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
- U.S. 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 circle reflects the relative amount of annual R&D spending by the indicated country

Source: World Bank, World Development Indicators. World Bank, USA. 2013, OECD

Global R&D Expenditures by Region

Figure D-5
Global R&D expenditures, by region: 2011
Billions of U.S. PPP dollars

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


World total = $1,465
PPP = purchasing power parity.
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 databases, rather than their year of publication, and are assigned to a country/economy on the basis of the institutional addresses cited in the article. Articles are credited on a whole-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

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 databases, rather than their year of publication, and are assigned to a country/economy on the basis of the institutional addresses cited in the article. Articles are credited on a whole-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
U.S. Researchers Less Likely to Co-Publish Internationally

Highly cited (top1%) scientific articles by type of collaboration 2006-2008
As a percentage of highly cited scientific articles worldwide

Source: OECD calculations, based on Scopus Custom Data, Elsevier, December 2009
StatLink: http://dx.doi.org/10.1787/888932464563

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.

International NSF Strategic Plan

NSF support for international collaboration aims to:

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

• **Prepare** a GLOBALLY-ENGAGED U.S. S&E workforce
  o NURTURE capable young researchers with strong networks overseas
  o DEVELOP a global perspective
  o FACILITATE mobility
    o Brain circulation

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
Office of International Science & Engineering (OISE)

**Internal**
- Diplomatic “desk officers” for NSF
- Support NSF Directorates and Offices
- Leverage Resources and Expertise
- Test New Models

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

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**NSF Funding for International Activities**

*Most* international research and education activities are **funded by NSF disciplinary programs**:
- As part of regular awards
- As supplements to regular awards

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### 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 a Globally Engaged Workforce

- Research Experiences for Undergraduates (REU)
- International Research Experiences for Students (IRES)
- East Asia Pacific Summer Institutes (EAPSI)
- Graduate Research Opportunities Worldwide (GROW)
- (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. STEM graduate 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 (25 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 with 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

Some Tools for International Research

- Partnerships for International Research and Education (PIRE)
- Partnerships for Enhanced Engagement in Research (PEER)
- Science Across Virtual Institutes (SAVI)
- Global Venture Fund (GVF)
Partnerships for International Research & Education

- ISE-managed flagship research program
- Frontier research that leverages complementary expertise of all partners
- Extensive overseas research opportunities for U.S. students/early career researchers
- 5 year awards; average award $4.5M
- ~50 active awards across all NSF disciplines
- Next solicitation: due out in mid-FY2016
  - Biennial competition

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
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

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
Keys to Success in ISE Funding

- Top-notch science question
  - Demonstrate how the collaboration enhances the research
- Involve U.S. students, junior researchers
  - Prepare, mentor, and assess
  - 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, e.g.
  - Fly America Act
  - Visa regulations
- Consult OISE program officer early in process
For Further Information
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Thank You!