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Federal R&D in the FY 2007 Budget: An Introduction

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AN OVERVIEW OF R&D IN THE FY 2007 BUDGET

On February 6, President Bush released his proposed budget for fiscal year (FY) 2007 and offered the same themes as in previous years: big increases for defense and homeland security, trims in some entitlement programs, proposed extensions of expiring tax cuts, and a promise to reduce the budget deficit by cutting domestic discretionary spending. But the President also announced an American Competitiveness Initiative (ACI) in his State of the Union address a week earlier to boost federal investments in physical sciences research. The FY 2007 budget follows through with large increases for key physical sciences funding agencies, but otherwise the budget request is similar to past requests: federal R&D would increase slightly less than projected inflation, the entire increase and more would go toward the development of new weapons and new space vehicles, and increases in the remainder of the federal R&D portfolio would be offset by cuts in other areas.

The large increases for the Department of Energy (DOE) Office of Science, the National Science Foundation (NSF), and the National Institute of Standards and Technology (NIST) laboratories in the ACI and the increases for National Aeronautics and Space Administration (NASA) development enable nondefense research and development (R&D) to increase 1.6 percent, in contrast to the 0.5 percent requested cut for all domestic programs in the FY 2007 budget. But within a declining domestic budget, there would be stark contrasts between priority programs and everything else: the above priorities would receive large increases, while everything else in the federal R&D portfolio would face steep cuts (see Figure 1), with only biomedical research flat in the middle.

- **The proposed federal R&D portfolio in FY 2007 is $136.9 billion, 1.8 percent or $2.4 billion above this year's funding level**, short of the

2.2 percent increase needed to keep pace with expected inflation (see Table II-1). In real terms, the total federal R&D portfolio would decline for the first time since 1996 after flattening out the last few years. Development would be the clear winner: increases for weapons development in the Department of Defense (DOD; up $4.2 billion) and space vehicles development in NASA (up $907 million) would be far greater than the overall $2.4 billion increase, leaving all other R&D programs collectively with less money. Development funding would hit a new high of $77.9 billion (up 6.0 percent). **Total federal support of research (basic and applied) would fall 3.3 percent** to $54.8 billion, even with large proposed increases for physical sciences and related research in NSF, DOE's Office of Science, and NIST (see Table II-1). In real terms, the federal research portfolio would fall nearly 6 percent.

- The nondefense R&D investment would increase 1.6 percent to $58.5 billion, far better than the 0.5 percent cut requested for all nondefense discretionary programs (see Table II-1). Boosts for physical sciences research and space vehicles development help to offset cuts in other programs, but even increases in these areas are not enough to keep the nondefense portfolio from falling behind expected inflation. Four nondefense R&D agencies would do well in the FY 2007 request (see Figure 1): there would be significant increases for R&D in DOE's Office of Science (up 14 percent to $3.8 billion), NIST intramural research (up 21 percent to $382 million), and NSF (up 8.3 percent to $4.5 billion) because of the American Competitiveness Initiative; and a 8.0 percent increase to $12.2 billion for NASA R&D to develop a Crew Exploration Vehicle and Crew Launch Vehicle.

- But other nondefense R&D agencies not linked to the high priority areas would see flat funding or steep cuts (see Figure 1). The NIH budget, after declining slightly in 2006 for the first time in 36 years, would remain flat at $28.6 billion. All but three NIH institutes and centers would see their budgets fall for the second year in a row. Other R&D agencies would face steep cuts: the Environmental Protection Agency's (R&D) portfolio would fall 7.1 percent to $557 million, while Commerce's National Oceanic and Atmospheric Administration (NOAA) would see its R&D funding decline 6.3 percent to $578 million. R&D funding in the U.S. Geological Survey (USGS) and the U.S. Department of Agriculture (USDA; down 16.5 percent) would also fall. Even the Department of Homeland Security (DHS), a past favorite, would see its R&D fall 10.3 percent to $1.1 billion. And despite proposed increases for some alternative energy R&D investments, steep cuts or outright program terminations in energy conservation, fossil energy, and some renewable technologies would leave DOE energy R&D down 4.8 percent to $1.3 billion.

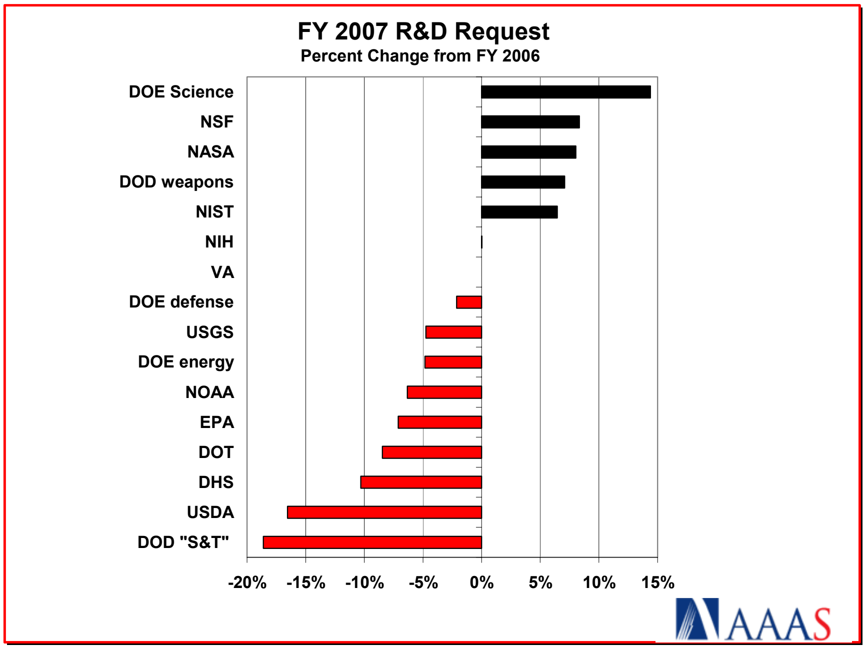

Figure 1.

- There would be tough budgetary choices even in agencies with increasing budgets. At NASA, a $907 million boost in R&D funding to $12.2 billion would be far less than the $1.3 billion boost to $3.1 billion for the Constellation Systems program to develop the next generation of human space vehicle to replace the Space Shuttle. Among the casualties of the shift in resources are NASA's aeronautics research program, falling 18 percent to $724 million, and what remains of its life sciences program, proposed for a 56 percent cut after a 30 percent cut in 2006. Other NASA research programs would also decline. R&D at the National Institute of Standards and Technology (NIST) laboratories would climb, but the budget proposes to eliminate NIST's external Advanced Technology Program (ATP). Substantial increases for DOD development would be offset by steep cuts in DOD research.

- Defense R&D continues to do relatively well, in a budget that sustains overall defense spending at record funding levels. Total defense R&D would increase 1.9 percent to $78.4 billion, falling just short of matching inflation for the first time since 1996 (see Table I-1). Department of Defense (DOD) weapons systems development would increase dramatically by 7 percent to a new high of $62.9 billion (see Figure 1), but once again there would be steep cuts in DOD's S&T (DOD "6.1" through "6.3" plus medical research) programs. DOD S&T would plummet 18.6 percent down to $11.2 billion, with cuts in all three categories of basic research, applied research, and technology development.

- The total federal research investment (basic and applied research, excluding development and facilities funding) would total $54.8 billion in 2007, down 3.3 percent from the current year (see Table II-1). Although NSF (up 7.1 percent), DOE's Office of Science (up 12.3 percent), and NIST (up 11 percent) would do very well for their research portfolios in the 2007 budget because of the ACI emphasis on the physical sciences, there would be steep cuts in other agencies, even in agencies such as DOD and NASA that are major supporters of physical sciences research. Some of the cuts would be from agencies shifting funds out of research and into development, such as DOD (research down 16 percent), the Department of Homeland Security (DHS, down 19.8 percent), and NASA (down 16.5 percent). Other cuts would result from the proposed elimination of research earmarks, such as USDA (down 13 percent), EPA (7 percent), DOD, and NOAA (down 2.4 percent). NIH, the largest federal sponsor of research, would see its research remain flat at $27.7 billion, a 2.2 percent loss after inflation.

- The Administration priorities of defense development, space exploration, and basic physical sciences research would all receive large increases, while R&D for other national missions would fall sharply (see Table I-4). Space-related R&D would gain 10.7 percent to $11.5 billion, though entirely from gains in development of new space craft instead of the broader space R&D portfolio. Boosts to DOE Science and NSF R&D make up the 11.0 percent gain for general science R&D to $8.3 billion. Defense R&D continues to be a high priority with a 1.9 percent boost to $78.4 billion. But R&D for other national missions including agriculture (down 19 percent), transportation (down 16 percent), and the environment (down 7 percent) would all fall in a tight domestic budget. Despite increases for some alternative energy R&D

programs, cuts in energy conservation, fossil fuels, and some renewables would result in a 4 percent cut for energy R&D to $1.4 billion. Even health R&D would fall for the second year in a row down to $29.8 billion after decades of steady gains, as would justice R&D (down 11.5 percent) after steady gains for the DHS R&D portfolio over the previous four years.

- The federal government continues to invest billions of dollars in multi-agency R&D initiatives that cut across agency missions (see Table I-9). After an increase in 2006, funding for the **National Nanotechnology Initiative** would fall 1.8 percent to $1.3 billion, primarily because DOD would remove earmarked 2006 nanotechnology projects from its 2007 request. Funding for the **Networking and Information Technology R&D** initiative would surge 7.7 percent to $3.1 billion because the American Competitiveness Initiative encompasses increasing support for computer sciences and other IT research. The three ACI agencies of NIST, NSF, and DOE Office of Science, all large contributors to the initiative, would all boost their funding for IT research. **Climate Change Science Program (CCSP)** funding would barely increase by 0.2 percent to $1.7 billion, after a steep cut in 2006 due to falling NASA funding for space-based observations of the environment. (For more on the NNI, see Chapter 24; for more on NITRD, see Chapter 23; for more on CCSP, see Chapter 16.)

(Details of R&D in the largest R&D funding agencies can be found in Chapters 6 through 13.)

THE ROLE OF R&D IN THE U.S. INNOVATION SYSTEM

Science and technology are recognized as key drivers of economic growth, as well as improved health and quality of life in the United States and throughout the world. Economists estimate that up to half of U.S. economic growth over the past five decades is due to advances in technology. A study of recent U.S. patents released several years ago found that nearly two-thirds of the papers cited in these patents were published by researchers at organizations supported by federal funds—and these linkages have been growing at an accelerating pace.

Recent advances in genetics and biotechnology, as well as computers and information technology, have raised public awareness of the vital economic role of research-based technology. High-tech industry is sought after by economic development organizations in virtually every state and locality. Policymakers regard universities as catalysts for high-tech economic development both through entrepreneurial activity that spins off from their research and through the concentrations of highly trained human resources they attract and generate. The federal government plays a central role in research in the nation's universities.

R&D is a substantial and growing enterprise in the United States. All in all, the U.S. invested an estimated $312 billion in R&D in 2004. This represented 2.66 percent of the nation's Gross Domestic Product (GDP). The largest share of this money (64 percent) came from industrial firms. Most of the balance (30 percent) came from the federal government. Colleges and universities, private foundations, other nonprofit institutions, and state and local governments provided the remainder. Industry's share of national R&D funding has been growing steadily for several decades. From the end of World War II to 1980, the federal government supported the largest share of the nation's R&D.

Despite its relatively modest share of total U.S. R&D funding, the federal government's role is critical to the nation's science and technology enterprise. Federal agencies support nearly two-thirds of the nation's *basic* research and 58 percent of the R&D performed in U.S. colleges and universities. Basic research is the primary source of the new knowledge that ultimately drives the innovation process. At the same time, federally funded research at colleges and universities plays a key role in educating the next generation of scientists and engineers. Federal applied research and development programs also provide direct support for key government missions, such as improving the nation's health and medical care, exploring space, and national security.

R&D IN THE FEDERAL BUDGET

Although the President's budget presentation each year generally contains a section devoted to R&D and a number of tables summarizing proposed federal R&D expenditures, it is important to recognize that *there is no overall "R&D budget"* and no special treatment for R&D within the budget.

Expenditures for R&D programs are regular budget items. They are contained, along with other types of expenditures, within the budgets of more than 20 federal departments and independent agencies as shown in

Table II-1. For some of those agencies, such as NSF, NASA, and NIH, R&D is a dominant activity. For others, such as the Department of Housing and Urban Development (HUD), it is a small part of a much larger set of programs. Some R&D programs are "line items" in the budget and are relatively easy to identify as R&D. Others are included within larger line items and are more difficult to ferret out.

Federal R&D expenditures represent 4.9 percent of the overall proposed $2.8 trillion federal budget for FY 2007. Nearly all federal R&D comes from the discretionary budget, the one-third of the budget that is subject to annual appropriations decided by the President and the Congress. (The remaining two-thirds of the federal budget goes to mandatory programs (entitlements) such as Social Security, Medicare, Medicaid, and interest on the national debt. Less than 0.2 percent of the federal R&D portfolio is mandatory spending.) Federal R&D is roughly one out of every seven discretionary dollars (see Table I-3). On the whole, trends in R&D funding have closely followed trends in federal discretionary spending. Despite the fact that R&D funding trends are the combination of hundreds of different budget decisions that are only aggregated after a budget is done, the two trends match almost perfectly on the nondefense side for the past 30 years. On the defense side, R&D has grown as a share of the defense budget over the years as high-tech weapons systems have claimed increasing shares of defense spending.

Growth in overall discretionary spending over the past four decades has allowed federal investment to grow in many areas, including R&D. Efforts to balance the federal budget by cutting discretionary spending during the mid-1990s resulted in reductions in most of these areas, including R&D. Subsequent increases have erased these losses in several agencies and produced significant gains for a few, but the return of budget deficits this decade has resulted in flat to declining discretionary spending in 2006 and the 2007 proposal, mirrored by similar trends in R&D spending.

FEDERAL R&D BY PERFORMER

Although the government maintains several hundred laboratories around the country, only a quarter of federally supported R&D is actually carried out in these labs. The largest share of federally funded R&D is performed by industrial firms under contracts (36 percent of the total; see Figure 2). A quarter is conducted under federal grants in colleges and universities. Other nonprofit institutions perform a small portion, and 8 percent of the portfolio is performed by FFRDCs (federally funded R&D centers) operated by contractors, such as the Department of Energy's (DOE) Oak Ridge National Laboratory in Tennessee, which is operated in partnership by the University of Tennessee and the Battelle Memorial Institute. Although these figures apply to the overall federal R&D portfolio, each federal funding agency has its own mix of performers depending on the agency's mission and historical relationships with performers. The majority of DOD's R&D portfolio is performed by industry, for example, while DOE sends the majority of its R&D portfolio to its network of FFRDCs; nearly all of the NSF portfolio, however, goes to universities.

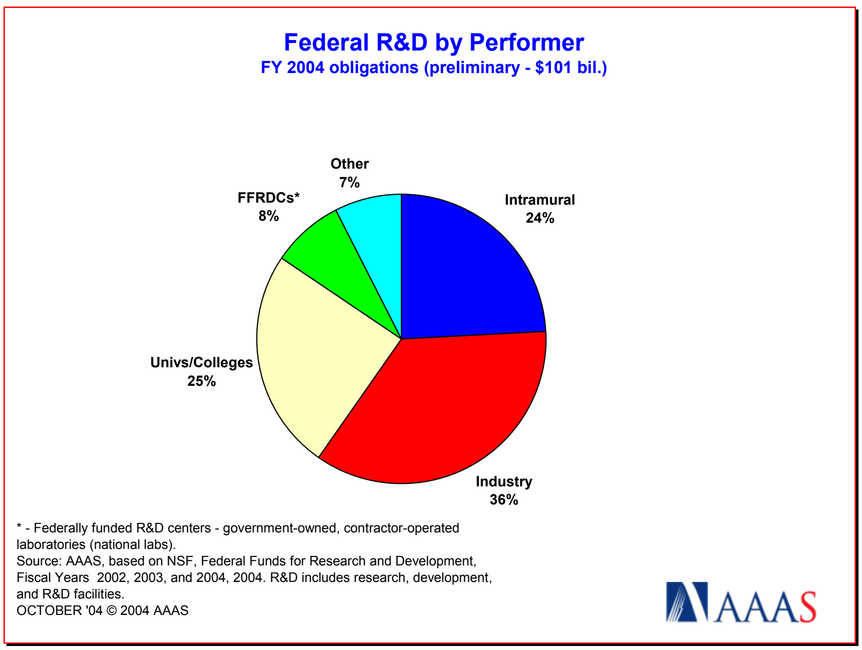

Figure 2.

Altogether, including the research that firms support with their own funds and that which is conducted under government contracts, industry is responsible for performing more than two-thirds (70 percent) of the nation's total R&D. U.S. academic institutions perform 14 percent, while federal laboratories, nonprofit institutions (research institutes, hospitals, etc.), and FFRDCs perform the remainder.

FEDERAL R&D BY NATIONAL MISSIONS

Most of the federal government's R&D is mission oriented; that is, it is intended to serve the goals and objectives of the agency that provides the funds (*e.g.*, agricultural research in the U.S. Department of Agriculture). Only NSF, whose mission is to support basic and applied research, research facilities, and education across a wide range of science and engineering disciplines, has a primary mission to support science and engineering. For the remaining 97 percent of the federal R&D portfolio, R&D investments are the means to achieve other government ends.

The federal government divides the budget into 20 "functional" groupings to illustrate these national missions, each with a function number.[1] The President's budget and the congressional budget resolution divide the total budget "pie" into functional "slices," which serve as non-binding guides for appropriators in allocating funds to agencies and programs. Viewing the R&D budget by function sheds light on the funding priorities assigned to different areas over time, and allows for international comparisons with other nations' spending on R&D by objective. Table I-4 shows R&D by function in the FY 2007 budget. (Chapter 2 discusses historical trends in federal R&D missions.)

The Administration priority missions of defense development, space exploration, and basic physical sciences research would all receive large increases, while R&D for other national missions would fall sharply (see Table I-4).

Space-related R&D (252) would continue to be a beneficiary of the Bush Administration's January 2004 announcement of a space exploration vision to return humans to the Moon within the next decades and then possibly on to Mars. Space R&D would gain 10.7 percent to $11.5 billion, though entirely from gains in development of new space craft instead of the broader space R&D portfolio. Defense R&D (050) continues to be a high priority with a 1.9 percent boost to $78.4 billion. Boosts to DOE Science and NSF R&D make up the 11.0 percent gain for general science R&D (251) to $8.3 billion.

[1] AAAS separates the general science, space, and technology function (function 250) into its subfunctions of General Science (251) and Space (252). AAAS also counts Department of Veterans Affairs R&D programs in the health (550) function instead of veterans affairs (700).

But R&D for other national missions including agriculture (350; down 19 percent), transportation (400; down 16 percent), and the environment (450; down 7 percent) would all fall in a tight domestic budget. Despite increases for some alternative energy R&D programs, cuts in energy conservation, fossil fuels, and some renewables would result in a 4 percent cut for energy R&D (270) to $1.4 billion. Even health R&D (550) would fall for the second year in a row down to $29.8 billion after decades of steady gains, as would justice R&D (750; down 11.5 percent) after steady gains for the DHS R&D portfolio over the previous four years.

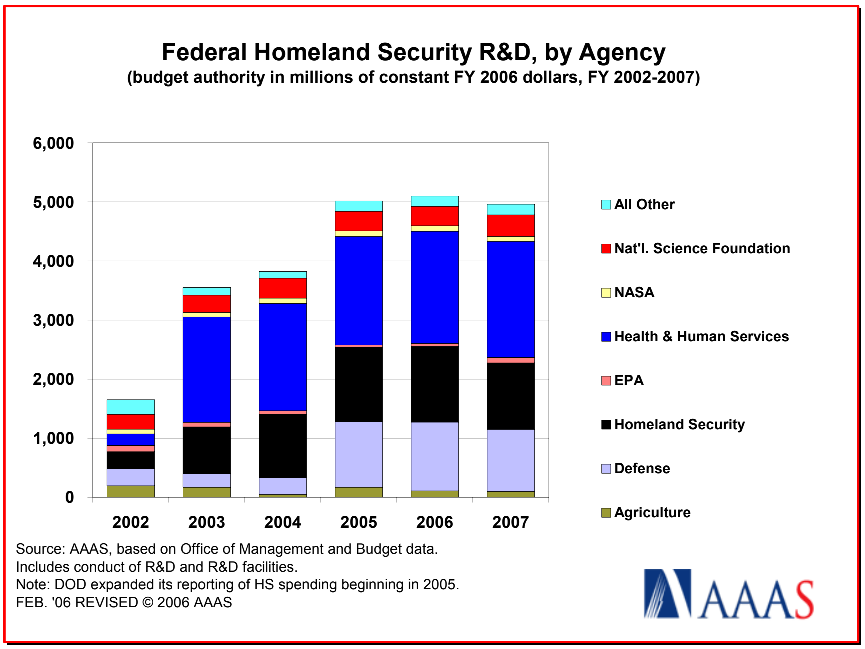

Figure 3.

Although there is much talk of homeland security becoming a major new federal mission, in the budget homeland security spending is a category that cuts across spending on traditional government missions such as national defense, transportation, and justice. R&D in the new Department of Homeland Security (DHS), for example, serves the three missions of defense, justice, and transportation. (See Chapter 12 for more information on DHS.)

Federal homeland security-related R&D would total $5.1 billion in FY 2007, a small loss of $29 million or 0.6 percent that would be the first cut in a portfolio that has expanded dramatically in the aftermath of the 2001 terrorist attacks (see Figure 3 and Table I-6; the totals are significantly higher than in previous years because DOD recently expanded its reporting of homeland security-related spending). The majority of the multi-agency portfolio would remain outside the Department of Homeland Security (DHS), with the largest part in the National Institutes of Health (NIH). NIH's portfolio, mostly in the National Institute of Allergy and Infectious Diseases (NIAID), would total $2.0 billion in FY 2006, up 6.1 percent despite a flat overall NIH budget. The DHS R&D portfolio would fall for the first time with a 10.3 percent proposed cut to $1.1 billion.

R&D BY CHARACTER OF WORK

The total federal R&D portfolio is made up of five different kinds of investments, known as the "character of work" of R&D. Within the R&D portfolio, distinctions are made among basic research, applied research, development, R&D facilities construction, and capital equipment for R&D (See Appendix 2 for definitions. AAAS tables combine R&D facilities construction and capital equipment for R&D, often described together as "R&D facilities" or "R&D plant.") Basic and applied research together make up "research", while the two research categories plus development make up "conduct of R&D." Adding in R&D facilities construction and capital equipment results in "total R&D" or "R&D."

The figures shown in Tables I-5 and II-1 represent agencies' best attempts to classify basic and applied research, development, and R&D facilities within their R&D portfolios. The data reported here are imprecise and reflect the agencies' judgments as to how their R&D fits into the definitions for character of work.

The **total federal investment in research (basic and applied research) would fall 3.3 percent to $54.8 billion because of cuts in both defense and nondefense research** (see Table II-1). Large proposed increases for the three ACI agencies of NSF, DOE Office of Science, and NIST would be more than offset by steep cuts in other agencies' research.

Development would increase 6.0 percent to a record $77.9 billion in FY 2007 because of continuing increases for DOD's development of weapons systems, including national missile defenses, new fighter planes, and an array of other expensive future weapons systems (see Chapter 6 for more on DOD development). NASA development would surge $1.5 billion or 29 percent because of a marked shift from research to the development of new space vehicles. DHS would also shift resources from research to development, resulting in a near-doubling of DHS development from $133 million to $246 million.

R&D facilities spending would fall 1.7 percent to $4.3 billion. NASA accounts for the majority of the facilities investment, primarily for just one facility: the orbiting International Space Station. Here on Earth, the Department of Energy (DOE) is the primary funding source for R&D facilities, mostly for the construction and operation of large-scale scientific user facilities at the DOE national laboratories, facilities that are open for use by the entire scientific community. DOE facilities funding would increase 2.3 percent to $1.2 billion. The largest increase would go to NSF's investments in facilities, up 21 percent to $473 million in FY 2007.

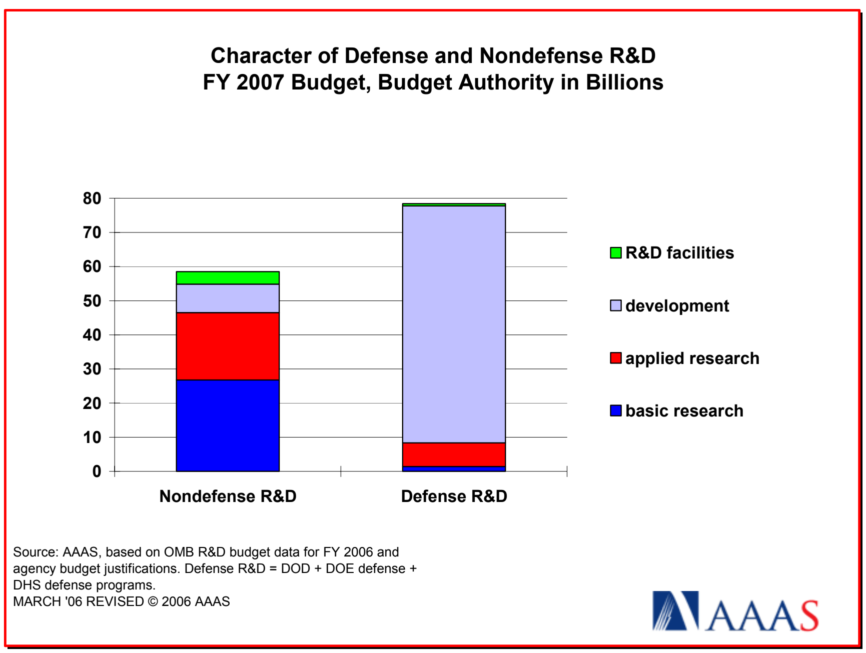

Figure 4.

The character of work is quite different in defense and nondefense R&D, a point illustrated in Table I-5 and Figure 4. Development would be by far the largest component of defense R&D, accounting for 89 percent of the FY 2007 total, while applied research would be 9 percent and basic research would be only 2 percent. In nondefense R&D, by contrast, basic research would be the largest category at 46 percent, with development at only 14 percent and applied research at 34 percent. A major reason for the difference between the character of defense and nondefense R&D is that development in DOD includes testing and evaluation of weapons systems. These activities are extremely expensive compared to other types of R&D. R&D facilities construction and capital equipment costs make up 6 percent of nondefense R&D and 1 percent of defense R&D.

PRIORITY-SETTING FOR FEDERAL R&D INVESTMENTS

Priorities for R&D programs generally depend on the priorities of the agencies in which they are located and the priority of the missions of those agencies. From the standpoint of serving the nation's interests, at least in the short term, this makes good sense, since these R&D programs are not ends in themselves but means to the ends (missions) that their sponsoring agencies serve. From the standpoint of the long-term health of the research enterprise, however, it can cause problems. The mission orientation of R&D programs may make it difficult for policymakers to assess the overall health of the research enterprise, to coordinate programs among different agencies, and to address issues of balance among various scientific and engineering fields and disciplines.

The Office of Management and Budget (OMB), which has overall responsibility for preparation of the President's budget, is able to provide some coordination, although it is hampered by the fact that the agencies that support R&D are treated individually by its different sections in the budget review process. Some coordination also takes place under the National Science and Technology Council (NSTC), an interagency body comprised of cabinet officers and the President. NSTC has organized a number of interagency initiatives in areas of R&D, including global change research, information technology, and nanotechnology. Budgets for three of these initiatives are shown in Table I-9, and are discussed in Chapters 16 (CCSP), 23 (NITRD), and 24 (NNI).

Even the modest level of coordination in R&D in the executive branch is not matched by Congress. Congressional treatment of R&D, like most other aspects of congressional budget and policymaking, is characterized by fragmentation and diffusion of power. R&D programs are considered at two main levels in Congress, that of authorizations and that of appropriations. Authorizing committees (such as the House Science Committee and the Senate Committee on Health, Education, Labor, and Pensions) develop special expertise in the programs they oversee and review the substance of these programs. However, the legislation they prepare does not directly result in spending but only provides guidance and sets appropriations ceilings.

For discretionary programs, including R&D, the power to write the legislation that provides actual spending authority resides in the Appropriations Committees of the House and Senate. These committees are divided into 10 subcommittees, each of which is responsible for a bill that controls one portion of the budget, and 1 bill written by the full committee.

Table I-8 shows the distribution of R&D funds among the newly reorganized appropriations subcommittees; each subcommittee produces its appropriations bill separately from the others, and each bill is usually signed into law separately, although in recent years several bills have had to be bundled into a single omnibus appropriations bill at the end of the congressional session. The FY 2005 omnibus appropriations bill, for example, contained final versions of 9 regular appropriations bills, but in FY 2006 all the appropriations bills were enacted separately.

In the congressional appropriations process, the federal R&D investment is contained in 10 of the 11 appropriations bills (see Table I-8). The large proposed increases for NSF, NASA, and NIST will have to find room in the new Science, State, Justice, and Commerce appropriations bill, while DOD development increases would be funded in the Defense bill. The flat NIH budget would be funded in the always-contentious Labor/HHS/Education bill, which contains many health and education programs that are proposed for steep cuts or even elimination in the FY 2007 request.

The division of the budget into 11 appropriations bills limits the extent to which it is possible to coordinate or trade off increases and decreases in agency R&D budgets in the congressional process. For example, three R&D agencies—NSF, NASA, and the Department of Commerce—are under the jurisdiction of the Subcommittee on Science, State, Justice, and

Commerce. NIH appropriations reside in the Labor, Health and Human Services, and Education subcommittee. This means, for example, that money used for the increase in NASA's budget in FY 2005 did not come from the same pot of money as NIH, although NASA's budget increase was offset with a cut in NSF's budget. But this system does mean that R&D programs compete with non-R&D programs in the same appropriations bill for limited funds.

THE "FEDERAL SCIENCE AND TECHNOLOGY (FS&T)" BUDGET

Five years ago, the Office of Management and Budget (OMB) introduced a "Federal Science and Technology" (FS&T) budget in the FY 2002 budget, and continues to advance this concept in the FY 2007 budget (see Table I-7). The **FS&T budget** is successor to the Clinton Administration's "21st Century Research Fund" (see previous editions of this report) and contains most of the same programs. FS&T is a collection of selected R&D and non-R&D programs that emphasize basic and applied research and the creation of new knowledge or technologies. It also includes some S&T education and training activities but excludes most development, and is designed to be an alternative measure for the federal investment in science and technology and an alternative way to track federal S&T investments in the budget process. (This FS&T budget has a similar emphasis but different definitions from the FS&T concept proposed in 1995 by the National Academies as a subset of federal R&D; thus, the data in Table I-7 differ from NAS discussions of its version of FS&T in previous editions of this report.)

Because of the tight situation for domestic discretionary programs in the FY 2007 budget, FS&T would fall 1.0 percent to $59.8 billion.

U.S. INVESTMENTS IN AN INTERNATIONAL CONTEXT

In absolute terms, the $312 billion spent on R&D from all sources in the U.S. in 2004, the latest year for which full international data are available, was larger than the total R&D expenditures of the entire European Union combined. The U.S. spent 38 percent of world R&D, a share that has declined only slightly over the past decade even as emerging R&D powers such as South Korea and China have dramatically increased spending (see Figure 5). From tiny amounts in the last decade, China has emerged as a major R&D investor this decade. Adjusting for the much lower costs for R&D talent and equipment there, China is now the third largest R&D performer in the world, behind only the U.S. and Japan.

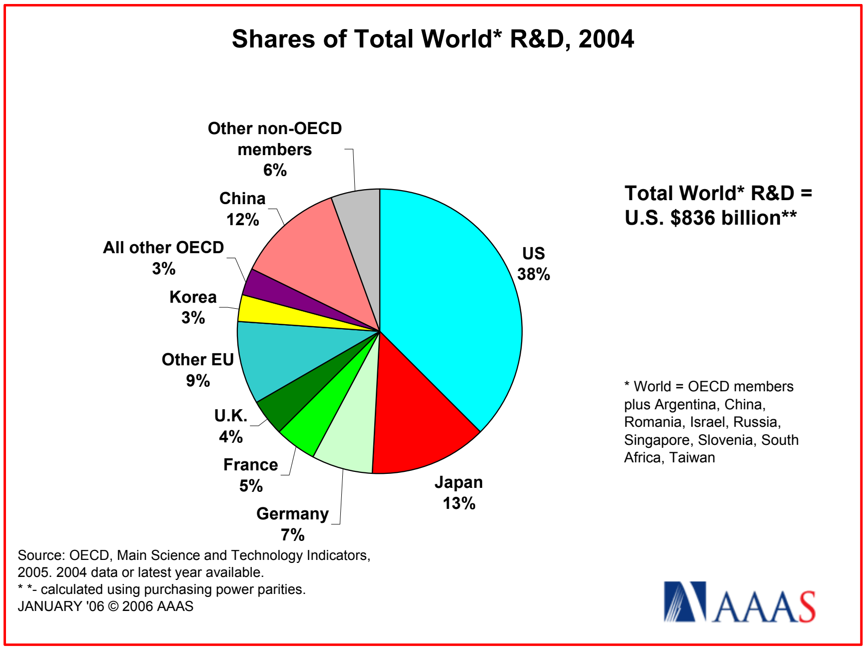

Figure 5.

When one looks at the national R&D expenditures of various countries in relation to the size of their economies, however, the picture is somewhat different. R&D represented 2.66 percent of gross domestic product (GDP) in the United States in 2004. This places the U.S. below Japan (3.1 percent) but above most other major industrialized countries—including the United Kingdom, France, and Germany. Although the EU recently set a goal of attaining an EU-wide R&D investment ratio of 3 percent of the EU economy by 2010, currently the combined EU nations have a R&D/GDP ratio of just 1.9 percent, down significantly from previous figures because of the induction of 10 less research-intensive nations two years ago. On the other hand, a significant share of the U.S. R&D investment is on the military side, where it has relatively little impact on the civilian economy and U.S. industrial competitiveness. This is very different from the situation in Germany and Japan, which devote only a small portion of their R&D resources to defense.