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DEFENSE ACQUISITION INFRASTRUCTURE

Changes in RDT&E Laboratories and Centers





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National Security and
International Affairs Division

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The Honorable John R. Kasich
Chairman, Committee on the Budget
House of Representatives

The Honorable William S. Cohen
Chairman, Subcommittee on Oversight of
Government Management and
the District of Columbia
Committee on Governmental Affairs
United States Senate

As requested, we reviewed the Department of Defense's (DOD) research, development, test, and evaluation (RDT&E) infrastructure. Specifically, we (1) reviewed previous studies on DOD's laboratory infrastructure to determine what actions DOD has taken to implement prior recommendations and (2) analyzed data on RDT&E infrastructure funding, workforce composition, and operating cost. On June 6 and June 25, 1996, we briefed your staffs on the results of our review. This report summarizes and updates the information presented at the briefings. It also provides our preliminary examination of lessons learned from successful consolidations that may be applicable to the federal laboratory infrastructure and will be the subject of a later report.

Background

Future spending increases for readiness and weapons modernization will have to come, in part, from infrastructure reduction savings, according to the Secretary of Defense. The combination of the operations and maintenance (O&M) and military personnel appropriations fund about 80 percent of DOD's total infrastructure activities. Thus, if DOD as a whole is to achieve significant infrastructure savings for future force modernization, then most of the savings must come from these two accounts.¹

A segment of this infrastructure is comprised of a diverse network of laboratories and test and evaluation centers. The laboratories and centers are funded partly by the O&M account and, according to DOD officials, to a greater extent by the RDT&E and procurement accounts. In fiscal year 1994, DOD spent more than \$22 billion—about 8 percent of its \$266 billion budget

¹The funding for 80 percent of DOD's infrastructure activities is what we could clearly identify in the Future Years Defense Program—DOD's long-term financial plan. See also Defense Infrastructure: Costs Projected to Increase Between 1997 and 2001 (GAO/NSIAD-96-174, May 31, 1996).

for fiscal year 1994—through 55 military service research, development, engineering, test, and evaluation laboratories and centers worldwide on both in-house and outsourced activities. These organizations employ a workforce of almost 115,000 personnel, including about 95,000 civilian and 20,000 military, although these totals are expected to decrease.

Over the years, DOD's definition of its laboratory and center infrastructure has been a matter of debate. DOD currently defines a research and development (R&D) laboratory as any DOD activity that performs one or more of the following functions: science and technology, engineering development, systems engineering, and engineering support of deployed materiel and its modernization. DOD defines a test and evaluation (T&E) center as any facility or capability used to collect data for T&E. Finally, infrastructure is generally defined as mission-supporting property, plant, equipment, and personnel, including contractor manpower. DOD excludes from this definition the equipment and personnel necessary to perform directly critical technical and acquisition functions.

Results in Brief

Studies of DOD's laboratories and centers have reported excess capacity, but generally have made recommendations focusing on management efficiencies rather than infrastructure reductions. Since 1988, the base realignment and closure (BRAC) process has been the primary vehicle for laboratory and center infrastructure reductions. However, despite four BRAC rounds, reductions in DOD's infrastructure have not kept pace with reductions in its funding, personnel, and force structure levels. According to DOD officials, after all current BRAC actions have been completed, DOD's laboratory infrastructure still will have an excess capacity of approximately 35 percent.

Officials believe that DOD lost opportunities in the BRAC 1995 process to reduce laboratory infrastructure by splitting the analysis of R&D laboratories and T&E centers and because each service tried to protect its own facilities instead of adopting cross-service efficiencies. Some DOD officials and others have suggested that additional BRAC rounds are needed to reduce further defense infrastructure.

Since fiscal year 1990, laboratory funding has been increasing. In contrast to reductions in DOD's overall O&M, procurement, and RDT&E funding since fiscal year 1990, the same accounts have been rising for its laboratories and centers. These increases are due largely to the Navy's reorganization of its RDT&E establishment and an increased laboratory responsibility for

logistics and program management by all of the services. In addition, the services increasingly are dependent on private sector laboratory infrastructure. From fiscal years 1991 to 1994, laboratories and centers increased their outsourced funding and sent roughly 50 percent of the \$22 billion spent in fiscal year 1994 to the private sector.

Limitations in the data available make it difficult for DOD to analyze fully trends in DOD's R&D laboratory and T&E center infrastructure. First, each service has its own distinct laboratory and center organizational structure. Second, a significant discrepancy in data available about the laboratory workforce prevents an analysis of trends in workforce composition. Third, because each service has its own financial system to support unique organizational structures, management approaches, and cultures, DOD has multiple systems reporting disparate elements.² Finally, as a result of these factors, DOD is unable to determine the true cost of operating its laboratory and center infrastructure.³

As part of an ongoing study of successful RDT&E infrastructure consolidations, we are reviewing laboratory and center infrastructure reductions undertaken by the United Kingdom and private industry in the United States. British government officials and private industry representatives said that to consolidate their RDT&E infrastructure, they needed clearly defined, comparable terms for RDT&E organizations and their infrastructure elements; accurate, reliable, and comparable financial data, such as operating costs and overhead; and accurate and reliable data about the composition of the workforce.

Agency Comments

We provided DOD officials with a draft of this report. DOD concurred fully with the information contained in this report. We incorporated their oral comments, as appropriate.

Scope and Methodology

We reviewed studies conducted between fiscal years 1987 and 1996 on DOD's laboratory and center infrastructure. These studies were directed by the Congress, conducted by the defense base closure and realignment commissions and the Office of Science and Technology Policy, or initiated by DOD. We then reviewed our list of studies with the Office of the

²See High Risk Series: An Overview (GAO/HR-95-1, Feb. 1995).

³DOD officials said that they are in the process of hiring an outside consultant to assist them in determining the true cost of operating DOD's RDT&E infrastructure. They currently estimate the total annual costs for operations and program management to be about \$11.5 billion.

Director, Defense Research and Engineering, which identified those studies and recommendations still under consideration or being implemented by DOD.

We analyzed data on RDT&E infrastructure funding, workforce composition, and operating cost. DOD funding data comes from the National Defense Budget Estimates for Fiscal Year 1996. As we note in briefing section II, accurate or comprehensive data on the cost and composition of DOD's RDT&E community does not exist. We obtained the best available data on laboratory funding, operating cost, and general workforce composition from DOD's in-house RDT&E activities management analysis reports for fiscal years 1990 through 1994, the most recent years for which data are available. We did not attempt to verify the accuracy of the data, which provided relative comparison among the various RDT&E activities. All funding data are presented in 1996 constant dollars except for data in appendix I, which are presented in current-year dollars.

To examine the composition of DOD's laboratory and center workforce in greater detail, we obtained data from the Defense Manpower Data Center on military and civilian employment levels from fiscal years 1990 to 1994 stratified by organization, occupational series, and management levels. However, we found a significant discrepancy of more than 40,000 personnel between the Defense Manpower Data Center's 1994 data set and the Department of Defense In-House RDT&E Activities Management Analysis Report for Fiscal Year 1994. Therefore, we were unable to analyze in detail the composition of the laboratory and center workforce. We reported the discrepancy to DOD, which is taking action to correct it.

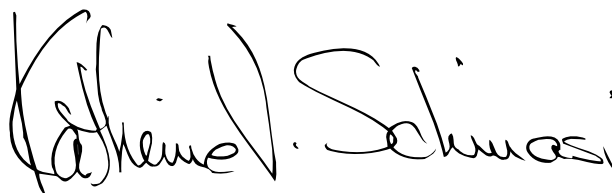
To review methodologies used in consolidations of RDT&E infrastructure outside the U.S. government, we interviewed representatives from the Boeing Defense and Space Group in Seattle, Washington, and officials at the British Embassy in Washington, D.C.

We also visited the Naval Command, Control and Ocean Surveillance Center in San Diego, California; the Army Research Laboratory in Adelphi, Maryland; the U.S. Army Engineer Waterways Experiment Station in Vicksburg, Mississippi; and the Air Force's Wright Laboratory at Wright-Patterson Air Force Base, Ohio. In addition, we interviewed officials from the Laboratory Quality Improvement Program-Financial Subpanel.

We performed our review from November 1995 through July 1996 in accordance with generally accepted government auditing standards.

As arranged with your staff, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from its issue date. At that time, we will send copies to the Secretaries of Defense, the Army, the Navy, and the Air Force, and to other interested congressional committees. We will also make copies available to other interested parties upon request.

Please contact me at (202) 512-4383 if you or your staff have any questions concerning this report. Major contributors to this report are listed in appendix II.

A handwritten signature in black ink that reads "Katherine V. Schinasi". The signature is written in a cursive style with a large initial 'K'.

Katherine V. Schinasi
Associate Director, Defense Acquisitions Issues

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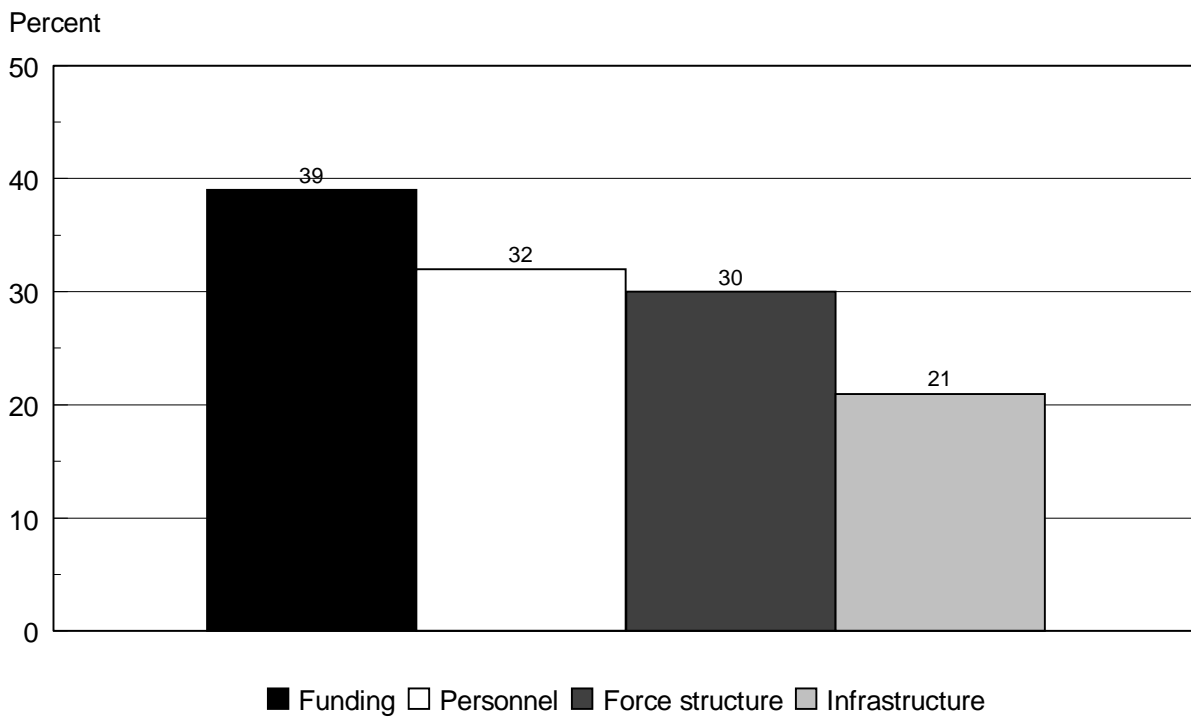
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Abbreviations

BRAC	base realignment and closure
DOD	Department of Defense
NSTC	National Science and Technology Council
O&M	operations and maintenance
OSTP	Office of Science and Technology Policy
R&D	research and development
RDT&E	research, development, test, and evaluation
T&E	test and evaluation

Previous Infrastructure Studies and Recommendations

GAO DOD Reductions Since Fiscal Year 1985



Source: DOD and the 1995 Defense Base Closure and Realignment Commission.

Numerous studies in recent years have concluded that the Department of Defense's (DOD) infrastructure is too large and too costly. Further, reductions in infrastructure lagged behind reductions in funding, personnel, and force structure. According to the Secretary of Defense, future increases in spending for readiness and weapons modernization will have to come from (1) an increase in DOD's budget over the next 5 years, (2) infrastructure reduction savings, and (3) acquisition reforms. The Secretary of Defense said if DOD cannot significantly increase the amount of money available for long-term readiness and force modernization, then it will need to reduce force structure and thus revise the current national military strategy based on the ability to fight two near-simultaneous major regional conflicts.

Despite four rounds of base realignments and closures (BRAC) in 1988, 1991, 1993, and 1995, DOD's infrastructure reductions have not kept pace with reductions in funding, personnel, and force structure. Since fiscal year 1985, the defense budget has declined by 39 percent. Moreover, military and civilian personnel levels are expected to be reduced by up to 32 percent in the next several years. Overall, DOD has reduced the size of the military service force structure by 30 percent. However, the cumulative reduction of the four BRAC rounds will reduce domestic base infrastructure by only 21 percent. In fact, when BRAC 1995 is implemented fully by 2001, significant excess capacity will remain in DOD's infrastructure.

DOD officials noted that DOD's laboratory and test and evaluation (T&E) infrastructure remained relatively flat while funding, personnel, and force structure increased sharply during the early to mid-1980s. They contended it is not clear that DOD's research, development, test, and evaluation (RDT&E) infrastructure reductions should necessarily keep pace with reductions in funding, personnel, and force structure. Although infrastructure reductions often lag behind reductions in these other categories, DOD officials said infrastructure needs must be based on requirements rather than tied to other budget reductions.

GAO Significant Excess Capacity Remains
in DOD Laboratories

- BRAC 1995 left 35% excess capacity in DOD's laboratory infrastructure
 - DOD lost opportunities in the BRAC 1995 process to reduce laboratory infrastructure
 - Splitting RDT&E analysis into two groups created artificial barriers
 - R&D laboratories and T&E facilities were reviewed independently using different methodologies
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**Briefing Section I
Previous Infrastructure Studies and
Recommendations**

According to DOD Laboratory Joint Cross-Service Group officials, who were an integral part of the BRAC 1995 process, DOD's laboratory infrastructure has excess capacity of approximately 35 percent.

Officials believe that DOD lost opportunities in the BRAC 1995 process to reduce laboratory infrastructure. DOD's decision in 1993 to split its analysis of research and development (R&D) laboratories and T&E centers into two groups created artificial barriers around the functions and facilities that each could consider, since the mission and location of laboratories and T&E facilities are often interrelated. Thus, in 1995, R&D laboratories and T&E facilities subsequently were reviewed independently using different methodologies.

GAO Significant Excess Capacity Remains
in DOD Laboratories (Cont.)

- Services protected own facilities
 - Services did not adopt scenarios to reduce excess T&E infrastructure
 - Services could not agree on realignments or closures
 - Little laboratory joint cross-servicing occurred
 - Lack of comparable definitions and data
-

During the BRAC 1995 process, each of the services tried to protect its own facilities, which undermined the BRAC process. Although the services made some reductions, they did not adopt scenarios and the corresponding reduced costs that could have eliminated excess T&E infrastructure.

The military services could not agree on realignments or closures. Even in those areas where there was policy agreement,¹ they were unwilling to collocate or rely on each other. As a result, little joint cross-servicing occurred in BRAC 1995. According to the Director, Defense Research and Engineering, the final results from the Laboratory Joint Cross-Service Group were “disappointing and unbalanced.” Scenarios were not developed to implement potential interservicing alternatives and interservicing did not occur.

Finally, the lack of comparable definitions of laboratories and centers, as well as their infrastructure elements and the lack of accurate, reliable, or comparable data made it difficult for DOD and the 1995 Defense Base Closure and Realignment Commission to analyze potential facilities for closure and realignment.

¹For example, DOD policy was to make maximum use of common support assets. Various commands perform both laboratory and T&E functions. Thus, many buildings and facilities are used for both purposes. DOD components were instructed to look for cross-service or intraservice opportunities to rely on a single military department for support. Moreover, Deputy Secretary of Defense guidance for the BRAC 1995 process stated, in part, that DOD components and joint cross-service groups should, where operationally and cost-effective, strive to retain in only one service militarily unique capabilities used by two or more services, and consolidate workload across the services to reduce capacity.

GAO Results of Previous DOD Laboratory
Studies

- Since 1988, the BRAC process has been the primary vehicle for laboratory infrastructure reductions
 - DOD is implementing prior recommendations from previous studies
 - New presidential and congressional direction given to reduce infrastructure
-

**Briefing Section I
Previous Infrastructure Studies and
Recommendations**

Our analysis of dozens of previous studies shows that since 1988, the BRAC process has been the primary vehicle for laboratory and center infrastructure reductions. In the past, the services reduced the size of their laboratory infrastructure through force structure reductions. During the 20 years prior to BRAC 1988, the military departments consolidated and reduced their laboratory infrastructure by various means. However, between 1988 and 1995, by law, all installations with more than 300 personnel were required to go through the BRAC process. Most laboratories and centers met this threshold. The services reported that cross-service alternatives are more costly or less supportive of their objectives than in-service alternatives. Although limited, according to the Secretary of Defense, the joint cross-service effort did help DOD reduce capacity and determine where joint or collocated functions made functional or economic sense.

Currently, DOD is implementing prior recommendations from several previous studies.² DOD also is implementing presidential and congressional direction to reduce further, consolidate, and restructure DOD laboratory and center infrastructure. This direction is included in the Office of Science and Technology Policy (OSTP)/National Science and Technology Council (NSTC) Interagency Federal Laboratory Review Final Report (1995) and section 277 of the National Defense Authorization Act for Fiscal Year 1996. These reports and direction are discussed in appendix I.

²These studies include the Report of the Defense Science Board 1987 Summer Study on Technology Base Management; Institute for Defense Analyses Long-Term Modernization of Research, Development, Test and Evaluation (RDT&E) Facilities (1991); Base Realignment and Closures: Report of the Defense Secretary's Commission (1988); and Defense Base Closure and Realignment Commission 1991 Report to the President, 1993 Report to the President, and 1995 Report to the President.

GAO Vision 21: DOD's Response to the
President and the Congress

- OSTP/NSTC report directed DOD to submit a report to the President detailing its plans and schedules for downsizing DOD laboratories
 - The Secretary of Defense is required by law to develop a 5-year plan to consolidate and restructure DOD laboratories and T&E centers
 - Vision 21 report is DOD's plan to develop an action plan by July 1998
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The OSTP/NSTC's report, entitled Interagency Federal Laboratory Review Final Report (May 15, 1995), directed DOD to submit a report to the President by February 15, 1996, detailing plans and schedules for downsizing DOD laboratories. The report was required to include opportunities to increase efficiency through cross-service integration and service laboratory consolidations. It subsequently was delayed to combine it with a report directed by the Congress.

Section 277 of the National Defense Authorization Act for Fiscal Year 1996 directed the Secretary of Defense to develop a 5-year plan to consolidate and restructure DOD's laboratories and centers. The objective is for the Secretary to specify the actions needed to consolidate the laboratories and centers into as few facilities as practical and possible, by October 1, 2005. The Secretary was required to submit a report on the plan to the congressional defense committees by May 1, 1996.

DOD consolidated its response to the President and the Congress in its Vision 21 report. It was submitted to the congressional defense committees and to OSTP in May 1996. This report summarizes reductions already made in DOD laboratory and center infrastructure through the BRAC processes as well as DOD's plan for its laboratories and T&E centers for the 21st century. The report outlines how DOD will develop a detailed plan by July 1998.

GAO Future Laboratory Infrastructure
Reduction

- One Vision 21 option is to reduce laboratory and T&E infrastructure each by at least 20 percent beyond BRAC 1995
 - DOD's intent is to baseline consolidation and downsizing efforts on all BRAC-related actions plus non-BRAC actions as of May 1996
 - Unclear what further laboratory infrastructure reductions will be achieved
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**Briefing Section I
Previous Infrastructure Studies and
Recommendations**

The Vision 21 report states that one option DOD will consider is reducing DOD's laboratory and T&E infrastructure each by at least 20 percent beyond the BRAC 1995 recommendations. DOD considers the completion of all BRAC-related actions and non-BRAC-related actions occurring as of May 1, 1996, as its baseline for Vision 21. It is unclear what further laboratory infrastructure reductions will be achieved.

GAO **Need for Another Round of Base
Closures**

- Secretary of Defense suggested an additional round of closures in 3 to 4 years after DOD has absorbed effects of closures from prior rounds
 - Chairman, JCS sees need for additional base closing authority in the future
 - Under Secretary of Defense (A&T) said DOD likely will request next year that Congress authorize several more rounds of base closure and realignment
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Note: JCS is the Joint Chiefs of Staff and A&T is Acquisition and Technology.

The Secretary of Defense told the 1995 Defense Base Closure and Realignment Commission that DOD still will have excess infrastructure even after BRAC 1995 actions have been completed. Several DOD officials suggested that one option to reduce the defense infrastructure is to undertake an additional round of base closures and realignments. In particular, the Secretary suggested another BRAC round in 3 to 4 years, after DOD absorbed the effects of all previous BRAC rounds. The Chairman of the Joint Chiefs of Staff said that excess capacity would remain in DOD after BRAC 1995. The Chairman agreed with the Secretary of Defense on the need for additional base closing authority in the future and said opportunities remain in DOD to increase cross-servicing. The Under Secretary of Defense for Acquisition and Technology said that, in his opinion, given the pressures to achieve an enormous increase in modernization funding in coming years, DOD is likely in fiscal year 1997 to request that the Congress authorize several more BRAC rounds, including a specific focus on laboratories.

Trends in Cost, Size, and Composition of DOD's R&D Laboratory and T&E Center Infrastructure

GAO Limitations to Analysis of Trends in RDT&E Infrastructure

- Distinct service laboratory and center organizational structures
 - Discrepancy in laboratory and center workforce data
 - Unique service financial systems report disparate elements
 - DOD unable to determine true cost of operating laboratory and center infrastructure
-

**Briefing Section II
Trends in Cost, Size, and Composition of
DOD's R&D Laboratory and T&E Center
Infrastructure**

Limitations in the data available make it difficult for DOD to analyze fully trends in DOD's R&D laboratory and T&E center infrastructure. First, each service has its own distinct laboratory and center organizational structure. Second, a significant discrepancy in data available about the laboratory workforce prevents an analysis of trends in workforce composition. Third, because each service has its own financial system to support unique organizational structures, management approaches, and cultures, DOD has multiple systems reporting disparate elements. Finally, as a result of these factors, DOD is unable to determine the true cost of operating its laboratory and center infrastructure.

GAO Required Components for Streamlining
Infrastructure

- Two common elements present in effective RDT&E infrastructure consolidation efforts
 - Clearly defined, comparable terms for RDT&E organizations and their infrastructure elements
 - Accurate, reliable, or comparable data

 - DOD has neither
-

**Briefing Section II
Trends in Cost, Size, and Composition of
DOD's R&D Laboratory and T&E Center
Infrastructure**

As part of an ongoing study of successful RDT&E infrastructure consolidations, we are reviewing laboratory and center infrastructure reductions undertaken by the United Kingdom and private industry in the United States. According to British government officials and private industry representatives, their consolidations were enhanced by clearly defined, comparable terms for RDT&E organizations and their infrastructure elements. They said they also benefited from accurate, reliable, and comparable financial data, such as operating costs and overhead, as well as accurate and reliable data about the composition of the workforce.

In contrast, DOD officials said that they do not know the true cost of operating much of their RDT&E infrastructure.¹ Because each service has its own financial system to support unique organizational structures, management approaches, and cultures, DOD has multiple financial systems reporting on a wide variety of elements. Thus, disparate financial data, as well as DOD's various definitions for laboratories and centers, makes it difficult to compare the services' RDT&E organizations across DOD.

¹DOD officials said that they are in the process of hiring an outside consultant to assist them in determining the true cost of operating DOD's RDT&E infrastructure. They currently estimate the total annual costs for operations and program management to be about \$11.5 billion.

GAO Significant Differences Exist Between Services' Laboratory Structures

	Air Force	Navy	Army
Organization and composition	Four R&D laboratories with separate T&E centers and engineering support in product centers	Single corporate laboratory and four full life-cycle warfare centers	Three largely independent laboratory structures: Army Materiel Command/ Army Corps of Engineers/Medical
Financing	Direct funding by appropriation and some industrial funding	Defense Business Operations Fund (industrial funding) customer-supplier relationship	Direct funding by appropriation (Corps of Engineers by appropriations and industrial funding)
Infrastructure responsibility	Tenant relationships with Air Force bases. Air Force customers not charged overhead	Owns and operates principal facilities. Distributes all costs to customers through Defense Business Operations Fund	Mixed responsibility

DOD's ability to compare the services' laboratories and centers is obscured by significant differences in their RDT&E infrastructure. These differences can be divided into three categories: organization and composition, financing, and infrastructure responsibility.

At the most fundamental organizational level, the services' RDT&E infrastructures vary greatly in size and composition. In the Air Force, about 12,000 civilian and 11,000 military personnel conduct RDT&E. They

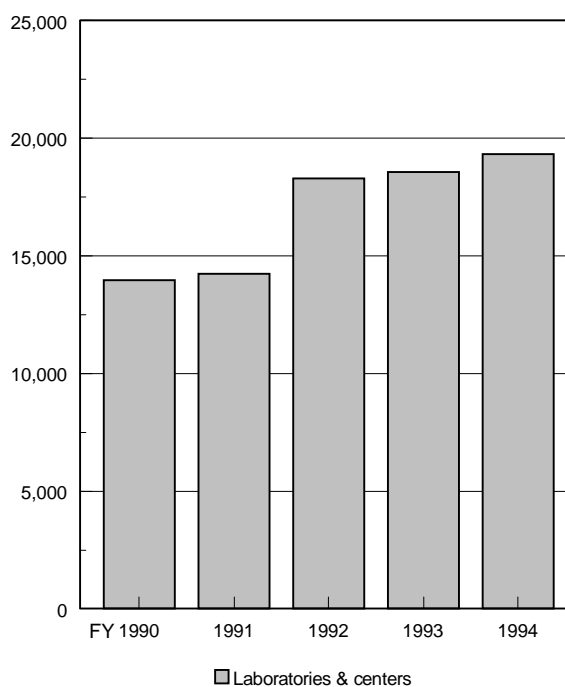
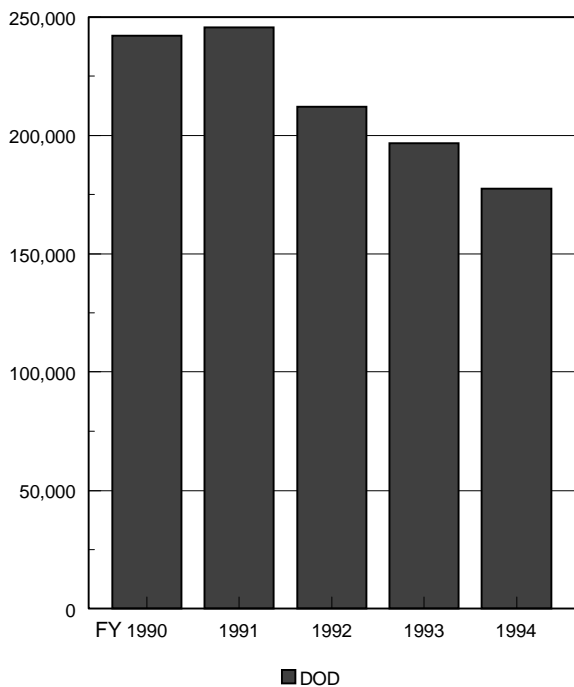
work at four laboratories that perform basic research and development in space; aircraft; command, control, communications, and intelligence; and human systems; as well as three distinct T&E centers and one engineering development center. The Navy employs about 55,000 civilian and 5,000 military personnel in 4 large warfare centers and 1 corporate laboratory. The warfare centers are aligned with the naval systems commands (sea, air, and space and naval warfare) and provide full spectrum support (basic research to in-service engineering) on families of platforms and systems. Finally, the Army's 31 laboratories are organized into 3 largely independent systems—the Army Research Laboratory and research development and engineering centers of the Army Materiel Command; Army Corps of Engineers laboratories and centers; and medical laboratories—and employ about 27,000 civilian and 4,000 military personnel.

Attempts to compare service laboratories and centers are made even more difficult by differences in financing. Laboratories and centers generally have one or two sources of financing: institutional funding (direct appropriations from the Congress) and industrial funding (reimbursable contracts with customers). Air Force laboratories and centers receive mostly appropriated funds, which they complement with some reimbursable contracts. Navy laboratory and centers operate under the Defense Business Operations Fund and do all work under reimbursable contracts. The Army has a hybrid of the two sources. The Army Research Laboratory; the research, development, and engineering centers; and the medical laboratories are primarily funded by appropriations, while the Army Corps of Engineers laboratories are funded by 40 to 50 percent reimbursable funds.

Institutionally and industrially funded laboratories and centers are responsible for financing different amounts of their facility infrastructure. Most institutionally funded laboratories, such as those in the Air Force, are tenants on larger military bases. This host-tenant relationship generally results in the tenant receiving reduced cost or no-cost support services, which means customers are not charged for overhead costs. In contrast, industrially funded laboratories and centers, such as the Navy's, are responsible for all operating costs, including maintaining their physical plants and providing other necessary support services, such as human resources, security, and accounting support. These laboratories and centers include operating costs and overhead in their charges to customers. The result is that the cost of a project at an institutionally funded activity appears less than at an industrially funded activity.

GAO Divergent Trends in Three Budget Accounts for DOD and Service Laboratories/Centers

Constant 1996 dollars in millions



Note: Three budget accounts are RDT&E, O&M, and Procurement.

Sources: DOD National Defense Budget Estimates for fiscal year 1996 and DOD in-house RDT&E activities management analysis reports for fiscal years 1990 to 1994.

Briefing Section II
Trends in Cost, Size, and Composition of
DOD's R&D Laboratory and T&E Center
Infrastructure

As presented in DOD's in-house RDT&E activities management analysis reports, the funding sent through laboratories and centers for work done in-house and outsourced is the sum of total obligational authority² from four funding categories: RDT&E, operations and maintenance (O&M), procurement, and other. Trends in RDT&E, O&M, and procurement can be compared for laboratories/centers and for DOD as a whole. The sum of these three categories for DOD decreased by about 27 percent, from \$242.0 billion in fiscal year 1990 to \$177.6 billion in fiscal year 1994. In contrast, service laboratory and center funding for the same categories increased about 38 percent, from approximately \$14.0 billion to \$19.3 billion over the same period. Including the other funding category increased the total funding for service laboratories and centers in fiscal year 1994 to more than \$22 billion.

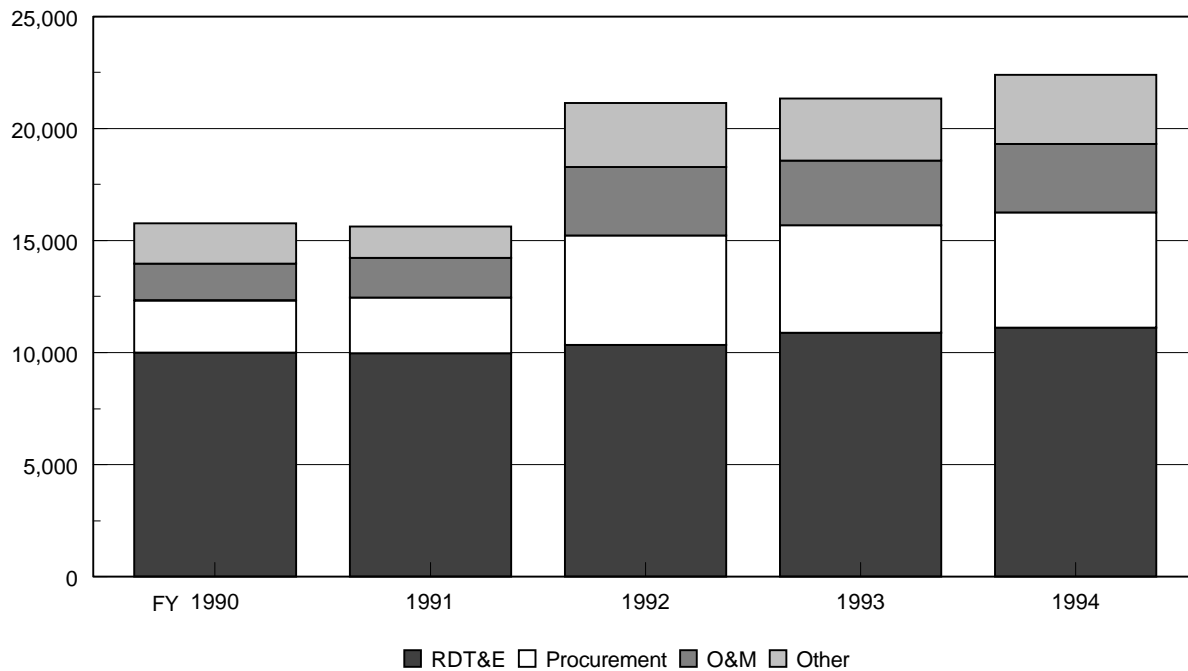
According to officials in the Office of the Director, Defense Research and Engineering, the rise in the laboratories' and centers' O&M and procurement accounts was due largely to the Navy's reorganization of its RDT&E establishment into warfare centers and the services' implementation of Defense Management Review Directive 922, dated January 2, 1992. Under this directive, the laboratories and centers took on added responsibilities in logistics and program management areas. As a result, according to DOD officials, the laboratories serve as conduits from program offices to private industry for roughly 50 percent of the \$22 billion spent annually. In addition, DOD officials said that the laboratory personnel are being cut 5 percent annually (over 30,000 people) through fiscal year 2001 to meet Defense Planning Guidance requirements.

DOD officials also stated that due to reporting inconsistencies by the services, funding authority granted to one service and then passed through to another service under reimbursable contracts may be reported by both services in DOD's in-house RDT&E activities management analysis reports. Thus, the officials believe the increases represent an undefined level of "double counting," which they were unable to document during our review.

²Obligational authority is the sum of (1) budget authority provided for a given fiscal year, (2) unobligated balances of amounts brought forward from prior years, (3) amounts of offsetting collections to be credited to specific funds or accounts during that year, and (4) transfers between funds and accounts. The balance of obligational authority is an amount carried over from one year to the next because not all obligational authority that becomes available in a fiscal year is obligated and paid out in that same year.

GAO Trends in Laboratory Total Obligational Authority

Constant 1996 dollars in millions



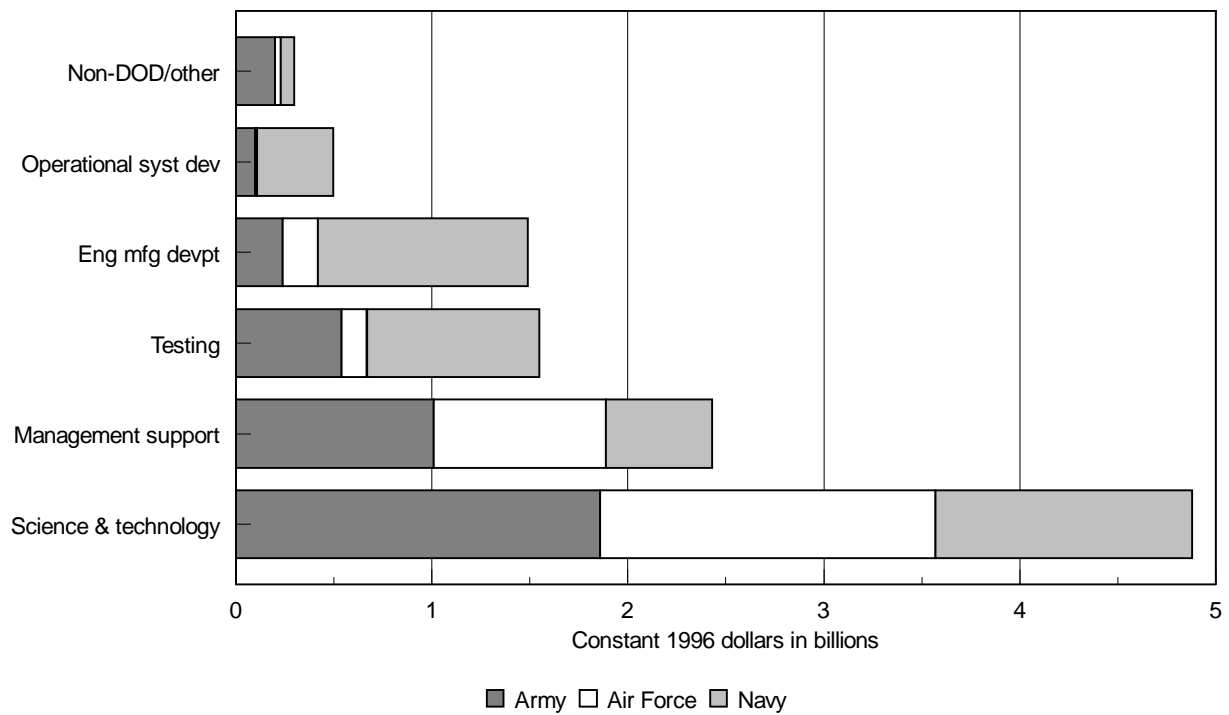
Source: DOD in-house RDT&E activities management analysis reports for fiscal years 1990 to 1994.

**Briefing Section II
Trends in Cost, Size, and Composition of
DOD's R&D Laboratory and T&E Center
Infrastructure**

A breakout of laboratory and center funding trends reveals that procurement, O&M, and other funding categories each have increased for fiscal years 1990 to 1994. Procurement has increased 126 percent, from about \$2.3 billion to \$5.2 billion; O&M has increased 88 percent, from about \$1.6 billion to \$3.0 billion; and other has increased 78 percent, from about \$1.8 billion to \$3.2 billion. However, RDT&E funding has remained relatively constant, increasing only 11 percent, from about \$10.0 billion to \$11.1 billion.

GAO Breakout of Laboratory and Center RDT&E Funding

RDT&E research categories



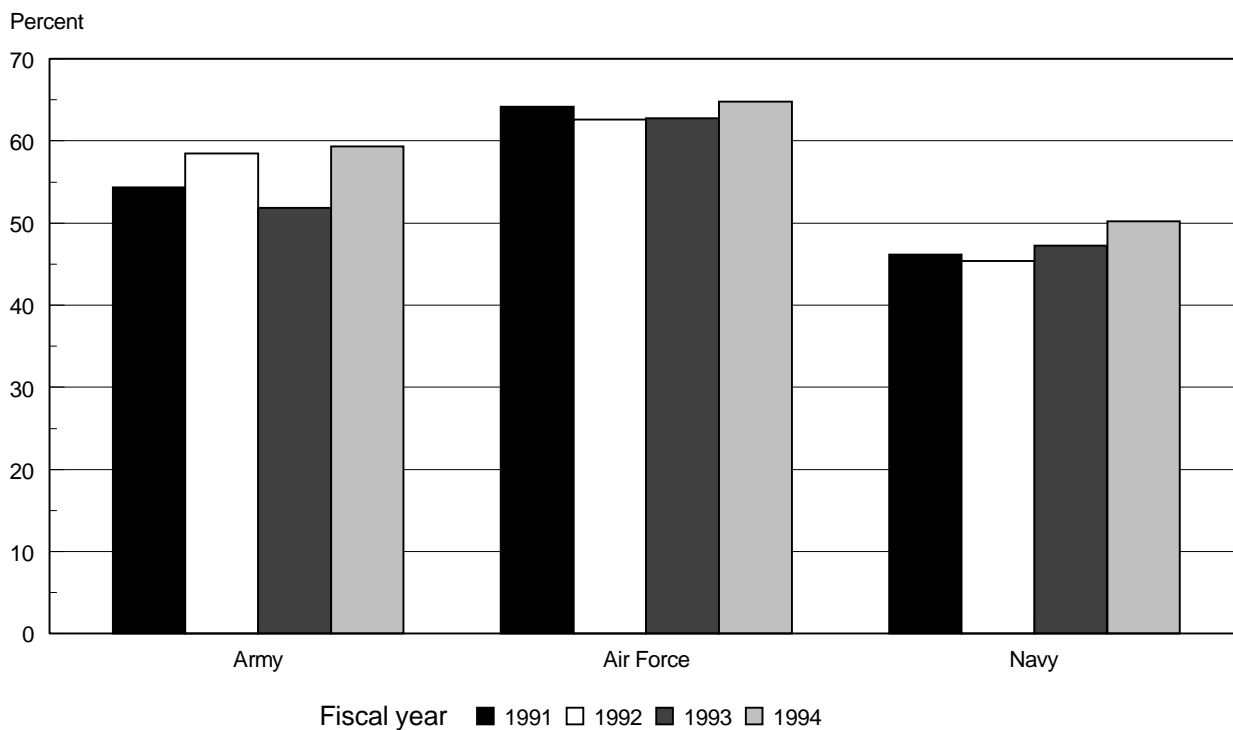
Source: Department of Defense In-House RDT&E Activities Management Analysis Report for Fiscal Year 1994.

**Briefing Section II
Trends in Cost, Size, and Composition of
DOD's R&D Laboratory and T&E Center
Infrastructure**

The RDT&E funding category is about 50 percent of all laboratory and center funding. Its budget activities can be broken out into eight research categories: basic research; exploratory development (applied research); advanced technology development; demonstration and validation, also known as testing; engineering and manufacturing development; management support; operational systems development (budget account categories 6.1 through 6.7, respectively); and non-DOD/other. The first three categories combined can be defined as science and technology.

In fiscal year 1994, the two largest segments of RDT&E funding were science and technology and management support. Also, the sum of RDT&E management support, O&M, and other—funding categories that contribute to supporting the RDT&E infrastructure—were about 38 percent of all laboratory and center funding.

GAO Percentage of Total Laboratory Funding Dollars Outsourced



Source: DOD in-house RDT&E activities management analysis reports for fiscal years 1991 to 1994.

**Briefing Section II
Trends in Cost, Size, and Composition of
DOD's R&D Laboratory and T&E Center
Infrastructure**

Service laboratories and centers increasingly are dependent on private sector laboratory infrastructure. From fiscal years 1991 to 1994, defense laboratories and centers consistently outsourced more than 50 percent of their total funding dollars. During that time, they increased the dollar amount of their outsourced funding by about 46 percent, from approximately \$8.4 billion to \$12.3 billion.

Of the three services, the Air Force outsourced the largest percentage of its laboratory and center funding in fiscal year 1994 (about 65 percent). However, the Navy not only outsourced the largest dollar amount of funding (\$6.6 billion), but also had the largest increase (about 106 percent from about \$3.2 billion in fiscal year 1991 to about \$6.6 billion in fiscal year 1994). According to DOD officials, these increases are due largely to the Navy's reorganization of its RDT&E establishment into warfare centers.

The R&D laboratory and T&E center infrastructure encompasses more than the military facilities themselves; it includes an established private sector infrastructure on which the laboratories are dependent. DOD officials said that one advantage of using private contractors is the ability to shed overhead structure as technical requirements or funding resources change over time. In addition, it is current DOD policy to outsource DOD functions or activities whenever reasonable and possible.

DOD Focus on Prior Laboratory Studies

Currently, DOD is focusing its efforts and committing its resources to implementing prior recommendations contained in the following studies. Also, DOD is implementing presidential and congressional direction, discussed below, to reduce further its laboratory infrastructure.

Report of the Defense Science Board 1987 Summer Study on Technology Base Management (Defense Science Board, 1987). This study serves as a baseline study, since DOD is still implementing its recommendations. The Defense Science Board was tasked by the Under Secretary of Defense for Acquisition to evaluate the management of DOD's technology base and to make recommendations to improve management's effectiveness and efficiency. The study addressed (1) the best DOD-wide management structure and decision-making process to identify and emphasize technology areas likely to be critical to defense capabilities in the future; (2) more effective coordination of advanced technology development activities within and between the services and their laboratories, the defense agencies, the Strategic Defense Initiative Organization, national laboratories, industry, the university community, and our allies; (3) the establishment of "critical mass" in terms of funding, facilities, and human resources for technology areas having the greatest potential; and (4) the transition of emerging technologies to military systems.

Long-Term Modernization of Research, Development, Test and Evaluation (RDT&E) Facilities (Institute for Defense Analyses, 1991). The Institute for Defense Analyses was requested to provide the Deputy Director, Defense Research and Engineering, with analyses and recommendations to respond to a congressional committee request for DOD to develop a long-term modernization plan for RDT&E facilities. The report found that the average age of real property used by DOD research activities is older than the average ages of similar structures in other parts of the government and in industry. It determined the age and value of DOD research facilities and calculated the renewal period of investment, which was far in excess of that in other parts of government or industry. Also, it analyzed military construction needs at RDT&E activities among the military services. Finally, the report recommended the establishment of a structure to provide oversight of laboratory capabilities and improvements and a process to delineate long-range planning.

Base Realignments and Closures: Report of the Defense Secretary's Commission (1988). To ensure that scarce DOD resources would be devoted to the most pressing operational and investment requirements rather than maintaining unneeded property, facilities, or overhead, the

Secretary of Defense chartered the 1988 Commission. The 1988 Commission sought to close obsolete military bases and bring the base structure in line with the declining force structure. Legislation passed in late 1988 provided relief from statutory impediments to closures, such as a partial exemption from the National Environmental Policy Act of 1969, delegation of property management and disposal authority, and an expedited process for congressional review of BRAC recommendations. The 1988 Commission recommended the closure of 86 military facilities and the realignment of 59 others, with an estimated savings of \$693.6 million annually. The 1988 Commission's recommendations represented a reduction of approximately 3 percent of the domestic base structure.

1991 Report to the President (Defense Base Closure and Realignment Commission, 1991). The 1991 Commission recommended the closure of 34 bases and the realignment of 48 others. These actions are expected to generate an estimated net savings of \$2.3 billion between fiscal years 1992 and 1997 and recurring savings of \$1.5 billion annually after a one-time cost of \$4.1 billion. The 1991 Commission's recommendations represented a reduction of approximately 5.4 percent of the domestic base structure.

1993 Report to the President (Defense Base Closure and Realignment Commission, 1993). The 1993 Commission recommended the closure of 130 bases and the realignment of 45 others. Estimated net savings from fiscal years 1994 to 1999 were approximately \$3.8 billion after one-time costs of approximately \$7.4 billion. The savings from these actions are estimated to total \$2.3 billion annually. The approved closures and realignments represent a further reduction of 6.2 percent of the domestic base structure.

1995 Report to the President (Defense Base Closure and Realignment Commission, 1995). The 1995 Commission recommended the closure, realignment, redirection, disestablishment, and relocation of 132 bases. These actions are expected to generate an annual savings of \$1.6 billion after one-time costs of approximately \$3.6 billion. Over the next 20 years, the total savings are expected to be approximately \$19.3 billion. The 1995 Commission recommendations represent a reduction of approximately 6 percent of the domestic base structure.

Interagency Federal Laboratory Review Final Report (National Science and Technology Council, Office of Science and Technology Policy, Executive Office of the President, 1995). A Presidential Review Directive/NSTC-1, dated May 5, 1994, established the Interagency Federal

Laboratory Review, which focused on the federal government's three largest laboratory systems: DOD, the Department of Energy, and the National Aeronautics and Space Administration. All of these laboratory systems are reevaluating their roles as a result of the end of the Cold War and the National Performance Review of 1993. Because the future of these three major laboratory systems has important implications for the nation's entire research enterprise, the Council initiated this review, under the authority of the Presidential Review Directive, to guide, build upon, and integrate the individual agency reviews. The core purpose of this review was to evaluate the laboratories' effectiveness in meeting Council-identified areas of evolving national need and to identify ways the laboratories could effectively and efficiently contribute to meeting these needs.

Five-Year Plan for Consolidation of Defense Laboratories and Test and Evaluation Centers (Pub. L. No. 104-106, §277, 110 Stat. 186 (1996)). Section 277 of the National Defense Authorization Act for Fiscal Year 1996 requires the Secretary of Defense, acting through the Vice Chief of Staff of the Army, the Vice Chief of Naval Operations, and the Vice Chief of Staff of the Air Force (in their roles as Test and Evaluation Executive Agent Board of Directors) to develop a 5-year plan to consolidate and restructure DOD laboratories and T&E centers. The Secretary must consider, at a minimum, (1) the consolidation of common support functions; (2) the extent to which any military construction, acquisition of equipment, or modernization of equipment is planned at the laboratories and centers; (3) the encroachment on the laboratories and centers by residential and industrial expansion; (4) the total cost to the federal government of continuing to operate the laboratories and centers; (5) the cost savings and program effectiveness of locating laboratories and centers at the same sites; (6) any loss of expertise resulting from the consolidations; and (7) the necessity of any additional legislation to enable the Secretary to accomplish the downsizing and consolidation of the laboratories and centers.

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