



August 21, 2015

The Honorable Cory Gardner
Committee on Commerce, Transportation
and Science
United States Senate
Washington, DC 20510

The Honorable Gary Peters
Committee on Commerce, Transportation
and Science
United States Senate
Washington, DC 20510

Dear Senators Gardner and Peters:

As an organization representing more than 200 PhD-granting departments of computing, 15 industrial research labs, and 6 affiliated professional societies comprising more than 150,000 computing researchers across the Nation, we thank you for the opportunity to provide our input into the committee's deliberations on a reauthorization of the America COMPETES Act.

You have no doubt heard from many in industry and academia about the vital importance of the Federal investment in fundamental research, particularly those investments made by the National Science Foundation, National Institute of Standards and Technology, and Department of Energy's Office of Science, which were the focus of the original America COMPETES Act. Those investments in fundamental science help enable the innovations that create new businesses, new jobs, and even entirely new industries and help the United States retain its economic and security leadership in an increasingly competitive world.

As you consider the new legislation, we urge you to:

- Put a priority on ensuring that fundamental research in the physical sciences, including computing, sees strong and sustainable growth.
- Ensure that those investments span the full range of disciplines, in recognition of the important role that fields like social science, economics and behavioral science play in informing work in computing and other fields.
- Provide authorizations of meaningful lengths of time to allow researchers and the agencies that support them more predictability and stability, which will help improve planning around and management of Federal research programs.

The evolution of the computing field and the growth of the information technology industry provides an excellent case study of the importance of this sustained Federal support and investment. As you know, the Information Technology sector accounts for nearly \$1 trillion annually to the U.S. economy



and the creation of over 565,000 new jobs over the last decade.¹ Advances in IT are transforming all aspects of our lives – commerce, education, employment, health care, manufacturing, government, national security, communications, entertainment, science and engineering. These advances are also driving the economy, enabling productivity growth, enabling goods and services to be allocated more efficiently, and enabling the production of higher quality goods and services. Indeed, advances in IT are enabling innovations in all other fields – in business and in science and engineering.

The history of innovation in computing is impressive, but future opportunities are even more compelling. We have the opportunity to revolutionize transportation, provide personalized education, power the smart grid, empower the developing world, improve health care, enable advanced manufacturing and drive advances in all fields of science and engineering. It's impossible to imagine a field with greater opportunity to change the world.

But key to unleashing that innovation is maintaining the health of IT research and development ecosystem that enables it. And at that heart of this IT R&D ecosystem is federally sponsored research.

The National Research Council has described this ecosystem as an “extraordinarily productive interplay of federally funded university research, federally and privately funded industrial research, and entrepreneurial companies founded and staffed by people who moved back and forth between universities and industry.” The NRC’s Computer Science and Telecommunications Board created a graphic that attempts to visualize this complex ecosystem (see attachment).

The chart is really a timeline, tracking the growth of different sectors of the IT economy. It has three lines for each sub-sector of the IT industry: a red line that indicates when research was performed in universities (largely with Federal support), a blue line in the middle that shows when industrial research labs were working in the space (largely with private sector funding), and a dotted black line that indicates when the first product was introduced in that sector. Where that dotted line turns solid green indicates when that became a billion-dollar sector. Where the line thickens, it notes a \$10 billion+ sector. The arrows on the chart indicated the flow of people and ideas between the sectors. Above the lines are some of the billion-dollar companies that resulted.

The chart shows a number of key aspects of the path from research to major market sector:

1. Research often takes a long time before it pays off. In a number of cases on the chart, the earliest research is more than 15 years before the introduction of the first product in the chart.
2. Research often pays off in unanticipated ways. Developments in one sector can enable advances in others, often serendipitously.

¹ Atkinson, Robert D. and Luke A. Stewart, “Just the Facts: The Economic Benefits of Information and Communications Technology,” Information Technology and Innovation Foundation. May 14, 2013. Analysis of Bureau of Labor Statistics data.



3. Research in universities does not supplant work in industry, and vice-versa.
4. The research ecosystem is fueled by the flow of people and ideas back and forth from university and industry, and this robust ecosystem has made the U.S. the world leader in information technology.

Each one of the billion dollar (and 10+ billion dollar) sectors bears the clear stamp of the Federal investment, investments that have demonstrated extraordinary payoff – in the explosion of new technologies that have touched every aspect of our lives; and the economic payoff in the creation of new industries and literally millions of new jobs. The Federal Government has played an essential role in fostering these breakthrough advances.

Our position as the world leader in information technology has clearly paid enormous dividends, but that position is not guaranteed. In many key sectors, including high-performance computing and new areas like ubiquitous computing that comprise the “Internet of Things,” the global competition has grown more fierce. We cannot afford to lose our leadership role.

The Federal investment in computing research is without question one of the best investments the Nation has ever made. The future is bright. There is tremendous opportunity – and tremendous need – for future breakthroughs. The Federal Government’s essential role in fostering these advances – in supporting fundamental research across fields – must continue.

So we urge you to demonstrate that continued support in any reauthorization of the America COMPETES legislation. Provide robust, sustained authorization levels for key Federal science agencies. Support funding across scientific fields.

The computing research community thanks you for taking on this leadership role in crafting new COMPETES legislation and for the opportunity to provide this input to you. We stand ready to help in any way we can.

Sincerely,

Susan B Davidson

Susan Davidson
Chair

Attachment

IT Sectors With Large Economic Impact

