

7. Bridging the Barriers from Lab-to-Market

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CAP Goal Statement: *Increase the economic impact of federally-funded research and development by accelerating and improving the transfer of new technologies from the laboratory to the commercial marketplace.*

Soft robotics is a relatively new field of research. It will allow the robots of tomorrow to squish, stretch and squeeze, not unlike a real human hand, according to the National Science Foundation. Discoveries [like these](#) are an entrepreneur's dream, but they live in a different world than the scientists who develop these technologies. And their paths rarely cross. How can this dynamic be changed so discoveries move from the lab to markets more quickly and don't remain "a lamp under a bushel basket?"

Background. The federal government invests over \$130 billion a year in research and development. This R&D is conducted in a wide range of federal facilities, universities and private sector companies. The federal R&D system has led to significant job-creating technology breakthroughs including the Internet, the Global Positioning System and decoding the human genome.

But according to the White House Office of Science and Technology Policy (OSTP): "Despite the critical importance of federal R&D to economic development, agencies historically have lacked the resources and interagency platforms to act together in the commercialization of their technologies."

In response to this observation, a [2011 Presidential Memo](#) directed agencies to "establish goals, measure performance, streamline administrative process and facilitate local and regional partnerships to facilitate R&D commercialization." Agencies were given six months to develop [action plans](#) and agencies designated staff to coordinate informally with staff from other agencies. In 2014, the national objective of moving discoveries and inventions from labs to commercial markets was designated as one of 15 Cross-Agency Priority (CAP) Goals. In the intervening years, there have been a number of tangible successes.

Objectives of the Cross-Agency Priority Goal. The [Lab-to-Market CAP Goal](#) was created in 2014 to: "Increase the economic impact of federally-funded research and development by accelerating and improving the transfer of new technologies from the laboratory to the commercial marketplace." This goal reinforces the efforts begun under the 2011 Presidential Memorandum and focuses efforts in five areas:

- Develop human capital with experience in technology and entrepreneurial skills,
- Empower effective collaborations through partnerships and tech transfers,
- Open federally-funded labs and other R&D assets to private users,
- Fuel small business innovation by streamlining grant programs and
- Evaluate the impact of these initiatives to identify best practices.

Governance Structure. The 2011 presidential memo that created a national focus on accelerating the commercialization of federal research resulted in an informal cross-agency working group to coordinate efforts and share information, under the auspices of the White House Office of Science and Technology Policy (OSTP).

The informal working group was formalized with the launch of the CAP goal in April 2014 and sub-goals were developed. While formal leadership rested with OSTP and the Department of Energy, Commerce's National Institute for Standards and Technology (NIST) became a pivotal point for the coordination effort and the dynamics started to shift from cross-agency conversations to cross-agency activities.

By March 2016, OSTP wanted to ensure sustainability through the upcoming presidential transition. It chartered the Lab-to-Market working group as a formal subcommittee of the White House's [National Science and Technology Council](#). That subcommittee's charter will soon be renewed and extended by six months, awaiting further guidance from the new Administration once OSTP leadership is in place. The subcommittee taps into the expertise of [four interagency working groups](#) that focus on issues such as technology transfer, access to government-created intellectual property, access to federal lab facilities and engaging small businesses.

Evolution Over Time. According to one staffer, the CAP goal-designation helped spur action on the part of participating agencies by crystallizing the goals, placing a higher priority and greater visibility on the issues and requiring public accountability for progress. The quarterly progress reporting requirement was a catalyst, as well. But in the early days, the effort received no additional funding and is still largely voluntarily supported by the agencies involved.

In 2015, NIST requested funding for several sub-goal initiatives and received \$6 million for interagency projects. A team of Presidential Innovation Fellows came to work with the working group on increasing private investment in commercially-viable projects. Other projects included supporting entrepreneurship among scientists and expanding external reporting on government inventions. This focus on Open Data—related to another CAP Goal—led to improved search tools and data consolidation initiatives.

Progress to Date. The most recently available [annual report](#) on federal lab tech transfers, tracks the sharing of government-funded patents, invention licenses and Cooperative Research and Development Agreements with private sector entities. The trend data shows increases in each of these metrics since 2011 and a study is underway to quantify the economic impact that results from these sharing efforts.

The Lab-to-Market initiative has spawned [a number of specific projects](#) that have contributed to the progress in transferring federal intellectual property. For example:

- A [tech transfer playbook](#) was “developed to highlight existing agency resources and programs that facilitate commercialization activities” and document best practices from federal labs around the country so other agencies can see how particular legal authorities and transfer mechanisms can be used.
- The [Federal Lab Consortium](#), which is a professional network of federal labs across the country, launched [FLCBusiness 2.0](#), which “provides a one-stop search for finding information on more than 300 federal laboratories and 2,500 user facilities and specialized equipment.”
- Improved exchange of scientific personnel between the government and the private sector. A [2016 rule](#) developed by NIST clarifies the use of Cooperative Research and Development Agreement authority to facilitate the process of personnel exchanges between federal and non-federal scientists to enhance commercialization-based research.
- The [Small Business Voucher pilot program](#) at the Department of Energy creates a single point of entry for small business to access the department's various lab resources for clean energy projects.

The Innovation Corps: An Example of Success. One of the highest profile success stories is the expansion of the “I-Corps” initiative, evolved out of an effort begun in 2010 by the then-director of the National Science Foundation (NSF), Subra Suresh. He challenged his staff to teach entrepreneurship to the science community, and this was the genesis of the Innovation Corps initiative. The 2011 presidential memorandum, and the subsequent inclusion in the CAP goal, provided additional impetus.

Since then, this initiative has trained over 829 teams comprised of over 2,500 researchers to be entrepreneurial and provided direct experience interacting with potential customers. According to [a recent report](#): “This has led to the creation of over 320 companies and over \$83 million in follow-on funding.”

How does this work? I-Corps is comprised of cohorts of 21 teams. There are three components to each team: a faculty member who has been previously awarded with an NSF research grant; a post-doc or grad student responsible for lead development and a third-party business partner who is a volunteer mentor. They conduct 100 interviews of people in their proposed industry who can provide valuable information on whether the team has a commercial opportunity, an innovation and/or can start a business. They have six months to do this, and it includes seven weeks of classroom work with other teams in their cohort.

The classroom instruction is delivered through eight “nodes.” For example, the University of Michigan is the lead institution for the Midwest Node. The Nodes provide NSF with I-Corps instructors: entrepreneurs, investors and industry executives who teach the 14 I-Corps courses per year. Along with the instructors, I-Corps nodes are increasingly engaging program alumni, etc., for support and mentoring of budding new research entrepreneurs. In addition to university-based programs, the I-Corps Nodes have community-based training as well. Lastly, the I-Corps Nodes conduct periodic evaluations and research projects to ensure the instructional I-Corps program is effective and stays relevant in the growing entrepreneurial support ecosystem in the US. Each NSF I-Corps Node uses its own approach to achieve maximal impact in the local regions.

NSF’s I-Corps has been replicated in different forms in 11 other federal agencies, with the support of the CAP Goal network. The two most robust are at the National Institutes of Health’s Cancer Institute and the Department of Energy. The other nine agencies leverage NSF’s existing network of nodes and use NSF’s training materials. In 2016, NSF’s I-Corps program was formally [authorized via legislation](#). In addition, several state governments are launching I-Corps programs.

Next Steps. The future of the Lab to Market initiative is unclear, but its objectives are aligned with the Trump Administration’s efforts to create new jobs and industries, provide U.S. leadership in commercial global markets, increase government efficiency and reduce the amount of paperwork needed for the private sector to work with the government.