Germany.

The DFG's concept of added value can be described as encompassing several aspects:

- Collaboration and strategic alliances with the best in the world: International research collaboration enables researchers to participate in networks of cutting-edge and innovative activity. For scientists and researchers, collaboration provides opportunities to move further and faster by working with other leading people in their field. It is, therefore, unsurprising and we have seen it when looking at internationally co-authored publications that collaborative research is also identified as contributing to some of the highest impact activity.
- Quality assurance and enhancement through competition: Excellent research needs self-critical competition in order to safeguard continuous quality assurance and enhancement. Given the global dimension of research questions the respective national funding systems cannot be the sole frame of reference for this. Germany's top scientists and researchers have to match with the best in the world.
- Promotion of young scientists and researchers: The innovative

and self-renewing forces of a science system depend upon the continuous supply of excellent, well trained and highly-motivated young people. It is crucial that young German scientists acquire substantial research experience abroad and that the German science system be enriched through young international scientists and researchers.

- Access to infrastructure, people, research facilities and other resources: In addition to human resources, German science needs access to international large scale facilities and infrastructure (libraries; research "objects" like tropical forests, oceans, plateaus, accelerators).
- Increasing awareness of the strength of the national system: International collaboration affords the opportunity to market and promote the strengths of the national system abroad.
- Global responsibility: As one of the leading, politically independent research funding agencies, the DFG has the responsibility to engage itself internationally in causes that further the welfare of mankind and nature.
- Exchange of experience: Funding agencies need the continuous and open exposure to international reference systems in order to constantly improve and enhance their own program portfolio. A number of challenges that funding agencies face are not national but can be found in the international arena: difficulties in the supply of scientists and engineers, questions of how to

handle interdisciplinary projects, how to organize international peer review, and standards of good scientific practice. These are issues that concern funding agencies around the globe.

The following section addresses two of the DFG's international activities, namely the internationalization of research activities and cooperation with international partner organizations.

The DFG has not only opened all its funding schemes to foreign nationals willing to do science in Germany, but it supports collaboration between German scientists and international partners in all of its funding programs and with a multitude of instruments. In general, it is possible to apply for the funds needed for cooperation, in addition to the project funding itself, regardless of the specific type of project funding involved.

Cooperative projects with foreign partners are generally supported on the principle of reciprocal responsibility or matching funds mechanism: The researchers working in Germany interact with the DFG, while their collaborative partners working abroad liaise with the funding bodies in their own country.

Between 2004 and 2006 11.8 percent of foreign collaboration partners that German academics, funded in the DFG's Individual Grants Program, worked with were from the US. Within the DFG's Collaborative Research Center Program, international collaboration can take two different forms: either as a center (German national) to center (US national) collaboration, or through the integration of an international project into a "German national" Collaborative Research Center. 35 Collaborative

Research Centers and seven Transregional Research Centers reported official international collaboration in the form of individual projects; of these 14 and 2 were respectively with US partners.

While many links revolve around leading researchers, it is essential that the young generation of up-and-coming researchers becomes more involved in collaborative networks and international activities. The DFG's Research Training Groups<sup>13</sup> combine innovative top-level research and structured promotion of excellent young researchers in an international setting. They center on the qualification of doctoral researchers within the framework of a focused research program and a structured training concept that prepares doctoral researchers for the complexities of the job market that face scientists and academics. A key objective of Research Training Groups is to enable the speedy research-related qualification of doctoral researchers. As they focus on their respective core research topics, doctoral researchers also gain an overview that goes beyond their specialties by working within the larger context of a Research Training Group. Doctoral researchers are enabled and expected to conduct independent research early on. Research Training Groups aim to accelerate doctoral training and lower the age at which scientists and academics finish their doctorate. In this way, the participation of young researchers in Research Training Groups helps qualify them to compete in the international job market. An indicator of the attractiveness of this kind of PhD program is the proportion of

international participants, 30 percent international PhD students and 40 percent international postdocs.

A special variant of the program are the International Research Training Groups, in which German universities cooperate with research institutions in other countries to offer structured doctoral programs. Their purpose is to encourage and deepen bilateral cooperation in the training of young academics between German universities and universities or research institutions in other countries. They promote systematic research cooperation through joint research and qualification programs, cooperative, cross-border supervision of doctoral researchers of both partner groups, and long-term research stays for doctoral researchers at the respective partner institutions.

The DFG currently has 55 of these International Research Training Groups with a wide array of European and non-European countries. Seven research training groups have US-American counterparts. One such example is the Center for Metropolitan Studies, a joint venture between Berlin's three universities on the German side and Columbia, NYU and Fordham University on the American side. PhD students and post-doctoral students from across nine disciplines and six countries work together to research the problems of the modern metropolis. As part of the program, the Berlin-based students spend at least three months studying in New York during their studies, and PhD students from Columbia and NYU come to work in Berlin. In addition, they profit greatly from having co-advisors for their theses

from co-taught courses as well as from a rich program of guest lectures, workshops and colloquia.

Intensive large scale and medium-term collaborations like these do not fall from the sky but need careful preparation and long-term planning.

Hence, in addition to providing general research funding for specific international projects, the DFG also provides funding for preparatory measures that facilitate personal contact. Preparatory trips or collaboration visits to the partner's institute or department can be supported through the DFG's international cooperation funds, as long as the visit is not in connection with general cooperation between the institutes involved, but is associated with a specifically planned cooperation project or a specific joint research project.

Likewise, funding for bilateral events is provided to facilitate cooperation between scientists and academics with the aim of developing scientific contacts. As of next year, all these instruments will be merged into one and can be applied for in a "pick and choose" combination style as needed to initiate an international collaborative project.

Another program, which serves as a nucleus for the development of sustainable research collaborations, is the DFG's Mercator Visiting Professorship Program.<sup>14</sup> It enables Germany's research universities to invite highly qualified scientists and academics working abroad to complete a DFG-funded stay at their institutes. The visit should focus on joint cooperative projects by the guest and host. By assuming teaching duties, visiting

professors contribute to providing a clear international dimension to the research-oriented training of young researchers in the host departments.

To ensure that the special knowledge and skills of international researchers participating in this program of excellence become accessible to a wider audience in Germany, the DFG provides travel allowances for the visiting professor to visit other interested research institutes in Germany. The application process is very simple for the visiting professor. In fact, it is the German host who submits the application. He or she suggests to his or her university to invite the respective researcher as a Mercator Visiting Professor. The university then submits an application to the DFG to obtain funding for the professorship as well as for travels within Germany. If approved, the German university can invite the researcher and a fruitful transatlantic collaboration may begin.

Many letters, which the DFG has recently obtained from US-Mercator-alumni, bespeak the value of the program not only for the individual researcher but also for the young academics they work with, their field of science and last but not least for society as a whole. In addition to the personal enrichment, lasting memories, friendships and contacts the US scientists experienced in Germany, they name as additional positive results of their research stay: co-authored publications, the development of groundbreaking knowledge, sustainable collaborations as well lively students, doctoral students and professorial

exchanges, joint lecture series and media attention.

Let us now discuss the relevance that links between funding agencies have for international research collaboration. Clearly, effective cooperation among funding agencies will stimulate research contacts. One of the largest obstacles in international research collaboration is so called double jeopardy, the dependence on separate funding decisions by each of the funding agencies in the USA and Germany. Double jeopardy deters principle investigators from research collaborations that begin with a joint planning phase continue with writing one joint proposal and flow into jointly working on the common project. As long as international research collaboration is exposed to double jeopardy, one cannot blame researchers if they opt out for the safe way; namely to design a research project where the international collaborative component is nice to have but not necessary and comes into the picture only once national funding has been secured at both national fronts.

The DFG values the benefits of partnerships with its US counterparts and views them as an essential vehicle to create framework conditions that are attractive for research collaboration from scratch. Building on already existing bonds, the DFG seeks to strengthen its ties with its American partners – NSF, NIH, NEH, DoE, to name but a few – in order to stimulate and enhance transatlantic research contacts.

Unlike on the European stage, where scientific collaborations across national boundaries are made relatively easy through a number of programs and funding schemes, German-US

partnerships in research funding are on the whole less institutionalized and managed more on an ad hoc basis. On the European level, the “Money follows researcher” scheme allows PIs to transfer their grants to another country when they start a new position there. And most recently, the DFG, the Austrian Science Fund (FWF) and the Swiss National Science Foundation (SNF). have introduced the so-called “lead agency principle” which will make transnational collaboration considerably easier. In the case of transnational projects, the three countries accept the peer review decisions reached by the “lead agency”, which is the agency which handles the major part of the projects.

Although German - US science funding cooperation is less institutionalized, there are, of course, effective inter-agency agreements in place designed to promote research collaboration. For example, the NSF and the DFG have cooperative activities in chemistry. Under the joint chemistry solicitation, applicants can submit one proposal which is evaluated jointly by a set of reviewers who then reach a joint funding decision. Preference is given to proposals where the involvement on the US and German sides is balanced and complementary. The use of cyberinfrastructure to facilitate data sharing and communication, as well as the exchange of students and junior investigators are strongly encouraged. There is also close collaboration in the field of material sciences and last but not least, the annual DFG-NSF Research Conferences, which identify new directions in a specific field of science

and technology, bring together scientists from both countries and foster future scientific collaborations between them. These jointly planned and organized conferences support interaction between groups already communicating on an informal basis and help initiate new collaborations between scientists currently working independently. The long-term goal is to help scientists establish strong collaborative ties that will, on a more formal basis, bring “value-added” content to proposals submitted to both the DFG and the NSF in their existing programs. Ties will begin to be formed by the conference participants but then, hopefully, spread to the German and American scientific community in general.

Increasing international collaboration will also make peer review more international. The following figures offer a picture of the composition of the international reviewers the DFG consulted between 2005 and 2007: The proportion of scientists and academics working abroad and who participated in the written review process during the study period was 17.7 percent (or 4,930 scientists and researchers). This is a significant increase in comparison to previous report periods, 8 percent from 1999 to 2001 and 13 percent from 2002 to 2004.

From 2005 to 2007, the overall participation of peers from North America in the DFG peer review process across all disciplines amounts to 3.4 percent. 19 percent of all international reviews come from North America. This, of course, requires that applications be submitted in the lingua franca of science, English.

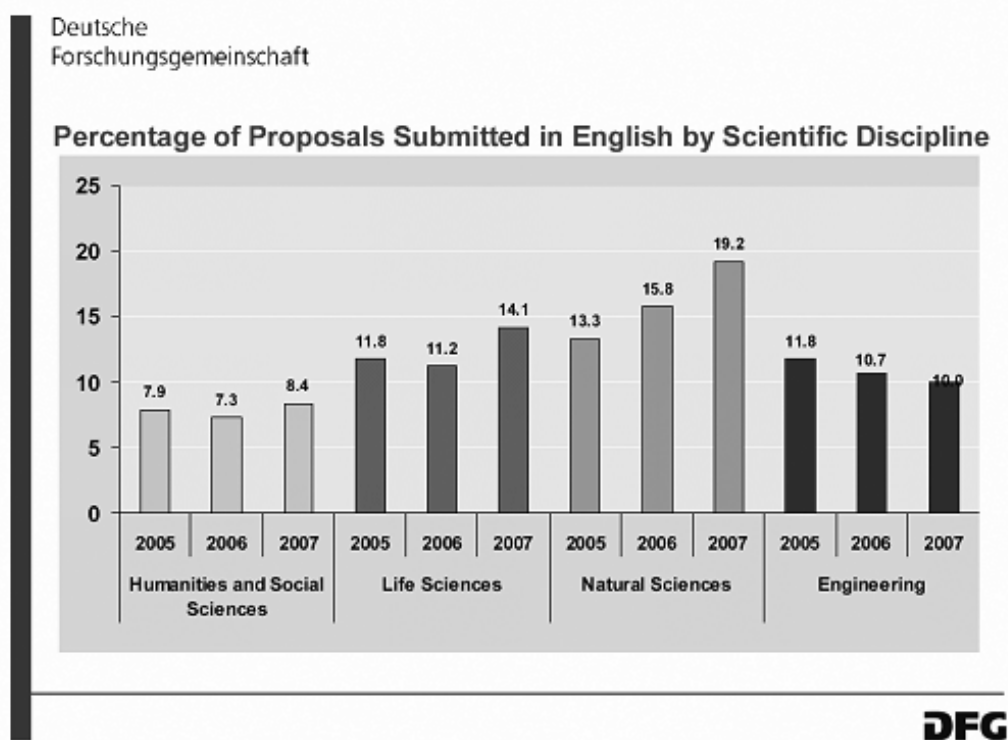
Figure 4 shows the percentage of proposals submitted to the DFG in English.

In the German federal government's recent Excellence Initiative, a nationwide competition for extra research money, the percentage of international reviewers was over 80 percent. American researchers participating in the Excellence Initiative's peer review process have become multipliers for the exciting things happening at German

the best possible research environment, at the same time, it opens up new opportunities for international research cooperation, for the training of doctoral students, for common use of large scale equipment, for exploratory workshops as well as for the development of grass root international projects.

In conclusion, let us return one more time to the opening question. International research collaborations are nice to have, of course, but more than

**Figure 4**



universities. American universities have expressed a keen interest in collaborating with the universities that were successful in obtaining funding and have thus become internationally visible landmarks of scientific excellence. While the Excellence Initiative no doubt actually initiates competition by attracting the best brains and creating

that they are increasingly and vitally necessary to tackle important challenges and to keep science successful and competitive. However, in order to render them as natural as they used to be, e.g. in the early modern period, the different stakeholders, not least the funding agencies, university managers and policymakers, must create a habitat

where international collaboration can truly thrive and bear fruit.

## References

1. [http://www.internationale-kooperation.de/doc/Internationalisierungsstrategie\\_2008\\_2800.pdf](http://www.internationale-kooperation.de/doc/Internationalisierungsstrategie_2008_2800.pdf)
2. [http://www.nsf.gov/pubs/2008/nsb084/nsb084\\_2.pdf](http://www.nsf.gov/pubs/2008/nsb084/nsb084_2.pdf)
3. "Is America Falling Off the Flat Earth?" by Norman R. Augustine, National Academies Press, 2007, pp. 2, 3.
4. Jonathan Adams, Karen Gurney and Stuart Marshall: Patterns of international collaboration for the UK and leading partners (Summary report) A report commissioned by the UK Office of Science and Innovation, June 2007. Evidence 2007, <http://globalhighered.files.wordpress.com/2008/08/evidencereportjune20072.pdf>.
5. Adams et al., p.5.
6. Adams et al, p. 13.
7. Gareth, Roberts (†), International Partnerships of Research Excellence, UK-USA Academic Collaboration, White Paper 2006, [www.wolfson.ox.ac.uk/UK-US-Academic-collaboration](http://www.wolfson.ox.ac.uk/UK-US-Academic-collaboration).
8. <http://www.nsf.gov/statistics/inbrief/nsf08301>
9. <http://www.nsf.gov/statistics/seind08/>, Figure 2-24.
10. <http://opendoors.iienetwork.org/>
11. <http://www.acenet.edu/AM/Template.cfm?Section=International&Template=/CM/ContentDisplay.cfm&ContentFileID=4736>
12. *ibid.*
13. [http://www.dfg.de/en/research\\_funding/coordinated\\_programmes/research\\_training\\_groups/index.html](http://www.dfg.de/en/research_funding/coordinated_programmes/research_training_groups/index.html)
14. [http://www.dfg.de/en/research\\_funding/scientific\\_contacts/mercator/index.html](http://www.dfg.de/en/research_funding/scientific_contacts/mercator/index.html)