International Research & Education Collaboration: Opportunities & Resources at NSF

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The U.S. in the Global R&D Landscape

- U.S. R&D spending up 1% to $465B or ~2.8% of GDP
- ~$1.6 Trillion invested in R&D around the world
- Total global investments in R&D (% of GDP) will stay relatively steady throughout the world in 2014
- US share of global R&D spending down 0.6% since 2012; Asia’s up by 2.1%
- China’s R&D spending could surpass U.S. by early 2020’s
**World of R&D 2013**

Size of circles reflects the relative amount of annual R&D spending by the indicated country.

**Global R&D Expenditures by Region**

**Figures D-5**

Global R&D expenditures, by region: 2011

Billions of U.S. PPP dollars

PPP = purchasing power parity.

NOTES: Foreign currencies are converted to U.S. dollars through PPPs. Some country figures are estimated. Countries are grouped according to the region described by The World Factbook, available at www.cia.gov/library/publications/the-world-factbook/index.html.


Science and Engineering Indicators 2014
International Work Increasing Across all Fields

Figure 5-22
Share of world’s S&E articles with international collaboration, by S&E field: 1997 and 2012

NOTES: Data are from the set of journals covered by the Science Citation Index (SCI) and Social Sciences Citation Index (SSCI). Articles are classified by the year they entered the database, rather than the year of publication, and are assigned to a country/economy on the basis of the institutional address(es) listed in the article. Articles are credited on a single-count basis (i.e., each collaborating institution or country is credited one count). Internationally coauthored articles may also have multiple domestic coauthors.


And Cooperation Increasing Globally

Figure 5-23
Share of S&E articles internationally coauthored, by selected country: 2002 and 2012

NOTES: Article counts are from the set of journals covered by the Science Citation Index (SCI) and Social Sciences Citation Index (SSCI). Articles are classified by the year they entered the database, rather than the year of publication, and are assigned to a country/economy on the basis of the institutional address(es) listed in the article. Articles are credited on a single-count basis (i.e., each collaborating institution or country is credited one count). Internationally coauthored articles may also have multiple domestic coauthors.


Science and Engineering Indicators 2014
US Researchers Less Likely to Co-Publish Internationally

Highly cited (top 1%) scientific articles by type of collaboration 2006-2008

As a percentage of highly cited scientific articles worldwide

- Single author
- International co-authorship
- Domestic co-authorship

Source: OECD calculations, based on Scopus Custom Data, Elsevier, December 2009

North American Student Mobility is Flat

Figure 1.20. Evolution in the number of students enrolled outside their country of citizenship (2000, 2009)

This figure shows the growth of foreign tertiary student enrolment, by regional grouping, over the past nine years.

U.S. STEM Graduate Degrees are Flat

International NSF Strategic Plan

NSF support for international collaboration aims to:

- **Advance** the FRONTIERS of Science and Engineering
  - ACCESS to unique expertise, facilities, and phenomena
  - LEVERAGE limited resources
  - EXCHANGE insights and techniques

- **Prepare** a GLOBALLY-ENGAGED U.S. S&E workforce
  - NURTURE capable young researchers with strong networks overseas
  - DEVELOP a global perspective
  - FACILITATE mobility
    - Brain circulation
Role of International Science and Engineering (ISE)

Internal
- Support NSF Directorates and Offices
- Leverage Resources and Expertise
- Test New Models
- Provide Data and Oversight

External
- Engage the US Research Community
- Strengthen Partnerships with Foreign Counterparts
- Cooperate with other U.S. Government Agencies

Core Values for International Engagement

- Intellectual partnerships and clear mutual benefit
- U.S. students and junior researchers engaged internationally
- Networks that link expertise and resources
Most international research and education activities are funded by NSF disciplinary programs:

- As part of regular awards
- As supplements to regular awards

Some NSF International Opportunities with External Partners

- Dimensions of Biodiversity
- Collaborative Research in Computational Neuroscience
- Partnerships for International Research and Education (PIRE)
- Belmont Forum Collaborative Research Action
- Graduate Research Opportunities Worldwide (GROW)
- Partnerships for Enhanced Engagement through Research (PEER)
- Several Directorates/Division (SBE, GEO, BIO/DEB) offer lead agency agreements
Developing an Internationally Engaged Workforce

- International Research Experiences for Students (IRES)
- East Asia Pacific Summer Institutes (EAPSI)
- Graduate Research Opportunities Worldwide (GROW)
- Pan-American Advanced Studies Institutes (PASI)
- (International) Postdoctoral Research Fellowship Program

International Research Experience for Students

IRES:
- Develop a more globally engaged S&E workforce
- Supports small group of students for focused research experience overseas
- Graduate and/or undergraduate students
- $250,000 maximum budget for up to three years
East Asia & Pacific Summer Institutes

EAPSI:
• Introduce U.S. students to S&E research in East Asia & Pacific
• Foster student-initiated professional relationships to facilitate future international research collaborations
• 8-10 week summer research program in 7 locations
  • Australia (30 positions), China (40), Japan (65), Korea (25), New Zealand (15), Singapore (15), Taiwan (25)
• Open to grad students who are U.S. citizens or permanent residents
• Partnership between NSF and counterpart funding agencies

Graduate Research Opportunities Worldwide

• GROW offers opportunities for 3-12 month international research collaborations to NSF Graduate Research Fellows
• 15 Current Partners
  • Australia, Brazil, Chile, Denmark, Finland, France, India, Ireland, Japan, Korea, the Netherlands, Norway, Singapore, Sweden and Switzerland
• Expanding partnerships for future
• Contact: grow@nsf.gov
Partnerships for International Research and Education (PIRE)

- ISE-managed flagship research program
- Frontier research that leverages complementary expertise of all partners
- Extensive overseas research opportunities for US students/early career researchers
- 5 year awards; average award $4.5M
- ~50 active awards across all NSF disciplines
- Preliminary proposals due Oct 21, 2014
  - Biennial competition
Science Across Virtual Institutes (SAVI)

Platform for teams of NSF-funded investigators to:

- **Network** with partners abroad
- **Leverage resources** to advance shared research interests
- **Engage students** in international collaboration
- SAVI is a mechanism, **not a stand-alone program**
  - ISE and NSF Directorate support
  - Support from counterpart agencies overseas

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Global Venture Fund (GVF)

- **INTERNAL** NSF Mechanism
- **Co-funding** of proposals with true intellectual collaboration with foreign partners
  - New and renewal proposals
  - Supplement requests
  - RAPIDs, EAGERs
  - Workshop, conference proposals
- **$10,000-$50,000, in principle**
- Contact ISE country program officer
Partnerships for Enhanced Engagement in Research

PEER Supports collaborators in developing countries

- USAID provides funding
- U.S. investigator must have active NSF award, may request supplement if partner receives funding
- Only certain countries eligible (check website)
- USAID – development objectives
- Managed by National Academies

Catalyzing New International Collaborations

CNIC supports initiation of new international collaboration

- Planning Visits
- Initial data gathering activities
- Proof-of-concept experiments
- Single or multiple research visits
- Workshops

Maximum 1 year, $10K-$75K

Intended outcome: Proposal to NSF Research Directorate

Suspended - Revisions to solicitation currently under discussion
Keys to Success in ISE Funding

- Top-notch science question
  o Demonstrate how the collaboration enhances the research
- Involve U.S. students, junior researchers
  o Prepare, mentor, and assess
  o Pay them: travel, living costs, stipends
- Meaningful attention to diversity
- Include bio-sketch of key collaborator(s)
- Include letter(s) of support from collaborator(s)
- Work with others in your institution
- Know and observe special rules
  o Fly America Act
  o Visa regulations
- Consult ISE program officer early in process
For Further Information
www.nsf.gov/od/iaa/ise/
aemig@nsf.gov
Thank You!