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# Federal R&D in the FY 2008 Budget: An Introduction

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## AN OVERVIEW OF R&D IN THE FY 2008 BUDGET

On February 5, 2007, President Bush released his proposed budget for fiscal year (FY) 2008. The new budget continues old themes from previous budgets: large proposed increases for the three physical sciences agencies in the American Competitiveness Initiative (ACI), increases for weapons development and human spacecraft development, and declining funding for the rest of the federal research and development (R&D) portfolio. Within an overall budget that once again proposes to restrain domestic spending but dramatically increase defense spending, many agencies such as the National Institutes of Health (NIH) would see their R&D funding fall. The overall federal investment in R&D would increase to $143.0 billion, a 1.3 percent increase over the final total for the recently completed FY 2007 budget, but development funding would take up the entire increase and more. The federal investment in basic and applied research would fall 2.1 percent from the 2007 total to $55.5 billion in 2008 as gains in the ACI agencies would be more than offset by cuts in other agencies' research funding. In real terms, the federal research investment would fall for the fourth year in a row after peaking in 2004.

In its broad outlines, President Bush's proposed budget for FY 2008 once again offers the same themes as in previous years: big increases for defense and homeland security, trims in some entitlement programs, extensions of expiring tax cuts, and a promise to reduce the budget deficit primarily by cutting domestic discretionary spending. Unlike last year, when the ACI made its debut, there are no new R&D initiatives in the budget but rather a sustained commitment to increasing funding for the three favored agencies of the National Science Foundation (NSF), the Department of Energy (DOE) Office of Science, and the National Institute of Standards and Technology (NIST) laboratories in Commerce. The three research-oriented ACI agencies lead the pack in R&D gains (see Figure 1), followed closely by proposed gains for development programs in the National Aeronautics and Space Administration (NASA) and the Department of Defense (DOD; see Figure 1). But within a declining domestic budget, there would be stark contrasts between these priority programs and everything else: nearly all other nondefense R&D programs would face cuts, and defense research would also fall steeply.

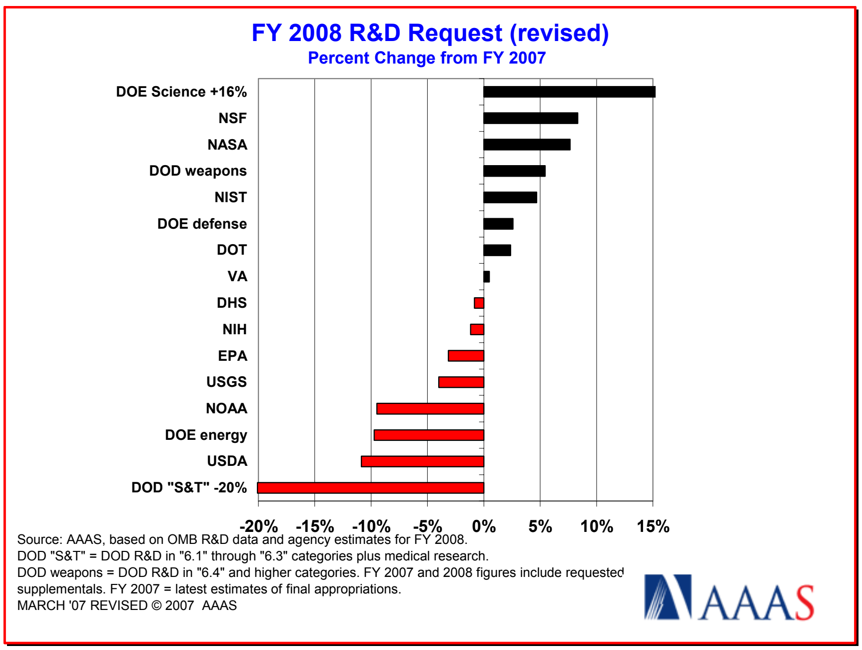


Figure 1.

Most federal agencies prepared their 2008 budgets this January and earlier based on temporary funding levels contained in a continuing resolution (CR) that expired on February 15. On that day, President Bush signed into law the final 2007 joint funding resolution that had cleared Congress a day earlier (Public Law 110-5). The resolution boosts funding for key R&D agencies, including NIH and the ACI agencies. As a result, the 2007 funding baseline for many agencies shifted dramatically after the February 5 release of the 2008 budget. (The FY 2007 figures and FY 2007-08 comparisons are based on revised AAAS estimates of R&D in final FY 2007 appropriations. In many cases, the revisions result in funding trends that differ significantly from funding trends in the President's budget documents.)

**- The proposed federal R&D portfolio in FY 2008 is a record $143.0 billion, $1.9 billion or 1.3 percent above the final 2007 funding level** (see Table II-1). Once again, development would be the clear winner: development funding would hit a new high of $82.8 billion (up $2.3 billion or 2.9 percent) because of large increases for DOD weapons and NASA spacecraft development, including new requests for $1.4 billion in 2007 and $2.9 billion in 2008 for DOD development as part of the Bush Administration's war supplementals.

**- Total federal support of research (basic and applied) would fall 2.1 percent** to $55.5 billion, even after large proposed increases for physical sciences and related research in NSF, DOE's Office of Science, and NIST (see Table II-1). A rare cut in NIH research funding and steep cuts in research funding at DOD, NASA, USDA, and other agencies would more than offset the ACI gains. In real terms, federal research spending would fall for the fourth year in a row, down 7.4 percent from 2004.

**- President Bush's American Competitiveness Initiative (ACI) would once again be the big winner among domestic programs.** The three ACI agencies recently won large increases in 2007 as part of the joint funding resolution; now, the President proposes to boost ACI funding even higher in 2008. NSF R&D would increase 8.3 percent over 2007 to $4.9 billion within a total budget of $6.4 billion (up 8.7 percent). DOE's Office of Science would get a 15.4 percent increase in its R&D funding to $4.1 billion in 2008 over 2007. And R&D performed in the NIST laboratories would increase 13 percent to $420 million. But although the ACI aims to boost federal investments in physical sciences research, the two other major sponsors of the physical sciences would face cuts in their research support: DOD support of basic and applied research would fall 18 percent to $5.9 billion, while NASA research would slide 1.9 percent to $3.4 billion (see Table II-1).

**- The National Institutes of Health (NIH) budget would fall in 2008 compared to 2007.** NIH received a surprise $600 million boost in the 2007 joint funding resolution above what it had been expecting all year, but the additional 2007 money means the $28.8 billion NIH request for 2008 would be a cut instead of an increase. NIH R&D would fall $333 million or 1.2 percent (see Table II-9).

**- NASA R&D would continue to climb to fund the development of new human spacecraft to replace the Space Shuttle.** NASA R&D

would climb 6.7 percent to $12.6 billion, but the entire increase would go to two big projects: finishing the International Space Station and developing the Crew Launch Vehicle / Crew Exploration Vehicle combination. As a result, NASA support of research in the physical sciences, environmental sciences, aeronautics, and other disciplines would fall once again (see Table II-12).

- **Nondefense R&D agencies not linked to the ACI or space would see their R&D funding decline** within a tight domestic budget (see Figure 1). Even R&D in Administration priorities such as DOE's energy R&D (down 8.9 percent to $1.4 billion, primarily because of last-minute infusions of 2007 funds) and DHS R&D (down 0.8 percent to $996 million within an expanding DHS budget) would fall in 2008. Commerce's National Oceanic and Atmospheric Administration (NOAA) would see its R&D funding decline 9.5 percent from a newly boosted 2007 funding level down to $544 million despite an increase for oceans research.

- **Nondefense R&D would increase 1.9 percent to $60.1 billion, far better than the flat funding requested for all nondefense discretionary programs** and just short of 2.4 percent expected inflation (see Table II-1). Boosts for the ACI and space vehicles development help to offset requested cuts in other nondefense R&D programs, but even increases in these areas are not enough to keep the nondefense portfolio from falling behind inflation for the fourth year in a row.

- Defense R&D continues to climb to record levels in wartime, boosted by additional billions for development in both 2007 and 2008 as part of war-related supplemental requests. Total defense R&D would reach $83.0 billion in 2008 (including $2.9 billion in a war supplemental), up 0.9 percent over an FY 2007 total that also includes supplemental funding that was just requested but has not yet been appropriated for the current year. Department of Defense (DOD) weapons systems development would increase dramatically by $3.5 billion or 5.5 percent to a new high of $68.1 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 20.1 percent down to $10.9 billion, with cuts in all three categories of basic research, applied research, and technology development.

- President Bush's FY 2008 budget goes to a newly Democratic-majority Congress, where the R&D requests will go through a newly reorganized appropriations process. Democratic appropriators have reorganized appropriations jurisdictions into 11 bills, 10 of which fund some R&D (see Table I-8). As in the past, 95 percent of the federal R&D portfolio will be appropriated through 4 appropriations bills.

**- Despite increasing attention to climate change and possible policy measures to address it, federal spending on climate change science is falling (see Table I-9)**. **Climate Change Science Program (CCSP)** funding would decline 7.4 percent to $1.5 billion in 2008, falling steeply for the fourth year in a row from nearly $2 billion in 2004. Although climate change funding in most participating agencies remains stable, steep cuts in recent years to NASA research (the largest sponsor of climate change science) have resulted in a diminishing overall federal effort. Among other multi-agency R&D initiatives, funding for the **Networking and Information Technology R&D** initiative would level off at $3.1 billion. The **National Nanotechnology Initiative** would benefit from ACI increases for leading members NSF and DOE Office of Science to reach $1.4 billion (up 3.8 percent). (For more on the NNI, see Chapter 23; for more on NITRD, see Chapter 22; for more on CCSP, see Chapter 15.) (Details of R&D in the largest R&D funding agencies can be found in Chapters 5 through 12.)

## 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 (62 percent) of the nation's *basic* research and nearly two-thirds (64 percent) of the R&D performed in U.S. colleges and universities (see Table I-10). 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 4.6 percent of the overall proposed $2.9 trillion federal budget for FY 2008. 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 2007 and the 2008 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 (40 percent of the total; see Figure 2). Less than 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.

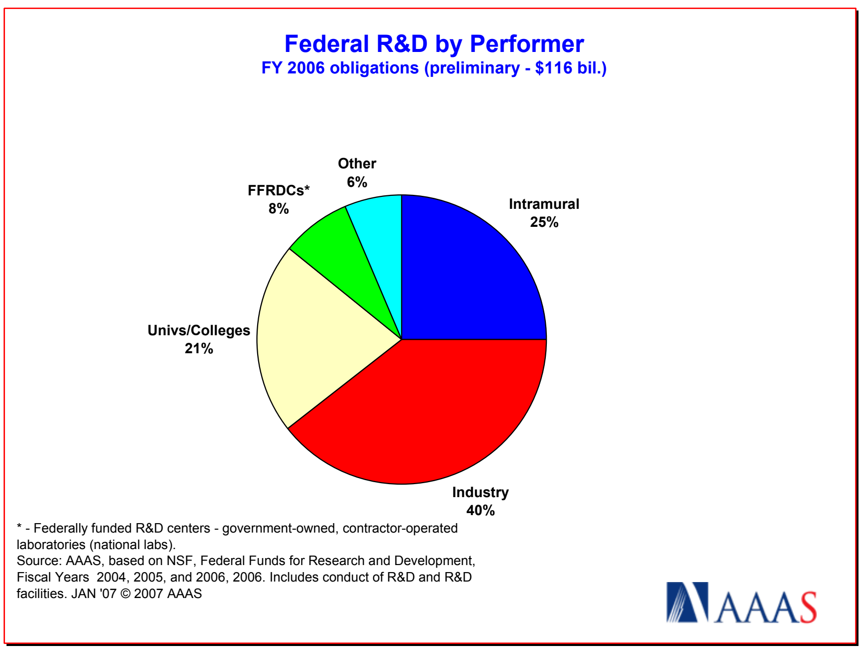


Figure 2.

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 2008 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 in 2008, 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 Vision for Space Exploration to return humans to the Moon within the next decades as a stepping stone to Mars. Space R&D would gain 8.4 percent to $12.0 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 0.9 percent boost to a record $83.0 billion. Boosts to DOE Science and NSF R&D as part of the ACI make up the 11.4 percent gain for general science R&D (251) to $8.9 billion.

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[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 12 percent), transportation (400; down 8 percent), and the environment (450; down 5 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 an 8 percent cut for energy R&D (270) to $1.5 billion. Even health R&D (550) would fall down to $30.1 billion after decades of steady gains.

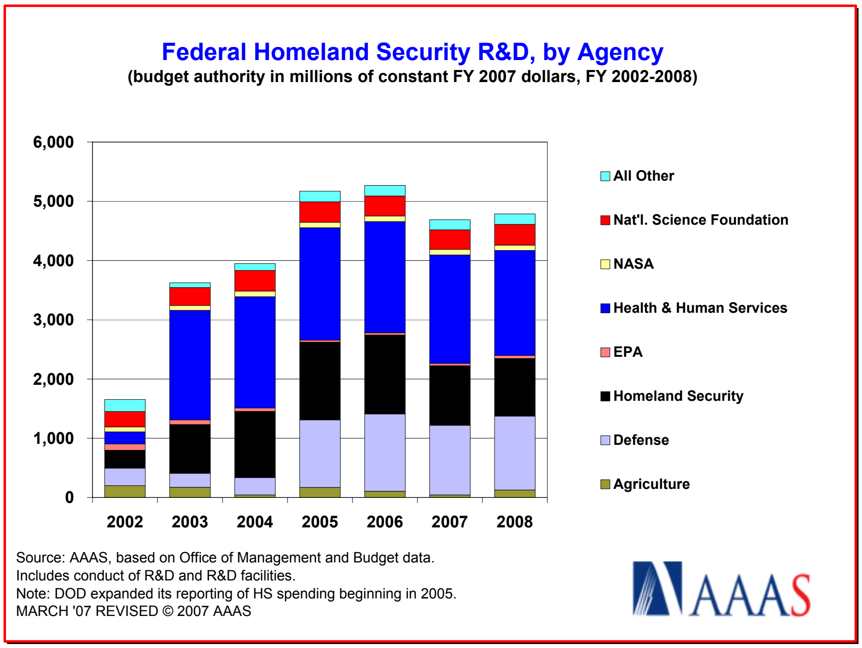


Figure 3.

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 11 for more information on DHS.)

**Federal homeland security-related R&D would total $4.9 billion in FY 2008**, a gain of $212 million or 4.5 percent after a steep fall in 2007 (see Figure 3 and Table I-6; the totals are significantly higher since 2005 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 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 $1.8 billion in FY 2008, down 0.7 percent within a declining NIH budget. The DHS R&D portfolio fell sharply for the first time in 2007 from $1.3 billion down to $1.0 billion, and would decline a little more in 2008. Increases would go to food safety research in USDA, basic research on terrorism-related topics at NSF, and decontamination and drinking water protection projects at EPA.

**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 2.1 percent to $55.5 billion** (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 2.9 percent to a record $82.8 billion in FY 2008 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 5 for more on DOD development). NASA development would surge $497 million or 8 percent because of a continuing shift from research to the development of new space vehicles.

R&D facilities spending would surge 18.5 percent to $4.8 billion. NASA accounts for the majority of the facilities investment, primarily for just one facility: the orbiting International Space Station, funding for which would climb dramatically in 2008. 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, a key part of DOE's ACI investments, would increase 17 percent to $1.1 billion. NSF's investments in facilities, also benefiting from the ACI, would also increase 17 percent, to $498 million in FY 2008.

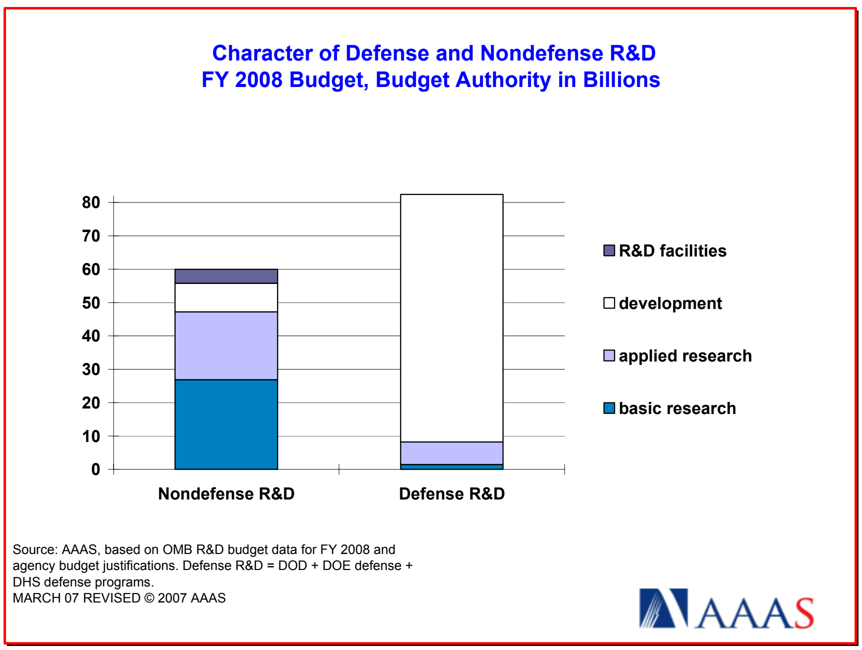


Figure 4.

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 2008 total, while applied research would be 8 percent and basic research would be only 2 percent. In nondefense R&D, by contrast, basic research would be the largest category at 45 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 7 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 15 (CCSP), 22 (NITRD), and 23 (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 and Technology 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 11 subcommittees, each of which is responsible for a bill that controls one portion of the budget.

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 FY 2007, two of the bills were enacted individually, but 9 bills were rolled into a new type of bill, a joint funding resolution that resembles an omnibus bill but funded most programs by formula instead of by specific appropriations.

**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 Commerce, Justice, and Science appropriations bill, while DOD development increases would be funded in the Defense bill. The declining 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 2008 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 Commerce, Justice, and Science. NIH appropriations reside in the Labor, Health and Human Services, and Education subcommittee. This means, for example, that money used for the increase in the NASA 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

Six 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 2008 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 2008 budget, FS&T would fall 0.7 percent to $61.3 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 35 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.

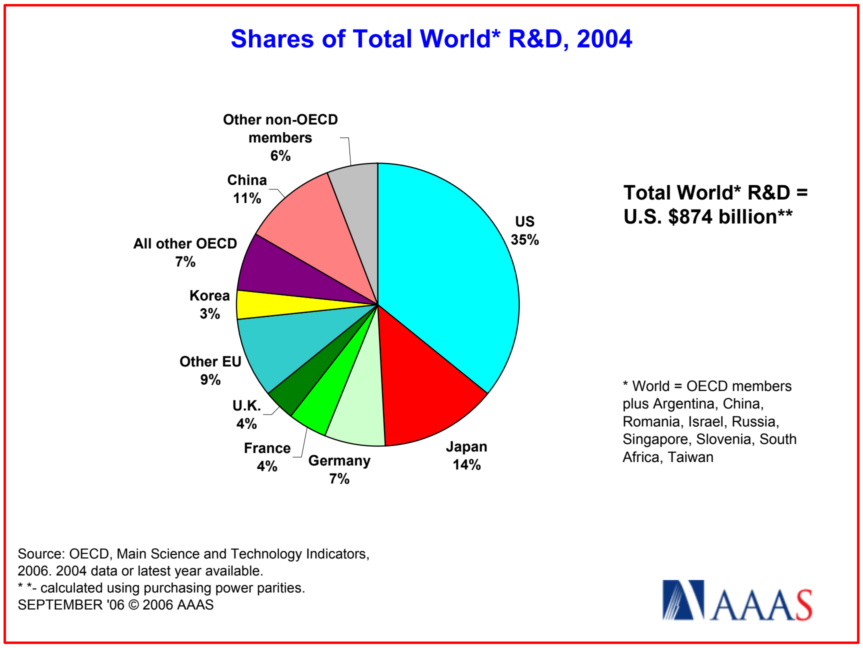


Figure 5.

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 1.8 percent, down significantly from previous figures because of the induction of 10 less research-intensive nations three 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.