RECOMMENDATION #5

The Commission recommends that the federal government establish a national aerospace policy and promote aerospace by creating a government-wide management structure. This would include a White House policy coordinating council, an aerospace management office in the Office of Management and Budget, and a joint committee in Congress. The Commission further recommends the use of an annual aerospace sectoral budget to establish presidential aerospace initiatives, assure coordinated funding for such initiatives, and replace vertical decision-making with horizontally determined decisions in both authorizations and appropriations.

Chapter 5

Government: Prioritize and Promote Aerospace

The federal government plays a key role in promoting the health of the U.S. aerospace industry. Maintaining global aerospace leadership to ensure America's military preeminence, guarantee homeland security, and assure economic growth and a superior quality of life for our citizens in the 21st century requires government activism. Aerospace provides the fastest, safest, most flexible and often the only means of travel and security. A coherent and integrated national aerospace consensus is critical to move the country forward, drive government action, and preserve U.S. global aerospace leadership.

The federal government has called on the aerospace industry in time of crisis in the past. The aerospace industry has always responded when called. Today, the U.S. aerospace industry is in jeopardy and is looking to the federal government to respond. The Commission is not asking for the federal government to create industrial policy, to pick winners and losers, or to subsidize the development of commercial aerospace products and services. But, the federal government must recognize that its interactions with industry are key to its strength and long-term survival and, ultimately, to the security and economic prosperity of America.

The health of the aerospace industry, today and in the future, is inextricably linked to the leadership of the federal government.

Objective: Government—Flexible, Responsive and Oriented Towards Decision Making

The health of the aerospace industry, today and in the future, is inextricably linked to the leadership of the federal government. Its interaction with the U.S. aerospace industry is vast, complex, and multi-dimensional. In the rapidly changing global economy, government leadership must be increasingly flexible,

responsive and oriented toward decisionmaking at macro-levels. It must prioritize and promote aerospace both within the government and in its interaction's with the industry in order to realize the fullest potential of aerospace to the nation.

- As a leader, the government must provide the national policies and investments needed for the industry to be competitive, to be innovative and to serve the public good both in the short and long term.
- As a customer and operator, the government must buy, use and provide the finest aerospace products and services for the public good, such as for national defense, homeland security, air transportation and science.
- As a facilitator, the government must create a level international playing field so that the U.S. aerospace industry can compete openly and fairly around the world.
- As an enabler, the government must look to and enable the future by investing in workforce development, public infrastructure, and long-term research critical to the nation's future.

In sum, the health and future of the aerospace industry depends on the federal government performing these functions efficiently and effectively in order to preserve our national security, economic prosperity and the quality of life of all Americans.

Issues

National Aerospace Consensus: Needed

The development and implementation of federal aerospace policy is currently spread across multiple government departments and agencies, with oversight by numerous and different Congressional committees. (See Appendices F and G.) Therefore, no organization in either the executive branch or the legislative branch has an integrated view of the health and future of the aerospace sector.

Air transportation policy is but one example of an aerospace issue that crosses many federal departments and agencies.

- The Department of Transportation (DOT) develops domestic and international aviation policy.
- The Federal Aviation Administration (FAA) regulates and certifies aircraft safety; develops, acquires and maintains the air traffic control facilities and equipment at commercial airports; and provides the air traffic controllers and operates the air traffic management system.
- The Department of Defense (DoD) acquires and maintains the air traffic systems for its airfields; trains military air controllers; and develops and operates air and space surveillance systems, secure communications and the Global Positioning System (GPS) that support its national security mission. It also conducts research and fields technologies that are used to manage its forces globally in combat, such as JTIDS/Link 16, high-bandwidth digital communications, battle management systems, and digital terrain and elevation data. Many of these technologies could be used by the civil aviation system but are not.
- The proposed Department of Homeland Security will be responsible for the security of commercial and general aviation and airports, among other

The development and implementation of federal aerospace policy is currently spread across multiple government departments and agencies.

ISSUES

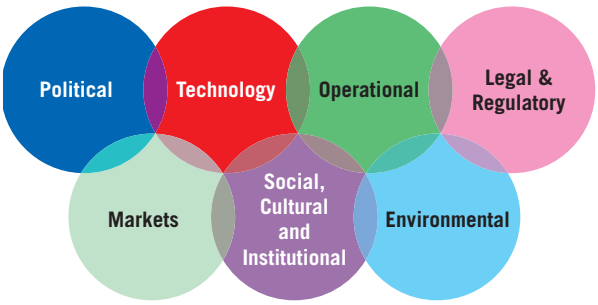
- National Aerospace Consensus
- Government Organizational Structure
- Key Government Processes
- Private-public Partnerships

things. Currently, some 22 departments and agencies share responsibility for homeland security.

- The Department of State, working with the other federal departments and agencies, deals with international treaties, agreements and standards development dealing with aviation.
- The Department of Commerce and, in particular, its National Oceanic and Atmospheric Administration (NOAA), develops and maintains the National Weather System, including the air- and space-based systems, that provides meteorological and weather forecasting data used by the nation's air transportation system.
- The Environmental Protection Agency (EPA) provides regulations for vehicle noise and emissions and environmental permits for airport and runway construction.
- The National Aeronautics and Space Administration (NASA) develops prototype algorithms for the current civil air traffic control system, new models and simulations to improve air traffic management and technology to improve safety.

The federal government does not have a process to bring the appropriate departments and agencies together to reach a consensus on national aerospace policy. Complicating matters further, there is no process that brings all of the stakeholders together to address the factors that influence the health and the future of the aerospace sector. (See Figure 5-1.)

Figure 5-1 Factors Influencing the Health and Future of the Aerospace Sector



The Commission believes that sustaining U.S. global aerospace leadership will require Presidential and Congressional leadership and a unified national team—state and local government, industry, labor, academia and non-governmental organizations—committed to sustaining a healthy U.S. aerospace sector.

Government Organizational Structure: Not Integrated and Responsive

The government is not organized to define national aerospace priorities, develop federal aerospace sector plans and budgets, manage programs that cross multiple departments and agencies, or foster a healthy aerospace sector in a global economy. As described earlier, no single federal organization is responsible for identifying the appropriate role of aerospace in the context of the nation's transportation system and other national needs, including homeland and international security, air transportation, and space exploitation and exploration. No organization is responsible for defining national aerospace priorities or addressing all of the factors that will influence national aerospace policy across all stakeholders and all dimensions—international, national and governmental.

U.S. global aerospace leadership will require Presidential and Congressional leadership and a unified national team.

The federal government is organized vertically while national aerospace challenges are becoming more horizontal in nature. Legacy structures and processes, which were effective in the past, are fundamentally incapable of addressing the system-of-systems level challenges facing the nation today. These structures and processes simply must be modified and/or replaced by integrated, crosscutting structures to achieve our goals.

The ability of the United States to compete both militarily and economically requires a government that speaks coherently, can focus its collective capabilities on national issues, such as terrorism and air transportation, and can respond quickly and flexibly to rapidly changing global trends. It requires a

Figure 5-2 A National Global System-of-Systems Architecture

government that is structured and has the appropriate incentives to provide system-of-systems solutions to problems that transcend all levels of government, industry, labor and academia and national and international boundaries.

National challenges now will increasingly require system-of-systems solutions that involve government, industry, labor, academia and non-governmental organizations and, in most cases, international involvement. The nation's air transportation system, for example, requires all stakeholders be involved in the solution to ensure that:

- The nation's air transportation system can move people and cargo safely and securely when and where they need to go domestically or abroad in peacetime and in wartime;
- Aerospace manufacturers build safe, clean and quiet aircraft that meet international standards and are appropriately equipped;
- Airplanes operate safely and have well trained pilots and crews; and,
- Airports have runways and terminals that can handle aircraft of all sizes and capabilities and have facilities that can move people and goods quickly to and from connecting modes of transportation without sacrificing safety and security.

The federal government is organized vertically while national aerospace challenges are becoming more horizontal in nature.

Without integration, national aerospace policy occurs either by default or piecemeal. Government aerospace sector resources often are not efficiently focused on national problems, such as air transportation, or new breakthrough opportunities, such as in propulsion and power.

The Commission believes that the U.S. government can only ensure U.S. aerospace global leadership by leading itself. To do this, both the executive and legislative branches need to be reoriented to better address national aerospace issues. Both branches need to provide a focus on national aerospace needs and priorities, government aerospace sector plans and budgets, and government management of national aerospace initiatives. The Commission believes that the following executive and legislative branch organizational changes are necessary.

Executive Branch

Federal Departments and Agencies—Offices of Aerospace Development. Most federal departments and agencies spend public funds to develop, operate and use aerospace-related products and services to advance public policy and to perform their missions. This includes departments and agencies typically not identified with aerospace, for example:

- The Department of Agriculture promotes the use of remote sensing for monitoring the nations agricultural, rangeland and forestry resources, and the Global Positioning System for improving farming techniques, such as precision farming.
- The Department of Health and Human Services promotes the use of space-based communications for distance medicine and for space-based research on new medicines and drugs.
- The Department of Interior uses aerospace derived geodetic information for fish and wildlife preservation, mining reclamation and enforcement, and national park surveys.
- The DOT promotes the use of space-based communications and navigation for air, highway, transit, rail and maritime applications, including law enforcement. It also licenses commercial space launches.

Appendix F provides a more comprehensive list of departments and agencies that spend public funds on aerospace-related products and/or services. The list highlights the fact that almost every federal department and agency contributes to or benefits from the aerospace industry in performing its mission.

Most federal departments and agencies, however, do not have an organization that helps them to: promote and implement national aerospace policies; define aerospace requirements in support of their mission; coordinate aerospace policies, plans and programs within their department or agency; prioritize aerospace budgets and spending; and leverage broader aerospace capabilities in the government and the private sector to achieve their mission more efficiently and effectively.

The Commission believes that each federal department and many agencies should have an Office of Aerospace Development.

The Commission believes that each federal department and many agencies should have an Office of Aerospace Development to perform these functions better. The Office should report directly to the Office of the Secretary or Agency Head and be led by a full-time senior executive.

Office of Management and Budget—Bureau of Aerospace Management. The federal government is not organized to deal with issues that are more horizontal than vertical in nature (i.e., system-of-systems issues), whether it is developing national aerospace policy, defining national priorities, or planning and budgeting aerospace resources. It does not have an organization and process that looks at government-wide plans and budgets with the health and future of the aerospace sector in mind. Further, it does not have an organization that manages initiatives that are a national priority, span multiple departments and agencies and require system-of-systems solutions. Development of a next generation air transportation system is a good example.

To manage its aerospace investments efficiently, effectively and as a sector, the federal government

and the aerospace sector need a standardized set of terms and definitions in order to get a clear and accurate picture of government aerospace budgets. A standard set of terms and definitions will also help to improve communications, standardize procedures and processes, and simplify government business and administrative practices.

As the DoD has found over the last several decades, a system-of-systems level solution requires a single organization to plan, budget and manage it efficiently and effectively. As a result, DoD has created joint programs that report either directly to the Office of the Secretary, such as the Missile Defense Agency and Defense Advanced Research Projects Agency (DARPA), or to a lead service, such as the U.S. Air Force for the Joint Strike Fighter. The success of these joint programs can, in part, be attributed to the DoD's decision for a single program management structure.

The formation of the Department of Homeland Security is one of the first attempts to create an organization at the interagency level to provide focused and integrated management of programs across the federal government from a systems perspective. The Commission is not proposing the creation of a new Department of Aerospace. The executive branch, however, needs an organization that performs this function for major national aerospace initiatives that, through necessity, cross multiple federal departments and agencies.

The Commission believes the White House Office of Management and Budget (OMB) should perform this function. It should assume a new and proactive role as horizontal integrator for the government's aerospace sector plans, programs and budgets. Within its organization, OMB should create a Bureau of Aerospace Management that would translate the national aerospace policy into annual planning and budget guidance to the appropriate federal departments and agencies. It would also produce an annual assessment, plan and budget for government aerospace activities.

The Bureau should take responsibility for those major aerospace initiatives that cross multiple departments and/or agencies and are deemed in the national interest. They should assign a lead organization to manage the interdepartmental effort. The Commission's approach of developing aerospace competency and prioritizing aerospace throughout the government will make this role even more important.

Critical national aerospace initiatives, especially those that require a system-of-systems approach (e.g., modernizing the nation's air transportation system), require focused and streamlined management, a national plan that provides a well-defined system architecture and performance measures, and program budget authority with clear lines of responsibility among participating departments and agencies. OMB seems particularly well positioned to carry out this vital management role.

The Office of Management and Budget should assume a new and proactive role as horizontal integrator for the government's aerospace sector plans, programs and budgets.

White House—Aerospace Policy Coordinating Council. All federal departments and agencies need to be involved in developing and implementing national aerospace policy. Today, there is no organization or process in the executive branch that does this. Because of the importance of aerospace to national security, homeland defense and the economy, this policy function should be assigned jointly to the National Security Council and the National Economic Council. They should establish an Aerospace Policy Coordinating Council (PCC) to develop and implement an integrated means of formulating national aerospace policy. This builds on Commission deliberations that have identified a wide range of aerospace policy issues that cut across the federal government, such as spectrum availability, GPS civil frequencies, air transportation, space launch infrastructure, workforce and research priorities.

The Aerospace PCC should include the direct participation of the Office of Vice President, Domestic Policy Council, OMB, Office of Science and Technology Policy and Office of Homeland Security. A senior executive should be assigned full time to perform this function.

The Aerospace PCC should provide an annual report to the President with an assessment of the health of the aerospace sector, including the impact of government fiscal and monetary policy, U.S. statutes and regulations (e.g., export controls), international treaties and agreements, and public funding in the aerospace sector.

Legislative Branch

Joint Committee on Aerospace. The legislative impact of our recommendation to create Offices of Aerospace Development throughout the federal government will be to extend aerospace jurisdiction to most, if not all, committees on Capitol Hill. Therefore, a prudent response from Congress should be to organize a Joint Committee on Aerospace that would have the obligation to coordinate legislatively the multi-faceted jurisdiction issues.

A prudent response from Congress would be to organize a Joint Committee on Aerospace.

Like the former Joint Committee on Atomic Energy, the Joint Committee on Aerospace would be empowered to hold hearings, initiate legislation and provide overarching and integrated guidance and direction to the appropriate Congressional authorization and appropriations committees.

Key Government Processes: Neither Streamlined Nor Integrated

Government processes tend to be complex, lengthy and inefficient. As a result, aerospace products and services developed and used by the government, such as military weapon systems and civil space missions, are more costly for the taxpayer and take longer to

Figure 5-3 Notional Federal Responsibilities for Coordination and Oversight of Aerospace Matters

	Executive Branch			Legislative Branch	
	White House	Office of Management and Budget OmB	Federal Departments and Agencies	House and Senate	Congressional Budget Office
	Aerospace Policy Coordinating Council	Bureau of Aerospace Management	Offices of Aerospace Deployment	Joint Committee On Aerospace	
Policy National Vision, Goals and Priorities Financial Policy Performance-Based, Flexible laws and Regs International Treaties and Agreements Maintenance of Nation's Industrial Base	Lead	Participate	Participate	Oversight Authority	
Management and Budget Common Definitions/Currency/Policy Major Aerospace Sector Budget	Input	Lead	Participate	Oversight Authority	Analysis
Program Acquisition and Procurement Multi-Year Funding, Life-Cycle Cost/ Management Civil and Military Needs Simpler, Shorter, More Efficient Best Practices From Private Sector Incentives For Risk Taking	Input	Lead (Designate Lead)	Lead (As Assigned)	Oversight Authority	Analysis

acquire. Also, aerospace products and services developed by industry for sale in the commercial marketplace take longer and cost more because of extensive government legal and regulatory barriers, resulting in lost market share and diminished profitability.

Integrated Government Aerospace Sector Planning, Budgeting and Program Management. The Government Performance and Results Act of 1993 has mandated strategic planning and program management within individual federal departments and agencies. The DoD, for example, has a very well defined strategic management process including:

- National strategy and policy development (e.g., National Security Strategy, Quadrennial Defense Review);
- Requirements definition in the Joint Chiefs of Staff (e.g., Joint Vision 2020);
- Planning and budgeting across the Services and Defense organizations (e.g., DoD Strategic Plan, Defense Guidance); and
- Management of joint and individual service programs (e.g., Missile Defense Agency, Joint Strike Fighter, GPS, DARPA).

The Government Performance and Results Act, however, does not adequately address strategic planning, budgeting and program management **across** federal departments and agencies, especially when the issues cross military, civilian and commercial lines.

Aerospace Sector Budget. The federal government spends public funds for aerospace products and services in performing its missions. This includes: the development, procurement and operation of military weapon systems and the nation's civil air traffic control system; the conduct of long-term civil aeronautics research; and the procurement and use of aircraft for monitoring our borders and for fighting forest fires. It also invests in maintaining the nation's critical manufacturing capacity, workforce development, national aerospace infrastructure, such as space launch, and long-term research that directly and positively impact the nation's security, economy and job creation.

As the Commission noted in Interim Report #1, the federal government aerospace sector spending, however, is currently spread across multiple government agency budgets, with oversight by numerous and different Congressional committees. As a result, none of these government groups has an integrated view of our national aerospace efforts. As was stated

AEROSPACE SECTOR CATEGORIZATION

- Systems*
  - Air (e.g., aircraft (fixed, rotary wing), airships, unmanned vehicles)
  - Missiles (e.g., cruise, guided, ballistic, rockets)
  - Space (e.g., spacecraft, space transportation)
- Services
  - Air transportation
  - Telecommunications
  - Navigation
  - Earth Monitoring
  - Others
- Infrastructure (e.g., facilities and equipment)
  - Airports/airfields
  - Spaceports
  - Air traffic control
  - Research, development, test and evaluation facilities
  - Manufacturing and maintenance facilities
  - Other launch and support facilities and equipment (e.g., telemetry, tracking and control)
- Research
  - Government
  - Industry
  - Academia
- Workforce (e.g., personnel)

* Note: Subcategories include: system research, development, test and evaluation; flight systems (production); and operations (including maintenance and decommissioning).

previously, the government's organizational structure and planning and budgeting process lack the necessary overall insight and accountability to develop and implement a coherent national strategy and program. This makes it difficult, if not impossible, to provide overall national aerospace leadership and oversight.

As a result, the Commission asked the OMB to work with the Commission staff to develop an acceptable categorical definition of the aerospace sector and to prepare an aerospace sector budget breakout to be submitted with the President's annual budget request, by category. Appendix C provides the first attempt by OMB to provide an aerospace sector budget using the categorization depicted in the accompanying insert.

Ultimately, OMB and the Congressional Budget Office should agree to a categorization and provide aerospace sector budget data and analysis on an annual basis. The Commission believes that these two steps are important, if the executive and legislative branches are to have insight into the government's aerospace investments.

Since this categorization is new and much more comprehensive than what has been used by the government in the past, the Commission was not able to assess completely the adequacy, balance and trends in the government aerospace sector budgets. However, based on existing historical data, the Commission has the following observations.

- *Aeronautics Research and Development.* Based on the data contained in the annual publication of "Aeronautics and Space Report of the President" for the fiscal years 1980 to 2000, the federal aeronautics budget more than tripled between 1980 and 1993, reaching a peak of $11,359 million in 1993. From 1993 to 1999, the budgets declined by approximately 20 percent to a low of $8,997 million before heading upward again with levels now approaching those in the early 1990's. See Figure 5-4. Most of this budgetary increase has been in the DoD and DOT. Of concern, however, is the continued decrease in NASA's civil aeronautics budget. This is unacceptable given the huge opportunities to improve the nation's air transportation system as discussed in Chapter 2.

Figure 5-4 Federal Aeronautics Budget (in millions of dollars)

FY	DoD[a]	NASA[b]	DOT[c,d]	TOTAL
1993[1]	7,582	1,245	2,532	**11,359**
1994[1]	6,848	1,546	2,309	**10,703**
1995[1]	7,196	1,310	2,212	**10,718**
1996[1]	6,792	1,315	2,052	**10,159**
1997[1]	6,323	1,252	2,146	**9,721**
1998[1]	6,256	1,327	2,099	**9,682**
1999[1]	5,532	1,194	2,271	**8,997**
2000[1,2]	6,460	1,060	2,201	**9,721**
2001	6,587[3]	985	2,838[3]	**10,410**
2002	6,149[3]	997	3,203[3]	**10,349**
2003	6,808[3]	985[4]	3,107[3]	**10,900**

Notes:

[a] Research, Development, Testing, and Evaluation of Aircraft and Related Equipment.
[b] Research, Development, Construction of Facilities, Research and Program Management.
[c] Federal Aviation Administration: Research, Engineering, and Development; Facilities, Engineering, and Development.
[d] DOT's R,E&D Presidential budget for 2003 is $126 million. This does not reflect aviation security R&D that has been moved from FAA to the Transportation Security Administration (TSA).
[e] Department of Energy (DOE) has an annual budget of approximately $70 million for aircraft and systems research and development.
[1] Budget numbers are from the "Aeronautics and Space Report of the President" for years 1993-2000.
[2] The budget figures for the year 2000 are estimates.
[3] Budget numbers from Office of Management and Budget.
[4] Presidential Budget for FY 2003

- *Space.* The "Aeronautics and Space Report of the President, Fiscal Year (FY) 2000 Activities" shows that annual government budgets for civil and military space (in equivalent FY 1999 dollars) have essentially been flat at approximately $26 billion per year since 1995 after reaching a peak of $37 billion in 1989. During the period from 1989 to 1995, the DoD saw a decrease of over 50 percent from $23.8 billion in FY 1988 to $11.6 billion in FY 1995. This downward trend has now been reversed and investments are approaching the levels of the early 1990s. Over the last decade, NOAA saw its budgets increase from approximately $300 million in FY 1990 to $571 million in FY 2000.

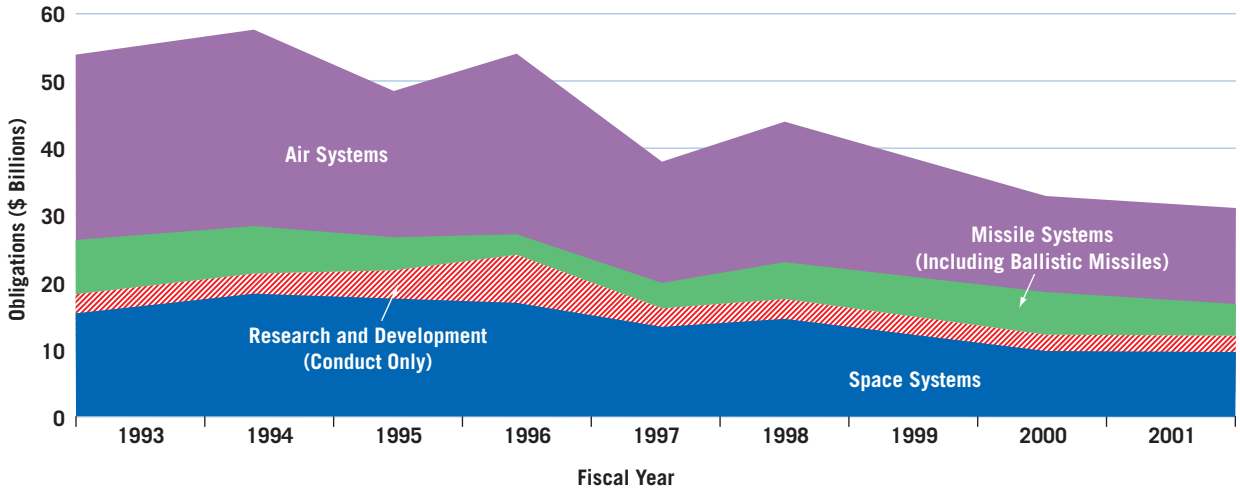
  On the other hand, from FY 1991 to FY 2000, NASA's space budget authority declined by almost 20 percent from $15.8 billion to $12.5 billion. Given the extreme importance of civil space to the nation, the Commission finds this alarming.

The federal budget only provides a partial picture of government investments in the aerospace sector.

The federal budget, however, only provides a partial picture of government investments in the aerospace sector. The federal budget is a policy document and does not explain in detail how the budget authority is spent. To understand more about specific spending, the Commission contracted with the RAND Corporation to determine federal procurement spending in the aerospace sector. Figure 5-5 provides a summary of this data from 1993 through 2001. Additional information can be found in Appendix D. The data show the following:

- *Procurement.* The direct link between the U.S. government and the nation's aerospace industry is the federal procurement system through which federal agencies purchase air, missiles and space systems and their related infrastructure from the private sector companies that comprise the aerospace industry. The past decade has witnessed a steady decline in federal procurement spending in all of these areas. Specifically, it shows that between FY 1993 and FY 2001, federal procurement spending dropped 35 percent on air systems, 50 percent on missile systems, and 46 percent on space systems in absolute dollars. At the same time that the U.S. government was buying fewer and fewer aerospace systems, federal departments and agencies were also investing fewer dollars in R&D efforts of private industry to advance and improve existing aerospace systems. The combined spending of all federal departments

Figure 5-5 Federal Aerospace Procurement and R&D Expenditures FY 1993 – FY 2001



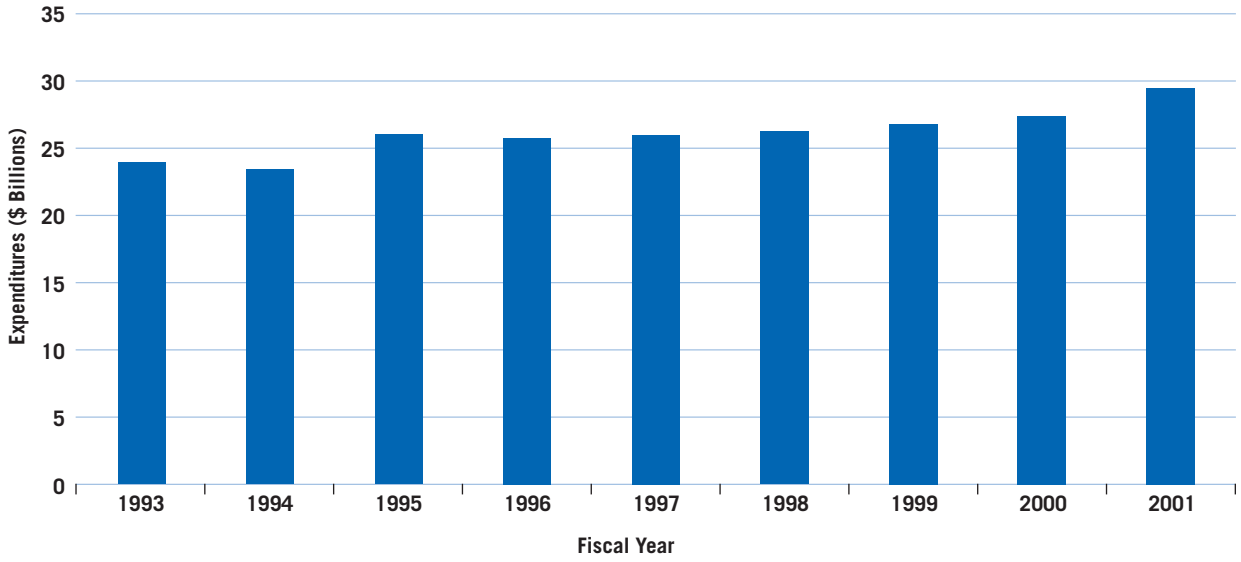
and agencies on extramural aerospace-related R&D dropped by 46 percent in absolute dollars. In the past decade, federal support for major segments of the aerospace industry has declined significantly as evidenced by direct purchases.

- *Personnel.* The U.S. Air Force, NASA and FAA are the three lead agencies for aerospace. Figure 5-6 shows that during the same years in which federal support to the aerospace industry was declining, U.S. Air Force, NASA and FAA spending on their own internal workforces (i.e., personnel) increased by 25 percent in absolute dollars even though overall federal support to the industry was declining. This suggests, that in the past decade, the operating costs of those three organizations began to "encroach upon" activities in other areas (i.e., procurement and R&D).
- *Government Users of Aerospace Systems.* DoD, DOT/FAA and NASA are the major federal departments and agencies involved in aerospace, accounting for over 99 percent of federal procurement spending. There are others departments and agencies that are major users of aerospace products and services and have spent more than $100 million in at least one fiscal year between 1996 and 2000. These include the General Services Administration and the Departments of Energy, State and Justice.

Even though the Commission was not able to assess completely the adequacy, balance and trends in the government aerospace sector budgets using the new aerospace sector categorization used by OMB, it was able to get some insight into important trends in government aerospace sector procurement and personnel costs. This information has not been available to decision makers in the past but needs to be in the future.

The Commission believes, therefore, that both the executive and legislative branches of government need better insight into aerospace sector budgets and procurement and personnel costs over time. To achieve this, both branches should adopt the aerospace sector categorization definition developed by the Commission with OMB. Further, OMB should prepare a budget and spending breakout, by category, as an addendum to the President's Annual Budget Request. The Department of Commerce should compile and present baseline statistics on the economic performance and investment expenditures of the aerospace sector for the purpose of comparing federal outlays. And, the Congressional Budget Office should provide an annual sectoral budget breakdown that parallels the President's Annual Budget Request, using the same aerospace sector categorization.

Figure 5-6 Air Force, NASA, and FAA Personnel Expenditures FY 1993 – FY 2001



Integrated Government Science, Technology and Acquisition Process. In the future, government must think and act on the same time scales as industry—weeks and months as opposed to years and decades. This will require a much simpler, better-integrated and more streamlined government science and technology (S&T) and acquisition process.

The government's current S&T and acquisition process is rooted in the nation's science policy that was articulated by President Roosevelt's Director of the Office of Scientific Research and Development, Vannevar Bush, in 1945. The science policy suggested that basic research leads to applied research, then to technology development and, ultimately to product development and sales. This linear model has resulted in segmentation as opposed to integration of S&T and acquisition not only within and among government organizations but also across government, industry and academia. Today, the government's S&T and acquisition process:

Global competition dictates that the United States aerospace sector's product-development process be dramatically simpler, integrated, and streamlined.

- Is complex, fragmented, and lengthy;
- Has a one-year planning, budgeting and execution time horizon;
- Varies from department to department and agency to agency and, hence, is a maze of different processes, practices and procedures for government customers and stakeholders to figure out and use;
- Does not use best business practices and performance-based contracting, standards and certification processes; and
- Provides few incentives for risk taking, private investment, cost sharing and cost and timesavings.

Global competition dictates that the U.S. aerospace sector must transition from the fragmented, linear and functional-oriented S&T and acquisition process to a dramatically simpler, integrated, and streamlined product-development process—a national innovation process. The sector needs a process that enables it to transform the best domestic and international ideas available into new and better products and services faster than our competitors. It needs a process that has dramatically shorter cycle times and provides a much higher rate of return on the nation's investments and natural resources.

To meet this challenges, the aerospace industry has started to: reengineer its major business and manufacturing processes; integrate its research and development with its manufacturing processes; create partnerships with government and industry to leverage national research investments; automate these processes using tools such as computer-aided design, development and manufacturing; and adopte international quality standards.

The federal government is under similar pressures from the public and its internal customers to deliver better products and services faster and cheaper for the taxpayer. As with industry, it also needs to integrate, streamline and speed up its product-development process.

In summary, the Commission believes that both the executive and legislative branches should work together to:

- Create a common set of terms and definitions (e.g., aerospace sector, aerospace sectoral budget categorization), currency (e.g., not different "colors" and kinds of funds) and administrative and business policies, practices and procedures across the government;
- Reengineer its strategic planning and budget process to look at government aerospace polices and investments as a sector and from a long-term perspective (e.g., multi-year funding, life-cycle costing and management);

- Create a single S&T and acquisition process—a product-development or innovation process—that is simpler, shorter and more efficient, uses private-public partnerships and addresses both civil and military needs;
- Emulate best private sector business practices, including the use of performance-based contracting and process (not product) certification; and
- Provide incentives for risk taking, capital formation, cost and risk sharing, and time and cost savings.

Public-Private Partnerships: Difficult to Build

Government, industry, labor and academia must work together—as partners—to transform the way they do business, allowing the nation to capitalize on the best ideas available and apply them rapidly to new aerospace products, processes and services. Each play different, but important, roles. They cannot perform these roles separately or in isolation. Each must understand its role and work together to create an environment that fosters innovation in aerospace sector. Collectively, they need shared goals, objectives and incentives to share the risks, costs and benefits of doing business.

- Government, at all levels, should:
  - Provide leadership and policy that prepares the nation for the future while sustaining public trust and confidence today;
  - Create a supportive legal and regulatory framework that enables rapid introduction of new products and services;
  - Encourage open and fair global competition and markets; and
  - Invest in the future—workforce development, special-purpose national infrastructure and long-term research.
- Industry should:
  - Understand customer and market needs;
  - Produce quality aerospace products and services;
  - Invest in technologies and concepts that will provide a competitive advantage;
  - Leverage government investments in long-term research; and
  - Ensure that it has the manufacturing capacity and human resources needed to produce and sell new products and services quickly and affordably.
- Labor should:
  - Represent workers and ensure that they are treated fairly by employers,
  - Engage in collective bargaining on behalf of the workforce,
  - Hold industry accountable to the workforce and the communities where work is performed,
  - Develop and enhance existing training and apprenticeship programs, and
  - Provide a voice for workers.
- Academia should:
  - Play a leadership role in developing the well-educated, scientifically literate workforce that government and industry will need in the future, and
  - Perform cutting-edge research for the nation.

To date the success of private-public partnerships are mixed, but they are improving. One potential measure of the outcome of these partnerships is the number of jobs, wages, establishments and payroll data for the U.S. aerospace and aviation industry. Appendix E provides a summary of national, regional, state and metropolitan data collected by the Commission.

The Commission believes that all of the stakeholders must work together to ensure that the government can do its mission and the commercial sector to prosper and compete successfully. They all have a stake in the outcome; and all need to work together to ensure that the outcome is in the best interest of the nation and the American people.

Conclusions

The Commission concludes that the government must ensure that the nation has a healthy aerospace industry today and in the future, an industry that can not only meet the security and economic needs of the country but also can compete successfully in the international market place. The government needs to exert leadership and prioritize and promote aerospace by managing its activities efficiently, effectively and as a sector to accomplish national objectives. It needs to create an environment that fosters innovation in the U.S. aerospace industry, ensuring its competitiveness into the 21st century.

Create a National Aerospace Consensus. The federal government does not have a national aerospace consensus that supports broader national security and economic policies, goals and objectives. This will require Presidential and Congressional leadership to develop a consensus of federal, state and local government, industry, labor, academia and non-governmental organizations to sustain a healthy U.S. aerospace sector.

Reorient Government Organizational Structures. The federal government is dysfunctional when addressing 21st century issues from a long-term, national and global perspective. Government is organized vertically while national problems are becoming more horizontal in nature requiring system-of-systems solutions. Key government processes, such as planning and budgeting, are currently spread across multiple departments and agencies, with oversight by numerous Congressional committees. As a result, none of these government groups has an integrated view of our national aerospace efforts.

The executive and legislative branches need to be reoriented to provide a focus on national aerospace needs and priorities, government aerospace plans and budgets, and government management of national aerospace initiatives.

- *Federal Departments and Agencies.* Every federal department and most federal agencies should create an Office of Aerospace Development to prioritize and promote aerospace activities within their organizations and with the public that they serve;
- *Office of Management and Budget.* OMB should establish a Bureau of Aerospace Management to develop and implement an aerospace strategic plan, establish an acceptable categorical definition of the aerospace sector, prepare an annual aerospace sector budget as an addendum to the President's Budget Request, and manage major national aerospace initiatives; and,
- *White House.* The White House should establish an aerospace policy coordinating council to develop and implement national aerospace policy consistent with national security and economic goals and objectives.
- *Congress.* In response to these executive branch changes, the Commissions encourages the legislative branch to create a Joint Committee on Aerospace to coordinate legislatively the multi-faceted jurisdictional issues.

Streamline and Integrate Key Government Processes. Government processes for policy, planning, and budgeting, and for developing and acquiring aerospace products and services are vestiges of the Cold War. As a result, they tend to be ad hoc, complex, lengthy and inefficient. The Administration and the Congress need to make a concerted effort to streamline these key government processes to reflect the new realities of a highly dynamic, competitive and global marketplace. Specifically, they should work together to create: an integrated federal planning, budgeting and program management process; an integrated government science, technology and acquisition process; and an environment that fosters rather than impedes innovation in the aerospace sector.

Promote Private-public Partnerships. Partnerships and interconnectedness are keys to competitiveness in the future. Government, industry, labor and academia play different, but important, roles in developing and deploying new aerospace products and services. They cannot perform these roles separately and in isolation. But today, cultural and

institutional biases hinder their ability to partner and achieve national goals. We need to create an environment and the incentives that will foster private-public partnerships.

RECOMMENDATION #5

The Commission recommends that the federal government establish a national aerospace policy and promote aerospace by creating a government-wide management structure. This would include a White House policy coordinating council, an aerospace management office in the Office of Management and Budget, and a joint committee in Congress. The Commission further recommends the use of an annual aerospace sectoral budget to establish presidential aerospace initiatives, assure coordinated funding for such initiatives, and replace vertical decision-making with horizontally determined decisions in both authorizations and appropriations.