

## Principles for Reauthorization of the America COMPETES Act

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The Information Technology and Innovation Foundation (ITIF) is a nonprofit, non-partisan public policy think tank committed to articulating and advancing a pro-productivity, pro-innovation and pro-technology public policy agenda internationally, in Washington and in the states.

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On April 28, the House Science Committee passed out of committee \$82 billion legislation enabling five-year reauthorization of the America COMPETES Act.<sup>1</sup> The House floor vote on the bill is scheduled to occur by Thursday, May 13, with the Senate subsequently taking up reauthorization. The COMPETES legislation includes support for many worthy new and continuing initiatives. And while we applaud the House for taking important steps towards COMPETES reauthorization, the current legislation, while a major step forward, could be strengthened in several important areas. Most importantly, the legislation needs to expand beyond its focus largely on additional funding for university private investigator (PI) research grants, and focus more broadly on science, technology, innovation, commercialization, and diffusion and how these contribute to economic growth. Given the severity of the challenges facing the United States—heightened competition for global innovation leadership, little improvement in enhancing its innovation capacity over the past decade, and the need to create millions of new jobs to combat stubbornly high unemployment—business as usual approaches will no longer suffice. COMPETES can and should go further towards enacting policies the United States needs to more effectively compete in the innovation-based global economy.

There are five key areas in which the COMPETES legislation can be bolstered: more explicitly linking the legislation to U.S. economic competitiveness, placing greater emphasis on stimulating partnerships and collaboration, focusing more on technology commercialization, incorporating greater incentives for accountability, and promoting institutional innovation.

### PRINCIPLE 1) EXPLICITLY LINK THE LEGISLATION TO U.S. ECONOMIC COMPETITIVENESS

As currently constituted, the COMPETES reauthorization does not meet the scale of the competitiveness challenge the United States faces as a growing number of nations seek to gain global market share in technology-based economic activities. As ITIF documented in its *Atlantic Century* report, which benchmarked 40 countries and regions on 16 indicators of innovation and competitiveness, whereas the United States led the world in these measures by a wide margin in 2000, by 2009 the United States had slipped to sixth place. More worryingly, the United States placed dead last in rate of change in enhancing its innovation capacity over the decade.<sup>2</sup> Part of this fall is attributable to the fact that over the past decade many of our competitors—from Great Britain and Finland to Japan and South Korea—have created national innovation

and competitiveness strategies designed specifically to link science, technology, and innovation with economic growth.<sup>3</sup> As Annabelle Malins, British Consul General in Atlanta, commented recently, “The United Kingdom has made a conscientious decision to place innovation at the center of our country’s economic growth strategy.”<sup>4</sup> Where these countries have coherent, strategic game plans to compete and win in the highest value-added sectors of economic activity, the U.S. relies more on one-off policies that, while valuable and appropriate, are all-too-often not tied into a coordinated strategy.

Accordingly, COMPETES needs to more clearly tie science, technology, innovation, and commercialization to U.S. global competitiveness, economic growth, and job creation. The United States needs to create millions of new good-paying jobs—and stand-up several new high-technology industries—over the next decade. If we want to do this and be successful in the global economy, it is critical that the federal government develop a serious, in-depth, and analytically-based national competitiveness strategy. We are in fact one of the few nations without one. Denmark, the United Kingdom, South Korea, The Netherlands, and Ireland are just a few of the nations that have invested the time and effort to craft national innovation and competitiveness strategies in recent years.

The COMPETES reauthorization does call for the development of five-year strategic plans in nanotechnology, networking and information technology research and development (NITRD), STEM (science, technology, engineering, and math) education, and energy STEM, noting that these plans should, “focus on research that has the potential for significant contributions to national economic competitiveness and for other significant social benefits.” But the legislation should move beyond looking at how just these four or five technology areas can contribute to economic competitiveness, and include language to create an overall National Innovation and Competitiveness Strategy, with funding of \$15 million for development of the strategy, which could be modeled after the national broadband plan. While the current legislation charges the Office of Innovation and Entrepreneurship at the Department of Commerce with, “developing and advocating policies to accelerate innovation and advance the commercialization of research and development, including federally funded research and development;

and identifying existing barriers to innovation and commercialization, including access to capital and other resources, and ways to overcome those barriers” this remit is not tantamount to creating an overarching national innovation and competitiveness strategy, which the COMPETES legislation should call for specifically.

## PRINCIPLE 2) STIMULATE PARTNERSHIPS AND COLLABORATION

As ITIF has written, innovation is becoming much more collaborative, involving large and small firms, universities, federal laboratories and others.<sup>5</sup> However, COMPETES places insufficient focus on collaborative industry, university, and state government partnerships. For example, a program for “Facilitating Interdisciplinary Collaboration for National Needs” in COMPETES is funded to the tune of just \$5 million over a period of five years.<sup>6</sup> COMPETES should provide more incentives for increased public-private collaboration around innovation, look for opportunities to better leverage non-federal resources, and remove barriers for other players, especially the private sector, to increase funding for innovation. Rather than focus mostly on university-based PI research grants, COMPETES should give greater focus to getting universities, federal laboratories, small businesses, and states into an ecosystem of partnerships. There are several ways COMPETES could promote these types of partnerships, including by promoting joint NSF-industry Ph.D. STEM fellowships, by making industry-funded research easier to conduct at universities, and by increasing funding for NSF’s Engineering Research Centers (ERCs) and Industry-University Cooperative Research Centers (IUCRCs).

For example, Congress could create a new NSF-industry Ph.D. fellows program, which would allow industry to fund individual fellowships of \$20,250 with NSF matching industry funds dollar-for-dollar. This would allow the United States to support more doctoral fellowships, a key factor in producing more STEM Ph.D. degrees from U.S. residents. The program would enable industry to build a relationship with students, expose them to basic research areas of interest and import to industry, and help students get a better sense of research challenges companies face. If Congress allocated an additional \$21 million for joint NSF-industry STEM fellowships, NSF could support an

additional 1,000 STEM graduate fellows. Further, Congress should move to allow any research expenditures at universities to qualify for the basic research credit. Currently, industry-funded research conducted at universities qualifies for the basic credit only if it does not have any “specific commercial objective,” significantly deterring research that could lead to commercializable products. Congress should delete this restrictive language from current law and allow any research expenditures at universities to qualify for the basic research credit. (While the Science Committee has no jurisdiction on tax policy, we encourage the tax writing panels to consider modifications in tax laws to advance the goals of COMPETES.)

In COMPETES, Congress should also expand support for the Engineering Research Center and Industry & University Cooperative Research Center programs at NSF. ERCs provide an environment where academe and industry together focus on next-generation advances in complex engineered systems important to the nation’s future. Likewise, the IUCRC program focuses on high-quality, industrially relevant fundamental research, strong industrial support of and collaboration in research and education, and direct transfer of university developed ideas, research results, and technology to U.S. industry to improve its competitive posture in world markets. COMPETES should double NSF’s funding for ERCs from the current base of \$52 million up to \$100 million over a three year period and double the IUCRC program from \$7.1 million to \$14 million over that timeframe.<sup>7</sup> This would support the creation of additional IUCRC centers and expand NSF engineering support provided to each center. (It is worth noting that NSF investment in the IUCRC program leverages investment of approximately \$65 million annually from industry, university, state, and other federal partners.)

### PRINCIPLE 3) FOCUS ON TECHNOLOGY COMMERCIALIZATION

The U.S. does reasonably well on supporting basic research. Where the real challenge lies is in commercializing that research into innovative new products and services. As such, COMPETES should place greater emphasis on commercialization; indeed, the term commercialization is mentioned just four times in the current legislation. The bill—like much of federal policy—appears to assume that scientific research works

in a linear model, where pouring dollars into basic scientific research at the front end will lead to commercializable products coming out the back end. But in reality, the process is choked with barriers, including institutional inertia, coordination and communication challenges, and lack of funding for proof of concept and other “valley of death” activities. Thus, the real challenge lies in transferring research coming out of universities, research hospitals, and federal and state laboratories and commercializing it into new products and services that create new companies—and jobs. The United States needs to significantly strengthen the connections between universities, labs, and industries in order to achieve a smoother and more active hand-off process between fundamental scientific research and industrial commercialization of technology.

It is time for federal policy to explicitly address this challenge and allocate more funding to commercialization activities.<sup>8</sup> COMPETES could bolster technology commercialization through several mechanisms. For example, Congress could create an automatic set-aside program taking a modest percentage of federal research budgets and allocating them to a technology commercialization fund. Allocating 0.15 percent of agency research budgets would generate \$110 million per year to fund university, federal laboratory, and state government technology commercialization and innovation efforts. Half the funds could go to universities and federal laboratories that could use them to create a variety of initiatives, including mentoring programs for research entrepreneurs, student entrepreneurship clubs and entrepreneurship curriculum, industry outreach programs, seed grants for researchers to develop commercialization programs, etc. The other half could go to match state technology-based economic development (TBED) programs. These programs, such as the Oklahoma Technology Commercialization Center, assist researchers, inventors, entrepreneurs, and companies in turning advanced technologies and high-tech startup companies into growing companies. But without assistance from the federal government, states will invest less in TBED activities than is in the national interest. COMPETES should provide at least an additional \$30 million in federal funding through the Economic Development Administration to match, on a dollar-for-dollar basis, states’ investments in spurring technology commercialization.

#### PRINCIPLE 4) INCORPORATE INCENTIVES FOR ACCOUNTABILITY

The prevailing view in innovation policy circles is that if we want institutions to change, we should provide them grants to help them change. But while positive support can help, ultimately it is accountability and incentives that drive change. COMPETES legislation contemplates more dollars and more grants for private investigator scientific research; but we need greater accountability for results—a challenge we’ve had for more than 20 years. Many countries are experimenting with measures that would bring greater accountability to show results from government-funded scientific research. For example, in Sweden, 10 percent of regular research funds allocated by the national government to universities and university colleges are now distributed using performance indicators. Five percent of these funds are allocated based on the amount of external funding the institutions have been able to attract, with the other 5 percent based on the quality of scientific articles published by each institution (as determined through bibliometric measures such as the number of citations).<sup>9</sup> Finland has also started to base its university budgets on performance—25 percent of Finnish universities’ research and research training budgets are based on “quality and efficacy” including the quality of scientific and international publications and the universities’ ability to attract research investment from businesses.<sup>10</sup> COMPETES needs to emphasize performance and accountability in all programs it funds, including the ability to leverage industry funding. Moreover, it should provide additional funding for programs measuring and researching innovation, productivity, and the value-added to firms from innovation programs.

#### PRINCIPLE 5) PROMOTE INSTITUTIONAL INNOVATION

Successful innovation policy requires innovation not just in the economy but also in innovation policy itself. In other words, we need to come up with new innovative institutional and policy ways to spur innovation, beyond simply giving existing government programs more money or asking federal agencies to better coordinate their activities. While the COMPETES legislation makes some steps in this direction, it appears to generally assume that existing programs and institutional arrangements are working well enough and that they just need a bit more money and fine tuning. But as we have

seen, the status quo is not sufficient for maintaining a world-leading position in innovation; new institutional approaches to innovation are needed, whether applied in education, government, or industry contexts.

For example, COMPETES provides funding for research to determine how STEM education can be improved in the United States. But universities should be doing this anyway; after all their job is to effectively teach STEM. It would be better for COMPETES to provide more funding for institutional innovation in education. Consider Olin College outside Boston. Founded in 1997, Olin is pioneering a new approach to undergraduate engineering education with an interdisciplinary, project-based approach that emphasizes entrepreneurship, liberal arts, and rigorous science and engineering fundamentals. Olin’s aim is to flip the traditional “theory first, practice later” model and make students plunge into hands-on engineering projects starting on day one and lasting throughout their senior year, when teams of students work on projects offered by corporations. Instead of theory-heavy lectures, segregated disciplines, and individual efforts, Olin champions design exercises, interdisciplinary studies, and teamwork.<sup>11</sup> Why not have COMPETES include grant program for analogues to Olin College throughout the country?

Another novel approach would be greater support for specialty math science high schools (MSHSs). There are only about 100 MSHSs in the United States, ranging from pull-out programs with 125 students, to full day programs and dedicated high schools of over 4,000 students, to state sponsored residential schools, together enrolling close to 50,000 students. By creating an environment focused more intensely on science and technology, these schools have been able to successfully enable students to study science and math, often at levels far beyond what students in conventional high schools are at; they can then go on to degrees in math and science at relatively high levels. It’s time to build upon this successful model and significantly expand the number and scope of our nation’s MSHSs. To achieve this, COMPETES should allocate \$100 million a year for the next five years, to be matched with funding from state and local school districts and industry, to invest in both the creation of new math and science high schools and the expansion of existing ones.

Innovation is also not just about federal science agencies, every federal agency takes actions that can spur or deter innovation. But currently there is no place in the federal government to guide agencies so that they don't inadvertently limit innovation. One way to give innovation a voice in federal policy would be to create an Office of Innovation Policy (OIP) in the Office of Management and Budget (OMB). Just as the Office of Information and Regulatory Affairs (OIRA) at OMB performs centralized cost-benefit reviews of proposed federal regulations, OIP would champion innovativeness in federal regulatory approaches and warn when regulations are stifling innovation. OIP would be an entity independent of existing federal agencies with more than mere hortatory influence. It would have some authority to push agencies to act in a manner that either affirmatively promoted innovation or achieved a particular regulatory objective in a manner least damaging to innovation. OIP would operate efficiently by drawing upon, and feeding into, existing interagency processes within OIRA and other relevant White

House offices (e.g., the Office of Science and Technology Policy). It is important to note that OIP would not be designed to thwart federal regulation; as a matter of fact, in some cases, the existence of OIP might lead to increased federal regulation (e.g., more Environmental Protection Agency regulations might pass muster under cost-benefit analysis if innovation-related effects were calculated).

COMPETES comes at a critical time in ensuring continued U.S. leadership in science, technology, and innovation. But the scope of the challenge before us calls not just for more funding (although that is sorely needed), but also for bold policy measures and institutional innovations that will spur innovation throughout the economy and bolster the United States' global competitiveness. As the Senate considers their own version of COMPETES, they have the opportunity to shape already good legislation into legislation that can go a long way to restoring America's global innovation leadership.



## ENDNOTES

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