



# FINAL REPORT

of the Commission on the Future of the United States Aerospace Industry



ANYONE



ANYTHING

ANYTIME



ANYWHERE



November, 2002



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Chairman, Wexler & Walker Public  
Public Policy Associates

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# Commission on the Future of the United States Aerospace Industry

## Commissioners

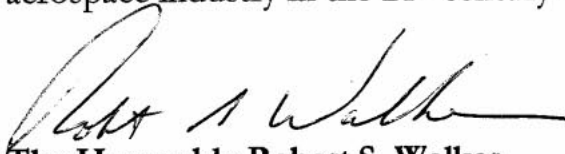


**Commission on the Future of the  
United States Aerospace Industry**

1235 Jefferson Davis Highway, Suite 940  
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To the President of the United States  
To the Congress of the United States

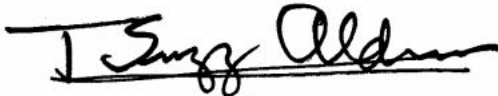
We, the undersigned Commissioners of the Commission on the Future of the United States Aerospace Industry, do hereby send to you the results of our deliberations and our best judgment of policies to assure the vibrancy and success of the United States aerospace industry in the 21<sup>st</sup> century.



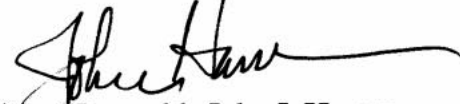
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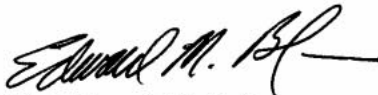
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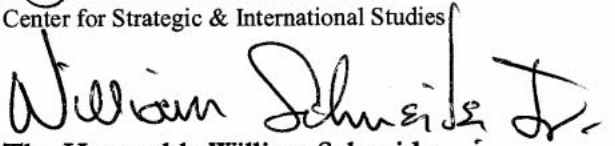
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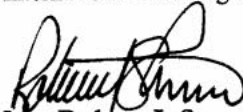
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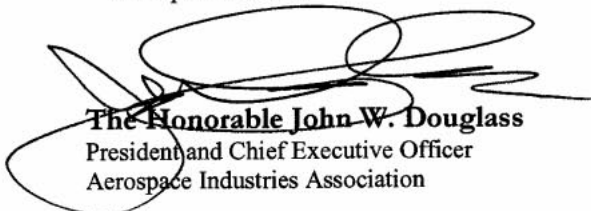
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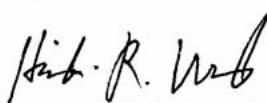
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# Executive Summary

Aerospace will be at the core of America's leadership and strength in the 21st century. The role of aerospace in establishing America's global leadership was incontrovertibly proved in the last century. This industry opened up new frontiers to the world, such as freedom of flight and access to space. It provided products that defended our nation, sustained our economic prosperity and safeguarded the very freedoms we commonly enjoy as Americans. It has helped forge new inroads in medicine and science, and fathered the development of commercial products that have improved our quality of life.

Given a continued commitment to pushing the edge of man's engineering, scientific and manufacturing expertise, there is the promise of still more innovations and new frontiers yet to be discovered. It is imperative that the U.S. aerospace industry remains healthy to preserve the balance of our leadership today and to ensure our continued leadership tomorrow.

## Our Urgent Purpose

The contributions of aerospace to our global leadership have been so successful that it is assumed U.S. preeminence in aerospace remains assured. Yet the evidence would indicate this to be far from the case. The U.S. aerospace industry has consolidated to a handful of players—from what was once over 70

suppliers in 1980 down to 5 prime contractors today. Only one U.S. commercial prime aircraft manufacturer remains. Not all of these surviving companies are in strong business health. The U.S. airlines that rely upon aerospace products find their very existence is threatened. They absorbed historical losses of over \$7 billion in 2001 and potentially more this year.

*The Commission's urgent purpose is to call attention to how the critical underpinnings of this nation's aerospace industry are showing signs of faltering—and to raise the alarm.*

The industry is confronted with a graying workforce in science, engineering and manufacturing, with an estimated 26 percent available for retirement within the next five years. New entrants to the industry have dropped precipitously to historical lows as the number of layoffs in the industry mount. Compounding the workforce crisis is the failure of the U.S. K-12 education system to properly equip U.S. stu-

dents with the math, science, and technological skills needed to advance the U.S. aerospace industry.

The Commission's urgent purpose is to call attention to how the critical underpinnings of this nation's aerospace industry are showing signs of faltering—and to raise the alarm.

This nation has generously reaped the benefits of prior innovations in aerospace, but we have not been attentive to its health or its future. During this year of individual and collective research, the Commission has visited and spoken with aerospace



leaders in the United States, Europe, and Asia. We noted with interest how other countries that aspire for a great global role are directing intense attention and resources to foster an indigenous aerospace industry. This is in contrast to the attitude present here in the United States. We stand dangerously close to squandering the advantage bequeathed to us by prior generations of aerospace leaders. We must reverse this trend and march steadily towards rebuilding the industry.

The time for action is now. This report contains recommendations intended to catalyze action from leaders in government, industry, labor and academia and assure this industry's continued prominence. A healthy aerospace industry is a national imperative. The Administration and the Congress must heed our warning call and act promptly to implement the recommendations in this report.

## An Aerospace Vision

This nation needs a national vision to keep alive the flames of imagination and innovation that have always been a hallmark of aerospace. For inspiration, we looked to what aerospace can do for our nation and world. The vision the Commission used to guide its efforts is “Anyone, Anything, Anywhere, Anytime.” We offer this to the nation as its vision for aerospace.

## Conclusions and Recommendations

The Congress gave our Commission a broad mandate to study the health of the aerospace industry and to identify actions that the United States needs to take to ensure its health in the future. The challenge of looking across military, civil and commercial aspects of aviation and space was an opportunity to take an integrated view of the aerospace sector – government, industry, labor and academia.

The Commissioners represent a broad cross section of the stakeholders responsible for the health of the industry and whose expertise represents the breadth and depth of aerospace issues. Drawing on their

extensive experience, and on the hundreds of briefings and public testimony, the Commission has made nine recommendations—one per chapter—that provide our guidance to the nation's leaders on the future of the U.S. aerospace industry. The size and scope of this report reflects an industry that is complex and interdependent.

The following are the conclusions and recommendations in the final report by chapter.

*VISION: “Anyone,  
Anything, Anywhere,  
Anytime.”*

## Chapter 1—Vision: Anyone, Anything, Anywhere, Anytime

### Conclusions

To achieve our vision for aerospace, the Commission concludes that:

- The nation needs a national aerospace policy;
- There needs to be a government-wide framework that implements this policy;
- The Administration and Congress need to remove prohibitive legal and regulatory barriers that impede this sector's growth and continually seek to level the international playing field; and
- Global U.S. aerospace leadership can only be achieved through investments in our future, including our industrial base, workforce, long-term research and national infrastructure.

### Recommendation #1

The integral role aerospace plays in our economy, our security, our mobility, and our values makes global leadership in aviation and space a national imperative. Given the real and evolving challenges that confront our nation, government must commit to increased and sustained investment and must facilitate private investment in our national aerospace sector. The Commission, therefore, recommends that the United States boldly pioneer new frontiers in aerospace technology, commerce and exploration.



## Chapter 2—Air Transportation: Exploit Aviation's Mobility Advantage

### Conclusions

The Commission concludes that superior mobility afforded by air transportation is a huge national asset and competitive advantage for the United States. Because of the tremendous benefits derived from a highly mobile citizenry and rapid cargo transport, the United States must make consistent and significant improvements to our nation's air transportation system a top national priority.

**TRANSFORM THE U.S. AIR TRANSPORTATION SYSTEM AS A NATIONAL PRIORITY.** We need national leadership to develop an air transportation system that simultaneously meets our civil aviation, national defense and homeland security needs. Today, leadership and responsibility are dispersed among many federal, state and local organizations that impact the aviation community. In the federal government, this includes the Department of Transportation's Federal Aviation Administration (FAA), National Aeronautics and Space Administration (NASA), Environmental Protection Agency, and the Departments of Defense (DoD), Commerce, and State.

Often these departments and agencies deal with aviation-related issues independently, without adequate coordination, and sometimes at cross-purposes. All have separate authorizing and appropriating Congressional committees. State and local governments also play important aviation development roles and private industry has numerous near-term competing forces that often delay longer-term solutions. Only strong federal leadership, aimed at a national objective, can sustain a transformational effort.

**DEPLOY A NEW, HIGHLY AUTOMATED AIR TRAFFIC MANAGEMENT SYSTEM.** The core of an integrated 21st century transportation system will be a common advanced communications, navigation and surveillance infrastructure and modern operational procedures. The system needs to allow all classes of aircraft, from airlines to unpowered vehicles, to operate safely, securely, and efficiently from thousands of communities based on market size and demand. It

also needs to be able to operate within a national air defense system and enable military and commercial aircraft to operate around the world in peacetime and in war.

As a first step, the Commission recommended in its Interim Report #2 "the Administration should immediately create a multi-agency task force with the leadership to develop an integrated plan to transform our air transportation system." This task force should be immediately assigned the leadership role to establish a Next Generation Air Transportation System Joint Program Office that brings together needed participation from the FAA, NASA, DoD, Office of Homeland Security, National Oceanographic and Atmospheric Administration, and other government organizations. Within a year, the Joint Program Office should present a plan to the Administration and the Congress outlining the overall strategy, schedule, and resources needed to develop and deploy the nation's next generation air transportation system.

As this transformational plan is developed, the FAA must continue to implement the Operational Evolution Plan. FAA and NASA must also continue to perform critical long-term research. The Commission also recommended in Interim Report #2 "the Administration and Congress should fully fund air traffic control modernization efforts in fiscal year 2003 and beyond, and prioritize FAA and NASA research and development efforts that are the critical building blocks for the future."

**PROVIDE CERTIFICATION PROCESS AND AIRBORNE EQUIPAGE INNOVATION.** The Commission calls for a new approach to the regulation and certification of aircraft technology, processes and procedures. The government also needs new mechanisms to accelerate the equipage of aircraft in order for the nation to realize broader system benefits. Airborne equipment needed for safe, secure, and efficient system-wide operations should be deemed to be part of the national aviation infrastructure.

- *Shift from product to process certification.* Instead of a focus on rules and regulations that dictate the

design and approval of each particular piece of hardware or software, the FAA should focus on certifying that design organizations have safety built into their processes for designing, testing, and assuring the performance of an overall system.

- *Solve the airborne equipage problem.* The government, in partnership with industry, must be more responsible for airborne equipment development and continuous modernization. In addition to current regulatory and operational incentives, the government should consider additional options to motivate a critical mass of early equippers, including full federal funding for system-critical airborne equipment, tax incentives or vouchers for partial funding support, and competitively auctioned credit vouchers.

**STREAMLINE THE AIRPORT AND RUNWAY DEVELOPMENT PROCESS.** The FAA and other agencies should expedite new runway and airport development as a national priority. Further, because aircraft noise and emissions constrain capacity growth, additional government investment in long-term research in this area is imperative.

**ACT NOW.** The Commission sees compelling reasons for the Administration and Congress to take immediate action. First, new homeland security and defense requirements call for system capabilities not previously anticipated. Second, an entirely new level of transportation efficiency and national mobility can be enabled by more flexible, scalable, higher precision aviation operations. Third, inherently long lead times required for major aviation changes demand preparation far ahead of anticipated demand. And fourth, there could be no better American response after 9/11 than to rebuild the U.S. air transportation system dramatically better than it was before.

As we approach the 100th anniversary of powered flight, the Commission urges the President and Congress to recognize a pressing national need, and powerful opportunity, and **act now** to create a 21st century air transportation system.

## Recommendation #2

The Commission recommends transformation of the U.S. air transportation system as a national priority. This transformation requires:

- Rapid deployment of a new, highly automated air traffic management system, beyond the Federal Aviation Administration's Operational Evolution Plan, so robust that it will efficiently, safely, and securely accommodate an evolving variety and growing number of aerospace vehicles and civil and military operations;
- Accelerated introduction of new aerospace systems by shifting from product to process certification and providing implementation support; and
- Streamlined new airport and runway development.

## Chapter 3—Space: Its Special Significance

### Conclusions

The Commission concludes that the nation will have to be a space-faring nation in order to be the global leader in the 21st century—our freedom, mobility, and quality of life will depend on it. America must exploit and explore space to assure national and planetary security, economic benefit and scientific discovery. At the same time, the United States must overcome the obstacles that jeopardize its ability to sustain leadership in space.

**ACHIEVE BREAKTHROUGHS IN PROPULSION AND SPACE POWER.** The ability to access space and travel through the solar system in weeks or months instead of years would help create the imperative to do so. Propulsion and power are the key technologies to enable this capability. Future progress in these areas will result in new opportunities on Earth and open the solar system to robotic and human exploration and eventual colonization. The nation would benefit from a joint effort by NASA and DoD to reduce significantly the cost and time required to access and travel through space.

**DEVELOP A NEXT GENERATION COMMUNICATION, NAVIGATION, SURVEILLANCE AND RECONNAISSANCE CAPABILITY.** The nation needs real-time, global space-based communications, navigation, surveillance and reconnaissance systems for a wide range of applications. These capabilities will provide the military with the ability to move its forces around the world, conduct global precision strike operations, defend the homeland, and provide for planetary defense. The civil and commercial sectors will also benefit from these capabilities for air transportation management, monitoring global climate change, weather forecasting and other applications. The federal government needs a joint civil and military initiative to develop this core infrastructure.

**REVITALIZE THE U.S. SPACE LAUNCH INFRASTRUCTURE.** NASA and DoD must maintain and modernize their space launch and support infrastructure to bring them up to industry standards. They should implement our recommendations contained in Interim Report #3 concerning federal spaceports, enhanced leasing authority, and utility privatization and “municipalization.” We recommended that DoD and NASA should:

- Investigate the feasibility of establishing a national spaceport structure at Kennedy Space Center (KSC) and Cape Canaveral Air Force Station (CCAFS) under a single management system; and
- Seek Congressional approval for
  - Enhanced leasing authority that allows them to lease real property at fair market value and retain lease proceeds to cover the total costs incurred at KSC and CCAFS; and
  - Privatization of NASA utilities at KSC and CCAFS to overcome the budget burdens associated with capital improvements to outdated infrastructure.

In addition, NASA and DoD need to make the investments necessary for developing and supporting future launch capabilities. NASA should also consider turning over day-to-day management responsibilities for its field centers to the respective state governments, universities, or companies.

#### **PROVIDE INCENTIVES TO COMMERCIAL SPACE.**

Government and the investment community must become more sensitive to commercial opportunities and problems in space. Public space travel may constitute a viable marketplace in the future. It holds the potential for increasing launch demand and improvements in space launch reliability and reusability. Moreover, it could lead to a market that would ultimately support a robust space transportation industry with “airline-like operations.” The government could help encourage this by allowing NASA to fly private citizens on the Space Shuttle.

**SUSTAIN COMMITMENT TO SCIENCE AND SPACE.** The U.S. government should continue its long-standing commitment to science missions in space and focus on internationally cooperative efforts in the future.

### Recommendation #3

The Commission recommends that the United States create a space imperative. The DoD, NASA, and industry must partner in innovative aerospace technologies, especially in the areas of propulsion and power. These innovations will enhance our national security, provide major spin-offs to our economy, accelerate the exploration of the near and distant universe with both human and robotic missions, and open up new opportunities for public space travel and commercial space endeavors in the 21st century.

## Chapter 4—National Security: Defend America and Project Power

### Conclusions

The Commission concludes that aerospace capabilities and the supporting defense industrial base are fundamental to U.S. economic and national security. While the nation’s defense industrial base is strong today, the nation is at risk in the future if the United States continues to proceed without a policy that supports essential aerospace capabilities.

#### **DEVELOP A U.S. MILITARY INDUSTRIAL BASE POLICY.**

The Department of Defense should task the Defense Science Board to develop a national policy that

will invigorate and sustain the U.S. aerospace industrial base. The policy should address issues, such as mergers and acquisitions, procurement and budgeting policies, research and development investments, technology transition, international sales and workforce development.

**SUSTAIN THE DEFENSE INDUSTRIAL BASE.** Today's national defense industrial base is indeed robust, but without constant vigilance and investment, vital capabilities will be lost.

- DoD's annual science and technology (6.1-6.3) funding must be sufficient and stable to create and demonstrate the innovative technologies needed to address future national security threats. An amount no less than three percent of Total Obligational Authority, "fenced" from budget cuts, would be sufficient. The use of more joint technology development and acquisition programs would spread the funding burden and promote interoperability.
- The federal government must remove unnecessary barriers to international sales of defense products, and implement other initiatives that strengthen transnational partnerships to enhance national security. To help reduce the high development and production costs of advanced military systems, the United States must also increase the number of international joint programs (like the Joint Strike Fighter), and continue to foster international interoperability of defense and commercial aerospace system-of-systems.
- DoD acquisition policies should be revised to encourage greater use of commercial standards. DoD should impose government requirements by exception only, allow commercial entities to protect intellectual property, and remove other burdensome regulations that deter providers of commercial products from doing business with the government.
- There are numerous government missions that would benefit from defense technology. For example, the U.S. military has developed capabilities

in the areas of communications, navigation, surveillance, and reconnaissance. These technologies could be adapted and transitioned into other government applications that would significantly enhance the capacity of our air traffic management system and, hence, our national defense and homeland security.

- The federal government and the aerospace industry must partner to enhance the operational readiness and capability of new and legacy military aerospace systems. The government should fund research and technology development programs to: reduce total ownership costs and environmental impacts; implement performance-based logistics support; create a structured, timely and adequately funded technology insertion process; and reform its procurement practices accordingly.

**INCREASE OPPORTUNITIES TO GAIN EXPERIENCE IN THE WORKFORCE.** The U.S. must continuously develop new experimental systems, with or without a requirement for production, in order to sustain the critical skills to conceive, develop, manufacture and maintain advanced systems and potentially provide expanded capability to the warfighter. Furthermore, the federal government and industry must develop approaches to retain and transfer intellectual capital as the workforce retires in greater numbers in the next few years.

**MAINTAIN AND ENHANCE CRITICAL NATIONAL INFRASTRUCTURE.** The federal government must assume responsibility for sustaining, modernizing, and providing critical, often high-risk, defense-related technologies and infrastructure when it is in the nation's interest. This includes critical design capabilities, solid rocket boosters, radiation hardening, space launch facilities, critical research, development, test and evaluation (RDT&E) infrastructure, Global Positioning System (GPS), and frequency spectrum.

## Recommendation #4

The Commission recommends that the nation adopt a policy that invigorates and sustains the



aerospace industrial base. This policy must include:

- Procurement policies which include prototyping, spiral development, and other techniques which allow the continuous exercise of design and production skills;
- Removing barriers to defense procurement of commercial products and services;
- Propagating defense technology into the commercial sector, particularly in communications, navigation and surveillance;
- Removing barriers to international sales of defense products;
- Sustaining critical technologies that are not likely to be sustained by the commercial sector, e.g. space launch, solid boosters, etc.; and
- Stable funding for core capabilities, without which the best and brightest will not enter the defense industry.

## Chapter 5—Government: Prioritize and Promote Aerospace

### 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).* 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 Commission encourages the legislative branch to create a Joint Committee on

Aerospace to coordinate legislatively the multifaceted 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 OMB, 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 6—Global Markets: Open and Fair

### Conclusions

Open global markets are critical to the continued economic health of U.S. aerospace companies and to U.S. national security. In order to remain global leaders, U.S. companies must remain at the forefront of technology development. They must also have access to global customers, suppliers and partners in order to achieve economies of scale in production needed to integrate that technology into their products and services.

Government intervention continues to distort global markets, from subsidies to anti-competitive restrictions on partnerships and collaboration to biased standards and regulations. U.S. companies frequently find themselves competing against foreign competitors supported directly or indirectly by their governments. We need to move to a different model of business characterized by competition between companies instead of between countries.

**REFORM EXPORT CONTROLS AND DEFENSE PROCUREMENT POLICIES.** U.S. national security and procurement policies represent some of the most burdensome restrictions affecting U.S. industry competitiveness.

We call for a fundamental shift away from the existing transaction-based export-licensing regime to process-based licensing. Under this new system, the government would rely on companies to safeguard against the sale of controlled technologies to unacceptable parties through internal company controls certified by the government. The government then would monitor and audit those company operations for compliance. Such a process-based licensing regime would improve security, reduce licensing costs and enable our companies to collaborate with international partners and sell to global customers.

Additional reforms, including those outlined in Interim Report #2, are necessary to make this new system effective. As quickly as possible, the government should revise the U.S. Munitions List,

remove barriers to global project licenses, expand waivers for trading with friendly nations, and update country risk surveys to facilitate better policy decisions.

U.S. procurement regulations currently are too restrictive and must be modified to be supportive of a global industrial base to meet military requirements, while maintaining U.S. industrial capacity in critical technologies and capabilities. We need to reform DoD procurement regulations to permit integration of commercial components into military products even if they are provided by non-U.S. companies or worked on by foreign nationals.

#### ESTABLISH A LEVEL INTERNATIONAL “PLAYING FIELD”.

U.S. companies have lost market share to foreign companies supported by protectionist and market distorting policies. The U.S. government must take immediate action to neutralize these distortions and enable fair and open competition.

We must continue to meet our responsibilities of setting national goals and priorities for basic research, reverse declines in basic research and experimentation funding and expand efforts to fund technology diffusion through U.S. industry.

We also must work bilaterally and multilaterally to get foreign governments out of the business of commercial “product launch.” In spite of inadequacies of the current World Trade Organizations (WTO) system, the U.S. government should work in the WTO Doha round of negotiations to strengthen the existing WTO provisions restricting the use of subsidies to distort the market. The U.S. government also should work with other WTO members to adopt more effective trade remedies that are usable and effective in a market characterized by increased globalization. When countries do violate existing provisions, we should not shy away from taking action.

We must ensure that U.S. companies are not disadvantaged by differences between U.S. and foreign tax policies as exemplified in the current WTO dispute over U.S. Foreign Sales Corporation/Extra Territorial Income regulations. In the near term we

must seek to delay European trade sanctions while both parties negotiate a solution to this dispute. We urge the Administration and Congress to authorize changes to U.S. tax law that are WTO compliant but that continue to offset the advantage enjoyed by European companies. In the longer term, the Administration should initiate changes in the WTO rules to remove the current inequity in the treatment of direct and indirect taxes that caused the dispute in the first place.

Official export credit support for commercial and military products is an essential tool to facilitate U.S. aerospace exports. In addition to continued funding for U.S. Export-Import Bank programs, we should seek to reduce international reliance on official export credits for export financing assistance, such as through ratification of the “Cape Town convention.” For military exports, the Defense Export Loan Guarantee should be modernized to permit the DoD to create an effective unsubsidized export credit organization to facilitate the financing of defense exports to U.S. allies and friendly nations abroad.

The U.S. government should remove policy and regulatory obstacles to increased commercial mergers and teaming within the U.S. and with international partners. The U.S. government should assist in developing and policing international anti-trust treaties relating to mergers and teaming between commercial entities to minimize divergence of requirements and the methods of assessment in anti-trust reviews, presumably making reviews more objective. The U.S. government also must continue to work bilaterally with key countries to remove barriers to foreign investment.

Global standards and regulations are critical to the efficient operation of the global aviation system and international markets. The U.S. government needs to step up its commitment to the development of global standards in International Civil Aviation Organization (ICAO) and via other forums. This will help to mitigate the efforts of other countries seeking to provide a competitive advantage for their companies through biased domestic standards or regulations.

**COMMIT TO GLOBAL PARTNERSHIPS.** International partnerships are essential to the creation of system-of-systems solutions to global challenges.

In order to meet our goal of transforming the way we use airspace through the use of advanced technology and improved procedures, we must act in concert with other countries around the world. We must commit to developing common standards and recommended practices for satellite navigation in ICAO, and ensure that global cooperative efforts are not thwarted by disputes over radio spectrum allocation. We strongly urge U.S. officials to work bilaterally and multilaterally to ensure that U.S. GPS and European Galileo systems are compatible and complementary in the event that Galileo becomes a reality.

U.S. policy makers should work toward global standards for safety certification as a way to prevent the use of safety certification by some governments to enhance their domestic competitiveness. We also call for increased liberalization of air transport services through negotiation of open skies agreements in order to expand the demand for all countries' air transport services and alleviate undue congestion at the largest airports.

The success or failure of our future activities in space is fundamentally linked to our ability to work effectively with international partners. It is in our country's best interest to work cooperatively with partner nations in space exploration and protection of our planet from the threat of near-earth objects.

## Recommendation #6

The Commission recommends that U.S. and multi-lateral regulations and policies be reformed to enable the movement of products and capital across international borders on a fully-competitive basis, and establish a level playing field for U.S. industry in the global market place. U.S. export control regulations must be substantially overhauled, evolving from current restrictions on technologies through the review of transactions to controls on key capabilities enforced through process controls. The U.S.

government should neutralize foreign government market intervention in areas such as subsidies, tax policy, export financing and standards, either through strengthening multilateral disciplines or providing similar support for U.S. industry as necessary.

## Chapter 7—Business: A New Model for the Aerospace Sector

### Conclusions

The Commission concludes that for our aerospace industry to be globally preeminent, now and in the future, it must be able to attract vitally needed capital at a reasonable cost. We further conclude that the defense and aerospace sector is viewed as a low growth industry with low margins, unstable revenue and a capricious major customer, the government. Without a significant change in the business model, the future of the aerospace industry, so critical to our national economic and homeland security, is uncertain and at risk.

**PROVIDE INVESTMENT OPPORTUNITIES.** Predictability, stability and performance are critical to the health and growth of a robust aerospace industry. The government must stabilize program requirements and protect adequate long-term investment funding, enact reforms that increase the financial flexibility of industry and the government, and improve program management stability.

**ENABLE INDUSTRY TO ATTRACT AND RETAIN HIGH-TECH PARTNERS AND SUPPLIERS.** The future of the aerospace industry is intrinsically tied to the ability of the sector to attract and retain high-tech partners and suppliers throughout the supply chain. The government should pursue near-term reforms to realign purchasing processes to lower costs and gain access to new technology by eliminating, or at least lowering, barriers that make government business inefficient and unattractive to commercial firms. DoD should implement changes to permit greater profitability and financial flexibility of industry working on government efforts. A government-wide review of functions and services should be conducted to



identify those functions that are not “core” to the effective operation of government and those functions that could best be performed by the private sector.

**CREATE A FAVORABLE DOMESTIC AND INTERNATIONAL BUSINESS CLIMATE.** Certain U.S. tax and trade laws and regulations that affect a wide variety of industries weigh particularly heavily on defense and aerospace, both in competition with domestic commercial entities as well as in the international markets. The government should act promptly to replace burdensome tax laws and outdated trade laws with laws and regulations that remove unnecessary administrative burdens from industry and recognize the unique contribution of defense and aerospace companies to our nation’s defense and economic security. In addition, the Administration and Congress should review and consider reducing user fees on the airlines and their customers.

**ENSURE LONG-TERM GROWTH AND FINANCIAL HEALTH.** Government and industry must recognize that a healthy, competitive, and innovative industry meeting security and aerospace needs must be closely integrated with the global commercial marketplace. Major challenges to this desired climate include the need for dramatic personnel and training reform and recognition of the dynamic interrelated global environment. Government and industry should work together to develop and implement training and exchange programs that would educate and expose their workforces to those challenges and responsibilities. All government officials with budget and program acquisition, management, or review responsibilities, both appointed and elected, should be required to have a business or financial background or training. Finally, government must develop and implement a policy regarding international cooperation in defense and aerospace that recognizes the global industrial base. The Administration is urged to undertake a review of the current policy regarding both domestic and international business combinations, based on an analysis of the U.S. defense industrial base, including the supplier industrial base.

## Recommendation #7

The Commission recommends a new business model, designed to promote a healthy and growing U.S. aerospace industry. This model is driven by increased and sustained government investment and the adoption of innovative government and industry policies that stimulate the flow of capital into new and established public and private companies.

## Chapter 8—Workforce: Launch the Future

### Conclusions

Clearly, there is a major workforce crisis in the aerospace industry. Our nation has lost over 600,000 scientific and technical aerospace jobs in the past 13 years. These layoffs initially began as a result of reduced defense spending following the conclusion of the Cold War. This led to an industry shift from reliance on defense sales to one dependent upon commercial markets. Increasing foreign competition in the commercial aerospace market has led to contractions in the industry, resulting in mergers and acquisitions. Job losses from this consolidation have been compounded by the cyclical nature of the industry.

Due to these uncertainties, most of the workers who have lost their jobs are unlikely to return to the industry. These losses, coupled with pending retirements, represent a devastating loss of skill, experience, and intellectual capital to the industry.

**REVERSE THE DECLINE AND PROMOTE THE GROWTH OF TODAY’S AEROSPACE WORKFORCE.** The Commission was unable to agree to any immediate solutions to help stem the loss of jobs within the industry. It hopes that its recommendations for a high-level federal management structure focused on establishing a national aerospace consensus (Chapter 5) and other actions to promote the industry will have a positive effect in the future. What is clear is that industry, government, and labor must begin to work now to restore an aerospace industry that will be healthy, stable, and vibrant.

U.S. policy towards domestic aerospace employment must reaffirm the goal of stabilizing and increasing the number of good and decent jobs in the industry. The Administration and the Congress should consider the impact of domestic and international policies on U.S. aerospace employment.

**ADDRESS THE FAILURE OF MATH, SCIENCE, AND TECHNOLOGY EDUCATION.** The aerospace industry must have access to a scientifically and technologically trained workforce. In the long term, the Commission stresses that action must be taken to improve mathematics and science instruction across the entire education range—K-12 through graduate school. These actions and investments should include scholarships and internship programs to encourage more U.S. students to study and work in mathematics, science, and engineering fields. In addition, investments should be made in vocational education to develop a highly skilled workforce, including registered apprenticeship programs for skilled and technical occupations. Further, as recommended in Commission Interim Report #3, targeted tax credits should be made available to employers who invest in the skills and training programs needed by the industry.

In addition, the Commission concludes that emphasis must be placed on the concepts of “lifelong learning” and “individualized instruction” as key elements of education reform. It is likely that individuals now entering the workforce will hold five or more jobs in their lifetime and the education system must be prepared to deliver training and education to meet these changing skill requirements and meet labor market needs. U.S. community colleges are adept at designing and delivering workforce training and individualized instruction.

Our policymakers need to acknowledge that the nation’s apathy toward developing a scientifically and technologically trained workforce is the equivalent of intellectual and industrial disarmament and is a direct threat to our nation’s capability to continue as a world leader.

## Recommendation #8

The Commission recommends the nation immediately reverse the decline in, and promote the growth of, a scientifically and technologically trained U.S. aerospace workforce. In addition, the nation must address the failure of the math, science and technology education of Americans. The breakdown of America’s intellectual and industrial capacity is a threat to national security and our capability to continue as a world leader. The Administration and Congress must therefore:

- Create an interagency task force that develops a national strategy on the aerospace workforce to attract public attention to the importance and opportunities within the aerospace industry;
- Establish lifelong learning and individualized instruction as key elements of educational reform; and
- Make long-term investments in education and training with major emphasis in math and science so that the aerospace industry has access to a scientifically and technologically trained workforce.

## Chapter 9—Research: Enable Breakthrough Aerospace Capabilities

### Conclusions

The United States must maintain its preeminence in aerospace research and innovation to be the global aerospace leader in the 21st century. This can only be achieved through proactive government policies and sustained public investments in long-term research and RDT&E infrastructure that will result in new breakthrough aerospace capabilities.

Over the last several decades, the U.S. aerospace sector has been living off the research investments made primarily for defense during the Cold War—intercontinental ballistic missiles, the Saturn V, space-based reconnaissance, the global positioning system, stealth and unmanned aerial vehicles. The challenges posed by our rapidly changing world—asymmetric threats, international competition, environmental

awareness, advances in technology—demand that we, like the Wright brothers 100 years ago, look at the challenges as opportunities for aerospace and turn them into reality.

Government policies and investments in long-term research have not kept pace with the changing world. Our nation does not have bold national aerospace technology goals to focus and sustain federal research and related infrastructure investments. It lacks a streamlined innovation process to transform those investments rapidly into new aerospace products, processes and services.

The United States has unlimited opportunities to revolutionize aerospace in the 21st century, opening up new markets and launching a new era of U.S. global aerospace leadership. The nation needs to capitalize on these opportunities, and the federal government needs to lead the effort. Specifically, it needs to invest in long-term enabling research and related RDT&E infrastructure, establish national aerospace technology demonstration goals, and create an environment that fosters innovation and provide the incentives necessary to encourage risk taking and rapid introduction of new products and services.

**INCREASE PUBLIC FUNDING FOR LONG-TERM RESEARCH AND RDT&E INFRASTRUCTURE.** The Administration and Congress should sustain significant and stable funding in order to achieve national technology demonstration goals, especially in the area of long-term research and related RDT&E infrastructure. Research areas that provide the potential for breakthroughs in aerospace capabilities include:

- Information Technology;
- Propulsion and Power;
- Noise and Emissions;
- Breakthrough Energy Sources;
- Human Factors; and
- Nanotechnology.

**ESTABLISH NATIONAL TECHNOLOGY DEMONSTRATION GOALS.** The Administration and Congress should adopt the following aerospace technology demonstration goals for 2010 as a national priority. These goals, if achieved, could revolutionize aerospace in the next half century much like the development of the jet, radar, space launch, and satellites did over the last half-century.

#### *Air Transportation*

- Demonstrate an automated and integrated air transportation capability that would triple capacity by 2025;
- Reduce aviation noise and emissions by 90 percent;
- Reduce aviation fatal accident rate by 90 percent; and
- Reduce transit time between any two points on earth by 50 percent.

#### *Space*

- Reduce cost and time to access space by 50 percent;
- Reduce transit time between two points in space by 50 percent; and
- Demonstrate the capability to continuously monitor and surveil the earth, its atmosphere and space for a wide range of military, intelligence, civil and commercial applications.

#### *Time to Market and Product Cycle Time*

- Reduce the transition time from technology demonstration to operational capability from years and decades to weeks and months.

**ACCELERATE THE TRANSITION OF GOVERNMENT RESEARCH TO THE AEROSPACE SECTOR.** The U.S. aerospace industry must take the leadership role in transitioning research into products and services for the nation and the world. Government must assist by providing them with insight into its long-term research programs. The industry must aggressively develop business strategies that can incorporate this research into new products and services. Industry

also needs to provide input to government on its research priorities. Together industry and government need to create an environment that will accelerate the transition of research into application. The Departments of Defense, Transportation, Commerce and Energy, NASA, and others need to work with industry and academia to create new partnerships and transform the way they do business.

### Recommendation #9

The Commission recommends that the federal government significantly increase its investment in basic aerospace research, which enhances U.S. national security, enables breakthrough capabilities, and fosters an efficient, secure and safe aerospace transportation system. The U.S. aerospace industry should take a leading role in applying research to product development.

### Promise for the Future

The aerospace industry has always been a reflection of the spirit of America. It has been, and continues to be, a sector of pioneers drawn to the challenge of new frontiers in science, air, space, and engineering. For this nation to maintain its present proud heritage and leadership in the global arena, we must remain dedicated to a strong and prosperous aerospace industry. A healthy and vigorous aerospace industry also holds a promise for the future, by kindling a passion within our youth that beckons them to reach for the stars and thereby assure our nation's destiny.



