



Research Commercialization and Technology Transfer

What roles are federal, state, and private sector actors best suited to play in bridging the “valley of death” and reducing barriers to domestic, full-scale production of innovative products?

The federal government should create a policy environment conducive to business development at all levels that would aid the chemistry enterprise in creating and commercializing new products and services here in the United States. These products and services would help strengthen our existing industry and help create new industries, thus supporting new and sustainable science-based jobs.

The American Chemical Society (ACS) supports a fair and level playing field that enhances competition and stimulates research and development by

- Expanding university research infrastructure and developing communities of innovation centered on academic research environments and national laboratories.
- Providing grants, low-interest loans, and accelerated depreciation tax incentives to mitigate the high start-up or retooling costs associated with high technology businesses.
- Expanding federal programs that provide targeted support for commercialization activities at science research agencies.
- Revising existing laws strategically as business conditions change.

How can federal agencies under the Senate Commerce Committee’s jurisdiction incentivize institutions of higher education to improve research commercialization and accelerate innovation?

ACS supports federal agency efforts to experiment with adaptable and flexible grant structures to maximize the impact of S&T investment. The National Science Foundation (NSF) is testing a shift from traditional project-specific grants for principal investigators to more graduate student research fellowships. A few examples that can be incorporated from agencies not under the Committee’s jurisdiction include the National Institutes of Health’s introduction of longer grants to fund laboratories, rather than specific projects. Programs that involve interdisciplinary teams of researchers on high-priority topics, such as the Department of Defense’s Multidisciplinary University Research Initiatives and the Department of Energy’s Energy Frontier Research Centers, also deserve fresh attention as models for other agencies.

Such changes are expected to improve research funding predictability, enhance the quality of graduate student training and enable greater scientific achievements with the available funding levels. ACS, for instance, supports a distribution of funding to foster a healthy balance between new and established investigators.

The Society also supports efforts to reduce the administrative burden on researchers that receive federal funding. Principal investigators spend an ever-increasing amount of their time applying for more grants as well as processing associated paperwork. Although ACS encourages relevant assessment, we agree with the concerns raised by the 2014 National Science Board report that an inappropriately heavy administrative load is already felt by researchers and universities receiving R&D support.

How can federal agencies under the Senate Commerce Committee’s jurisdiction better promote the sharing and commercialization of federally-funded research and data?

The ACS supports universal access to the results of scientific research via publishing models that are sustainable and that ensure the integrity and permanence of the scholarly record upon which scientific progress is based. The ACS does not support unfunded mandates that place constraints on authors or that interfere with our ability to fulfill the Society’s mission as a provider of indispensable information to the world’s community of chemistry professionals.

The Society sees an appropriate role for governmental and other funding agencies to identify standards and best practices for the management of primary scientific data that are generated via taxpayer or other research grant funding that supports independent investigators. This role could include standards for the interoperability of data repositories with the published research literature. Such data resources could be linked (under license) to the published article at the websites of publishers, which would enable access to the authoritative record of science and eliminate the need for building, maintaining, and modifying redundant and costly government repositories/infrastructures. Such linking arrangements would avoid diversion of government funds away from basic research, lessen the impact of government competition with the private sector, and protect the public availability of the scientific record from changes in funding priorities.

What barriers or disincentives to effective R&D collaboration exist among federal, state, and private sector actors, and what are successful public-private partnership models that should be piloted or replicated?

The scientific and technological innovation that underpins our economic competitiveness results from sustained investments in scientific research and in strong education and training systems. To complement this technological advancement, our nation’s business laws, tax code, trade policies, and regulatory environment should work together to assure that the products of American science and technology companies can be introduced to the international marketplace competitively and without facing inappropriate barriers. The United States should be the most welcoming place to start, maintain, or expand science- and technology-based business activity.

ACS supports policies that foster the growth of small research and development businesses and encourage entrepreneurship by

- Improving access to shared resources and facilities for the conduct of early-stage proof-of-concept work by entrepreneurs.
- Making R&D tax credits accessible to start-up businesses by making them refundable or transferable.
- Expanding funding for the Small Business Innovation Research (SBIR), Small Business Technology Transfer (STTR), Small Business Investment Companies (SBIC), and Small

Business Administration microloan programs and reforming these programs to make direct research funding for small businesses more readily available.

- Providing incentives for larger companies to expand investments in start-up R&D businesses.

How should federal agencies coordinate, evaluate, and update manufacturing-related programs, such as those related to advanced manufacturing or aimed at small- and medium-sized manufacturers?

Historically, the largest employers of chemists have been large, publicly owned chemical companies. Increasingly, small businesses and entrepreneurs are becoming essential contributors to the chemistry economy and a growing factor in the chemistry employment picture. Federal research investments in university and national laboratories continue to spur new opportunities for technology transfer. Many large companies are now using venture capital funds to support small start-ups in collaborative business and commercialization models. By fostering the domestic expansion of existing companies and development of small businesses that can be centers of job creation, the chemistry enterprise not only improves its own prospects, but helps raise the prosperity of the entire nation.

STEM Education and Workforce Issues

How does the availability of STEM graduates affect corporate decision-making about where to conduct research and manufacture goods?

If companies cannot fill jobs within the state where they are located, they have an incentive to look to other states, or even other countries, where they can find qualified students with the type of skills they are looking for. For example, Microsoft supports increasing H1B visas to allow for workers from other countries to come to the U.S. to fill the immediate job vacancies when they cannot find the qualified workforce here at home.

To make the best use of limited resources, how can the federal government, in coordination with the private sector and academia, best prioritize STEM education investments and help respond to shifting academic and private sector workforce needs?

The ACS supports improving the STEM education system, including alignment with workforce programs by

- Incentivizing public-private partnerships between state and local actors and the industry and institutions of higher education in their state. Identifying partnerships can help schools develop and update curricula to fit changing and expanding workforce needs.
- Programs developed by these partnerships should align with the classroom experiences that teachers face so that support is most applicable to real life situations and enables best outcomes.
- Adopting national standards of learning to ensure states strive to have rigorous, broadly applicable standards for their students.
- Adopting research based practices in higher education including faculty that are trained in effective use of the practices.

What factors should federal agencies consider to measure the impact and success of the federal STEM education portfolio, and to decide whether to expand, modify, or replace individual programs given limited resources?

Is the program scalable? Is there a proven metric of success? For example, the Math and Science Partnership Program reports annual data for all 50 states showing funding levels, programs created and/or improved, number of teachers and students impacted and best practices.

How can federal agencies best identify and encourage implementation of promising, research-driven STEM education teaching models and best practices?

ACS supports establishing partnerships across the education community, both at the national and state levels. Sharing what is working in states across the education community and allowing membership groups, academia, and industry to disseminate that information can help identify and scale up the most successful programs and models, e.g. STEM Master Teacher Corps.

What actions can the federal government, private sector, and academia pursue to broaden STEM participation and provide education and research opportunities to students from all backgrounds?

Creating a diverse and multifaceted workforce is achieved when there is an increase of entry points and accessibility. Federal investment in both traditional K-12 and higher education infrastructure is only part of the equation. Investing in broad career and technical education programs, both in high school and post-secondary recertification programs, can allow a career change, make highly skilled training more accessible, and allow for nontraditional groups to be engaged in high paying and highly skilled careers.

The ACS supports nurturing students of all backgrounds—particularly those from underrepresented groups—in the pursuit of further studies, and ultimately, careers in the science and engineering fields by increasing coordination between two- and four-year institutions to provide students who enter education the options for pursuing all degree and career paths.