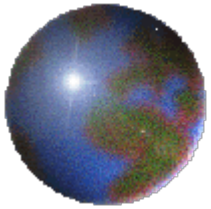

International Research & Education Collaboration: Opportunities & Resources at NSF

NSF Grants Conference
14-15 November 2016

Joe Miller
Office of International Science & Engineering
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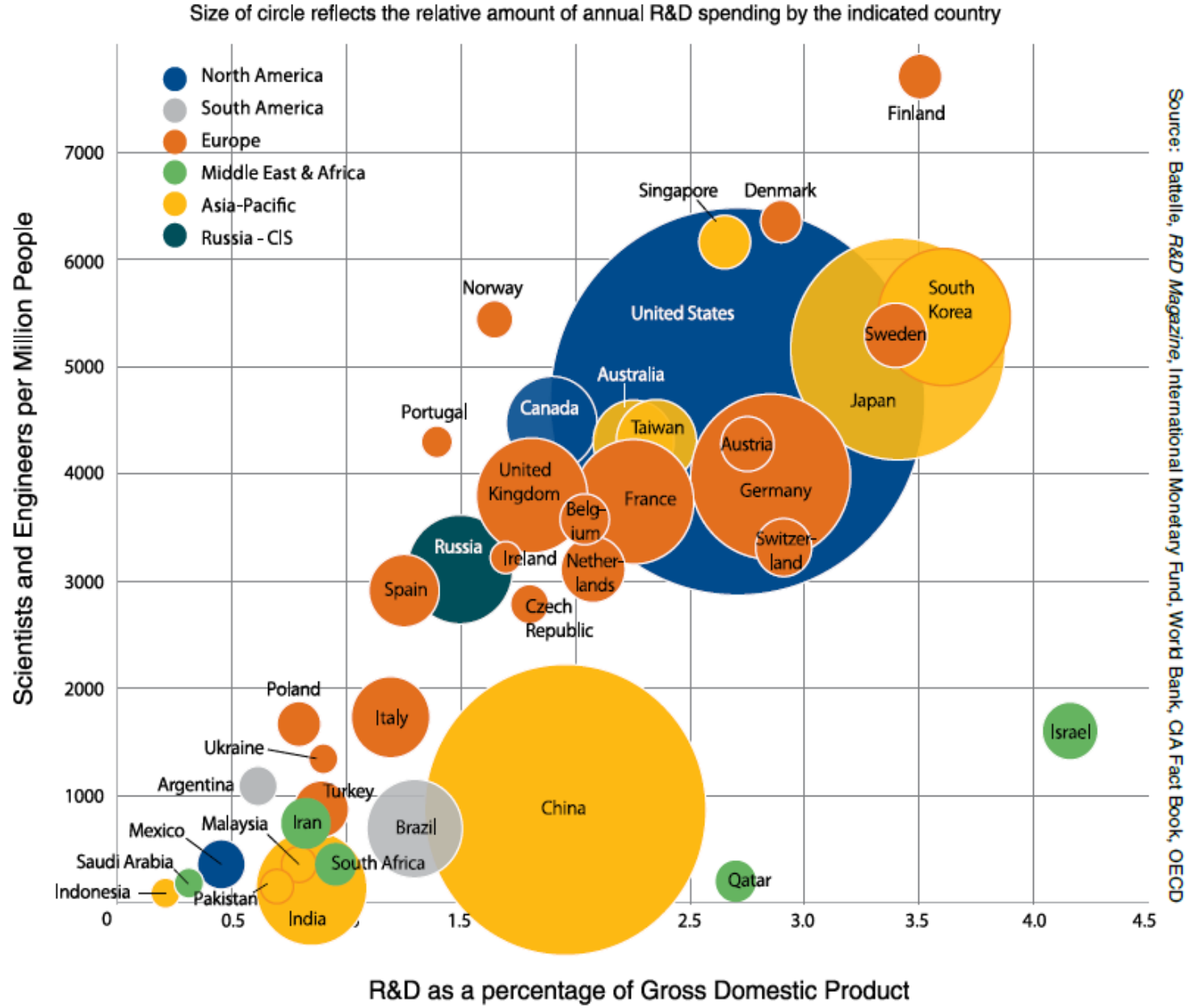
The U.S. in the Global R&D Landscape

Battelle Institute, Dec. 2013

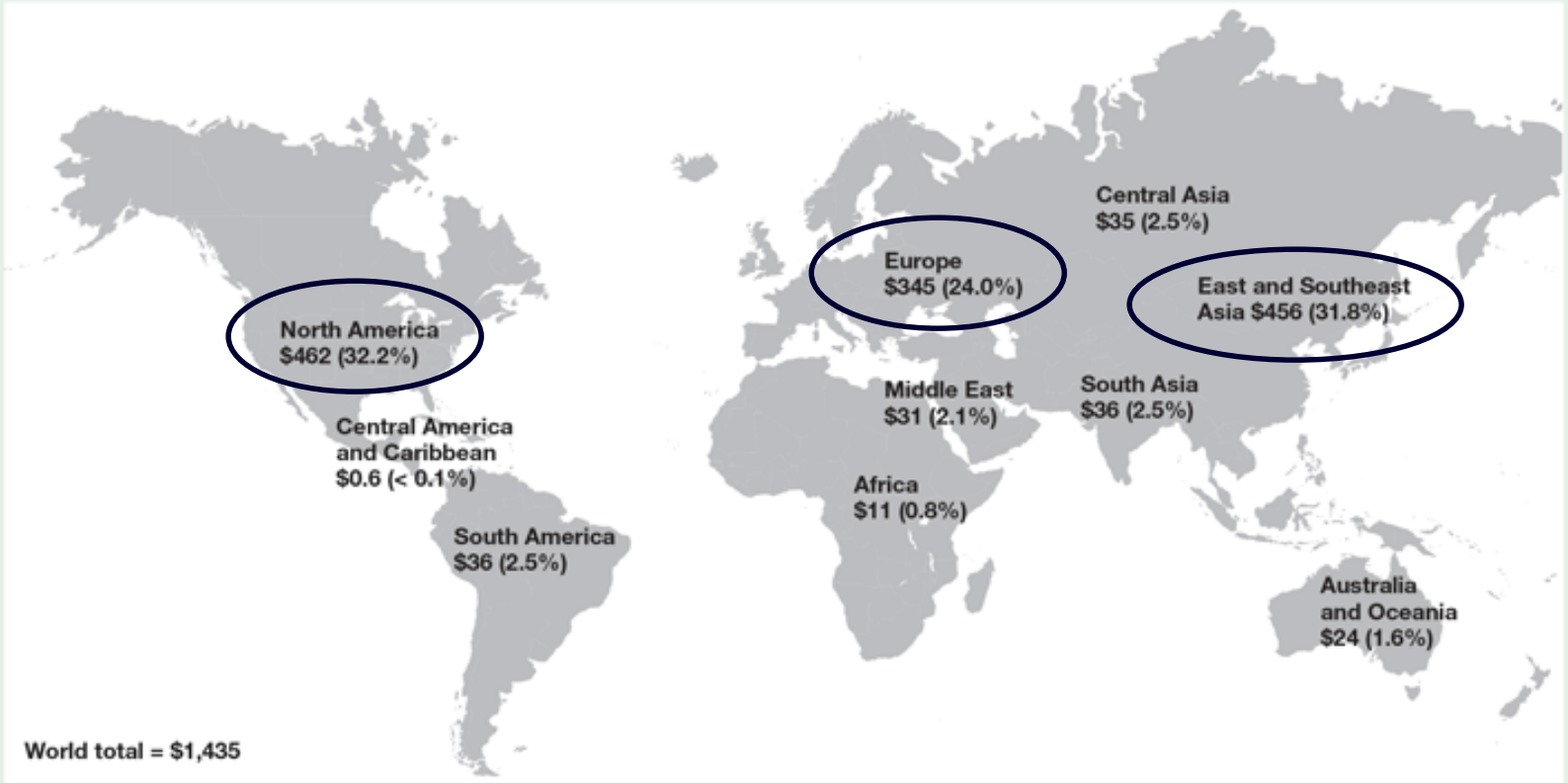
- U.S. R&D spending up 1% to $465B or ~2.8% of GDP
- ~$1.6 Trillion invested in R&D around the world
- Total global investments in R&D (% of GDP) will stay relatively steady throughout the world in 2014
- US share of global R&D spending down 0.6% since 2012; Asia's up by 2.1%
- China's R&D spending could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

World of R&D 2013



Global R&D Expenditures by Region

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



PPP = purchasing power parity.

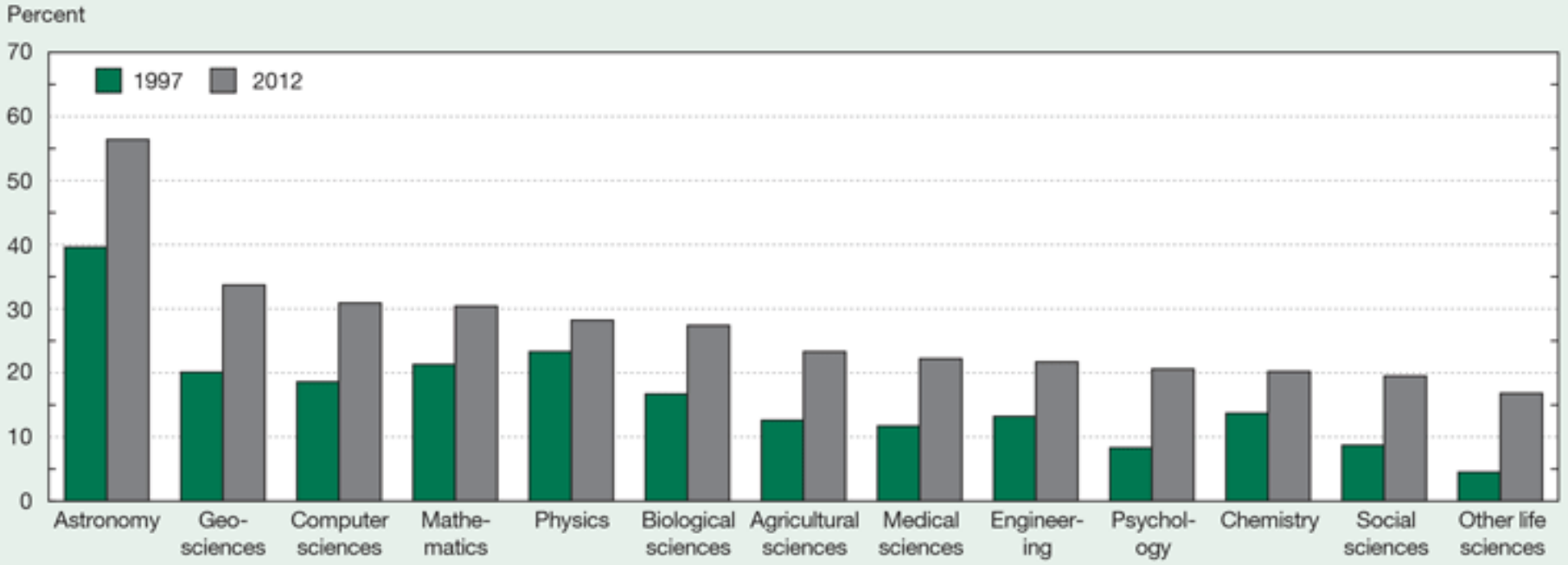
NOTES: Foreign currencies are converted to U.S. dollars through PPPs. Some country figures are estimated. Countries are grouped according to the regions described by *The World Factbook*, available at www.cia.gov/library/publications/the-world-factbook/index.html.

SOURCES: National Science Foundation, National Center for Science and Engineering Statistics, estimates (August 2013). Based on data from the Organisation for Economic Co-operation and Development, *Main Science and Technology Indicators* (2013/1); and the United Nations Educational, Scientific and Cultural Organization Institute for Statistics, http://stats.uis.unesco.org/unesco/ReportFolders/ReportFolders.aspx, table 25, accessed 2 August 2013.

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



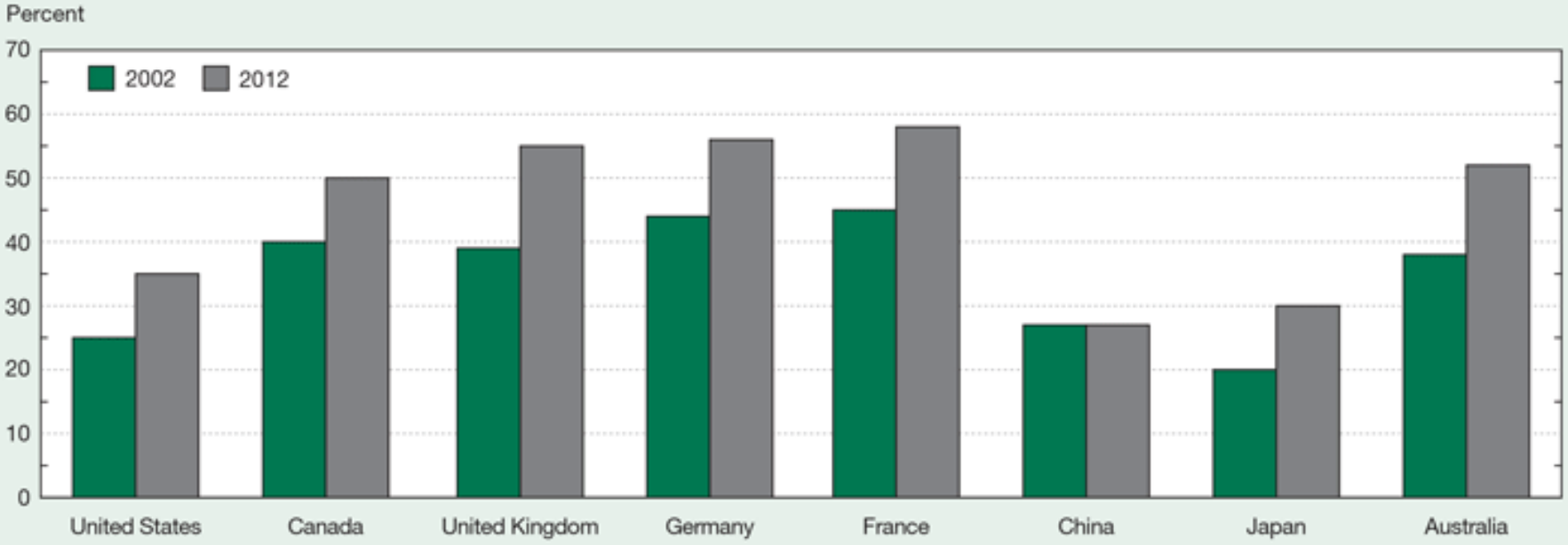
NOTES: Data are from the set of journals covered by the Science Citation Index (SCI) and Social Sciences Citation Index (SSCI). Articles are classified by the year they entered the database, rather than their year of publication, and are assigned to a country/economy on the basis of the institutional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

SOURCES: National Science Foundation, National Center for Science and Engineering Statistics, and The Patent Board,™ special tabulations (2013) from Thomson Reuters, SCI and SSCI, http://thomsonreuters.com/products_services/science/. See appendix tables 5-42–5-54.

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 database, rather than their 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 whole-count basis (i.e., each collaborating institution or country is credited one count). Internationally coauthored articles may also have multiple domestic coauthors.

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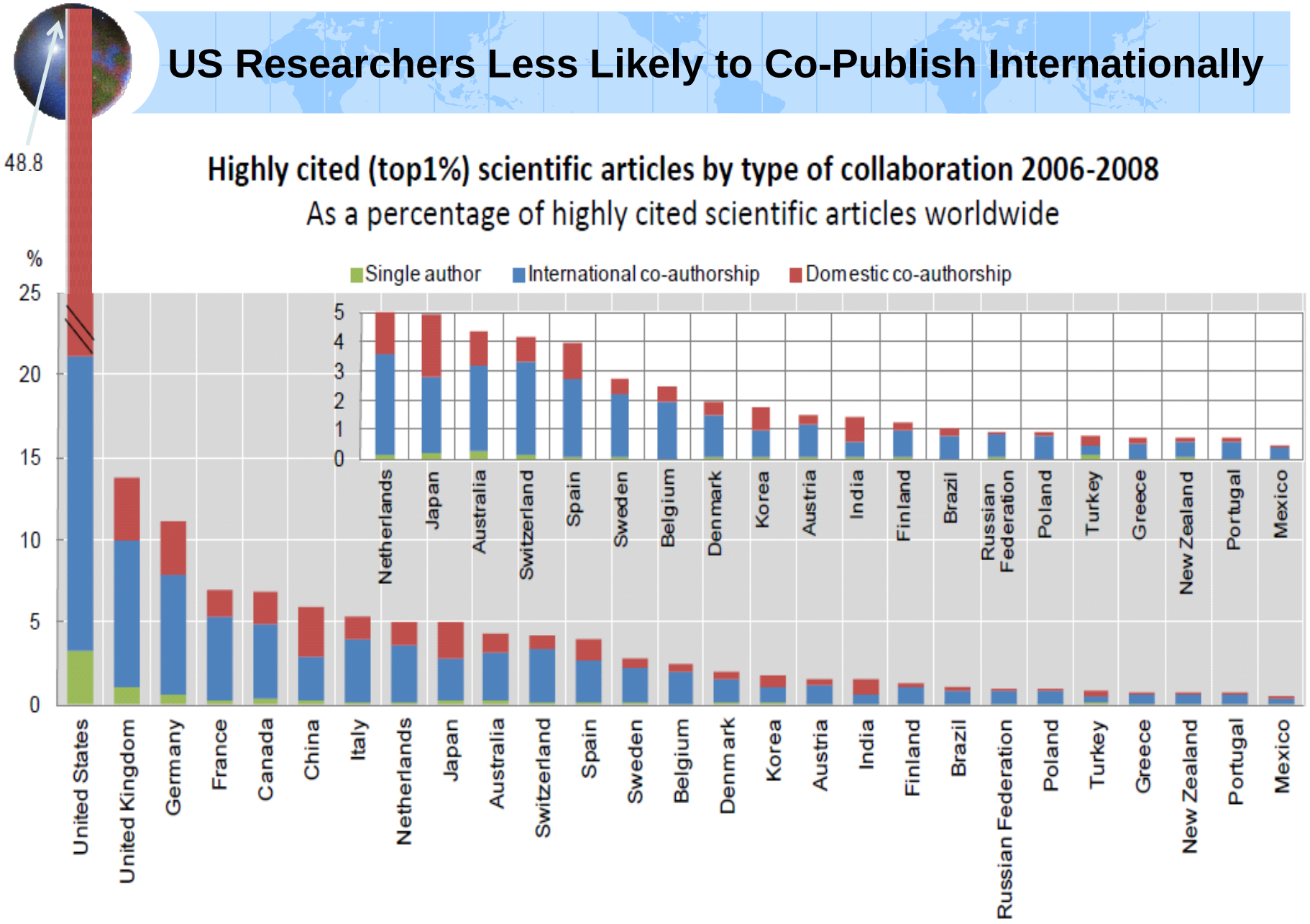
Science and Engineering Indicators 2014

US Researchers Less Likely to Co-Publish Internationally



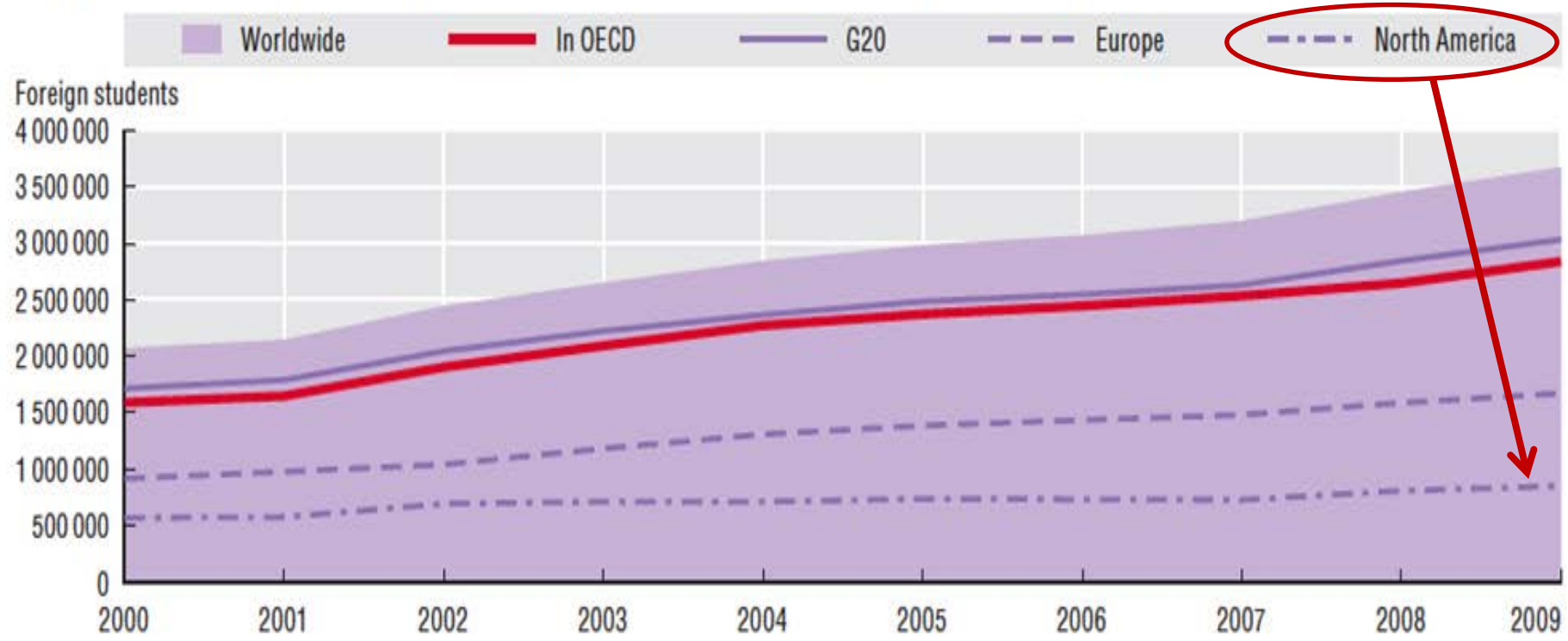
Source: OECD calculations, based on Scopus Custom Data, Elsevier, December 2009

Statlink: http://dx.doi.org/10.1787/836087047406

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.



Source: OECD (2011), *Education at a Glance 2011*, Table C3.5, available at http://dx.doi.org/10.1787/888932464543.

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

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

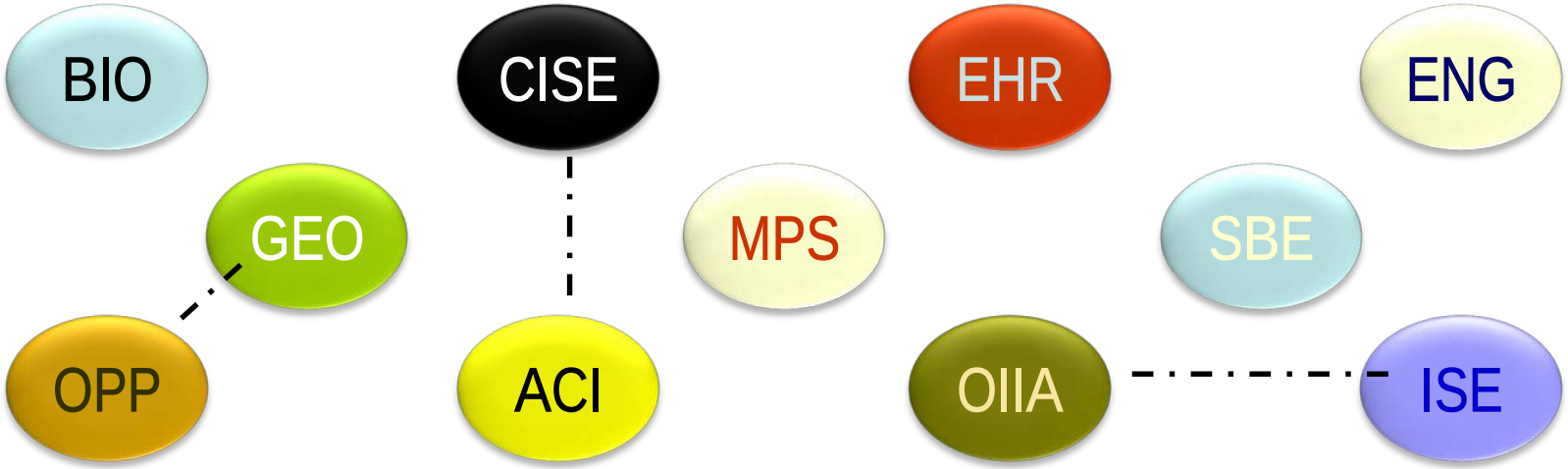
External

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

NSF Funding for International Activities

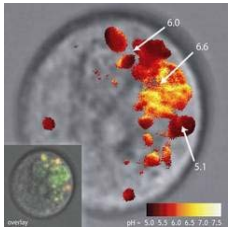
Most international research and education activities are **funded by NSF disciplinary programs**:

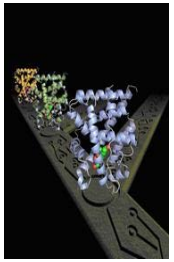
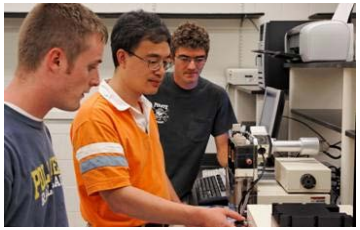
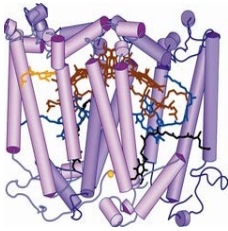
- As part of regular awards
- As supplements to regular awards



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



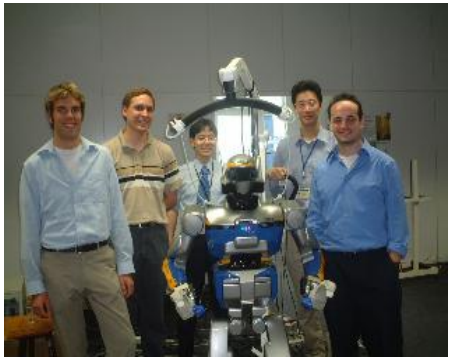
Developing a Globally Engaged Workforce

- 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



IRES
INTERNATIONAL RESEARCH EXPERIENCE FOR STUDENTS

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

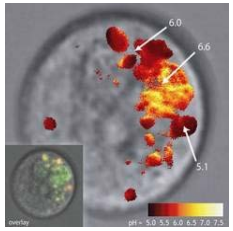
Graduate Research Opportunities Worldwide

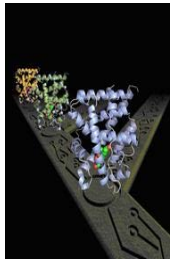
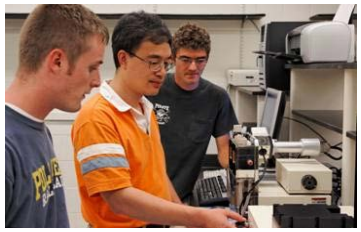
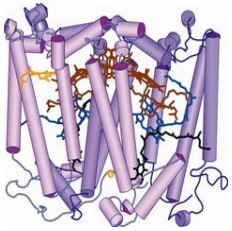
- GROW offers opportunities for 3-12 month international research collaborations to NSF Graduate Research Fellows
- 15 Current Partners
  - Australia, Brazil, Chile, Denmark, Finland, France, India, Ireland, Japan, Korea, the Netherlands, Norway, Singapore, Sweden and Switzerland
- Expanding partnerships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

GROW
NSF Graduate Research Opportunities Worldwide

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)**



PIRE

Partnerships for International Research & Education

- 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
- Currently proposals are under review
  - 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

International Science and Engineering (ISE)

ISE Home

About ISE

ISE Advisory Committee

View ISE Staff

ISE Resources

Staff by Region, Country & Program

Regional Opportunities

NSF Overseas Offices

- NSF Europe Office
- NSF Tokyo Office
- NSF Beijing Office

NSF-wide International Information

Student & Early Career Information

International Postdoctoral Research Fellowships

Counterpart Science Agencies

International Science and Engineering (ISE) Section

About International Collaboration & Funding at NSF

NSF highly values international collaboration, as it is critical to keeping the United States globally competitive at the frontiers of knowledge, leading to transformational S&E breakthroughs.

ISE serves as the focal point for international collaborative activities across NSF while working across the Foundation to co-fund awards and supplements in cooperation with NSF's disciplinary directorates.

To fulfill this unique role, ISE hosts three overseas NSF offices. Located in Paris, Tokyo, and Beijing, these offices promote collaboration among U.S. and foreign scientists and engineers, serve as liaison between NSF and its overseas counterparts, and report on developments in the international science and engineering community.

Links to the international offices, the ISE staff directory, and other ISE resources, are on the left side of this page.

Investigators based at a U.S. research institution may include international dimensions in new proposals that they intend to submit to NSF's disciplinary directorates or to ISE, or they may request supplemental funding for their existing NSF awards. NSF can support the costs associated with participation of U.S.-based researchers (including students) engaged in international collaboration. U.S. investigators are advised to consult early in the application process with both the disciplinary program manager and an ISE country program manager.

Proposals for international collaboration should fully address the first criterion below, as well as one or more of the subsequent criteria:

- True intellectual collaboration with foreign research partner (Proposals must

For Further Information

jtmiller@nsf.gov

Thank You!