



Global Collaboration: Finding the Right Solution for Supporting Science Worldwide

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www.acs.org/international and <http://global.acs.org>

About ACS



ACS Vision:

“Improving people’s lives through the transforming power of chemistry”

ACS Mission:

“Advance the broader chemistry enterprise and its practitioners for the benefit of Earth and its people.”

- Over 150,000+ members
 - 187 Local Sections
 - 32 Technical Divisions
 - 23 International Chemical Sciences Chapters
 - 56 Student Chapters-24 countries
 - 2,500 ACS Members in Canada
- 87% of members have degrees in chemistry, 13% in other fields
- >55% of members in business & industry
- Two primary locations – Columbus, Ohio and Washington, D.C.
 - 100+ ACS employees worldwide with offices in Beijing, United Kingdom and more
 - Represents all arms of the ACS Family



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ACS and Global Scientific Mobility

- **Article II, Section 3 ACS Constitution**

“The SOCIETY shall cooperate with scientists internationally and shall be concerned with the worldwide application of chemistry to the needs of humanity.”

- **ACS Position Statement – Freedom of International Scientific Exchange**

- Advocates freedom of scientific exchange and stronger scientific collaboration to benefit humankind.

- **ACS Position Statement - Visa Restrictions and Scientific Progress**

- Supports timely and reasonable screening processes for visits, greater transparency of the application process, and the issuance and management of visas that are more aligned with the purpose of academic study and scientific exchange.

ACS in a Global Context

- ACS is the world's largest individual science organization
 - 150,000+ members worldwide
 - Over 25,000 members outside the U.S. (~17% of members reside outside of the United States)
- Chartered by the U.S. Congress in 1876 to advance the field of chemistry and related sciences
 - Provide access to top peer-reviewed journals
 - Provide access to multiple scientific databases
 - Scientific conferences
 - Public education, advocacy, support the field broadly*
- Unique in that our charter *mandates* global involvement
 - Mission: *Advancing the broader chemistry enterprise for and its practitioners for the benefit of Earth and its people*

ACS Partners in Canada



ACS International Activities

ACS Committee on International Activities (IAC)

The Committee on International Activities assists scientists and engineers worldwide to communicate and collaborate for the good of the chemical and chemically related sciences, chemical engineering, and their practitioners.

Website:

ACS International Activities

- Serve as a nexus for ACS's global membership base
- Science diplomacy
- Advance U.N. Sustainable Development Goals
- Manage partnerships across governments, partner societies and industry

ACS Global STEM Outreach

- ACS has long been committed to promoting global collaboration in research and training
 - 2005 Open Doors Report: 16%*
 - 2017 Open Doors Report: 25% (STEM)*
- Scientists are beginning to catch on to what business and humanities have known all along!
- ACS continues to recalibrate its programming to reflect this global demand
 - Prepare U.S./ North American chemists for careers in global research (academia and research)
 - Facilitate global scientific collaboration through a variety of mechanisms
 - Committee on International Activities
 - Grant programming
 - ACS International Center
- Global Interaction among chemists and chemical engineers is only growing

*Institute of International Education Open Doors Report

Global Challenges in STEM Curriculum

- The chemistry community has long prepared its trainees for careers in basic research
 - However, 51% of ACS members work in industry, thus creating a huge gap
- Some difficulty in convincing US-based PI's on value of sending trainee abroad for short or long-term study
 - Prevailing culture of questioning value
 - Data suggests otherwise
- Curriculum restrictions create hurdles for STEM students to engage globally (i.e. semester long studies not practical)
 - Gave rise to funding of IREU Programs (still rather elusive)
 - Relatively few electives allowed in strict STEM programming

TOP FIVE MAJOR FIELDS OF STUDY OF U.S. STUDY ABROAD STUDENTS



STEM Fields

25%



Business

21%



Social Sciences

17%



Foreign Language &
International Studies

7%



Fine &
Applied Arts

7%

Open Doors is conducted by the Institute of International Education with the support of the Bureau of Educational and Cultural Affairs of the U.S. Department of State. **Online at: www.iie.org/opendoors**

opendoors®

“In today’s globalized world, an effective domestic education agenda must address global needs and trends and aim to develop a globally competent citizenry.”

Objectives

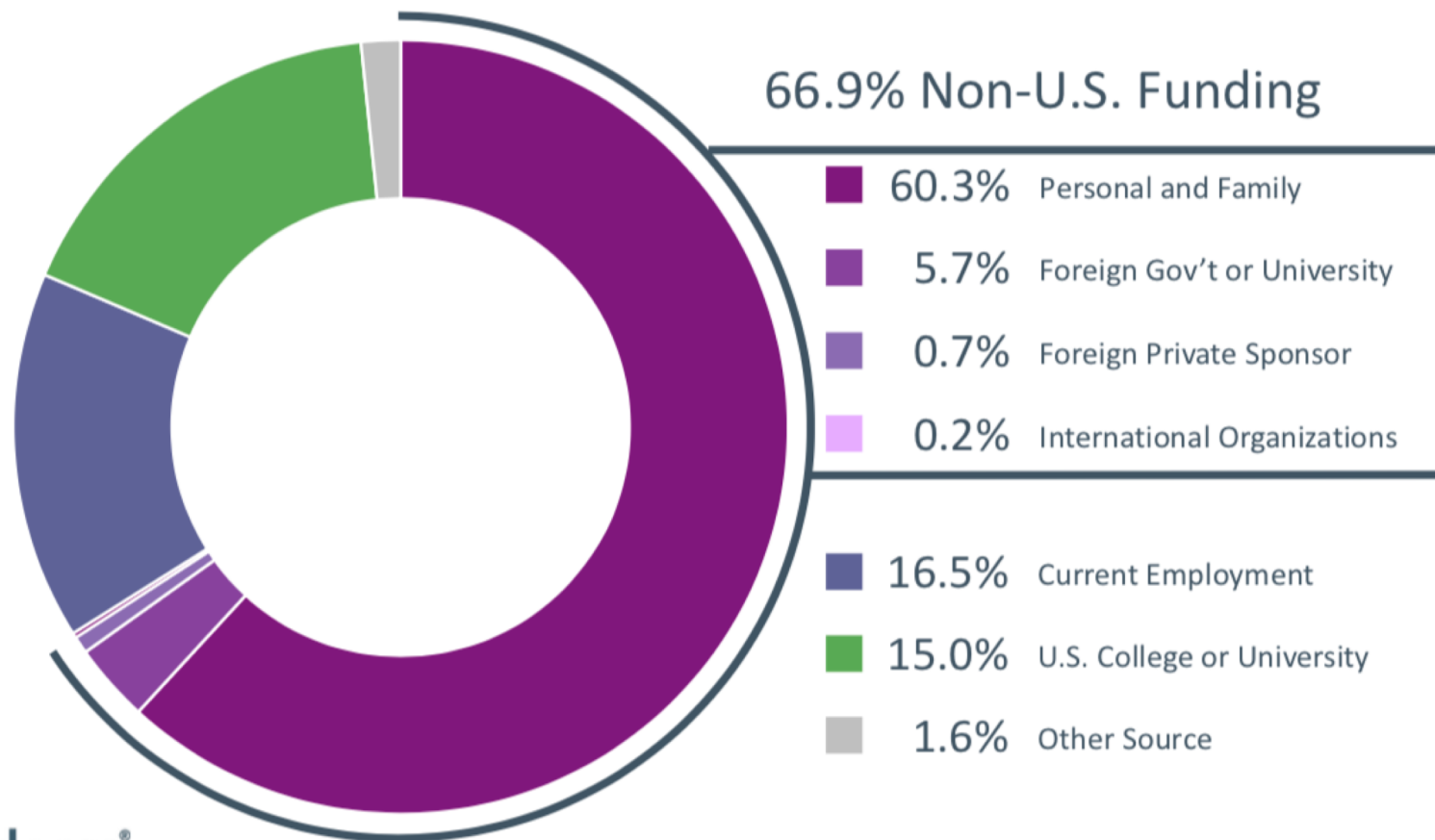
- Increase Global Competencies
 - economic competitiveness and jobs
 - meeting global challenges
 - national security and diplomacy
 - a diverse Society
- Learn from Other Countries
 - discover and apply best practices from high performing countries
- Engage in Educational Diplomacy
 - building and fostering relationships with government officials, policymakers, researchers, educators, students, and other professionals around the world to improve global security

International engagement is a key educational priority

Succeeding Globally Through International Education and Engagement U.S. Department of Education International Strategy, 2012-16. <http://www2.ed.gov/about/inits/ed/international/international-strategy-2012-16.html>

Contribution by international students to the U.S. economy in 2016: \$39.4 Billion

-Source: U.S. Department of Commerce



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#IEW2017

#OpenDoorsReport

Slide from: *Institute for International Education presentation: <https://www.iie.org/Research-and-Insights/Open-Doors/Open-Doors-2017-Media-Information>*

Economic Impact is Critical

- In 2016, international students in Canada generated \$15.5b CAN in economic activity
- Overall spending from international students generated 168,000 jobs across Canada
- Top three destinations: Ontario, British Columbia and Quebec

Source: Economic Impact of International Education in Canada, Global Affairs Canada, 2017 update.
<http://www.international.gc.ca/education/report-rapport/impact-2017/index.aspx?lang=eng>



Map of Scientific Collaborations from 2005-2009



Computed Using Data from Elsevier's Scopus

2008-2012



Computed by Olivier H Beauchesne at MindGeek

Computed by Olivier H. Beauchesne and SCImag

Collaboration for Greater Impact



- Support for international science should be maintained and strengthened
 - International activities and collaboration should be embedded in national science and innovation strategies
- Internationally collaborative science should be encouraged, supported and facilitated
 - Research funders should provide greater support for international research collaboration
- National and international strategies for science are required to address global challenges (**UN SDG's!**)
 - In devising responses to global challenges, governments worldwide need to rely on robust evidence-based policy making
- International capacity building is crucial to ensure that the impacts of scientific research are shared globally
 - National academies, learned societies and other similar institutions should actively promote public and wider stakeholder dialogue to help identify, shape and respond to global challenges and their local manifestations

Research by the Numbers

TABLE 1. Science and engineering articles in all fields, by region, country, or economy: 2004 and 2014

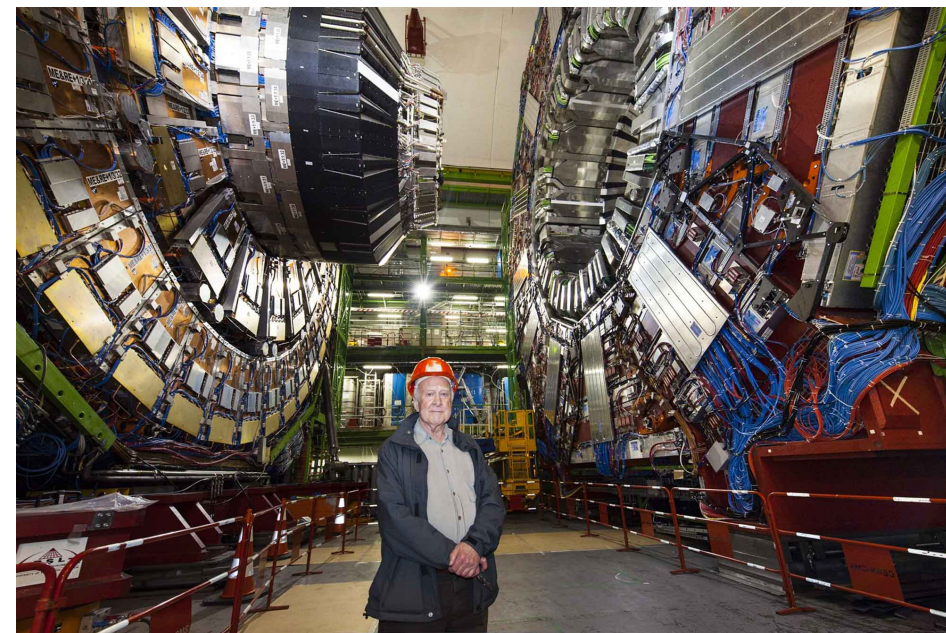
Rank	Region, country, or economy	2004	2014	Average annual growth rate (%)	2014 world total (%)	2014 cumulative world total (%)
na	World	1,272,362	2,290,294	6.1	100.0	na
1	United States	336,194	431,623	2.5	18.8	18.8
2	China	110,388	395,588	13.6	17.3	36.1
3	Germany	72,177	107,747	4.1	4.7	40.8
4	India	28,752	106,574	14.0	4.7	45.5
5	Japan	95,999	103,793	0.8	4.5	50.0
6	United Kingdom	75,119	101,536	3.1	4.4	54.4
7	France	53,375	74,269	3.4	3.2	57.7
8	Italy	42,647	70,453	5.1	3.1	60.8
9	South Korea	27,029	63,748	9.0	2.8	63.5
10	Canada	40,624	60,916	4.1	2.7	66.2
11	Spain	30,977	56,604	6.2	2.5	68.7
12	Brazil	18,814	53,152	10.9	2.3	71.0
13	Australia	26,277	52,269	7.1	2.3	73.3
14	Russia	26,869	43,487	4.9	1.9	75.2
15	Iran	4,952	36,539	22.1	1.6	76.8

SOURCES: National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database (www.scopus.com), <http://www.nsf.gov/statistics/> 2017.

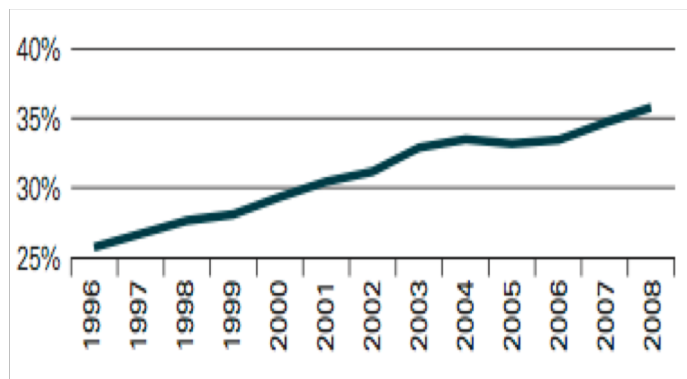
What Drives Collaboration?



- Access to unusual or major equipment (telescopes, synchrotrons), unique physical sites (ecology, geology), regional specialization
- Complimentary specialized skill sets
- Increased output/impact of publications
- Proximity
- Funding or other incentives
- Less quantifiable items
 - Friendship/Networking
 - Opportunities for students/faculty
 - Cross-fertilization of ideas

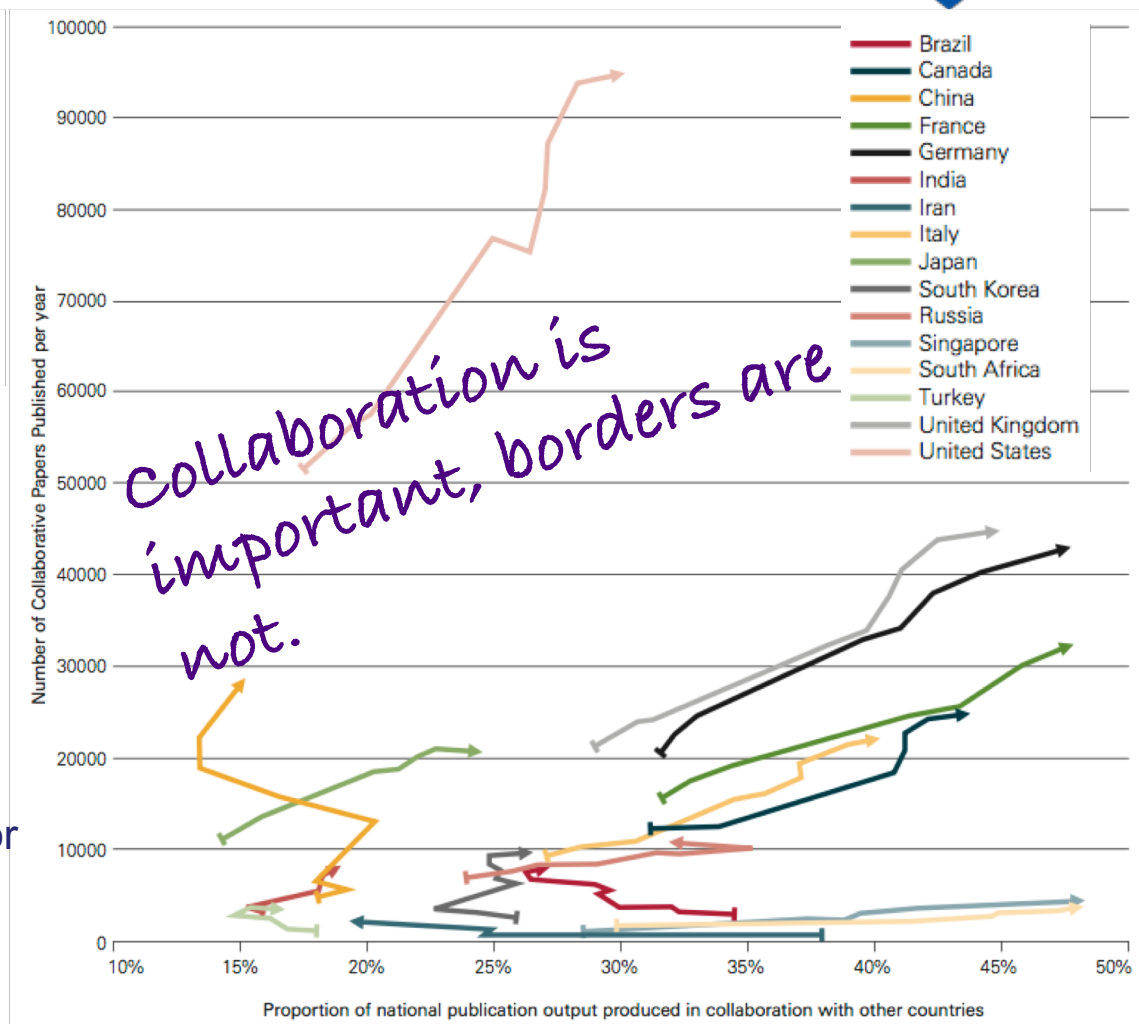


The Value of International Collaboration



Increase in the proportion of the world's papers produced with more than one international author, 1996–2008.

Growth in international collaboration for selected countries and the proportion of national output that this represents 1996–2008



Knowledge, networks and nations: Global scientific collaboration in the 21st century Royal Society of Chemistry Policy Document, 3/2011.

https://royalsociety.org/~media/Royal_Society_Content/policy/publications/2011/4294976134.pdf

READY TO TAKE YOUR STEM CAREER TO THE NEXT LEVEL?



The ACS International Center provides one-stop access to hundreds of international opportunities including fellowships, research grants, information on study abroad, travel awards, and much more.

Vetted & curated information

Over 600 scientific collaboration and research opportunities

Go global

Interact with partner organizations and learn tips for applying to programs

Expand your mind

Get access to information on scientific mobility and global collaboration

Learn more

Hear about successful global careers in chemistry. Sign up for the Global Chemistry newsletter to get updates on new opportunities.

Discover your global passion at <http://global.acs.org>

*A service provided by the American Chemical Society International Activities
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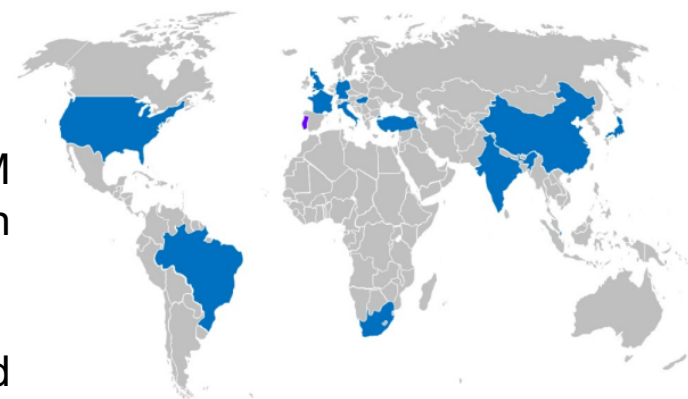
Placing a world of STEM opportunities at your fingertips.



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The ACS International Center™ is the essential guide for STEM practitioners looking to study, work, and conduct research overseas.

- **Vetted, curated Information:** on over 600 international STEM scholarships, internships, and travel awards, and collaboration opportunities.
- **Insider tips:** on upcoming calls for proposals, eligibility updates, and deadline extensions
- **Interact with Funders:** with representatives from embassies and international organizations
- **Get Questions Answered:** Learn about the latest information related to scientific mobility
- **Persuasive Evidence:** On the value of collaboration



Thank you!

- **Useful Links**
- International Activities: www.acs.org/international
- ACS International Center: <http://global.acs.org>
- *Chemical & Engineering News*: www.cen.acs.org
- OpenDoors: www.iie.org/opendoors

*Many thanks to Tim Hanks (Furman University)