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Committee on Commerce and Consumer Services James E. "Jim" King, Jr., Chairman

FLORIDA SPACE INDUSTRY

SUMMARY

Florida's historic association with space flight has earned the state the title of "Gateway to Space". While this distinction is a source of pride for all Floridians, the real importance of the space industry is measured in terms of its statewide economic impact. In recognition of the significance of the space industry Florida, has established a number of state entities and business incentives to support the industry. The state's efforts to expand and diversify the space industry have achieved some notable successes. However, recent developments are fundamentally changing the landscape of space commerce. In the governmental sector, NASA's new Vision for Space Exploration will dramatically impact Florida's space economy. Similarly, increased competition from the growing number of international and domestic spaceports threatens Florida's leadership position in the commercial space sector.

At this critical juncture in the history of Florida's space industry the state should evaluate its space-related efforts to ensure they are responsive to next generation federal programs and emerging commercial space opportunities. Importantly, the state should employ a more strategic approach to its wide-ranging space-related efforts. This will require improved coordination and cooperation among the state's various space-related economic development and research entities. Similarly, the state must focus and strengthen its space-related policy planning and business development activities. The state should also recommit itself to addressing a number of long-standing concerns that have limited Florida's space industry, including its continued dependence on launch operations. Finally, Florida officials should work with federal agencies to address a number of regulatory and institutional barriers that have constrained growth in Florida's space industry.

BACKGROUND

From its modest beginnings on the beaches of Brevard County, Florida's space industry has grown into a $4.5 billion segment of the state's economy. Twenty-six Florida counties are home to more than 180 space-related businesses directly employing over 23,000 Floridians. Since the 1980's, the State of Florida has assumed a more proactive role in the development of space-related enterprise. Through entities such as the Florida Space Authority the state has sought to expand and diversify the state's space industry. While the state and private sector have enjoyed some success in these efforts, recent events have significantly impacted the future of space enterprise in Florida, and posed new challenges for both the state and industry.

"Florida: The Place for Space"

Florida's long and storied association with space launch operations began in 1949 with the establishment of the Joint Long Range Proving Grounds at Cape Canaveral.[1] The virtually undeveloped Cape enabled military personnel to inspect, fuel, and launch missiles without danger to nearby communities. The area's climate also permitted year-round operations, and rockets could be launched over water instead of populated areas. A chain of islands extending into the Atlantic Ocean provided sites for tracking stations to follow the progress of missiles in flight. The primitive spaceport was inaugurated on July 24, 1950, when a modified German V-2 rocket, named Bumper 8, was successfully launched.

In 1961, the National Aeronautics and Space Administration (NASA) and the Department of Defense organized a joint study to find a launch site suitable for the proposed mission to the moon. They considered Hawaii, Texas, California, Georgia, and

[1] In 1950, the Air Force assumed sole responsibility for the proving grounds and operation of what ultimately became known as the Eastern Range. Through its facilities at Cape Canaveral Air Force Station the Air Force's 45th Space Wing coordinates civil, commercial, and military launches conducted on the Eastern Range.

Merritt Island (adjacent to the existing Air Force facilities at Cape Canaveral) as possible sites. Federal officials concluded that Merritt Island offered several compelling advantages. Most importantly, locating on Merritt Island would allow NASA to share the facilities of the Eastern Range, avoiding costly duplication. Originally designated the Launch Operations Center, the facility was renamed the John F. Kennedy Space Center (KSC) in December 1963, in honor of the slain president.

Overview of Florida's Space Industry – Space enterprise is a $4.5 billion business employing over 23,000 individuals in high-skill, high-wage positions.[2] Since its establishment 50 years ago, the space industry has developed a statewide presence, with half of the space-related businesses located outside of Brevard County. While launch operations remain the state's primary space-related activity, the industry has expanded to include additional capabilities and services. The space industry has also contributed significantly to the growth of Florida's research, technology development, and tourism sectors.

Florida currently ranks 4th among states in aerospace employment. The majority of aerospace employees are highly trained engineers, scientists, and technicians that command relatively high salaries. According to the Florida Aviation Aerospace Alliance the annual average wage of aerospace workers is approximately $52,000.[3] More than 86 percent of the 15,000 KSC-based employees work for prime contractors or their sub-contractors. The remainder are generally federal civil service workers employed directly by NASA. Based on NASA's 2003 estimate of its economic impact in Florida, each direct job at KSC multiplied into 2.4 indirect jobs, and each dollar of income was multiplied into $1.81 of total income.[4]

The primary space industry segment within Florida remains launch operations. This includes products and services related to payload support and processing, spaceport operations, and ground operations equipment and support. Within the spaceport, most activities revolve around three major programs: the Space Shuttle; the International Space Station; and expendable launch vehicles. The Space Shuttle Program, which is managed by United Space Alliance (a joint venture between Boeing Company and Lockheed Martin Corporation), constitutes the largest expenditure and employment category at KSC. Almost 10,000 employees currently work on the Space Shuttle Program. Boeing and Lockheed also serve as the major commercial launch operators through the expendable launch vehicles program managed by the Air Force.

Efforts to diversify Florida's space industry beyond launch-related operations have achieved some notable successes. For example, Florida is establishing itself as a leader in the life sciences and biotechnology. The recently completed Space Life Sciences Laboratory (previously known as the Space Experiment Research and Processing Laboratory or SERPL) serves as the primary gateway to the International Space Station for science experiments and as a world-class home to ground-based investigations in biological science. This facility will anchor the 400-acre International Space Research Park at KSC. This research park is intended to serve as a magnet for new space research and technology development initiatives.

The presence of the space industry has also stimulated opportunities for other sectors of Florida's economy. Numerous technologies, products, and businesses have been generated through research and technology development programs supported by the space industry. Similarly, Florida's academic community has benefited greatly through its access to NASA and Department of Defense research initiatives. Finally, space-related tourism has evolved into a major attraction, with the KSC Visitors Complex attracting more than 1.5 million visitors annually.

State Support for Space Enterprise

The state has long supported the development of space-related industry in Florida. During the 1980's the state significantly strengthened its support of space enterprise through the creation of the Governor's Commission on Space and the Spaceport Florida Authority, the nation's first state space agency. Since that time, the state has continued to facilitate the expansion of space-related commerce through a variety of economic development and education initiatives.

Governor's Commission on Space – In response to the changing landscape of space commerce, Governor Bob Martinez created the Governor's Commission on Space in 1987. Creation of the Commission was prompted by changes in federal space policies, increased global competition for space-related services, and the commercialization of the space industry. The

[2] Florida Space Authority, *2003 Annual Report.* These figures are based on 2000 data.
[3] The Florida Aviation Aerospace Alliance, *2003 Aviation/Aerospace Assessment*, October 2003.
[4] W. Warren McHone, Transportation Economics Research Institute, *The Economic Impact of NASA in Florida – 2003*, March 2004.

Commission's final report was published in 1988 and included an analysis of Florida's competitive position in attracting space commerce. The report pointed to the following as significant areas of concern: Florida's public educational system; the shortage of skilled labor; the state's overall business climate; and the lack of suppliers for space goods and services.[5] To address these concerns, the report contained the following major recommendations:

- Enhance Florida's K-12 educational system by including space curricula and space-oriented instruction for teachers;
- Strengthen Florida's higher education system as it relates to space;
- Demonstrate a long-term commitment to developing and supporting space commerce; and
- Encourage the development of a commercial spaceport in Florida.

Florida Space Authority – In 1989, the Legislature realized a key Commission recommendation through the creation of a permanent state space office – the Spaceport Florida Authority.[6] As authorized under s. 331.302, F.S., the Authority constitutes the state's space transportation and economic development agency and is charged with retaining, expanding, and diversifying the state's space-related industry. The Authority, which is modeled on similar types of transportation authorities (airport, seaport, etc.), is granted a wide range of powers and responsibilities. For example, the Authority is empowered to own, operate, construct, and finance spaceport infrastructure. Similarly, the Authority fosters space-related research and education by providing access to facilities, technology, and partnerships. Finally, the Authority is responsible for space transportation planning and the coordination of state space policy.

The Authority reports to the Governor through the Office of Trade, Tourism, and Economic Development and is administered by a seven-member Governor-appointed Board of Supervisors. One member each from the Senate and House of Representatives serve as ex-officio members of the board. The Authority is funded through a combination of state appropriations and revenues generated through the Authority's activities. For fiscal year 2004-2005, the Legislature appropriated $1.8 million to the Authority.

Florida Space Research Institute – In 1999, the Legislature created the Florida Space Research Institute (FSRI) to develop opportunities for Florida's academic institutions to support space technology programs. FSRI leverages state resources with those of NASA, the military, and industry, to expand and diversify Florida's space-related enterprise. For example, FRSI is responsible for co-management (with NASA) of the new Space Life Sciences Laboratory and assist Florida-based companies and universities with a variety of space-related research projects. FSRI also sponsors a range of workforce initiatives, including space-oriented instruction for K-12 teachers, and training for future aerospace technicians.

Section 331.368, F.S., establishes FSRI as a not-for-profit, public-private partnership. A 17-member, industry-majority board of directors manages FSRI. The board also includes representatives of Florida's universities and community colleges. State funding for FSRI is provided through the Office of Trade, Tourism and Economic Development. For fiscal year 2004-2005, FSRI was appropriated $800,000.

Florida Aerospace Finance Corporation – The same 1999 legislation that created FSRI also established the Commercial Space Financing Corporation.[7] The mission of the corporation is to support the development of commercial aerospace products, activities, services, and facilities. To achieve these goals the corporation is authorized to provide information, technical assistance, and financial assistance to aerospace businesses. Pursuant to s. 331.407, F.S, the corporation has a range of financial services available to assist businesses, including loan facilitations, equity facilitations, loan guarantees, and creative leases.

The not-for-profit corporation is governed by a Governor-appointed, seven member board of directors. The board includes representatives from the Florida Space Authority, the Florida Export Finance Corporation, the Florida Department of Transportation, Enterprise Florida, and the Office of Trade, Tourism, and Economic Development. For fiscal year 2004-2005, the Legislature appropriated $300,000 to the corporation through the Office of Trade, Tourism, and Economic Development.

[5] *Steps to the Stars*, Governor's Commission on Space, 1988.
[6] Chapter 2002-183, Laws of Florida, revised the name of the Authority to the Florida Space Authority.
[7] Chapter 2003-286, Laws of Florida, changed the name of the corporation to the Florida Aerospace Finance Corporation. This change was intended to eliminate confusion surrounding its mission and allow the corporation to service aviation-related projects.

Other Space-Related Entities and Incentives – In addition to the entities previously discussed, Florida has a host of other organizations that support and promote space-related enterprise. Similarly, the state has created a number of business incentives to retain and recruit space-related firms. The following briefly summarizes some of these organizations and business incentives.

- *The Technological Research and Development Authority*, established by the Legislature in 1987, focuses on the cost-effective transfer of new technologies to schools and small businesses in Florida.

- *The Florida Space Institute* is a consortium of state academic institutions responsible for expanding Florida's space industry through applied research, developing and transferring technology, and providing education and training for individuals in space-related fields.

- *Spaceport Management Council* was created by the Legislature to provide coordination and recommendations on projects and activities that will increase the capabilities of Florida's space industry.

- *Enterprise Florida* is the public-private partnership responsible for leading Florida's statewide economic development efforts. Enterprise Florida has designated aerospace as a target sector of Florida's economy.

- *Sales Tax Exemptions* – Section 212.08, F.S., provides an exemption for certain equipment and machinery used to expand the productive output of a spaceport activity. Similarly, s. 212.031, F.S., provides the lease of real property used for space flight business is exempt from Florida sales tax.

Recent Events Impacting Florida's Space Industry

A number of developments in recent years have significantly impacted space enterprise in Florida. For example, increased global competition in the face of relatively flat demand for launch services has created a challenging environment for Florida's commercial launch operators. Similarly, the tragic loss of the Shuttle Columbia and the resulting recommendations of the accident investigation board have impacted Florida-based Shuttle and Space Station operations. Finally, the President's New Vision for the Future of Space Exploration promises both opportunities and challenges for Florida's space industry.

Commercial Launch Trends – During the l990's the future of the commercial space industry appeared extremely promising. As recently as 1999, space launch forecasters projected a worldwide average of 110 commercial launches per year, with Florida potentially hosting up to 60 commercial launches annually.[8] Unfortunately, a weakened global economy, improvements in terrestrial and satellite technology, and the collapse of several major telecommunication ventures abruptly revised launch trends. In 2001 there were 59 orbital launches worldwide, the fewest since the early 1960's, and only 65 launches in 2002.[9] A 2003 market study funded by NASA estimated global launch demand will remain relatively steady at 70-80 launches per year through 2021.[10] The total number of Florida-based launches is projected to remain stable at approximately 20 launches per year through the remainder of this decade.

As the number of space launches has declined in recent years, competition among the growing number of launch sites has intensified. Major international competitors for this market include the U.S., Russia, the European Space Agency, China, and Japan. In addition to these existing international competitors, new spaceports in Australia, Brazil, and sea-launched systems are attempting to establish a market presence. Within the U.S., a number of states are developing new launch sites. In fact, 18 states have either established, or are exploring development of a spaceport, including Alaska, California, Maryland, New Mexico, and Virginia.

The Shuttle Columbia Accident – The loss of the Shuttle Columbia on February 1, 2003, triggered a fundamental re-evaluation of the U.S. space program. The Columbia Accident Investigation Board's final report concluded that while NASA's present Space Shuttle is not inherently unsafe, a number of mechanical fixes are required to make the Shuttle safer in the short term. The report also determined that physical and organizational causes played an equal role in the Columbia accident, and that the NASA organizational culture had as much to do with the accident as the foam that struck the orbiter on ascent.

[8] Volpe National Transportation Systems Center, *Building on Florida's Strength in Space: A Plan for Action*, December 1999.
[9] Futron Corporation, *The Space Launch Industry: Recent Trends and Near-Term Outlook*, July 2003.
[10] Futron Corporation, *Analysis of Space Concepts Enabled by New Transportation (ASCENT) - Final Report*, January 2003.

Although Florida was largely spared the economic upheaval that followed the 1986 Shuttle Challenger disaster, the Columbia accident has had a number of implications for the state's space industry. Most importantly, the accident led to the suspension of shuttle flights until at least May of 2005. As a result of the suspension of shuttle flights, space station processing activities at KSC have been interrupted. In addition, the accident investigation report identified a number of critical launch and safety concerns that must be addressed at KSC. The report also acknowledged that much of the infrastructure at KSC dates from the Apollo-era and is in need of extensive modernization.[11]

New Vision for the Future of Space Exploration – In January of 2004, President Bush announced a new vision for the nation's space program. The President committed the U.S. to a long-term human and robotic program to explore the solar system, starting with a return to the Moon that will ultimately enable future exploration of Mars and other destinations. The President's plan is based on the implementation of the following priorities:

- First, the U.S. will complete its work on the Space Station by 2010. The U.S. will launch a renewed research effort on-board the Space Station to better understand and overcome the effects of human space flight on astronaut health. Following final assembly of the Station, the Shuttle will be retired.

- Second, the U.S. will begin developing a new manned exploration vehicle to explore beyond our orbit to other worlds. The new spacecraft, the Crew Exploration Vehicle, will be developed and tested by 2008 and will conduct its first manned mission no later than 2014.

- Third, the U.S. will return to the Moon as early as 2015 and no later than 2020 and use it as a stepping-stone for more ambitious missions. A series of robotic missions to the Moon will explore the lunar surface beginning no later than 2008. Using the Crew Exploration Vehicle, humans will conduct extended lunar missions as early as 2015.

The new vision has significant implications for Florida. As previously noted, more than half of Florida's current space-related activities are linked to the Shuttle and Space Station. The new vision calls for the retirement of the Shuttle by 2010, and the reallocation of funds from the Space Station to NASA's exploration mission. The smaller Crew Exploration Vehicle, which is scheduled to enter service in 2014, will require significantly fewer personnel. In order to off-set the loss of jobs associated with the Shuttle program, Florida will need to not only secure new launch-related activities, but also acquire a major role in developing and manufacturing the new spacecraft.

Florida's Response to the New Space Vision – Florida's space-related entities are developing plans to address the new national space priorities. The Authority has tentatively identified the following strategies that will guide Florida's planning efforts:

Space Vehicle Strategy – Florida must secure a major role in the manufacturing and development of new space vehicles such as the Crew Exploration Vehicle.

Exploration Gateway Strategy – Florida must obtain a larger responsibility in NASA's new exploration mission by building on its existing capabilities in relevant research fields, and capitalizing on its advantage as the launch site.

Spaceport Strategy – Florida should ensure that spaceport and range infrastructure, technology, and operating environment supports new and proposed launch systems.

Diversification Strategy – Florida must strengthen its role in other federally-funded programs focused on earth sciences, aeronautics and aviation, ballistic missile defense, and other research fields.

METHODOLOGY

In preparing this report, committee staff conducted interviews with various space industry stakeholders, including representatives of private space-related interests. Similarly, staff solicited input from local, state, and federal government officials. Finally, staff conducted an extensive review of published and electronic literature sources.

FINDINGS

Through its space-related entities and positive business environment the State of Florida has made significant contributions to the advancement of the space industry. Although the industry itself has endured a period of uncertainty associated with the depressed commercial launch market and the Shuttle Columbia accident, the long-term, post-shuttle future of U.S. space policy is

[11] Columbia Accident Investigation Board, *Final Report, Vol. 1*, August 2003.

taking shape. At this pivotal point in the history of the space industry Florida must ensure that its space-related programs and policies are responsive to next generation needs and emerging opportunities. The state must also make certain that its existing space-related resources are effectively and efficiently utilized. Finally, the state must recommit itself to addressing several long-standing concerns that have limited growth in Florida's space industry.

Finding 1: The State Has Made Significant Contributions to Space Enterprise In Florida

In the 16 years since the Governor's Commission on Space recommended the creation of a permanent space office, the state's various space-related entities have provided valuable assistance and support to the space industry. Florida's space entities have also established a favorable record of leveraging state resources with federal and private financing. Finally, industry representatives generally agreed that Florida has created a positive business environment for space-related firms. The following summarizes some of the accomplishments of selected statutorily-authorized entities.

While the *Florida Space Authority* has benefited the space industry through a number of activities, it's most prominent accomplishments have occurred in facilitating infrastructure projects. For example, the $43 million Space Life Sciences Laboratory was financed, designed, and constructed by the Authority in partnership with NASA. Similarly, the Authority was instrumental in the financing of the recently constructed Boeing Delta 4 and Lockheed-Martin Atlas 5 expendable vehicle launch facilities.

The *Florida Space Research Institute* can point to a number of successes in its brief history, including its matching grants program that funds space research and education projects. During a recent 3-year period, FSRI leveraged $615,000 in state funds to sponsor almost $2 million in strategic research projects at Florida's universities. Through FSRI's marketing and promotion activities Florida's universities and aerospace companies have accessed significant federal research and technology development funding.

Since 1999 the *Florida Aerospace Finance Corporation* has assisted businesses in securing more than $40 million in new aerospace infrastructure with less than $3 million in total state appropriations. The corporation estimates that through its efforts 65 new aerospace jobs have been created, and more than 1,000 Florida jobs have been retained. Unfortunately, the depletion of the corporation's capital investment fund has severely limited its ability to service financial transactions.[12]

Finding 2: The Proliferation of Space-Related Entities in Florida Has Created Uncertainty Surrounding Responsibilities

Although estimates vary, Florida has almost 30 organizations with "space" in their title or mission statement.[13] More important than the sheer number of space-related organizations is the perception by many industry representatives that the state's space-related efforts lack coordination and accountability. For example, almost a dozen state and public/private entities are engaged in space-related economic development. Many of these organizations appear to have been created on an ad hoc basis, and lack clear lines of communication with other entities engaged in related activities. Finally, there is currently no single source to track the performance of the state's space-related entities.

Several options are available to address this finding. One option widely supported by the space industry is for the state to convene a panel on space, similar to the 1987 Governor's Commission on Space, to conduct a comprehensive evaluation of the state's space-related efforts. A number of industry representatives suggested that Florida could more efficiently utilize its limited space resources by consolidating the Florida Space Research Institute and the Florida Aerospace Finance Corporation under the Authority. Alternatively, the state may opt to follow the recommendations of the 2003 Aviation and Aerospace Assessment and merge space-related business development functions under Enterprise Florida, and establish a one-stop business center for space. Regardless of how Florida's space entities are reconfigured, the emphasis must be on improving coordination, increasing responsiveness to industry needs, and making the most efficient use of the state's limited space resources.

[12] In 2001, the corporation issued a loan guarantee for up to 90 percent of the loan amount to a Florida aerospace firm. In 2002, the aerospace company defaulted on the loan with an outstanding balance of $3.9 million. Last year, the corporation entered into a settlement agreement with the lending institution for payment of $1.65 million. This agreement exhausted the corporation's investment fund and effectively ceased its financing activities.

[13] The Florida Aviation Aerospace Alliance, *2003 Aviation/Aerospace Assessment*, October 2003.

Finding 3: Florida Should Take Action Now to Address the New Vision for Space Exploration

While many of the details surrounding the New Vision for Space Exploration remain in the planning stages, it is critical that Florida begin the process of developing a state-coordinated response. With 50 years of proven experience in space operations, a highly skilled space workforce, and the world's only quadra-modal (space, land, sea, air) port, Florida is well positioned to play a major role in the realization of the new vision. Furthermore, the new federal space policy provides Florida with an unprecedented opportunity to diversify its space industry beyond launch services and into more space-based research, technology development, and manufacturing. Preliminary estimates by the Florida Space Authority indicate that the new vision could potentially result in $2 billion in additional space-related investment in Florida through 2010.

In view of the importance of the New Vision for Space Exploration, Florida should take action now to position itself to compete for new programs and projects. As an initial step, the state should develop a strategic space plan that aligns the state's resources and policies with NASA's needs. The tentative strategies identified by the Florida Space Authority appear to be reasonable and should form the basis for the state's strategic planning efforts. As part of this effort, the state must create an effective outreach program in support of both the New Vision for Space Exploration and Florida's role in its implementation.

Finding 4: Florida Must Address Issues of Continuing Concern Relating to the Space Industry

At this critical point in the evolution of the U.S. space program it is imperative that Florida address several issues of long-standing concern. First, the state needs to take action to strengthen and expand KSC's role within the changing structure and mission of NASA. Second, the state should facilitate the continued diversification of Florida's space industry. Finally, the state needs to realize further improvements in space-related education and research. By addressing these interrelated concerns Florida can significantly enhance its position in attracting new federal and commercial space programs.

Strengthen the Capabilities of KSC – Estimates of the overall value of spaceport infrastructure in Florida approach $8 billion.[14] Despite growing international and domestic competition for launch services, Florida's spaceport remains the premier launch site in the world. Unfortunately, years of limited operations and maintenance funding by federal agencies have resulted in serious concerns relating to the deterioration of spaceport infrastructure, especially its utilities. Space industry representatives suggested that as NASA increasingly focuses on its new core mission of exploration, it will look to public and private partners to assume more responsibility for the delivery of support services, including infrastructure.

Through selective improvements in infrastructure the state can play a major role in enhancing the overall operating environment of KSC. The Authority has an established record of facilitating new space-related infrastructure projects, including roads, laboratories, spacecraft processing facilities, and launch complexes. The Authority should work to secure funding for KSC infrastructure rehabilitation through existing and new federal funding sources. The Authority should also continue to work with the Florida Department of Transportation to include funding for space, a statutorily recognized mode of transportation, within the state's transportation improvement plans.[15] Finally, the state should evaluate alternative funding sources for space-related programs, including the use of KSC Visitors Complex sales tax revenues.

Diversify the Space Industry – Although Florida has made some progress in diversifying its space-related industry, the state is still largely perceived to be a location for launching and processing spacecraft. Florida has had very limited success in attracting lucrative segments of the space industry, such as satellite and vehicle manufacturing, into the state. In order to change this perception and more effectively diversify Florida's space industry the state must build on its recognized expertise in fields such as spaceport and range technologies, and the life sciences, while developing new capabilities in other fields. Potential areas for growth include the earth sciences, aeronautics, robotics, and national security-related research and technology initiatives. Florida must also take steps to ensure that the state remains competitive with newer foreign and domestic spaceports that are attempting to capture a larger share of the commercial space market.

Diversification of the state's space industry will require a long-term commitment by the state to align key economic and technology sectors with the space

[14] Commission on the Future of the United States Aerospace Industry, *Final Report*, November 2002. This estimate of replacement costs includes both KSC and Cape Canaveral Air Force Station.

[15] Section 339.62(3), F.S.

economy. Importantly, Florida must have a better understanding of non-launch market conditions, as well as the likely impact of the New Vision for Space Exploration. To accomplish this goal the state should conduct a strategic assessment of non-launch industry segments and identify those technologies where Florida can establish a leadership position. Based on the findings of this strategic assessment, Florida should also develop a space-marketing plan that clearly identifies the advantages of locating space businesses in Florida and the resources available to assist businesses. Finally, the state should aggressively partner with NASA and other key space stakeholders in the development of new programs and market opportunities.

While Florida takes steps to position itself for the next generation of federal programs, it must also ensure that it remains an inviting location for commercial space businesses and space-related entrepreneurs. The depressed commercial space sector has recently shown some signs of slowly rebounding. Similarly, the recent success of the Ansari X Prize winner *SpaceShipOne* highlights the potential impact of privately funded space tourism in the near future. Improving Florida's competitiveness in these areas will require periodic review of space-related programs and business incentives. More importantly, the state must work with federal officials to address regulatory and institutional hurdles that have deterred some space firms from locating in Florida. Key to this effort will be improving spaceport access by streamlining range operating procedures and addressing the current cost environment at the spaceport.

Enhance Space-Based Education and Research – Expanding Florida's share of space-related research and development may ultimately prove to be the most effective strategy for diversifying Florida's space industry. In 2001, Florida ranked 30th nationally in NASA research and development funding.[16] One option for strengthening Florida's space-related research and development capabilities is the establishment of a Space Technology Center of Excellence, similar to other academic/industry centers recently created to support promising new technologies. The state should also consider increasing its matching investment for NASA's space research and education grant program.

While enhanced funding for space-related education and research should remain a state priority, there are a number of additional options available to address this concern. For example, there is a need for improved coordination among the 15 state and private academic institutions that conduct space-related research. Similarly, a number of industry representatives supported strengthening FSRI's role in setting state space research and workforce priorities. Finally, there are a number of emerging opportunities to link Florida-based space research with new sources of expertise and funding. For example, Florida should exploit the convergence of NASA's new exploration mission, the state's growing expertise in the life sciences, and the establishment of the Scripps Research Institute in Florida.

RECOMMENDATIONS

The Legislature should create a commission or task force similar to the benchmark 1987 Commission on Space to conduct a comprehensive analysis of Florida's space-related programs and identify needed policy changes, including the restructuring of state space-related entities.

The Legislature should make selective investments in space-related research and development programs. Funding options include the establishment of a Center of Excellence for space technology, and increased funding for NASA's space research and education grant program.

The Florida Space Authority, in consultation with interested parties, should develop a strategic plan for space that aligns the state's space-related programs and resources with NASA's New Vision for Space Exploration and emerging opportunities in the commercial space sector.

The Florida Space Authority should conduct a market analysis of non-launch market sectors and the effect of the New Vision for Space Exploration on the space industry. Based on the findings of this analysis, the Authority and Enterprise Florida should develop a space-marketing plan that identifies the advantages of locating space-related businesses in Florida and the resources available to assist businesses.

State space and economic development agencies should create an effective outreach program in support of both the New Vision for Space Exploration and Florida's role in its implementation.

[16] Commission on the Future of Aeronautics and Space in Florida, *Establishing Florida As a Prime Location For the Aviation and Aerospace Industries*, January 2001.

Florida's state and congressional representatives should work with the appropriate federal authorities to support KSC's role within NASA. Similarly, Florida officials should encourage NASA and the Air Force to address the existing regulatory and cost environment at the spaceport.