



OVERVIEW
Recommendations of the Presidential Taskforce
On Implementing the Concept of the
ACS International Center

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“The world has reached a stage where substantial interdependence among developed and developing countries is essential to the fulfillment of human needs. We need to match limited global natural resources – for providing energy, materials, food, and water – with the requirements of growing populations. ...

In these efforts, chemistry, perhaps the most utilitarian of all sciences, and chemists and chemical engineers worldwide must play a vital role. Success will call for much greater international cooperation. Humanitarian instincts may be a significant motivating force, but inevitably so will our own self-interest. The economic and social futures of the advanced and the developing countries are inexorably entwined.”

Glenn Seaborg, 1972

The ACS International Center was first conceived in 2009 by then President-Elect Joe Francisco. In its conception the Center was viewed as a mechanism to encourage U.S. talent to engage in international research experiences, learn about innovation in the global chemical enterprise, and transfer this knowledge to the U.S. marketplace. After initial assessment by a working group in 2009, a Presidential Task Force on Implementation of the Concept of an ACS International Center was appointed in 2010, with the objective:

To provide global and national leadership in research, education, and technology transfer for the chemical enterprise. The goal will be to assure that the next generation of chemical scientists is prepared to engage successfully in the global chemical enterprise and to address global chemical challenges. The center will encourage, engage, and support international exchange of chemists at all levels, i.e. undergraduate, graduate, faculty, post-doctoral, and professional levels, by building strategic alliances and partnerships between ACS and chemical institutions abroad.

Since the writing of both the preliminary findings of the working group and the charter document of the Task Force, the International Center Task Force (ICTF) has worked to identify the specific actions necessary for its implementation. As envisioned by the ICTF, the ACS International Center would be virtual, providing coordination and direction, and will build upon four foundational elements, or areas of opportunity, as follows:

- 1. Creation of an information clearinghouse to assist chemical practitioners who seek to participate in international exchange and collaboration.** Elements would include listings/links of available exchange programs, suggestions for addressing challenges inherent to exchange programs, options for language training, content regarding cultural adjustment, etc.
- 2. Development and dissemination of persuasive evidence of the value of international collaborations.** This would identify metrics and/or assessment methods to evaluate the success of collaboration and exchange experiences, which would then be used to develop communication materials to promote the value of international exchange, including customized toolkits for specific audiences.
- 3. Development and dissemination of best practices where education and training can catalyze innovation in the global chemical enterprise.** This would include existing publications and reports about innovation methodologies, successful innovation practices, educational form and content, and additional resources for acquiring entrepreneurial skills, as well as links to external sources of information for the items listed above.
- 4. Development and implementation of best practices for science-based input to domestic and international policy.** This would build upon our successful advocacy efforts to focus attention on the gap in international education/training, as well as funding, immigration, and other related issues. Effective policy would enhance U.S. competitiveness and facilitate engagement in and actions to address global issues and challenges. The ICTF agreed that the fourth pillar is more complex and requires extensive external emphasis, and could be deferred for more complete development of an implementation plan that would be provided to the Board in 2011.

Background and Rationale

Though the rationale of the International Center has been put forth in previous documents, some of the arguments will be reiterated here for the purpose of emphasis.

As documented in the recent National Academies Report, "Rising Above the Gathering Storm, Revisited: Rapidly Approaching Category 5" released September 23, 2010, the U.S. scientific enterprise has diminished over the last few decades.¹ This report, a follow-up to the 2005 report, "Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future",² details the further erosion of US capabilities and American competitiveness in the face of growing internationalization of knowledge, and provides a call to action in several areas.

The U.S. gap in international perspective cuts across all sectors of the chemical enterprise: academia, industry, government, etc., and is evident at all stages of education and professional development, to the detriment of our current and future competitiveness in science and technology.

The U.S. populace has little engagement in foreign cultures and languages. This cultural limitation has the potential to adversely affect U.S. security and to further degrade the ability of the U.S. to compete in the global marketplace.³ English may be the current *lingua franca* in the scientific sphere, but language competency and cultural familiarity open doors to engaging with scientists from abroad. As science internationalizes, the ability to engage with people from other nations and bridge cultural boundaries is increasingly necessary.

As a blue-ribbon task force convened by the Association of International Educators (NAFSA) in 2003 pointed out, "It is now cliché to talk about how small the world has become, and to note how the globalization of communications and commerce affects everyday life. But it is true. Our colleges and universities must respond to this reality by better equipping students to live and work in the interconnected world of the twenty-first century. We desperately need to understand other countries and other cultures—friend and foe alike."⁴ U.S. participation in study abroad programs and experiences has increased in recent years, but substantially more improvement is needed. The OECD's figures for international study in 2009, for example, showed that U.S. students comprised only about 6% of all students studying internationally in the OECD, compared with 12.5% for Korean students.⁵

The problem extends to the graduate and post-doctoral level of education. In many other countries, scholars have long viewed international experience as essential to professional success. Yet U.S. scholars are less engaged in international exchange and collaborations than their counterparts overseas.⁵⁻⁸ For instance, fewer than 30% of U.S. university faculty have participated in international exchange experiences, with most of those that have participated coming from the humanities, rather than science. At the graduate student level, the numbers are even lower, with fewer than 5% participating, again, primarily in the humanities.

The insufficient internationalization of U.S. science has implications for private industry as well. Innovation, the application of invention, has driven the growth of the American economy throughout history, and is just



as important for survival of the U.S. chemical enterprise as it is for the growth of other sectors. Inventions feed into a chain of services and production, which drive employment and productivity. Successful innovation requires the convergence of knowledge capital, human capital, and an ecosystem for creativity. All of these three aspects benefit from international exchange and collaboration. The exchange of ideas across fields, disciplines and applications, as well as outside of geographic boundaries promotes the growth of knowledge capital and contributes to the creative ecosystem. The ability to work outside of one's national boundaries influences the availability of human capital.

Specific to the chemical enterprise, the U.S. has seen expanded outsourcing of chemical manufacturing to overseas locations. Competition in core research areas has increased abroad, and domestic declines in funding and research infrastructure in the U.S. have worked to undercut the ability to generate new opportunities that would allow the U.S. to retain a competitive advantage in the chemical sciences.

Increasingly, scientific information is being generated on a worldwide basis, with an associated increase in international collaboration. One example is the dramatic increase in papers from other countries in the American Chemical Society (ACS) Journals, with the data shown below:

- 1988 36% non-US Papers
- 2001 57% non-US Papers
- 2005 62% non-US Papers.

Figure 1: Country and Regional Production of Chemistry Publications

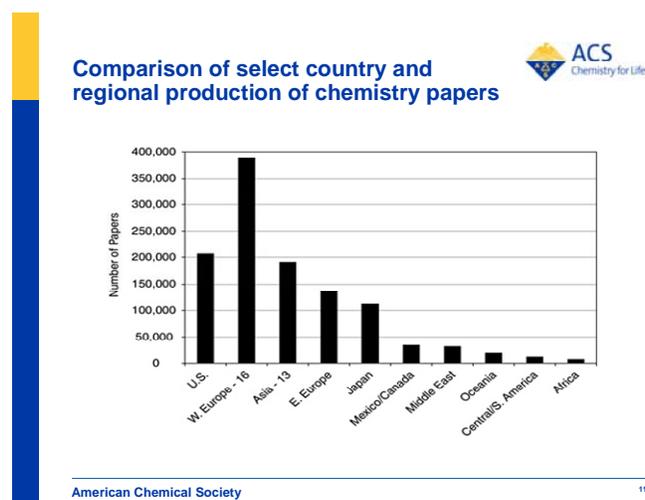
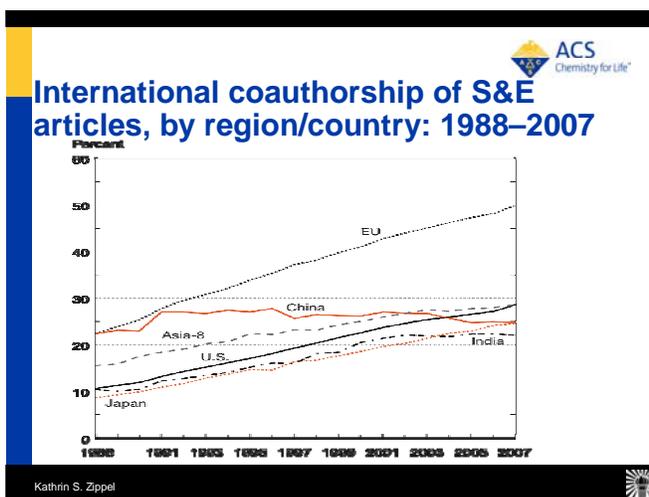


Figure 2: International Co-authorship of S&E Articles



If the expectation is for the U.S. to maintain a global leadership in science, participation by U.S. scientists in international collaboration is necessary to encourage the exchange of ideas so as to foster an atmosphere for innovation. Greater international collaboration from U.S. scholars would strengthen and sustain U.S. competitiveness in the face of new global centers of scientific investment and excellence. Even more, an internationally engaged U.S. scientific community is critical to building the collaborative teams and networks that are needed to tackle the scientific and societal challenges of our time. These considerations require that professionals appreciate cultural differences across the world, and be able to interact effectively with their counterparts.

Whether in academia or industry, resources for exchange, scholarships, and international travel are already available to those interested in international exchange, but these resources are not always easy to find, nor are they available in sufficient numbers. Additionally, the needs participants in exchanges vary considerably depending on their career stage, the role they play during the exchange, the infrastructure that is in place to facilitate the exchange, etc. For instance, the needs of undergraduates for language and

cultural experience are vastly different than those for the private sector. In the latter case, the gaps may not be so significant in language and culture, but candidates must learn regional business practices. It is evident, then, that mechanisms are required to prepare candidates for international exchanges; targeted initiatives are needed for specific interest groups. Further, individuals seeking exchange opportunities need assistance in finding initiatives that fit their needs.

ACS, with its diverse membership in the chemical enterprise, is well situated to take a leading role in enabling international exchange by providing a centralized facilitating mechanism, and encouraging increased exchange opportunities, with the ultimate end goal of fostering innovation.

ACS is respected world-wide by chemists and other members of the global chemical enterprise, e.g. stakeholders, key influencers, professional societies, governmental agencies, etc. ACS membership is extensive, encompassing all disciplinary sectors including academia, industry and government, and extending beyond U.S. boundaries as well. The Society also maintains institutional links with partner chemical societies abroad.

The development of the International Center would advance two important goals of the ACS Strategic Plan:

Goal #2 Engaging Global Community: ACS a preeminent scientific community that engages members and scientific professionals to advance the Society's Vision Mission, including education, research, knowledge, interaction, and collaboration.

"Building ... America means doing everything possible to thicken connections: finance research to attract scientists; improve infrastructure to ease travel; fix immigration to funnel talent; reform taxes to attract superstars; make study abroad a rite of passage for college students; take advantage of the millions of veterans who have served overseas."

- David Brooks

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Goal #3 Addressing Global Challenges: ACS will be a global leader in enlisting the world's scientific professionals to address, through chemistry, the challenges facing our world.

The formation of the ACS International Center presents a clear opportunity to bring industry, government, and academia together in the global chemical enterprise to coordinate and direct our talent pool to emerging science areas related to world and national economic challenges. Additionally, the Center can be a change agent for the much larger changes needed in the training of effective science professionals for successful participation in the US and global science and technology enterprise.

ACS is uniquely positioned to address the issues and objectives that we have identified for the ACS International Center. ACS is highly regarded by chemical professionals on a worldwide scale, and is noted for the quality of its scientific publications and its chemical information services. ACS has a unique strength



as a convener of chemical science professionals which can be leveraged to support the needed expansion of international exchange leading to collaboration. Additionally, since ACS membership comes from all areas of the chemical enterprise (academic, industrial, government, NGOs, etc.), ACS has a unique ability to assess and disseminate information regarding innovation in the chemical enterprise.

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