Fifth Annual
SCIENCE-ENGINEERING-TECHNOLOGY
CONGRESSIONAL VISITS DAY
April 4-5, 2000

Core Messages

★ Balanced federal investment in science, engineering, and technology (SET) is vital to the future of our Nation's prosperity.

★ SET partnerships between government, universities, and industries mean progress, economic growth and jobs.

Participants

Members of the Coalition for Technology Partnerships and the Science-Engineering-Technology Work Group and their colleagues in the science and technology enterprise.

R&D Is An Investment . . .

The federal government supports a unique world-class research and education enterprise that fuels the American economy. This enterprise provides the underpinning of high-technology industries, expands the frontiers of knowledge, and trains future generations of scientists, engineers, and mathematicians. The federal investment in research and development (R&D) has led to job growth in new and old industries and has produced a standard of living that is unparalleled in our Nation's history.

"Something special has happened to the American economy in recent years...a remarkable run of economic growth that appears to have its roots in ongoing advances in technology."

Federal Reserve Board Chairman Alan Greenspan, Testimony before Joint Economic Committee (6-14-99)

"The first thing I want to underscore, in the clearest possible way, is that science and technology have become the engine of our economic growth."

President Clinton, Speech at California Institute of Technology (1/21/00)

"The highest investment priority in Washington should be to double the federal budget for scientific research. No other federal expenditure would create more jobs and wealth or do more to strengthen our world leadership, protect the environment and promote better health and education for all Americans. For the security of our future, we must make this investment now."

Former House Speaker Newt Gingrich, in *The Washington Post* (10/18/99)

Return on Investment

Today, Congress is challenged with preserving a balanced federal budget. The current surpluses, however, cannot be maintained unless the American economy continues to grow, productivity is sustained, and inflation is held in check. According to many economists, technology is largely responsible for the enduring strength of the current economic expansion and the low rate of inflation that we have experienced in recent years. Sustaining the scientific enterprise is the key to future technological advances. Thus, federal support of research is critical to any balanced budget plan.

> "The federal investment in science has yielded stunning payoffs. It has spawned not only new products, but also entire industries. To build upon the strength of the research enterprise, we must make federal research funding stable and substantial, maintain diversity in the federal research portfolio, and promote creative, groundbreaking research."
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> **House Science Committee, *Unlocking Our Future: Toward a New National Science Policy* (1998)**

> "Because of productivity gains, the economy can now operate at a higher speed without inflation....[P]romoting the New Economy also requires wise policy from Washington. We need to support basic research and education at all levels, the seed corn of innovation."
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> **Editorial, *Business Week* (7/26/99)**

> "A successful knowledge-based economy requires large public investments in education, infrastructure, and research and development....Private rates of return on R&D spending (the financial benefits that accrue to the firm doing the spending) average about 24 percent. But social rates of return on R&D spending (the economic benefits that accrue to the entire society) are about 66 percent....This result, never contradicted in the economic literature, provides powerful evidence that there are huge positive social spillovers from research and development....Because the government doesn't care exactly which Americans reap the benefits, it has a very important role to play in R&D. Rates of return on R&D spending are far above those found elsewhere in the economy. Government now pays for about 30 percent of total R&D, but with a 66 percent rate of return it should be spending much more."
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> **Economist Lester Thurow, "Building Wealth" article in *Atlantic Monthly* (6/99)**

Although the forecast for federal R&D funding has improved over past budget proposals, the long-term trends are still uncertain. The significant increases for science and technology in FY 2000 indicate that the message of investment for the future has been heard, but it needs to be re-emphasized. For FY 2001, the President has requested a 2.5% increase for overall federal R&D, which includes a 1.4% decrease for defense R&D and a 6.6% increase for nondefense R&D. Congress provided more for R&D than the President requested in Fiscal Year 2000, and it is hoped that Congress will again exceed the President's request. It is critical that federal support for research continues to grow at a time when the global competitive marketplace is forcing industry to focus increasingly on shorter-term results in areas of known industrial needs.

R&D – An Integrated, Interdisciplinary Process

The Coalition for Technology Partnerships and the Science-Engineering-Technology Work Group encourage legislators to take into account the need for a balanced federal investment in science, engineering, and technology, and to take a long-term view when making decisions about federal support for R&D.

The benefits of science and technology flow across sectors, and a box cannot be drawn around any single element of the research cycle. Basic research, applied research, and development constitute a continuum from which arise new products and processes, new ideas and understanding, and new researchers and teachers. Each part of the continuum depends on the other – basic research underpins applied research and the development process, which in turn often stimulate new avenues for basic research to generate deeper fundamental understanding. Moreover, advances in basic research often come as the result of advances in instrumentation that is the product of applied research and development.

Neither can a box be drawn around individual disciplines; advances are taking place increasingly at the boundaries between disciplines or through collaboration among disciplines. Understanding human interaction with complex natural systems requires an interdisciplinary approach to problem solving that can integrate many different kinds of information across a wide range of spatial and temporal scales.

> "Advances in one field are often dependent on breakthroughs in other disciplines. For example, advances in computer science are helping us to develop drugs more rapidly, and to move from sequencing the human genome to better understanding the function of individual genes."
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> **President Clinton, Speech at California Institute of Technology (1/21/00)**

> "Engineering and physical sciences - taken together - accounted for 50 percent of federal research spending in 1970. That's down to 33 percent today.... The sharp nature of the shift in funding toward the biomedical fields has taken more than a few people by surprise. I'd be the first to tell you about the great things that are happening in biomedical fields. Some of that funding has gone to my own research. But, I also know that society cannot live by biomedical bread alone."
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> **NSF Director Rita Colwell, Testimony before House Appropriations Committee (3/99)**

> The decline in defense and energy R&D has serious but until recently, largely unrecognized, consequences. DOD is the primary funder of research in the fields of electrical, mechanical, civil and metallurgical engineering. DOE is the largest funder of physics. Each agency funds about 25% of all mathematics research. As a consequence, in the mid-1990's, federal funding of physics declined 28%, math declined 6%, mechanical engineering declined 50% and electrical engineering declined 35%. The proposed overall 8% increase in DOE's budget only begins to address the declines in physics, and the other disciplines continue to be underfunded due to the slight decrease requested for DOD.
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> **National Research Council, *Securing America's Industrial Strength* (1999)**

The Importance of Partnerships

The Coalition for Technology Partnerships and the Science-Engineering-Technology Work Group encourage legislators to sustain and enhance the federal government's role in R&D partnerships.

R&D partnerships allow government, industry, and university scientists and engineers to optimize their resources. Research conducted in government, industrial, and academic laboratories varies in style and objective. Each sector's efforts complement the others' and reinforce the world-class R&D enterprise of the United States. With recent changes in commercial and financial markets, however, industry is forced to reshape its R&D goals. Not only are foreign competitors challenging U.S. industry's stature in world markets, the pressure for short-term returns from U.S. capital markets forces the Nation's industry to focus its investment on development, which is closer to the marketplace.

> "The United States has unparalleled resources of science and technology. Its industrial research capability, universities, nonprofit research institutions, and federal laboratories are great national treasures. But in a time of severe financial constraints and heightened international competition, the Nation must maximize its returns on those assets...The time is ripe for bold steps to capitalize on the promise of partnership."
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> **State-Federal Technology Partnership Task Force Report, co-chaired by former Governors Dick Thornburgh (R-PA) and Richard Celeste (D-OH)**

The federal government plays a crucial role in R&D partnerships. It can create an environment conducive to collaborations among federal, industrial, and academic researchers. For example, **Cooperative Research and Development Agreements** give companies access to the expertise and facilities of federal labs for specified R&D. Under the National Institute of Standards and Technology's **Advanced Technology Program**, the federal government shares the costs of research on high-risk technologies that underlie a broad spectrum of potential new applications, commercial products, and services. The **Manufacturing Extension Program** aims to accelerate the transfer of advanced manufacturing technology to small and medium-sized, U.S.-based manufacturing firms. The newly introduced **National Nanotechnology Initiative** largely is directed toward university-based research across a variety of disciplines. Many advances will come at the interfaces between areas and will require multidisciplinary partnerships involving federal-university-industry teams. In addition, seven federal agencies support the **Experimental Program to Stimulate Competitive Research** (EPSCoR), a federal-state partnership that provides funds for research activities at universities and non-profit organizations in those states that historically have not received significant federal R&D funding.

The **Coalition for Technology Partnerships** is a group of small, medium, and large businesses, and trade associations. These groups have joined forces to demonstrate that partnerships between government and industry reflect the realities of today's budget climate and technology development mechanisms.

The **Science-Engineering-Technology Work Group** is an information network comprising professional, scientific, and engineering societies, higher education associations, institutions of higher learning, and trade associations. The Work Group is concerned about the future vitality of the U.S. science, mathematics, and engineering enterprise.