

Defense Industrial Base Assessment:

U.S. Space Industry

FINAL REPORT

**Dayton, Ohio
August 31, 2007**



Approved for public release; distribution is unlimited.

PREFACE AND ACKNOWLEDGEMENTS

This report focuses on the health and competitiveness of the U.S. Space Industrial Base, including the associated impacts of U.S. export controls. The Department of Defense, through the Under Secretary of the Air Force and the Space Industrial Base Council directed this study. An Air Force Research Laboratory, Materials and Manufacturing Directorate representative led an industry/government team and integrated the information gathered to prepare the study. The Department of Commerce's Bureau of Industry and Security developed and deployed the survey instrument and verified data provided by companies comprising the U.S. Space Industry. Team contractor support included the Universal Technology Corporation, Booz Allen Hamilton, The Tauri Group, Nortel Government Solutions which operates the AF Industrial Base Information Center, and Northrop Grumman Technical Services.

The Air Force would like to acknowledge the contributions of the various government agencies that supported this assessment and the companies who responded to the industry survey. Their efforts were instrumental in the team's completion of this Defense Industrial Base Assessment of the U.S. Space Industry.

Please address queries and comments to:

Mr. Alan Taylor
Industrial Base Planning Program Mgr.
AFRL/MLM
Wright-Patterson AFB, OH 45433
(937)904-4593
Alan.taylor@wpafb.af.mil

or Mr. Jason Bolton
Trade & Industry Analyst
U.S. Department of Commerce
1401 Constitution Ave., NW
Washington, DC 20230
(202)482-5936
jbolton@bis.doc.gov

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
LIST OF FIGURES AND TABLES.....	vii
EXECUTIVE SUMMARY	ix
1.0 INTRODUCTION	1
1.1 Study Purpose	1
1.2 Export Control Background.....	1
1.3 Study Team and Methodology.....	5
2.0 GLOBAL MARKETPLACE AND COMPETITIVENESS	9
2.1 What does the Global Space Marketplace Look Like?.....	9
2.2 What is the Outlook for U.S. Companies' in the Domestic/Foreign Marketplace?.....	11
2.3 How do U.S Companies Perceive their Competitive Position in the Domestic/Foreign Space Market?	12
2.4 How do U.S. Companies View the Foreign Market Environment?	14
2.5 What are the Barriers to U.S. Companies Entering Foreign Markets?	14
2.6 Has the Overall U.S. Global Market Share Changed?	15
3.0 U.S. SPACE INDUSTRY HEALTH	18
3.1 What is the Financial Viability of the U.S. Space Companies?	18
3.2 How do Export Controls Affect Research and Development?	27
3.3 How do Export Controls Affect the Workforce?	32
3.4 Are there any Impacts on International Relations or Joint Space Ventures?	33
4.0 EXPORT CONTROL IMPACTS	34
4.1 What have been the Impacts of the Export Licensing Change?	34
4.2 What Licensing Conditions were Described by the U.S. Space Industry?	38
4.3 What Remedies were Suggested by Industry?	43

5.0	SUMMARY	46
5.1	Key Findings	46
5.2	Conclusions	48
6.0	APPENDICES	50
6.1	Acronyms	50
6.2	U.S. Space Industry Financial Summary	52
6.3	U.S. Department of Commerce, Bureau of Industry and Security, U.S. Space Industry Survey Instrument	57

LIST OF FIGURES

Figure 1.3.1-1. Study Team	5
Figure 1.3.2-1. Study Sources and Methodology	5
Figure 2.1-1. World Space Industry Revenues (\$B).....	9
Figure 2.1-2. Payloads Launched by Year/Region	10
Figure 2.1-3. U.S. Company Global Space Sales	11
Figure 2.2-1. Domestic and Foreign Market Forecasts (2008-2012).....	12
Figure 2.3-1. Company Perspective on Being Competitive in Domestic Market (All Tiers) ...	12
Figure 2.3-2. Company Perspective on Being Competitive in Foreign Market (All Tiers)	13
Figure 2.5-1. Barriers to Foreign Markets – Top 5 Countries	14
Figure 2.5-2. U.S. Export Controls as Market Barrier by Country (Top 11 Countries)	15
Figure 2.6-1. U.S. Share of Satellite Manufacturing Revenues.....	16
Figure 2.6-2. U.S. Share of Communications Satellites - GEO and non-GEO	17
Figure 2.6-3. U.S. Share of Communications Satellites – GEO Only	17
Figure 3.1-1. Financial Risk by Tier.....	19
Figure 3.1-2. U.S. Space Industry Net Income	20
Figure 3.1-3. Gross Space-Related Business Gross Margins by Tier.....	20
Figure 3.1-4. Gross Space-Related Gross Margin Medians by Tier (\$M).....	21
Figure 3.1-5. Quick Ratio by Tier.....	21
Figure 3.1-6. Current Ratio by Tier	22
Figure 3.1-7. Space Sales by Tier	23
Figure 3.1-8. Top 10 Products – Percentage of U.S. and Foreign Sales (All Tiers).....	24
Figure 3.1-9. Competing Foreign Products/Services.....	25
Figure 3.1-10. U.S. Government Space Budgets.....	26
Figure 3.2-1. Tier 1-3 Space R&D by Funding Source	27
Figure 3.2-2. Tier 1-3 Space R&D Expenditures by Function	27
Figure 3.2-3. Space R&D by Tier (2003-2006).....	28
Figure 3.2-4. Tier 1–3 R&D Expenditure as Percentage of Total Space Sales	29
Figure 3.2-5. U. S. Government Space Research and Development Spending by Year and Agency (Constant FY05 Dollars).....	30
Figure 3.2-6. Introduction of New GEO Satellite Busses by Manufacturer	31
Figure 3.3-1. Total Employment by Tier	32
Figure 4.1-1. Total Export Control Compliance Cost.....	35

Figure 4.1-2. Financial Costs of Export Control Compliance – All Tiers (\$K).....	35
Figure 4.1-3. Employment – Total Export License Staff (ITAR/EAR)	36
Figure 4.2-1. Space Sales by Export Control Regime in \$K (2003-2006)	38
Figure 4.2-2. Space Export Destinations by Export Control Regime in \$K (2003-2006).....	39
Figure 4.2-3. ITAR License Applications by Tier	40
Figure 4.2-4. ITAR Application Processing	40
Figure 4.2-5. ITAR Applications Denied (%)	41
Figure 4.2-6. Product Groupings of Denied ITAR Applications (2003-2006).....	41
Figure 4.2-7. Destinations of Denied ITAR Applications	42
Figure 6.2-1. Sample Charts - Selected Financial Data.....	53
Figure 6.2-2. Profit Margins by Tier.....	54

LIST OF TABLES

Table 1.3.2.2-1. Analysis Themes and Questions.....	7
Table 1.3.2.2-2. Tier Level versus 2006 Space Sales	8
Table 3.1-1. Survey Population: Manufacturing vs. Services.....	22
Table 4.1-1. License Application & Decision History Summary (2003-2006).....	34
Table 4.1-2. Export Control Burden	36
Table 4.1-3. Average Foreign Sales per Export Control Staff Member	37
Table 4.2-1. Export Licensing – TAAs (2003-2006).....	42
Table 4.3-1. Anomaly Resolution Procedures	43
Table 4.3-2. TAAs for Meetings/Insurance/Phone Calls.....	44
Table 4.3-3. Comments on U.S. Congressional Role	45
Table 5.1-1. Section II Summary	46
Table 5.1-2. Section III Summary.....	47
Table 5.1-3. Section IV Summary	48
Table 6.2-1. Financial Risk Definitions.....	52
Table 6.2-2. Selected Five Years Corporate Financial Data (example)	53

EXECUTIVE SUMMARY

In October 2006, the National Security Space Office (NSSO) initiated this space industrial base assessment. The purpose was to assess the health, competitiveness, and ability of the space industrial base to continue support of national security space requirements. Specifically, the goals were to:

- Evaluate the industrial, economic, and financial factors affecting the U.S. Space Industrial Base.
- Determine if U.S. export controls and practices are impacting space prime contractors and 2nd/3rd tier subcontractors.
- Develop findings and conclusions for the Space Industrial Base Council (SIBC).

A team approach was taken to conduct the study. The government team project lead and integrator was the Air Force Research Laboratory (AFRL) Materials and Manufacturing Directorate (Industrial Base Program). The Department of Commerce (DOC), Bureau of Industry and Security (BIS) developed, deployed, and verified data collection from a survey of space industry companies, and the NSSO served in an oversight capacity.

The study involved a broad look at industrial base indicators and a detailed analysis of the BIS survey inputs. The BIS issued the survey electronically on February 2, 2007 and concluded it on April 24, 2007. The survey was sent to 274 space industry company/business units—the BIS received and verified 202 survey inputs for a 74% response rate. The team used tier levels aligned by typical business supply chain hierarchy to characterize the industry respondents. Prime contractors were Tier 1, subcontractors were Tier 2, and commodity suppliers were Tier 3. The study focused on three analysis streams including Global Marketplace/Competitiveness, U.S. Industry Health, and Export Control Impacts.

Global Marketplace and Competitiveness

Foreign competition is real and growing. Moreover, there is some evidence that U.S. export controls give foreign competitors a perceived advantage in marketing to non-U.S. customers. Segments of the U.S. space industry feel threatened competitively and see export controls as the main factor undermining their ability to compete for sales in foreign markets.

Sales/Market Share—Total global and total U.S. space sales have increased, mostly in services, for the 2003-2006 period surveyed. However, the U.S. share of the global market decreased. For example, the U.S. share of satellite manufacturing has decreased 20% for all commercial communication satellites (COMMSATs) sales and 10% for geosynchronous orbit (GEO) COMMSATs since 1999. Defense funding, domestic non-defense services and ground equipment dominate U.S. space industry sales. Export sales represent less than 10% of total U.S. company revenues annually from 2003-2006.

Competition—Industry's view on its competitiveness in the 2008–2012 timeframe is very positive with regard to the domestic market. In the foreign marketplace, there is a broad industry consensus on the difficulty in capturing sales. Industry identified strong foreign competition in spacecraft manufacturing, primarily in Europe followed by the Asia-Pacific region. Companies also indicated U.S. export control requirements were the number one barrier to selling in foreign markets, followed by indigenous purchase preferences.

U.S. Industry Health

Overall, financial viability for the U.S. space industry is good based on publicly available company annual reports, with 70% of the companies considered at low risk. Twenty-five percent of the companies were considered at moderate or high risk (primarily commercial space services and manufacturers of materials for launch systems). Aggregate Research and Development (R&D) expenditures grew an average of 8% per year since 2003, primarily in Tiers 2 and 3 as an investment in innovation by firms to remain competitive. The space workforce has grown 22% over the last 4 years.

Export Control Impacts

The industry survey captured information related to the added financial and labor costs associated with export sales, as well as, trends tied to processing International Traffic in Arms Regulations (ITAR) and Export Administration Regulations (EAR) licenses. This analysis addressed process issues, cost of compliance, the unintended consequences of export controls, and suggested industry remedies.

License Process Issues—Impacts of export control processes vary by tier with more pronounced impacts at lower tiers. Although less than 1% of ITAR license applications were denied from 2003–2006, the reported loss of foreign sales due to ITAR was \$2.35B, mainly due to lengthy processing times. The average processing time for Technical Assistance Agreements has grown to over three months.

Cost of Compliance—Export control compliance costs averaged \$49M/year industry-wide. Compliance costs grew 37% during the 2003–2006 period with the burden of compliance significantly higher for firms in the lower tiers.

Unintended Consequences—Foreign competitors leveraged their countries’ more relaxed regulatory climate in marketing their products as “ITAR-free”—purportedly directly affecting U.S. companies’ ability to compete. Some U.S. companies claimed the European Space Agency (ESA) directed European companies to find non-U.S. sources for space products, and ESA has also funded development of competing products to either avoid ITAR requirements, develop indigenous capabilities, or both.

Industry Remedies—Almost 60% of the recommended industry actions were to update U.S. export control lists more often to accurately reflect current global technology and the competitive environment. Nearly 23% of respondents recommended specific actions for streamlining the U.S. export control licensing process. Some firms also made recommendations to reform the Congressional review process.

Findings and Conclusions

The U.S. space industry has, in general, been healthy for the 2003-2006 period and very competitive domestically for both defense and commercial products and services; however, the global space market has changed significantly since 1998-1999 when the U.S. Government made major modifications to its overall export control regulations for space-related products and services. The U.S. industry now faces strong and growing competition, primarily from European firms, and is losing market share in allied countries. Reportedly, ITAR has impacted U.S. competitiveness by encouraging other nations, in many cases our allies, to develop indigenous space capabilities and industries that now market globally.

Survey respondents reported that ITAR changes and the cost of export control compliance have directly or indirectly precipitated this increased competition. To maintain and enhance the U.S. position in the global space market, ITAR processes need to be frequently reviewed and adjusted, as appropriate. ITAR staffing at the U.S. Department of State (DOS) and the Department of Defense's (DOD) Defense Technology Security Administration (DTSA) should be reviewed and adjusted to ensure that personnel/funding levels align with the number of applications processed. Moreover, restrictions regarding sales to U.S. allies should be re-examined to reflect geo-political and economic considerations.

1.0 INTRODUCTION

1.1 Study Purpose

Space is vital to the national security of the United States. The U.S. Space Policy issued in August 2006 states, “for five decades, the United States has led the world in space exploration and use and has developed a solid civil, commercial, and national security space foundation. Space has become a place that is increasingly used by a host of nations, consortia, businesses, and entrepreneurs.”¹

The National Security Space Industrial Base (NSSIB) is critical to U.S. success in developing and deploying national security space assets. Adjusting to recent declines in satellite and launch demand, the U.S. space industry has experienced significant consolidation and divestment. At the same time and in response to market and political changes, the space industry has become global, resulting in increased percentages of foreign components in U.S. spacecraft, foreign systems competing directly with U.S. products worldwide, and an overall decrease of U.S. industry’s global market share. Many executives within the U.S. space industry contend that export controls, having accelerated both the growth of foreign competition and weakening of the U.S. NSSIB, place undue restrictions on the sale of U.S. satellites and related components abroad, making them less attractive to foreign customers.

In October 2006, the Department of Defense (DOD), through the DOD Executive Agent for Space and the Space Industrial Base Council (SIBC) directed this study to develop insight and understanding concerning the impact of export controls versus other market factors on the current and future health of the U.S. space industrial base. This study addressed three goals with an emphasis on the examination of comprehensive survey data collected from U.S. industry:

- 1) Evaluate the industrial, economic and financial factors affecting the U.S. Space Industrial Base.
- 2) Determine if export controls and practices are impacting space prime contractors and 2nd/3rd tier subcontractors.
- 3) Develop findings and conclusions for the Space Industrial Base Council (SIBC).

The study primarily used industry data collected through a Department of Commerce (DOC) Bureau of Industry and Security (BIS) mandatory survey. This survey was sent to 274 U.S. space industry company/business units covering products and services in several space-related areas including services, spacecraft/components, ground equipment, and others. The survey response rate was 74% with 202 inputs received and analyzed. The responses included both subjective (narrative comments) and objective (data) inputs.

1.2 Export Control Background

Export controls reflect an evolution of national priorities over the last century. The development of export control policy vis-à-vis trade policy began with the Trading with the Enemy Act of 1917 and continued with the Neutrality Act of 1935 and “An Act to Expedite and

¹ Executive Office of the President, Office of Science and Technology Policy, “U.S. National Space Policy,” Fact Sheet, August 31, 2006.

Strengthen the National Defense” of 1940. These early policies matured into an extensive export control system. This section provides a short background on export controls, including an overview of export control agencies, their policies, and the impacts/applications these agencies and policies have on the space industry.

1.2.1 Governing Agencies

The primary governing agencies for current export control policies are the Department of State (DOS), the DOC, and the Department of the Treasury (Treasury), each with its own defined regulatory responsibility and regime.² The role of each respective agency has shifted over time in response to world events. These three agencies have had varying degrees of responsibility for regulating the export of defense and commercial commodities in the United States since the World War I era. Each seeks to ensure that U.S. trade policy supports national security, economic, and foreign policy interests.

The DOS, through its Directorate of Defense Trade Controls (DDTC), has been delegated by Presidential authority to control the export of defense articles and services as specified in the Arms Export Control Act. The DOS uses the International Traffic in Arms Regulations (ITAR) to implement this Act and exercise export controls over defense commodities. The DOS is responsible for maintaining the United States Munitions List (USML) which is used to identify which products or services are subject to export controls. Currently, satellites and all related space technologies are under DOS jurisdiction. Control of “Spacecraft Systems and Associated Equipment” is located under ITAR §121.1, Category XV (22 C.F.R. § 121.1).

The DOC, through the BIS, administers the Export Administration Regulations (EAR) to control dual-use and commercial items, including those identified in the Commerce Control List (CCL). In 1996, commercial communication satellites and related components were transferred to DOC jurisdiction. In 1999 as a result of the Cox Report, they were transferred back to the DOS. Circumstances surrounding the transfer are further discussed in section 1.2.2.

The Treasury department administers and enforces economic and trade sanctions based on U.S. foreign policy and national security goals through its Office of Foreign Assets Control (OFAC). The OFAC identifies both nations and terrorist organizations where these sanctions may apply, and exercises the authority to freeze trade assets. While there is limited literature on the issue, the degree to which OFAC-administered/enforced sanctions affects space assets depends on whether the desired asset source is a restricted organization or is in a restricted country. For instance, the China Great Wall Industry Corporation, which provides satellite applications and launch services, is on a Treasury restricted list.³

² Several other agencies have export control responsibilities, but do not play a significant role in the space industry. They include Department of Energy, Department of the Interior, Drug Enforcement Administration, Environmental Protection Agency, Food and Drug Administration, Nuclear Regulatory Commission, and Patent and Trademark Office.

³ The China Great Wall Industry Corporation was listed in Executive Order 13382 as an organization with whom “any person or company in the United States [is] prohibited from engaging in any transaction or dealing...” For more information on this /other similar restrictions, see the Department of the Treasury fact-sheet on nonproliferation restrictions available at <http://www.treas.gov/offices/enforcement/ofac/programs/wmd/wmd.pdf> (last accessed 15 Mar 07).

1.2.2 Satellites and Export Controls

Historically, the export of satellites from the United States to foreign nations was controlled by the DOS via ITAR. In 1996, in an effort to relax export regulations, commercial communication satellites were transferred under the purview of Commerce's less restrictive CCL. In 1999, however, a Congressional committee found that U.S. satellite manufacturers had been responsible for the unlicensed export of missile design information to the Peoples' Republic of China (PRC) as shown in the excerpt from The Cox Report highlighted below.

U.S. Loral and Hughes Commit Export Control Violation

Following the catastrophic launch failure of a Chinese Long March 3B rocket carrying the U.S.-built Intelsat 708 satellite, an Independent Review Committee composed of Loral and Hughes Space & Communications engineers met with PRC engineers to review the failure analysis performed by the Chinese. The Independent Review Committee took issue with the findings of the report, and therefore issued their own Preliminary Report, documenting two other potential failure points and recommending further testing.

According to the U.S. Department of Defense (DOD), evidence suggests that the Independent Review Committee very likely led the PRC to discover the true source of failure of the rocket. The DOD also concluded that "Loral and Hughes committed a serious export control violation by virtue of having performed a defense service without a license..."

Source: The Cox Report, 1999, Ch 5.

In response to this and other breaches, commercial communication satellites and all related equipment were placed back on the USML on March 15, 1999 pursuant to a provision in the Strom Thurmond National Defense Authorization Act of 1999. The State Department export control regime imposes significantly more restrictive controls on U.S. companies competing in the global commercial space marketplace. The export control regime regulates U.S. commercial satellite manufacturers' interactions with foreign customers and suppliers at every step of doing business including marketing, sales, manufacturing, delivery, and returns.

1.2.3 Recent Amendment Attempts

In the post-1999 era, there have been numerous attempts to reform DOS supervision of satellite exports, beginning with a series of denied Congressional actions. In May 2000, the DOS and DOD developed a series of proposals to once again change the export control process. These 17 measures, collectively named the Defense Trade Security Initiative (DTSI), and signed by President Clinton in 2000, were intended to streamline the processing of arms export license applications and increase mutual security with our North Atlantic Treaty Organization (NATO) allies. The DTSI covered a wide range of defense-related categories.⁴ Three notable amendment attempts were introduced in the Congress: H.R. 4417, "Satellite Exports with Security Act of 2000" would have transferred commercial communication satellites to Commerce; H.R. 1707 IH "Satellite Trade and Security Act of 2001," would transfer commercial communication satellites back to Commerce requiring referral of all satellite export license applications to DOS and DOD

⁴ "Brief History of U.S. Export Regulations" presented to the Defense Science Board October 16, 2006, Reinhold Bauer, Sr. Project Engineer, Project West Wing (PWW), The Aerospace Corporation, pp20-24

for review; and the Foreign Relations Authorization Act of 2004 would have lifted the requirement to obtain a license to provide marketing information about commercial communications satellites to NATO allies, Australia, Japan, and New Zealand. All three actions failed.

In 2005, Congress passed an ITAR amendment which called for expeditious processing of license applications for defense exports to the United Kingdom and Australia. Expansions in licensing officer staffing levels at the DDTC and implementation of an electronic license application process have been other indicators of efforts to streamline the arms export licensing process. According to a 2005 General Accounting Office report, however, “the arms export control system has not undergone fundamental changes.”⁵

1.2.4 New National Space Policy

In August 2006, the White House issued a new National Space Policy that recognizes the importance of space to U.S. economic and national security. A key component of the policy is effective export policies. “As a guideline, space-related exports that are currently available or are planned to be available in the global marketplace shall be considered favorably. Exports of sensitive or advanced technical data, systems, technologies, and components shall be approved only rarely on a case-by-case basis. These items include systems engineering and systems integration capabilities and techniques or enabling components or technologies with capabilities significantly better than those achievable by current or near-term foreign systems.”⁶

⁵ Government Accountability Office, *Defense Trade: Arms Export Control System in the Post 9/11 Environment*, GAO-05-234, Washington, DC: Government Accountability Office, February 2005.

⁶ Executive Office of the President, Office of Science and Technology Policy, “U.S. National Space Policy,” Fact Sheet, August 31, 2006, pg. 9.

1.3 Study Team and Methodology

1.3.1 Study Team

The Air Force Research Laboratory (AFRL) Materials and Manufacturing Directorate was assigned to lead the study with a team of government participants and contractor support as shown in Figure 1.3.1-1. The Space Industrial Base Council sponsored the study.

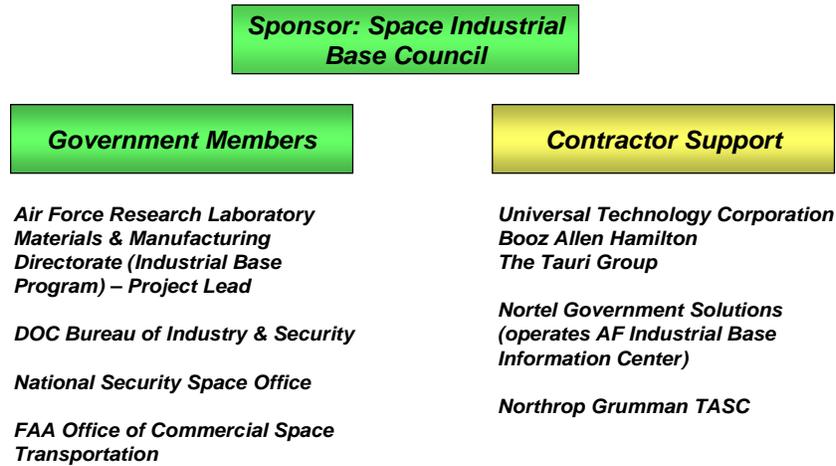


Figure 1.3.1-1. Study Team

1.3.2 Methodology

The study was conducted from January to July 2007. The three-phase effort and relevant information streams are shown in Figure 1.3.2-1. In Phase 1, the study team planned the study and gathered data; in Phase 2, the data were analyzed and integrated to develop findings; and in Phase 3, the results were documented and reported to the SIBC.

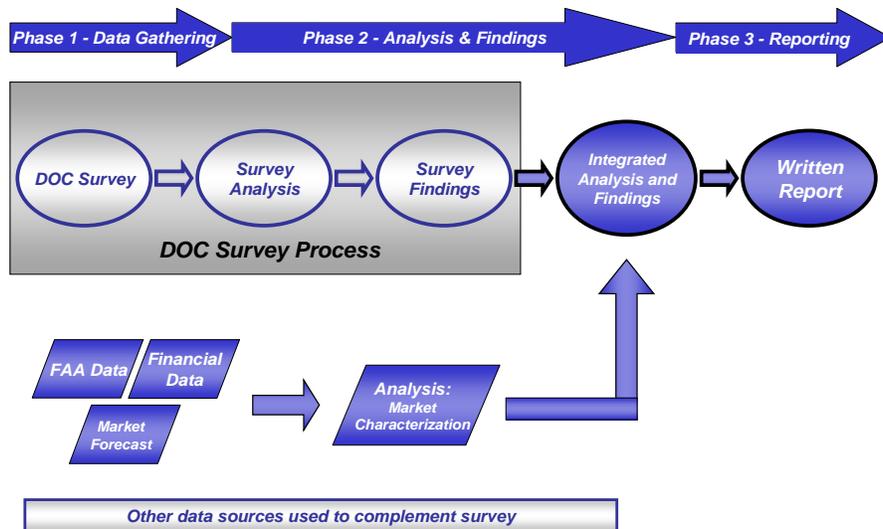


Figure 1.3.2-1. Study Sources and Methodology

1.3.2.1 Phase 1 – Data Gathering

The team employed several data sources for the study. The primary source was the BIS survey of U.S. companies with space-related business. BIS conducted this comprehensive survey with the principal goal to “analyze the health and competitiveness of the space industry in terms of industrial, financial, and economic performance.”⁷ The list of companies receiving the survey and the survey tool itself were vetted through multiple government organizations (the National Security Space Office (NSSO), AFRL, BIS, the National Reconnaissance Office (NRO), the National Oceanic and Atmospheric Administration (NOAA), and the National Aeronautics and Space Administration (NASA)), industry associations (the Aerospace Industries Association (AIA) and Satellite Industry Association (SIA)), and The Aerospace Corporation.

In responding to the BIS survey, companies had the option to report certain data at the corporate, business unit, or operating location level to focus on the best representation of their “space-related” business. Therefore, the study used the term “*company*” generically to describe the business entity that provided the survey response.

To complement the survey data, the study used separate company and space industry data sources to characterize the global and domestic space markets. This market data was used to corroborate and place the survey data in context. This “Market Characterization” drew upon a range of sources including the Air Force’s Industrial Base Information Center (IBIC) for financial risk assessments and market forecasts and the Federal Aviation Administration (FAA) for historical launch data.

1.3.2.2 Phase 2 – Analysis and Findings

In Phase 2, the study team analyzed the primary and complementary data sources separately. The BIS survey was analyzed question by question to develop findings. The IBIC, FAA, and other industry-specific data were analyzed to characterize trends at the market level. These two data and analysis streams were then brought together to provide an integrated analysis, sort findings, and form conclusions. These are discussed in more detail below.

To structure the analysis, the team divided the effort into three study themes with corresponding questions serving as essential elements of analysis (see Table 1.3.2.2-1).

⁷ United States Department of Commerce, Bureau of Industry and Security, “Defense Industrial Base Assessment: U.S. Space Industry.” OMB Control Number: 0694-0119, Released February 2, 2007. Herein after referred to as the DOC Survey.

Table 1.3.2.2-1. Analysis Themes and Questions

Global Marketplace and Competitiveness	U.S. Space Industry Health	Export Control Process
Do export controls versus other market factors affect current or future U.S. competitiveness in space?	What is the impact of export controls versus other market factors on past, current, or future industry viability?	Are there extended delays in export license processing and, if so, have they impacted U.S. competitiveness?
Do the observed impacts vary with corporate size or among specific technical specialties, components, or systems?	Do export controls versus other market factors impact space-related R&D?	
	What is the impact of export controls on past, current, and future employment?	
	Are there any impacts on international relations or joint space ventures? Are export controls driving alliances or are alliances formed to mitigate the impact of rising materials cost or limited availability?	

The survey analysis included developing aggregate summary information, data trends/characteristics, and quantitative impact metrics to address the three study themes. The BIS survey yielded thousands of data items for each respondent/company, depending on how thoroughly each completed the survey questions.

Statistical analysis software was employed to transform the individual data items into the foundation information used by the analysis team to develop insight and understanding of health, competitiveness, export control impacts and other issues. The software used by the team provided the ability to analyze multiple products generated from the survey data. These products included comparing/contrasting data by company products or services, sales, annual trends, license processing metrics, “Tier” group/level, etc.

In evaluating the data, the companies were categorized into industry tiers. In defining “Tier” levels, each company was grouped according to where the majority of its space business was in the product chain. When a company was broken into business units, each unit was evaluated based on its business area. The "corporate" entries for each business were based on which grouping best defined the majority of its space business. Companies were grouped into Tier 1, 2, or 3 as defined below:

Tier 1 - Primes: Companies that sell end products to commercial and/or government customers in their fields. Examples include companies selling satellites, launches, or satellite services. This group also includes emerging launch companies that are developing launch vehicles and services.

Tier 2 - Subcontractors: Companies that provide major components and/or subsystems to prime companies. Components provided are complex and are significant parts of the end-product. Product examples include sensors, satellite antennas, and solid rocket boosters.

Tier 3 - Lower Tiers: Companies that provide less complex components, subassemblies, structures, and materials, e.g., optics, propellant, coatings. Services in this Tier can include engineering, information technology, research, and custom fabrication services.

Survey respondents by tier (Table 1.3.2.2-2 below) represented a cross-section of small, medium, and large companies when associated with 2006 space sales. The intuitive view that Tier 1 companies are large and Tier 3 companies are small is reinforced even though there are exceptions based on space-only-related sales volume and business unit level responses.

Table 1.3.2.2-2. Tier Level versus 2006 Space Sales

	# of Companies	Small (<\$5M)	Medium (\$5M to <\$50M)	Large (≥\$50M)	Total
Tier 1	40	15%	22%	63%	100%
Tier 2	82	26%	38%	36%	100%
Tier 3	80	49%	41%	10%	100%

The complementary data and analysis stream resulted in a market characterization. As cited before, the study team analyzed financial and market risk assessments from IBIC, historical launch data from the FAA, and other industry-specific data. The results summarized information on past, present, and future market performance. Unless otherwise noted, all financial data is given in then-year dollars and is not adjusted for inflation.

In assessing the potential impact of export controls on the space industry, annual sales were grouped into three periods. These three periods were defined as follows:

- **Pre-Policy Change, 1994 to 1998** – This period includes five years of satellite data during which time commercial communication satellites and components were first under DOS jurisdiction (1994-95) and then under DOC jurisdiction for the remaining three years.
- **Transition Period, 1999 to 2001** – This period begins the year policy changes moved commercial communication satellites from DOC to DOS jurisdiction and includes three years for transition. Since satellite cycle times run several years from buying decision to launch, satellites launched during this period may have been licensed under either export regime.
- **Post-Policy Change, 2002 to 2006** – This period reflects the most recent five years of satellite data and buying decisions made after the policy change was in place. All satellites are under DOS jurisdiction in this time frame.

In the final step of Phase 2, the study team integrated the BIS survey and the market characterization analyses to form the overall findings and conclusions.

1.3.2.3 Phase 3 – Reporting and Support

Based on the integrated findings and conclusions in Phase 2, the study team prepared a briefing for the SIBC and the final report. This final report is organized into six sections. Following this introduction, the next three sections cover the study themes: Section II presents the analysis and findings on the space industry Global Marketplace and Competitiveness; Section III reports on the U.S. Space Industry Health; and Section IV addresses the Export Control Impact. The report closes with a Summary and Appendices in Sections V and VI.

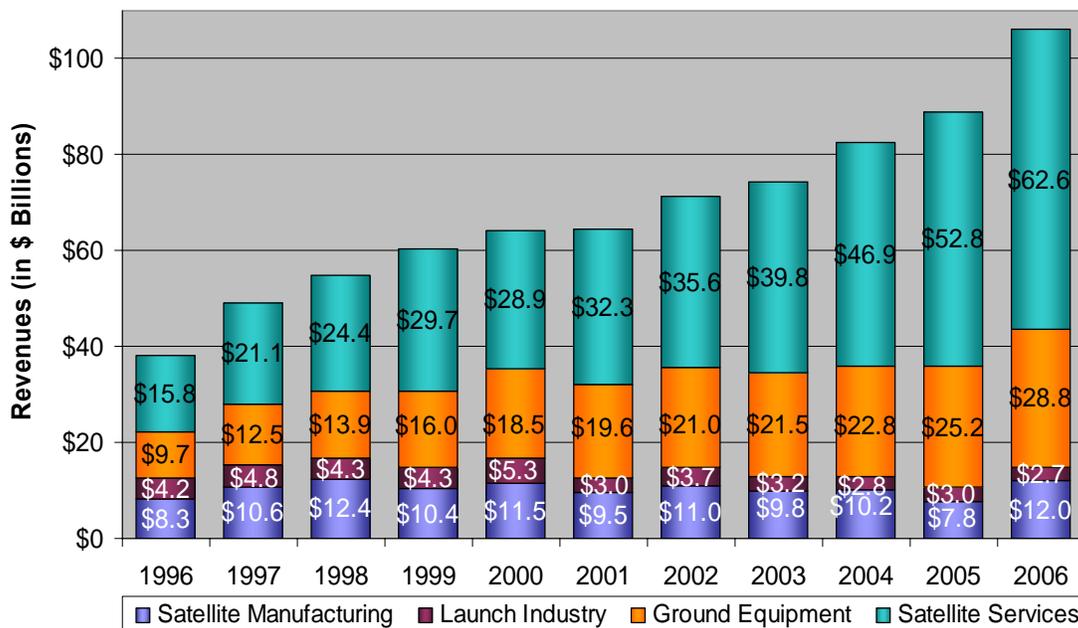
2.0 GLOBAL MARKETPLACE AND COMPETITIVENESS

This section assesses the global space marketplace and the current and projected ability of U.S. companies to compete in domestic and foreign markets. Two important questions were considered: 1) Do export controls versus other market factors affect current or future U.S. competitiveness in space?; and 2) Do the observed impacts vary with corporate size or among specific technical specialties, components, or systems?

The study team analyzed six interrelated areas to address these two issues using data from the BIS survey and the market characterization: 1) The status of the global space marketplace and the U.S. position; 2) U.S. companies' outlook for domestic and foreign markets; 3) U.S. companies' perception of their competitive position in the domestic and foreign space markets; 4) U.S. companies' view of foreign competitors; 5) Barriers to U.S. companies entering foreign markets; and 6) The change in U.S. market share.

2.1 What does the Global Space Marketplace Look Like?

The global satellite industry has experienced strong growth in revenues for the last 10 years, primarily due to telecommunications. The growth has been concentrated in the services and ground equipment segments (Figure 2.1-1).

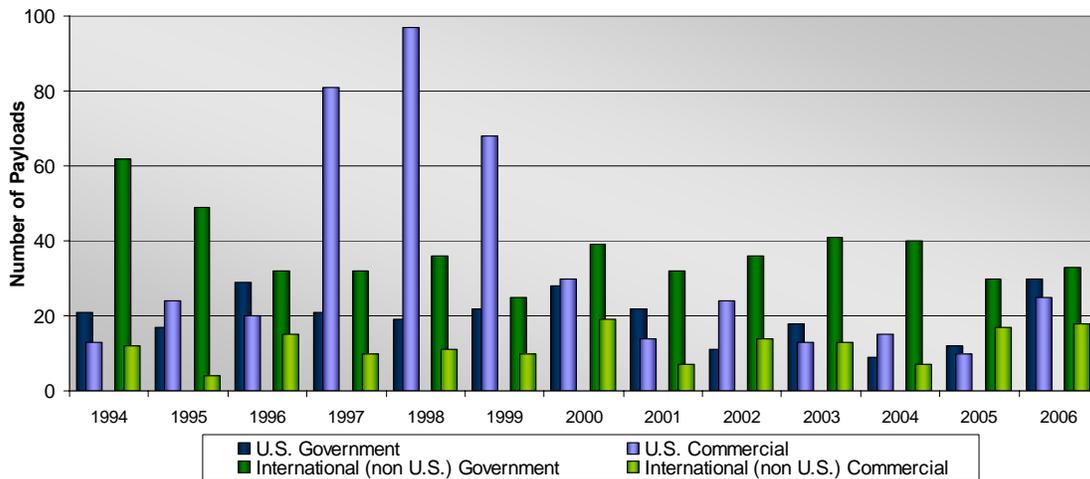


Source: Satellite Industry Association '04 and '07 State of the Satellite Industry Reports.
 (Note: SIA data was not collected before 1996. SIA satellite manufacturing revenues include revenues from the sale of commercial and government payloads)

Figure 2.1-1. World Space Industry Revenues (\$B)

Worldwide satellite manufacturing revenues remained relatively flat in total dollars and fell as a percentage of total space revenues, dropping from nearly 22% in 1998 to about 11% in 2006. Growth was limited primarily to the services and ground equipment segments. U.S. companies currently have about 60% of the \$110B global market for space products and services. The U.S. manufacturing segment remains volatile and is somewhat cyclical while the space services segment builds off that technology and has seen steady growth. Revenues for the launch services segment have declined steadily from 11% in 1996 to 2.5% in 2006. This trend is expected to continue with satellite sales ranging from \$7-12B annually based on forecasted demand for government and commercial payloads.

FAA launch data show that launched payloads experience peaks and valleys when viewed on an annual basis (Figure 2.1-2). These yearly “swings” are due to several market and non-market factors including changes in demand, deployment of a large system/constellation, and improved satellite durability and performance. As an example, the market peaks in the U.S. commercial payloads during the late 1990s reflect deployment of non-geosynchronous orbit (non-GEO) commercial communications satellite constellations, e.g., Iridium and Globalstar. As another example, the international (non-U.S. Government) market peaks in 1994 and 1995 reflect continued replacement of the Russian fleet of government satellites.⁸



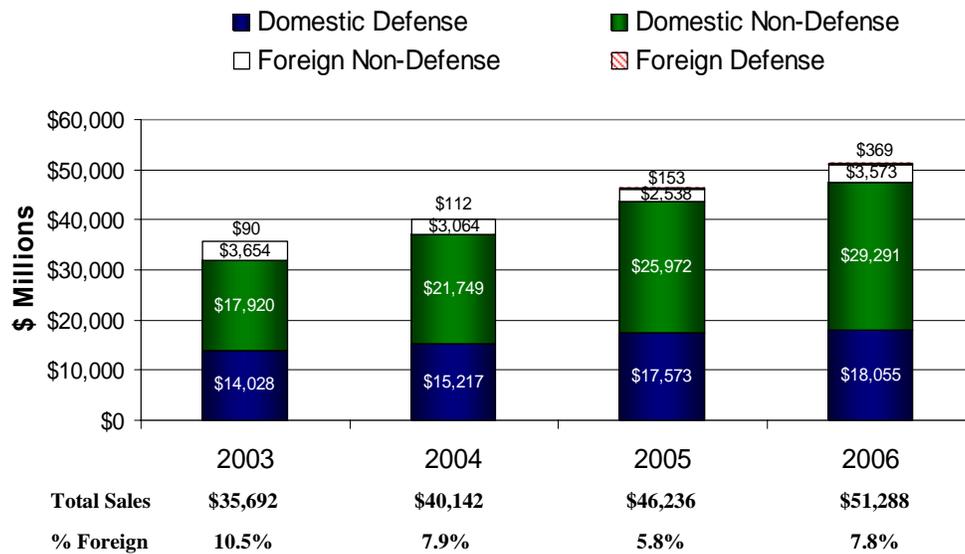
Source: FAA Office of Commercial Space Transportation Database

Note: Includes commercial, civil, and military payloads. Crewed flights and International Space Station servicing missions were excluded from the analysis.

Figure 2.1-2. Payloads Launched by Year/Region

⁸ United States Department of Transportation, Federal Aviation Administration, Office of Commercial Space Transportation. Data on orbital launches and payloads 1990 to 2006, from the FAA STAR database, retrieved March 26, 2007.

Analogous to the global space marketplace revenue growth, the survey results show U.S. space industry sales have been on a sustained upward trend the last four years. Figure 2.1-3 shows that aggregate space sales of the companies surveyed increased 44% (10-15% annually) for the 2003-2006 period. Domestic non-defense sales grew 63%, primarily in the space services and ground equipment segments. Domestic defense sales grew by 29%.



Source: DOC Survey Q5, Space-Related Defense and Non-Defense Sales (2003-2006)

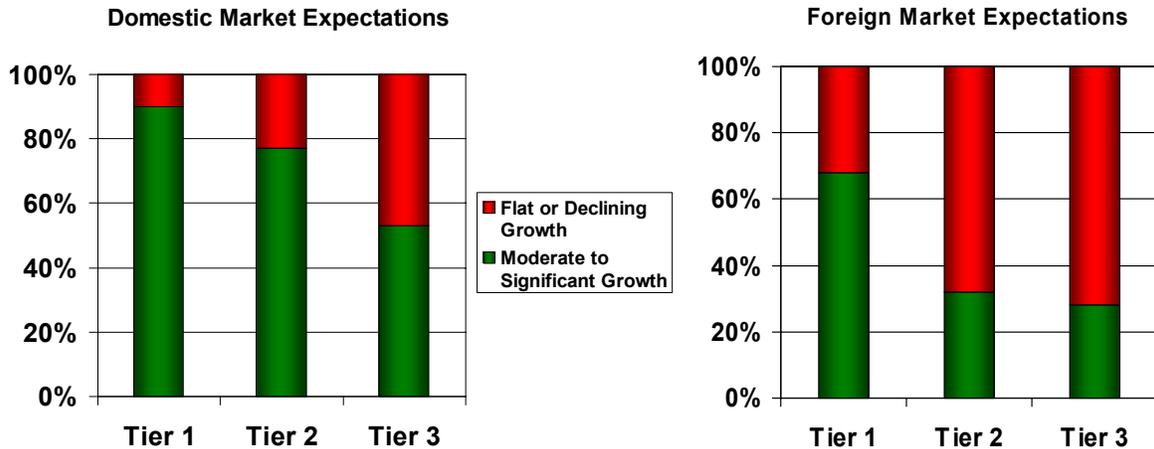
Figure 2.1-3. U.S. Company Global Space Sales (Then-year \$)

Foreign sales represented only 6 to 10.5% of total sales over the last four years and remained relatively flat compared to domestic and global marketplace growth rates. This corresponds to 2.7B to 3.9B annually. Of note is the fact that, according to the survey, approximately half of the respondents (104 companies) were exporting goods and services. The total revenues of those exporting accounted for 82% of total respondent revenues, making the average annual percentage of foreign sales for exporting companies still in the 10% range, although this varied by company. The 50% of surveyed companies that did not export comprised only 18% of total revenues and were predominately small firms dedicated to niche military technology/support services or companies that were self-limiting because of export controls.

2.2 What is the Outlook for U.S. Companies' in the Domestic/Foreign Marketplace?

Companies were asked about their expectations for domestic and foreign space-related business in the 2008 to 2012 timeframe (see Figure 2.2-1). Analysis shows the U.S. space industry's sales expectations for the domestic market differ by tier, with most companies optimistic; 90% of Tier 1 forecast moderate to significant growth, while 77% of Tier 2 and 53% of Tier 3 are optimistic for growth in 2008-2012. Conversely, the percentage of companies forecasting flat or declining domestic business sales increase markedly the lower you go in the tiers--from 10% of Tier 1 to 23% of Tier 2 and 47% of Tier 3.

U.S. space industry’s expectations for foreign markets also differ by tier. Only Tier 1 has a majority of companies expecting moderate to significant growth (68%). In contrast, a majority of companies in the lower tiers expect a tough foreign market; 68% of Tier 2 and 72% of Tier 3 forecast flat or declining foreign sales.

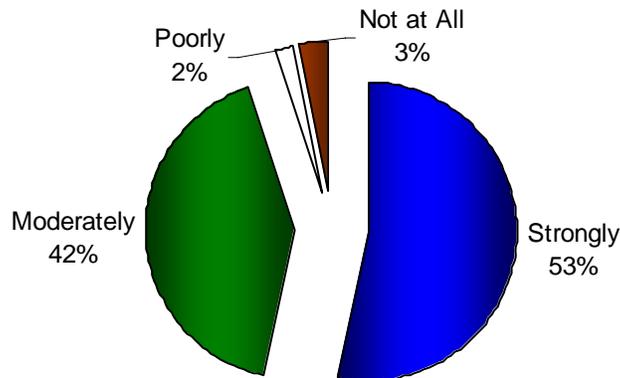


Source: DOC Survey Q10A & B, Market Forecasts

Figure 2.2-1. Domestic and Foreign Market Forecasts (2008-2012)

2.3 How do U.S Companies Perceive their Competitive Position in the Domestic/Foreign Space Market?

The competitive position of U.S. companies in the domestic market is excellent with 95% of the companies responding that they are strongly or moderately positioned to sell domestically (see Figure 2.3-1).

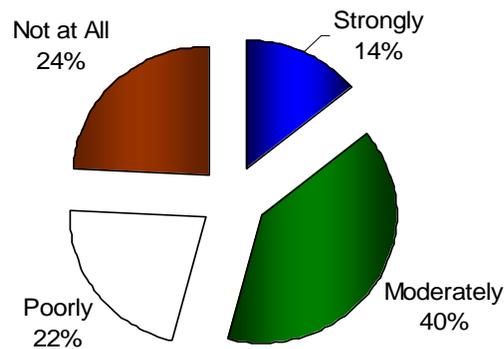


Source: DOC Survey Q10A, Domestic Market Forecast

Figure 2.3-1. Company Perspective on Being Competitive in Domestic Market (All Tiers)

This was equally true by each tier— 97% of Tier 1, 95% of Tier 2 and 94% of Tier 3 contend that they are well positioned. The 5% of companies who responded that they are poorly or not at all well positioned in the domestic market represent a potential risk that capabilities may be lost either to a lack of sales or poor financial performance.

Companies are confident of their domestic capabilities, but not as confident in their ability to export to foreign markets (Figure 2.3-2). Although 54% responded that they are in a strong or moderate position in the foreign market, 29% of Tier 1 companies contended they are strongly positioned, while 28% felt poorly positioned or non-competitive. Likewise, 11% of Tier 2 companies reported they are strongly positioned, but 47% stated that they are in a poor position or non-competitive. Tier 3 is much like Tier 2 with 10% in a strong position and 53% in a poor or non-competitive position.



Source: DOC Survey Q10B, Export Market Forecast

Figure 2.3-2. Company Perspective on Being Competitive in Foreign Market (All Tiers)

Over two-thirds of the survey respondents felt strongly enough to add narrative comments with over a quarter of those encountering difficulties in export markets. Some companies have self-eliminated from foreign markets to focus on the domestic market only. A Tier 2 company commented, “ITAR restrictions and limits are a major impediment to be able to respond to proposal requests and subsequently sell products in foreign markets.” A Tier 3 company “...is withdrawing from the space business due to a sustained absence of profitability and a refusal of some foreign customers to procure equipment that requires U.S. ITAR licensing.”

The BIS survey addressed competitiveness factors and industry outlook. Companies were asked to describe actions taken during the past five years and planned over the next five years to improve their competitiveness in the space market. They were also asked to indicate what actions, policy changes, or regulatory reforms the Federal Government could implement to improve their company’s overall competitiveness. Finally, they were asked how space-related spending and allocations by DOD, NASA, NOAA, and other agencies have impacted their company in products and services, personnel/staffing, and operations.⁹

⁹ DOC Survey Q18.

Survey respondents suggested focusing on revisions to the USML/ITAR and expediting the licensing process as government actions to improve U.S. industry competitiveness in the global space marketplace. These recommendations are discussed in-depth in section 4.3. To strengthen their competitive positions, companies have predominantly focused on product/supply chain improvements over the past five years. Over the next five years, these same companies are planning a number of approaches to retaining competitiveness, which appear unrelated to ITAR reform.

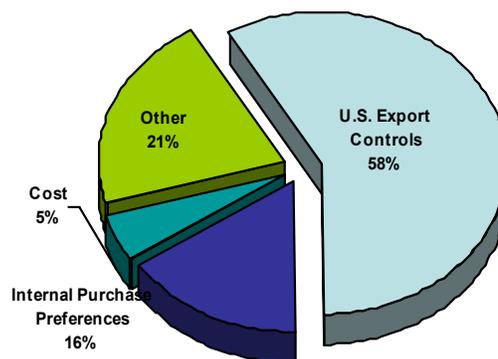
2.4 How do U.S. Companies View the Foreign Market Environment?

The survey asked companies to specify the factors making foreign producers’ products competitive compared to their products. Survey participants listed 262 foreign products in 59 product categories that are in direct competition with U.S. products. Export licensing requirements were a pivotal factor in making competition more difficult in 63% of the product categories. Tier 1 survey participants reported that 23% of their products were affected by export controls; Tier 2 – 52%; and Tier 3 – 25%. These competing products and services were concentrated in the spacecraft and components category (50%) with the remainder distributed among other industry segments: 20% in services followed by propulsion (9%) and ground systems (8%). Nearly two-thirds of the competing products are being manufactured by European companies.

The number one write-in factor reflecting how U.S. companies’ view the current international competitive environment was “Buy European/protectionism.” This suggests that U.S. firms are being excluded from foreign markets, particularly in Tier 2 and Tier 3 for non-competitive reasons. Survey respondents also listed additional reasons for why they thought their products were non-competitive. Cost was a factor for 37%. Product performance, trade/offset arrangements, and subsidies were factors for 21% of the products.¹⁰

2.5 What are the Barriers to U.S. Companies Entering Foreign Markets?

Companies were asked to provide the five most significant barriers to entry when attempting to market products in foreign countries. Figure 2.5-1 shows the number one barrier to entry is export controls (58% of the responses).



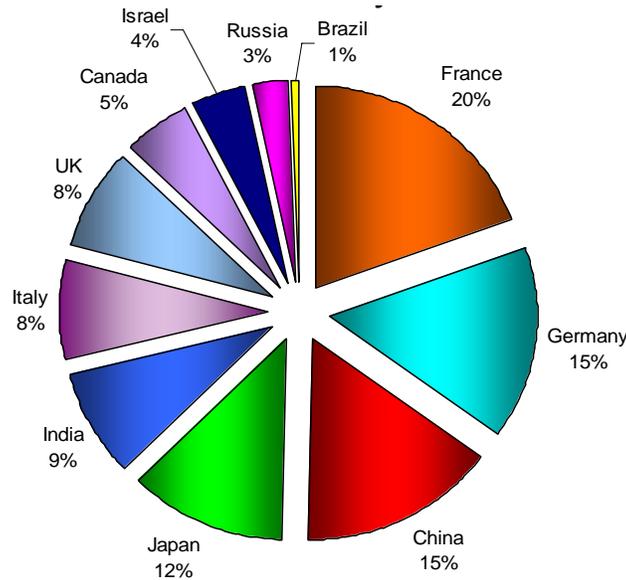
Source: DOC Survey Q18, Barriers to Entry in Foreign Countries

Figure 2.5-1. Barriers to Foreign Markets – Top 5 Countries

¹⁰ DOC Survey Q11

This is followed by internal purchasing preferences, including foreign reactions to ITAR, and “buy national” policies (16%). The fact that internal purchase preferences was a top answer shows significant concern on the part of U.S. industry and corresponds directly to the response to previous questions that “buy European/protectionism” has led to foreign products becoming more competitive. “Other” refers to foreign government subsidies, other regulatory restrictions, language/culture, product limitations etc.

Companies were asked to identify the countries associated with these barriers to entry. France was #1 with Germany and China tied for #2, followed by Japan and India (Figure 2.5-2). Europe and Japan, the largest export market for U.S. space products, were both identified by numerous respondents as having a significant number of trade barriers. Export controls were cited as a barrier to entry in all of the top 11 most frequently mentioned countries.



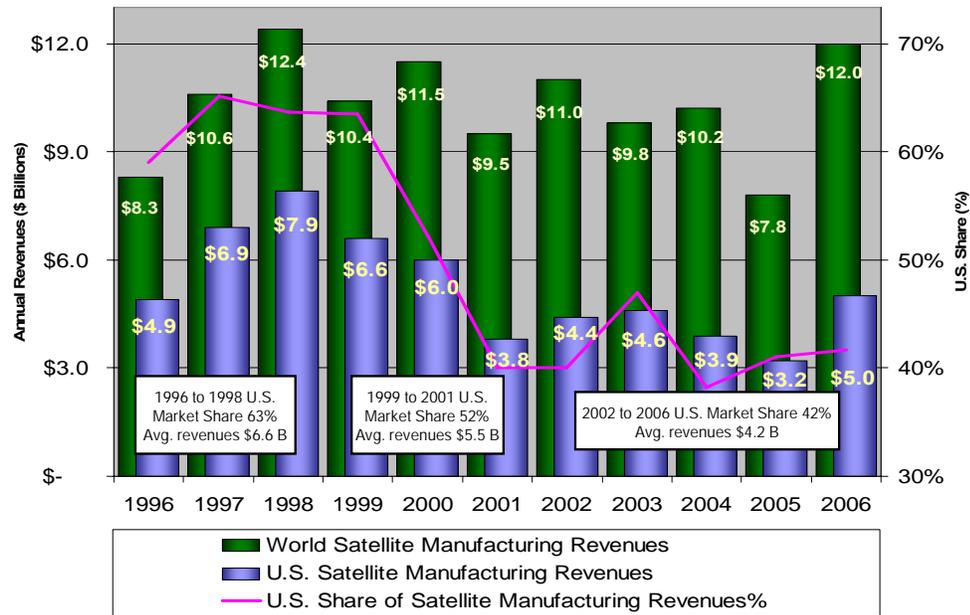
Source: DOC Survey Q18, Competitiveness Factors and Industry Outlook, Barriers to Entry in Foreign Countries

Figure 2.5-2. U.S. Export Controls as Market Barrier by Country (Top 11 Countries)

2.6 Has the Overall U.S. Global Market Share Changed?

Satellite manufacturing is the segment of the space industry that has been most directly affected by changes in U.S. export control policy. Based on Satellite Industry Association reports in 2004 and 2006, the U.S. share of global satellite manufacturing has decreased since the ITAR changes were implemented in 1999.

As shown in Figure 2.6-1, U.S. market share dropped from 63% in 1996-1998 to 52% in 1999-2001 and 42% in 2002-06. Revenues dropped in real terms as well from an average of \$6.6B in the first period, to \$5.5B in the transition period, and \$4.2B in the most recent period of data.



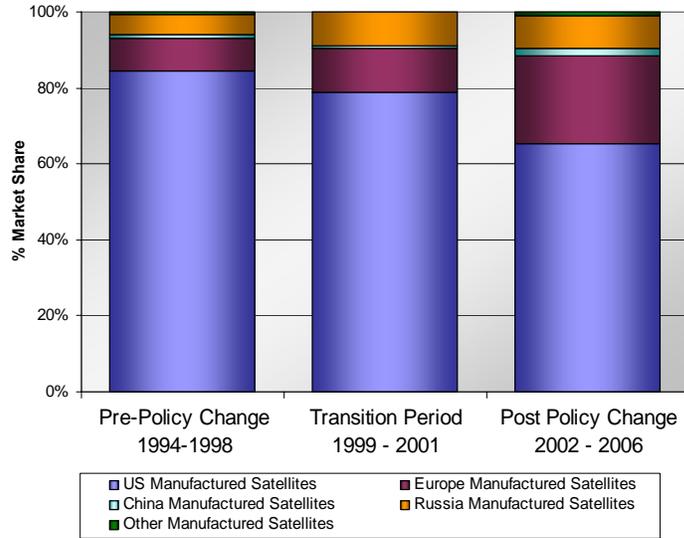
Source: Satellite Industry Association '04 and '07 State of the Satellite Industry Reports. Note: SIA data were not collected before 1996. SIA revenues include revenues from the sale of commercial and government payloads.

Figure 2.6-1. U.S. Share of Satellite Manufacturing Revenues

Global competition significantly increased for several reasons. Some foreign companies entered the market as a response to opportunities created by more stringent U.S. export controls; others due to policies within foreign countries that sought to increase indigenous capabilities. In this competitive environment, changes in U.S. export control policies may provide a more level competitive market for U.S. products.

In terms of launched payloads, commercial communications satellites represent a key measure for competitiveness and an indicator of future manufacturing capabilities. For all commercial communications satellites, U.S. market share of launched payloads dropped from 84% in the pre-policy change period to 79% in the transition period, 1999-2001, to 65% in the post-policy change period, 2002-2006 (see Figure 2.6-2). In the same periods, Europe's share grew from 9% to 11%, and finally 23% in 2002-2006. Large numbers of payloads built for low-earth orbit (LEO) communications satellite constellations, mostly supplied by U.S. companies, contributed to high market shares for the U.S. in the first two periods.

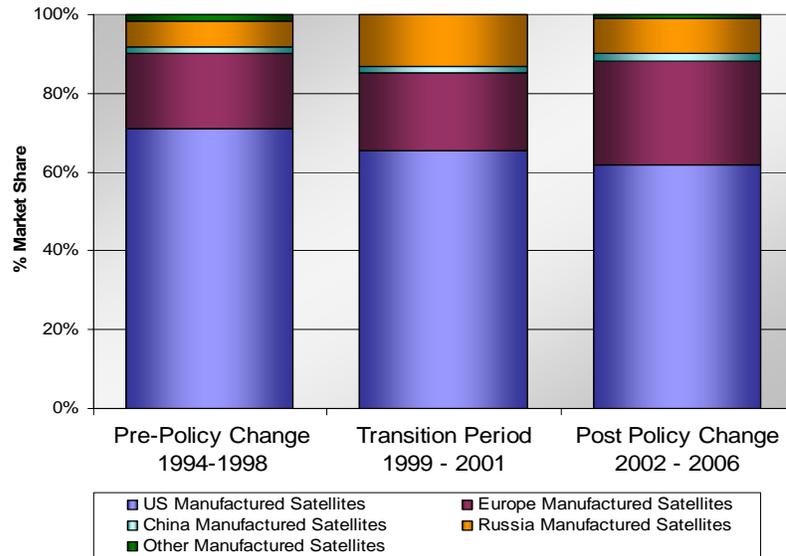
In addition to payloads, the U.S. Expendable Launch Vehicle industry has declined significantly in the international commercial market since the 1990s – U.S. industry is down to 20% of the market during the 2002-2006 timeframe versus a 40% market share for US-manufactured vehicles from 1996-2000. This is attributable primarily to price competition and a shift back to GEO payloads after conclusion of 3 non-GEO constellation launches. The second generation low Earth orbit constellations planned today (Globalstar selected Soyuz, Iridium still TBD, Orbcomm TBD but probably foreign) are probably going to go foreign for launch compared to US first time around.



Source: FAA Office of Commercial Space Transportation Database.
 Note: Includes only GEO commercial communications satellites.

Figure 2.6-2. U.S. Share of Communications Satellites – GEO and non-GEO

Eliminating non-GEO payloads from the analysis shows a similar, but less dramatic decline of U.S. market share (Figure 2.6-3). GEO satellites are more representative of manufacturers’ competitiveness due to the large financial and technology investment required. U.S. market share of launched GEO payloads fell from 72% in the pre-policy change period, to 66% in the transition period, to 62% in the post-policy change period. Regardless of the indicator used, the long-term trend has been a steady loss in market share for U.S. manufacturers and a steady increase for European competitors.



Source: FAA Office of Commercial Space Transportation Database. Note:
 Includes all commercial communications satellites, GEO and non-GEO

Figure 2.6-3. U.S. Share of Communications Satellites – GEO Only

3.0 U.S. SPACE INDUSTRY HEALTH

This section addresses U.S. space industry health with a focus on company financial viability, R&D expenditures, workforce stability, and international relationships. Looking at the U.S. space industry's health in terms of these factors provides an indication of whether or not U.S. export controls are causing systemic and/or permanent damage to domestic capabilities and future competitiveness.

To guide the analysis, the study team identified four questions: 1) What is the impact of export controls versus other market factors on past, current, or future industry viability?; 2) Do export controls versus other market factors impact space-related R&D?; 3) What is the impact of export controls on past, current, and future employment?; and 4) Are export controls influencing trends in international alliances, strategic partnerships or joint ventures? For example, it was reported that the European Space Agency (ESA) Strategic Harmonization Division, Technology Strategy Section "TSS" conducted a 1 year ITAR impact study.¹¹ This led to an "ITAR-free" re-design of the SED-26 Star Tracker that excluded U.S. components and included French components for the Error Detection & Correction requirement.

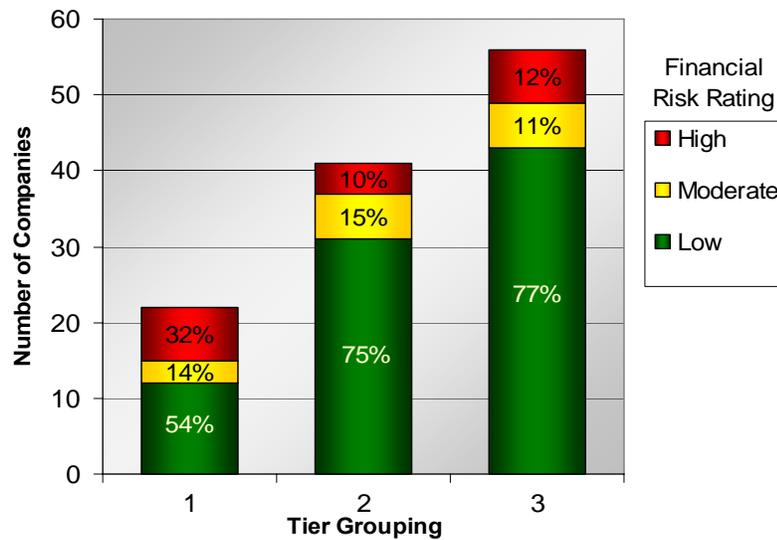
To answer the above questions, the study team analyzed these four interrelated areas using data from the market sources and the BIS survey.

3.1 What is the Financial Viability of the U.S. Space Companies?

The key question in addressing viability is how financially stable are individual companies in terms of sales, net income, and profitability? Appendix 6.2 provides detail on both the process used for the independent financial risk analysis on publicly traded space companies and an income statement analysis based on data from the BIS survey responses.

To complement the data collected from the survey, an independent financial risk analysis was performed by the Air Force's Industrial Base Information Center (IBIC) on those publicly held companies within the same population from which surveys were received (see Figure 3.1-1).

¹¹ "Brief History of U.S. Export Regulations" presented to the Defense Science Board October 16, 2006, Reinhold Bauer, Sr. Project Engineer, Project West Wing (PWW), The Aerospace Corporation, p29



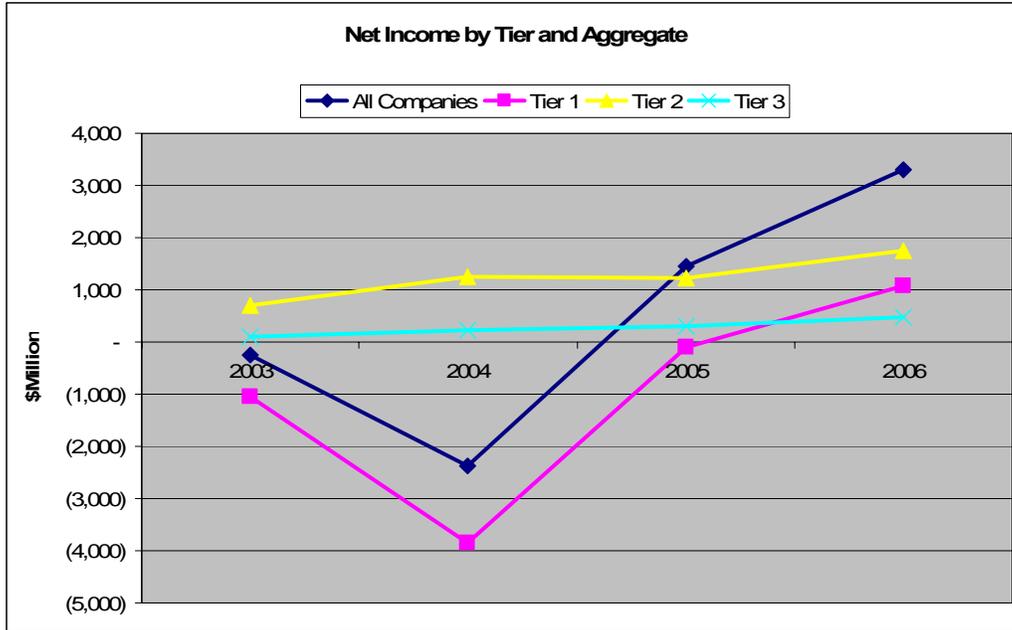
Source: Industrial Base Information Center

Figure 3.1-1. Financial Risk by Tier

The analyses were performed at the lowest level reported (most often at the corporate level and occasionally at the space business segment level). Five-year trends were evaluated for key indicators (sales, net income, debt, and working capital). Financial figures were publicly available for 119 of the 202 companies surveyed. This information was collected from Standard and Poor's, U.S. Security and Exchange Commission filings, and company annual reports.

In total, 70% of all companies assessed were found to be financially healthy—54% of Tier 1 companies were at low risk, while 75% of Tier 2 companies and 77% of Tier 3 were rated as low risk. This risk distribution was comparable to other defense and commercial product sectors studied by DoD over the past 5 years. Over 25% of all companies were at high or moderate risk with 46% of Tier 1 companies and 25% of Tier 2 and Tier 3 categorized at high or moderate risk. In Tier 1, commercial services firms such as satellite subscriber systems had the highest financial risk. This was due primarily to high start-up costs, slow revenue growth (resulting in annual losses), and higher than normal debt loads. Tier 2 and 3 risk is most prevalent in launch subsystem/material manufacturers. Several manufacturers of key military technologies and components have been financially struggling due to decreased domestic sales (both military and commercial).

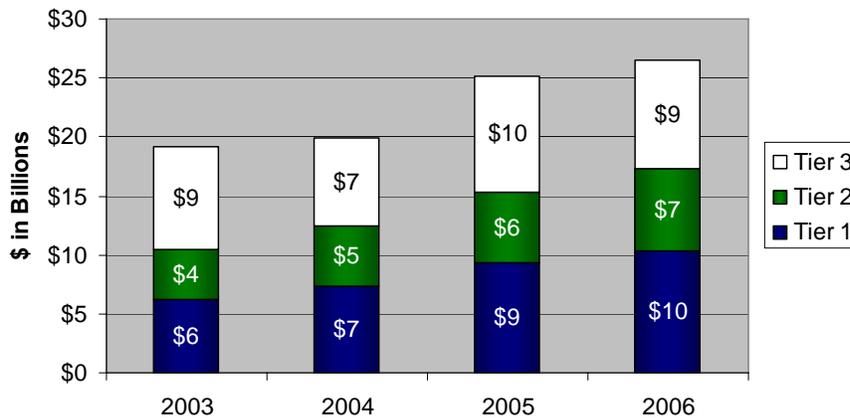
A key element of financial viability is net income. Figure 3.1-2 shows the net income reported by the survey respondents in aggregate as well as by tier. The dip in 2004 was largely driven by Tier 1 losses in the services segment. Tier 2 and Tier 3 firms indicated a slight growth trend.



Source: DOC Survey Q19, Financials – Income Statement for Space-Related Business

Figure 3.1-2. U.S. Space Industry Net Income

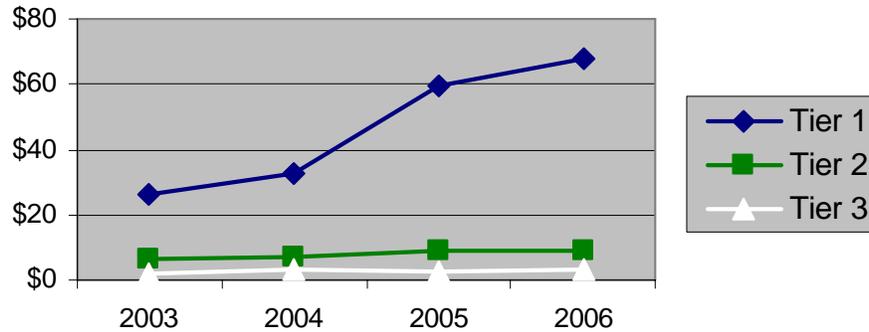
Gross margin growth is another important indicator of financial viability. Based on Figure 3.1-3, gross margins have risen substantially for Tier 1 and 2 companies over the past four years. Tier 1 growth was 65%, Tier 2 growth was 69%, and Tier 3 growth was only 4%.



Source: DOC Survey Q19 Financials – Income Statement for Space-Related Business – Gross Profit

Figure 3.1-3. Gross Space-Related Business Margins by Tier

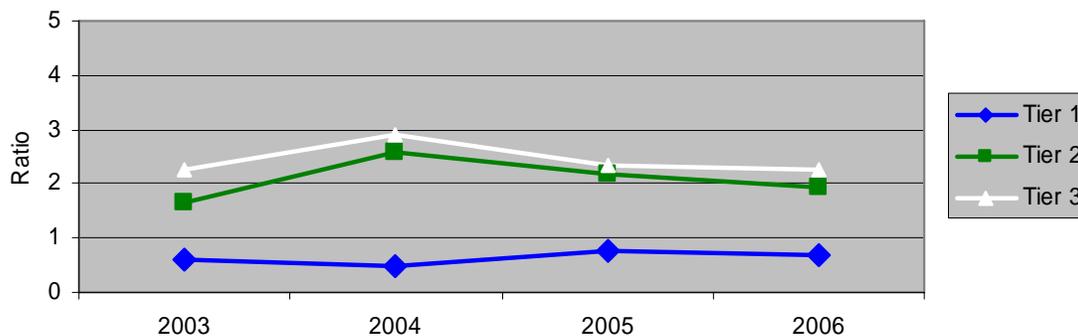
Median gross margins follow similar trends as Tier 1 profit medians grew to \$68M, Tier 2 profit medians rose slightly to \$9M, and Tier 3 profit medians increased to \$3M (see Figure 3.1-4).



Source: DOC Survey Q19 Financials – Income Statement for Space-Related Business

Figure 3.1-4. Gross Space-Related Profit Medians by Tier (\$M)

A well-known financial liquidity indicator is the “Quick Ratio.” The Quick Ratio measures the ability of a firm to use its near cash or quick assets to immediately extinguish its current liabilities. It divides total current assets less inventory by total current liabilities. A Quick Ratio was computed for each company and then averaged for each Tier. A value equal to 1 is considered normal. With a value of less than 1, a firm could suffer financial difficulties. Based on Figure 3.1-5, Tier 1 companies that reported business unit data had Quick Ratios less than 1 in 2003-2006. Lower Tier 1 ratios are most likely due to higher debt ratios and the poor financial performance noted earlier of commercial services firms. Tier 2 and Tier 3 had Quick Ratios greater than 1, indicating higher liquidity than Tier 1. For comparison, the Aerospace and Defense industry Quick Ratio is 0.76¹²

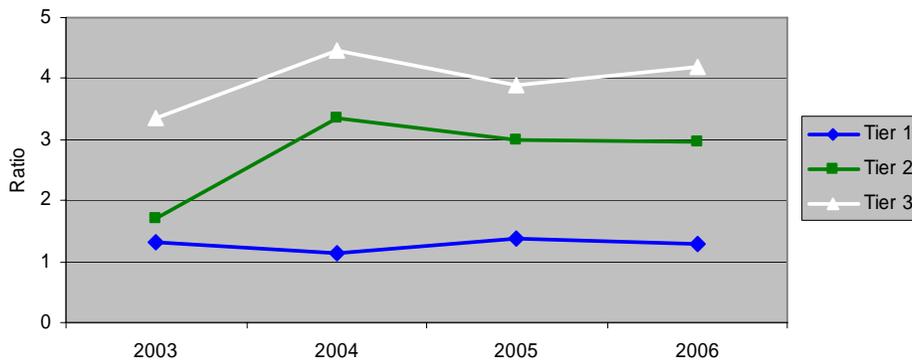


Source: DOC Survey Q20A, Financials - Balance Sheet

Figure 3.1-5. Quick Ratio by Tier

¹² “Aerospace & Defense Ratios,” *Reuters* <stocks.us.reuters.com> June 4, 2007

Another indicator of financial liquidity is the Current Ratio. This measures whether or not a firm has enough resources to pay its debts over the next 12 months. It divides total current assets by total current liabilities and a value greater than 1 is considered normal. The Current Ratio was computed for each company and then averaged for each Tier. Based on Figure 3.1-6, all companies had a Current Ratio greater than 1. Tier 2 and Tier 3 had the most liquidity while Tier 1 had the least liquidity. For comparison, the Aerospace and Defense industry Current Ratio is 1.37.



Source: DOC Survey Q20A Financials – Balance Sheet

Figure 3.1-6. Current Ratio by Tier

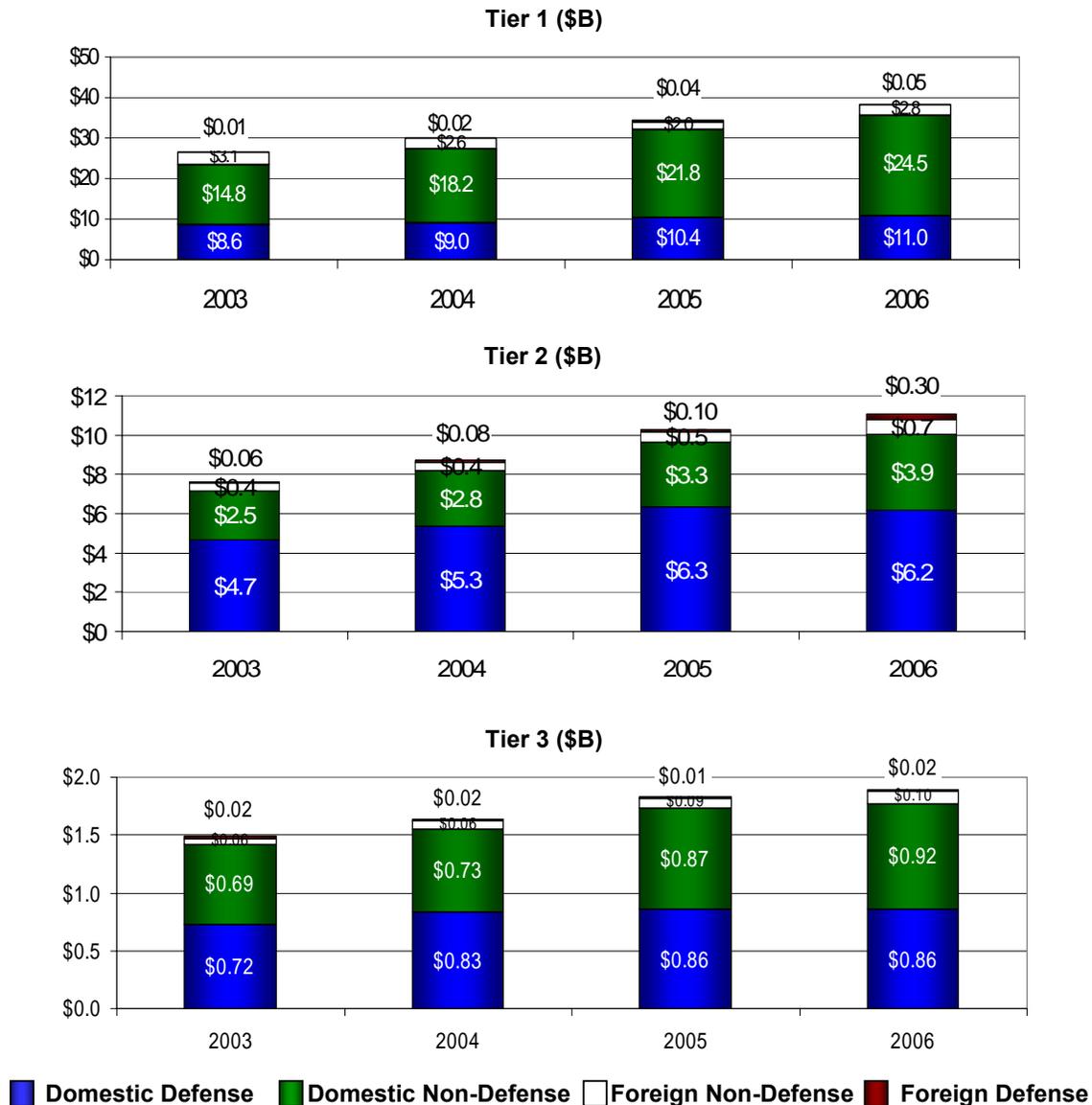
Financial health correlates closely to sales. A detailed breakout of the sales data evaluates trends by Tier across various market segments: Manufacturing vs. Services, Defense vs. Non-Defense, Foreign vs. Domestic. Table 3.1-1 shows the breakout of companies by tier. Tier 1 had the highest percentage of service related firms.

Table 3.1-1. Survey Population: Manufacturing vs. Services

	# of Companies	Manufacturers	Service Providers
Tier 1	40	19	21
Tier 2	82	55	27
Tier 3	80	75	5

In terms of significant change during the reporting period (2003-2006), the most notable was the increase the sale of services in Tier 1 to non-defense customers. These rose 53% going from \$13B in 2003 to \$20B in 2006. This is comparable to the global increase in space related services shown in Figure 2.1-1. During the same period, combined defense and non-defense sales of products manufactured by Tier 1 companies increased 22% from \$13B to \$17B. 70% of Tier 2 sales were driven by manufactured products. Increases occurred in sales of both manufacturing and services. Tier 3 sales were nearly all attributable to manufacturing.

Figure 3.1-7 shows space company sales (combined manufacturing and services) by tier and the breakout between foreign and/or domestic defense and non-defense sales.

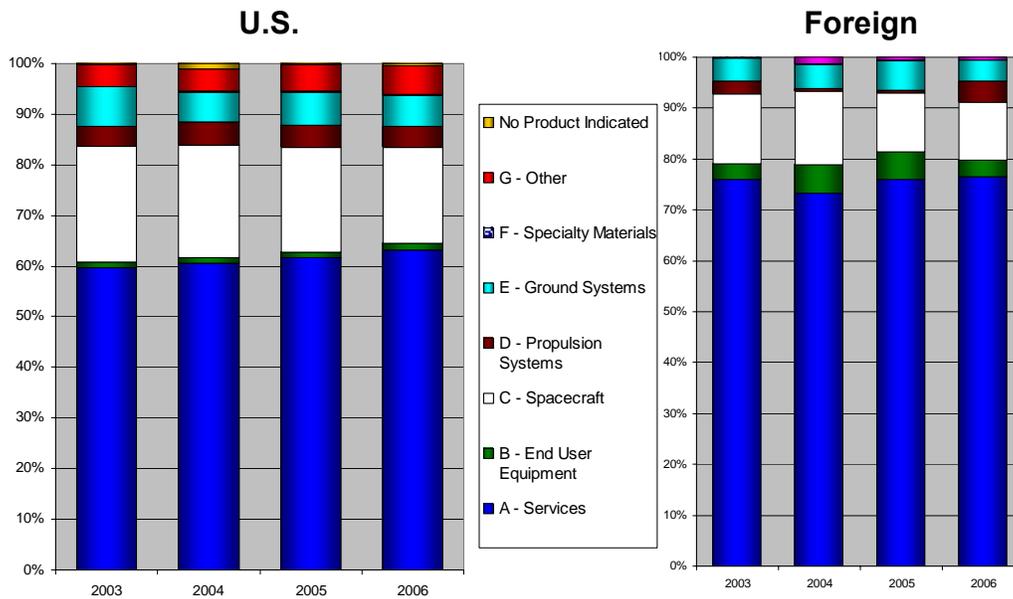


Source: DOC Survey Q5, Space-Related Defense and Non-Defense Sales

Figure 3.1-7. Space Sales by Tier

In total dollars, sales have been increasing across all tiers and most categories (domestic and foreign) from 2003-2006. The majority of Tier 1 sales (56-64%) have been in domestic non-defense and Tier 2 sales (56-62%) have been in domestic defense. Tier 3 sales have been evenly split between domestic defense (45-51%) and domestic non-defense (44-48%). Dependence on foreign sales decreases in the lower tiers. This is due in part to the fact that many Tier 2 and 3 components are incorporated into end items produced by Tier 1 satellite manufacturers that apply for the necessary export licenses.

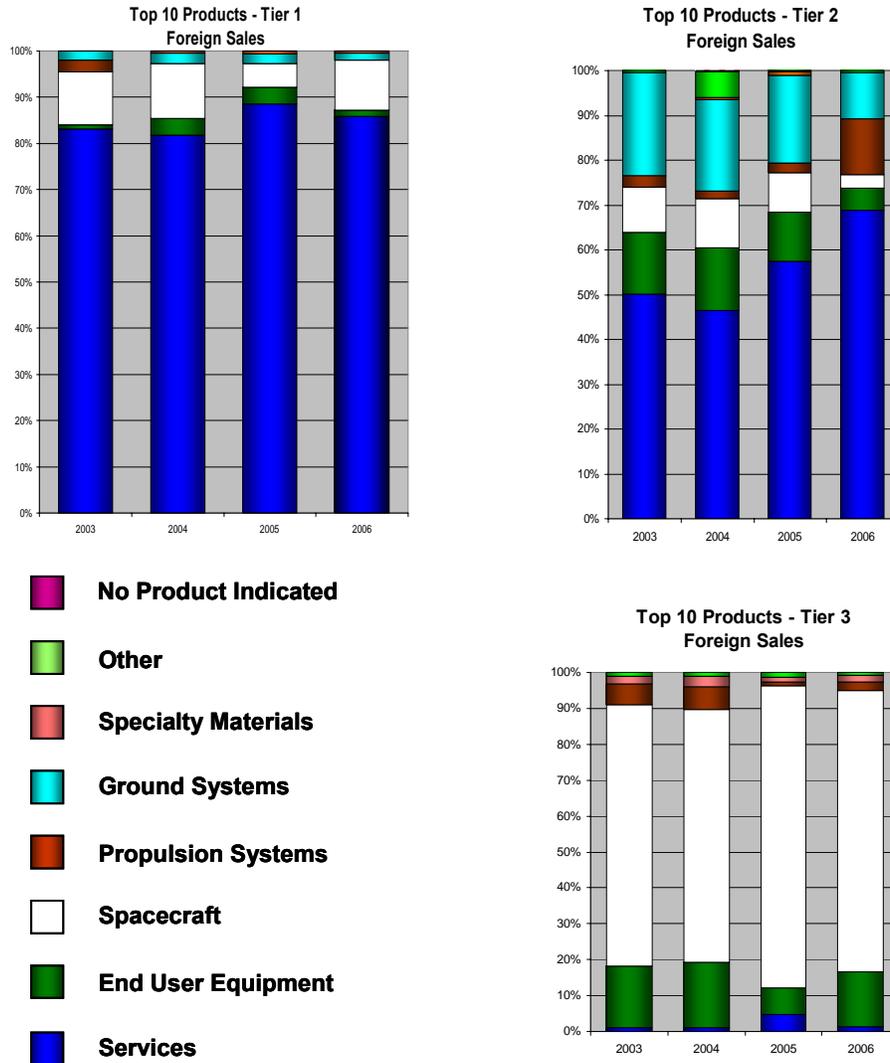
The survey had companies differentiate their product lines by numerous lower level product or service codes. Companies listed their top 10 products and/or services within several space industry segments. Figure 3.1-8 shows the distribution of the companies' products against those segments in the U.S. and foreign markets. Company inputs showed that 92% of all products and services were sold domestically and 8% were exported. All categories have domestic sales in the 90-100% range, except for end user equipment, where 25% of sales are foreign. U.S. and foreign sales are dominated by the Services and Spacecraft, and Components categories. Services represented 61% of domestic sales and 76% of foreign sales in 2003-2006. Spacecraft and Components represented 21% of domestic sales and 13% of foreign sales in 2003-2006.



Source: DOC Survey Q6, Top 10 Products – Production & Sales

Figure 3.1-8. Top 10 Products – Percentage of U.S. and Foreign Sales (All Tiers)

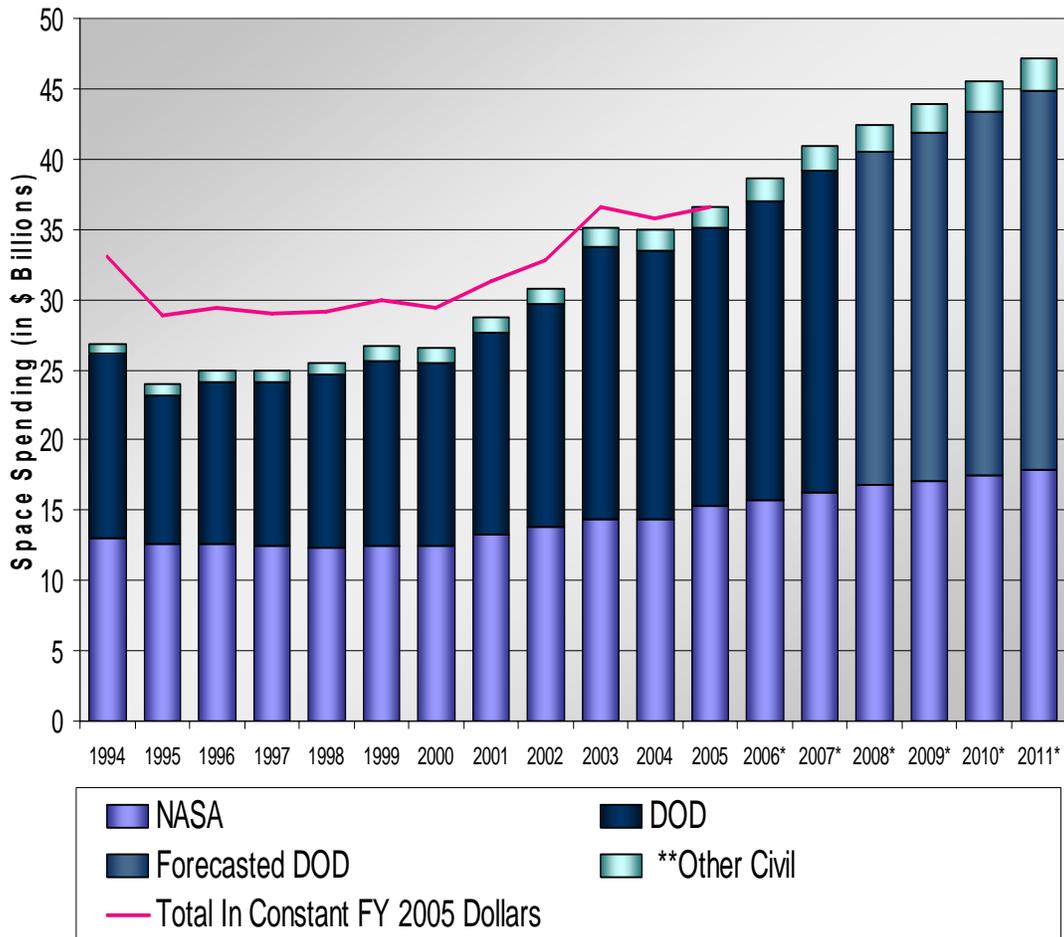
Figure 3.1-9 shows that the foreign sales product mix changed significantly among the Tiers. Services represented the majority of Tier 1 and Tier 2 foreign sales, 85% and 69% respectively. Spacecraft and Components represented the majority of Tier 3 sales with 77%. Tier 1 and Tier 2 had 10% and 7%, respectively, in this category but on significantly higher sales. A detailed analysis of the survey data showed that the majority of Tier 1 and Tier 2 sale of services are in subcategories such as satellite telecommunications, e.g., direct television, transponder leasing, Very Small Aperture Terminal (VSAT) services, and others. Limited sales of services also occurred in the commercial satellite operations, launch, ground, or spacecraft services subcategories.



Source: DOC Survey Q6, Top 10 Products – Production and Sales 2003-2007

Figure 3.1-9. Competing Foreign Products/Services

One final factor affecting the financial viability of the domestic space industry is the U.S. government space budget. U.S. Government spending accounts for 55% of domestic revenues and predictable budgets are necessary to maintain critical technologies, modern facilities and a skilled workforce. Figure 3.1-10 shows that U.S. government space budgets grew by 40% over the last decade.



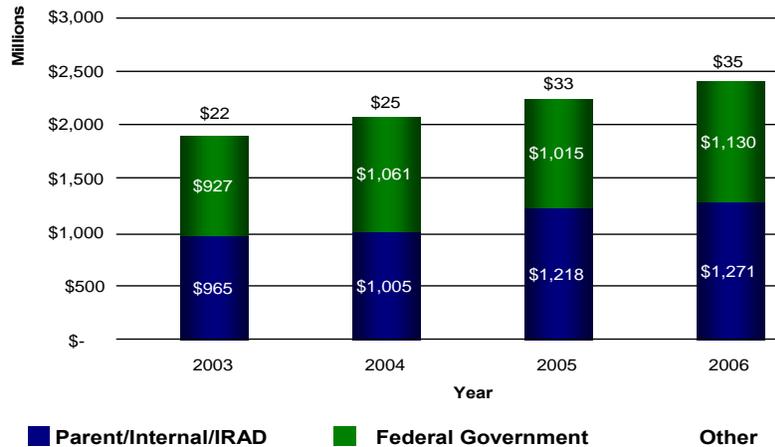
Source: NASA FY 08 Budget Request. *Budget years 2006 to 2011 are estimates. The out years are forecasted based on the 2007 number grown at the average growth rate of the previous 5 years, 4.2%. Civil budgets for 2006 and 2007 were based on budget authority numbers, the out years were forecasted based on the previous 5 year growth rate. ** Other Civil includes space spending by Departments of Energy, Commerce, Interior, and Transportation as well as by USDA and the National Science Foundation. The DOD numbers for 2006 and 2007 are estimates for total military space spending and are based on budget authority numbers from *Aeronautics and Space Report of the President, FY 2005*.

Figure 3.1-10. U.S. Government Space Budgets

Defense and intelligence budgets show a slight upward trend over the next 5 years while NASA has a relatively flat budget. Based on current future budget projections, the industry should not be negatively impacted from budget downturns similar to those experienced in the 1990s.

3.2 How do Export Controls Affect R&D?

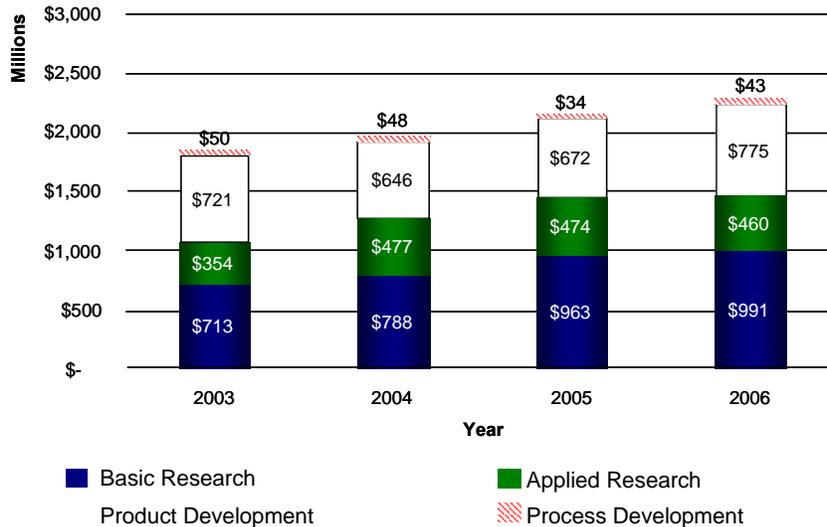
The survey collected detailed information on trends in R&D investments. According to Figure 3.2-1, the space industry spends on average \$2.2B on R&D annually across several categories. Sources of R&D funding were evenly split between Independent Research and Development (IRAD) and the Federal Government.



Source: DOC Survey Q22, Research and Development

Figure 3.2-1. Tier 1-3 Space R&D by Funding Source

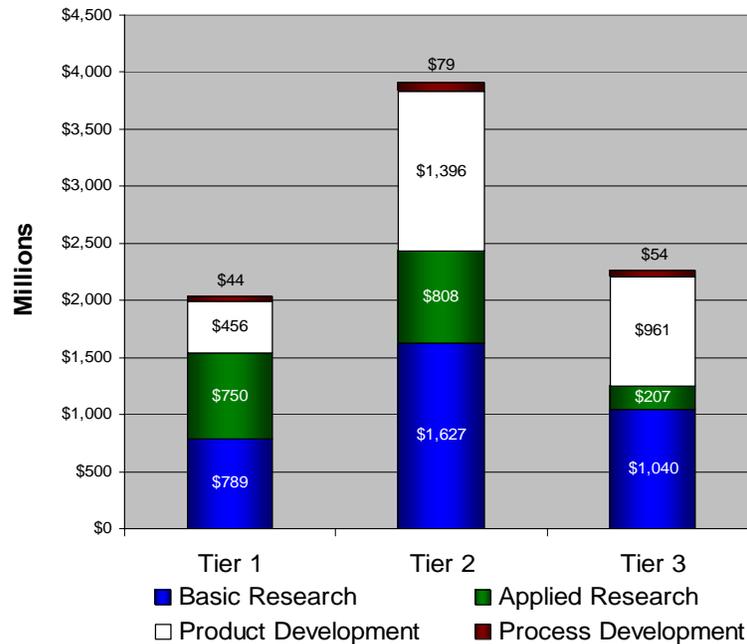
The survey indicated that expenditures for R&D included 42% going for basic research, 22% for applied research, 34% for product development, and 2% for process development. Over the period, expenditures grew 23%, an average of 8% per year (see Figure 3.2-2).



Source: DOC Survey Q22, Research and Development

Figure 3.2-2. Tier 1-3 Space R&D Expenditures by Function

Figure 3.2-3 breaks-out the distribution of R&D expenditures by Tier. It is apparent that Tier 1 conducted only 25% of R&D consisting of 39% basic research, 37% applied research, 22% product development, and 2% process development. Tier 2 was responsible for almost half of the R&D expenditures (48%) consisting of 42% basic research, 20% applied research, 36% product development, and 2% process development. Finally, Tier 3 conducted 27% of R&D comprising 46% basic research, 9% applied research, 43% product development, and 2% process development.

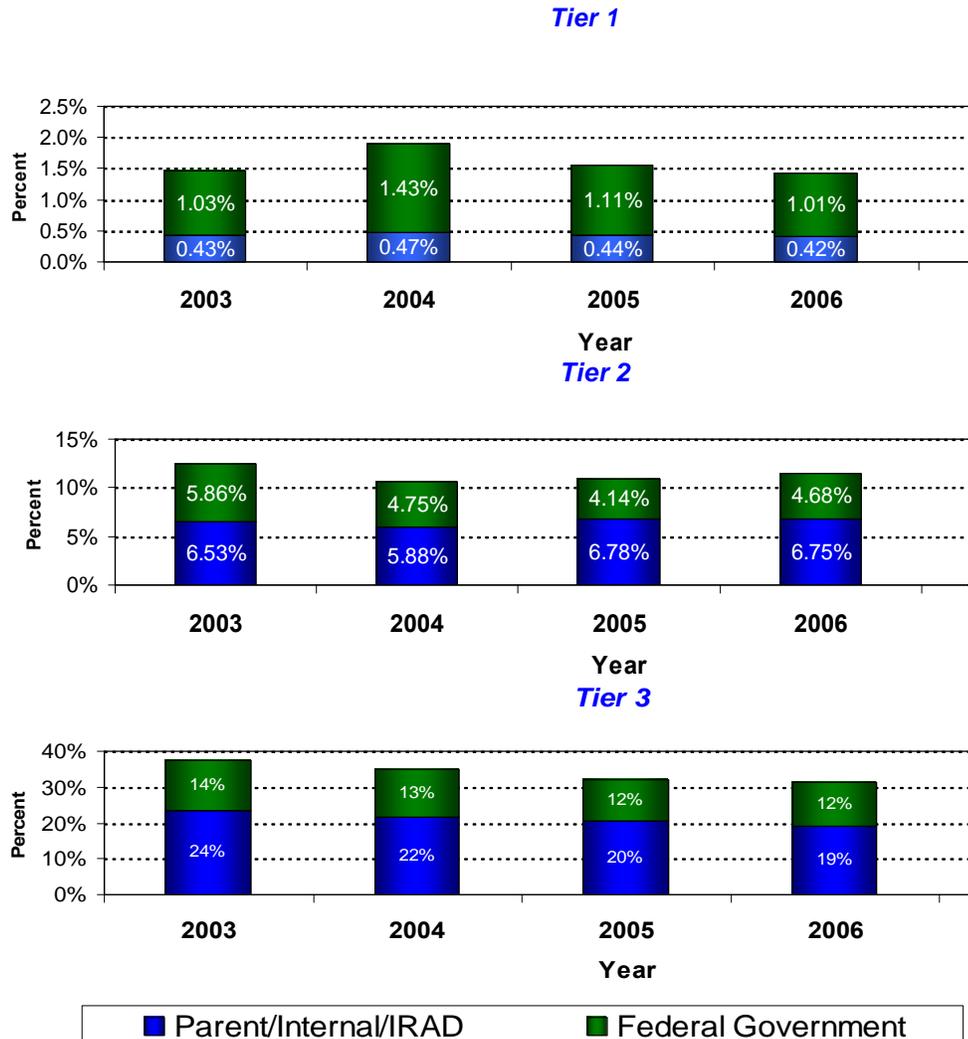


Source: DOC Survey Q22, Space-Related R&D by Function

Figure 3.2-3. Space R&D by Tier (2003-2006)

In comparing R&D expenditures between manufacturers and service providers, there were several interesting trends. Service companies categorized 80% of their research as “Basic”, just the opposite of the 20% of R&D expenditures identified by manufacturing companies as going to basic research. Total R&D expenditures by Tier 1 manufacturers, between 2003 and 2006, was 10 times greater than that spent by Tier 1 service providers. Tier 2 manufacturers and service providers are closer in R&D spending. Total Tier 2 R&D expenditures by manufacturers averaged \$530M annually from 2003 to 2006 while Tier 2 service providers averaged \$400M annually. This is significant given that Tier 2 manufacturers outnumbered Tier 2 service providers 2 to 1. The federal government was the primary source (75%) of funding for both Tier 1 manufacturers and service providers. By contrast, Tier 2 service providers financed over 75% of their R&D with company funds.

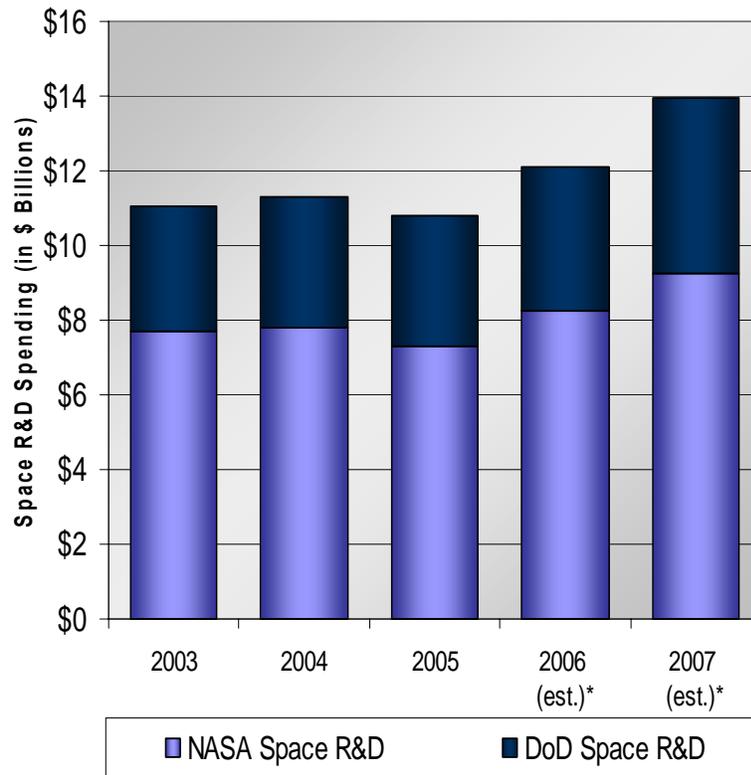
A third key innovation metric is R&D expenditures as a percentage of total space sales. Total R&D for all tiers represents about 5% of space sales. Of that, IRAD represents about 2.6% of total sales. However, IRAD varies significantly by tier (see Figure 3.2-4). Tier 1 IRAD is 0.44% of total sales, Tier 2 IRAD is 6.5% of total sales, and Tier 3 is 21% of total sales. It appears that, to stay competitive, the lower Tiers invested more in R&D as a percent of sales. R&D expenditure levels in the services segment is skewing Tier 1 data. When Tier 1 manufacturing companies are broken out separately, R&D as a percent of sales averages 3% annually. Tier 1 service providers have high dollar sales but relatively little R&D. The unusually high percentages in Tier 3 may be due to the inability of the companies to separate space related R&D investments from R&D conducted for the entire product line.



Source: DOC Survey Q22 and Q5

Figure 3.2-4. Tier 1-3 R&D Expenditure as Percentage of Total Space Sales

When comparing the government R&D funding reported by the survey respondents in Figure 3.2-1 to the published government space R&D investment (Figure 3.2-5 below), only 10% was captured by the survey question. There are two primary reasons for the difference: (1) a significant portion of the government space R&D funding goes to support government facilities and personnel in both NASA and DOD; and (2) many companies receive contracts that use R&D funding but may not classify it as such (e.g., engineering and technical services contracts). With NASA's budget at about \$16B a year, R&D is a large percentage (about half) over this time period. In contrast, the DOD spends a much smaller percentage of its space budget, between 17% and 20%, on research and development activities (6.1 through 6.3). Government funding for space R&D has been relatively stagnant for the past 4 years.



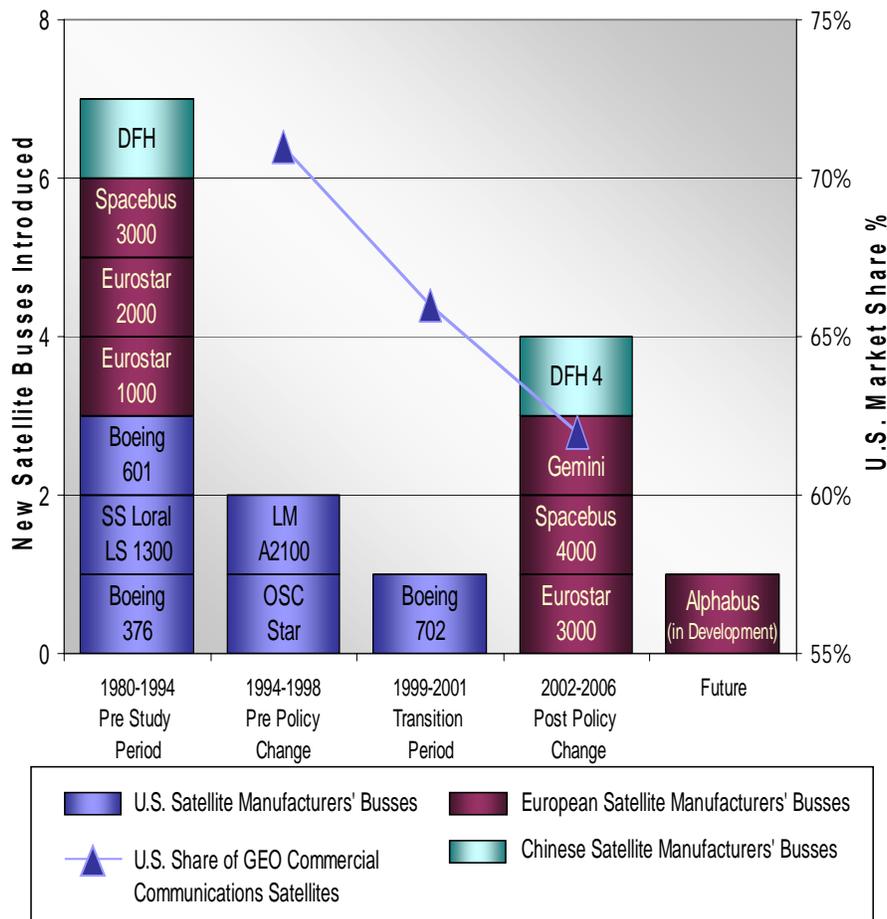
* 2006 and 2007 are based on estimates from 2005

Source: DOD figures from *Forecast International Satellites and Spacecraft Report* and includes U.S. Air Force/Navy/Army/DARPA space funding RDT&E for Budget Activities 1-5. NASA figures are from National Science Foundation annual reports, Federal research and development budget authority for Space Research and Technology (252). Note: NASA numbers do not include aeronautics re-search and development spending.

Figure 3.2-5. U.S. Government Space Research and Development Spending by Year and Agency (Constant FY05 Dollars)

Another metric, closely tied to R&D considerations for the assessment of industry health, is competition through innovation. The focus here was on the degree of innovation shown regarding the introduction of highly competitive satellite busses. Manufacturers' product offerings are centered on satellite busses, which are basic satellite models customized for different users.

Figure 3.2-6 illustrates that U.S. manufacturers have not introduced a new satellite bus since the Boeing 702 was developed in 1999. In contrast, European manufacturers have introduced 3 new busses in the last 5 years and are currently developing a 4th. There are, of course, underlying business issues driving innovation in this market, including fluctuations in the market for GEO satellites, but as the graphic indicates there has been little innovation in satellite busses by U.S. manufactures after the change in export controls in 1999. Another factor affecting these results is that European governments have invested directly in the commercial aspects of their satellite manufacturing firms while U.S. Government investment is indirect in support of military and civil agency requirements.



Source: Forecast International's *Space Systems Forecast - Satellites & Spacecraft*, January, 2007; U.S. Share of GEO Commercial Communications Satellites from FAA's Commercial Space Transportation database.

Figure 3.2-6. Introduction of New GEO Satellite Busses by Manufacturer

3.3 How do Export Controls Affect the Workforce?

As a rule, employment in any industry tends to track to sales. The space industry survey data follows this trend. Respondents provided the average number of space-related, full-time equivalent employees in their company's space products/services operations from 2003-2006. This information provided a basis for quantifying the impact of export controls in section 4.1.

Figure 3.3-1 shows total surveyed space industry employment increased by 26,682 from 2003 to 2006, or 22%. Increases were distributed equally within both the manufacturing and services segments. No respondents reported furloughs or terminations due to export controls in the 2003-2006 period. The average number of employees per company was 2002 for Tier 1, 718 for Tier 2, and 182 for Tier 3 (these averages reinforce the Tier-Size relationship methodology described in Table 1.3.2.2-2 in the Introduction).

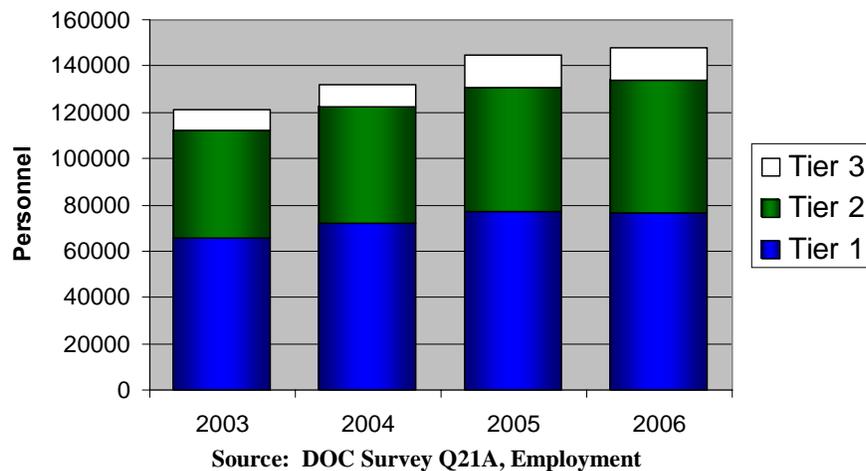


Figure 3.3-1. Total Employment by Tier

To identify workforce issues linked to export control policies, the DOC survey asked: “Has your company had any trouble hiring personnel in its core competencies for its space-related business? How has export license compliance complicated the hiring/training of personnel in your company?”

While the space workforce has grown, the space marketplace currently experiences a lack of qualified candidates in many skills. Based on the survey responses, export controls appear to affect the hiring of foreign workers regardless of whether the products had commercial or military applications. One Tier 1 company reported: “After several experiences, we do not hire foreign nationals. This prohibition has a serious deleterious impact on our hiring practices, particularly since there is such a dearth of qualified domestic personnel.” Another Tier 1 company reported: “Foreign nationals comprise a growing segment of the engineering talent pool. Export controls create significant challenges to a technology company's ability to maximize a foreign employee's expertise while maintaining rigorous control and accurate records on release/export of technology to the employee. Hiring a foreign national requires: an export license, a Technology Control Plan, special training in export control compliance, facility modifications, computer network architecture modifications, and escorting and monitoring the employee. Because of these requirements, the hiring of foreign nationals is infrequent unless there is a highly specialized capability that cannot be met by recruiting a U.S. citizen.”

3.4 Are there any Impacts on International Relations or Joint Space Ventures?

A final question was raised regarding industry health: “Are export controls influencing trends in international alliances, strategic partnerships or joint ventures?” The survey asked companies to describe merger and acquisition (M&A) relationships including licensor, licensee, manufacturer, service provider, service integrator, co-production relationship, product integrator, and other. Both M&A activity and establishing significant contractual relationships are avenues for industry to improve its competitiveness. Industry described the following M&A activity: Tier 1 and Tier 2 companies purchased smaller companies (numerous transactions of small value) and Tier 3 acquired other small companies with a few, large value transactions noted.

Companies identified significant contractual relationships they have with other U.S. and foreign business entities, and described the nature of these contractual relationships. They could select from the following choices: licensor, licensee, manufacturer, service provider, service integrator, co-production relationship, product integrator, and other. The space industry uses these numerous types of relationships to help it stay competitive. Of those surveyed that responded to the questions, foreign business entities are involved in 34% of identified formal business relationships:

- The most significant domestic relationship type is Manufacturer (53%), followed by Service Provider (37%).
- The most significant foreign relationship type is Manufacturer (45%), followed by Other (27%).
- Tier 2 is the most aggressive with foreign relationships.
- Japan, Canada, France, Germany, and the United Kingdom are the countries with which U.S. companies have the most number of relationships (in that order).
- By region, most foreign relationships are with Europe (48%), Asia/Pacific (27%), and North America (16%).

The vast majority of our space trade and business relationships are with our close allies (Europe, Japan, Canada, and Australia). Section 4.2 further looks at export license sales and license denials by region. Even though only a very small percentage of the license applications to these countries are ever denied, the ITAR process treats our allies the same as it does countries such as China. Most survey respondents (68%) felt ITAR is impacting trade with allied countries and needs to adjust processes to expedite business transactions with those allies. The following information from the survey places this issue in context:

- From 2003-2007, 73% of total export sales by US space firms were made to allied countries.
- In 2006, 80% of foreign procurements of space products by US companies were from our allies.
- From 2003-2006, of the (0.8% - 1.4%) of licenses denied, only 25% of these were with our allies although they represented the vast majority of the license applications. On average then, between 2003 and 2006, the percent of licenses denied to allies has been between two tenths and one third of one percent of total licenses applied for.

4.0 EXPORT CONTROL IMPACTS

Respondents to the survey provided data that allowed the study team to quantify the effect the export licensing process has on the U.S. space industry. Specific business measures in terms of sales lost, processing costs, processing times, and resultant changes to companies' behavior and/or business operations were captured. The guiding question for this section has three parts: what are the impacts of the export licensing change in 1999 to the U.S. space industry, are there extended delays in export license processing, and what are the industry's suggested remedies? This section closes with the study team's analysis and summary of the respondents' suggested changes to export control processes.

4.1 What have been the Impacts of the Export Licensing Change?

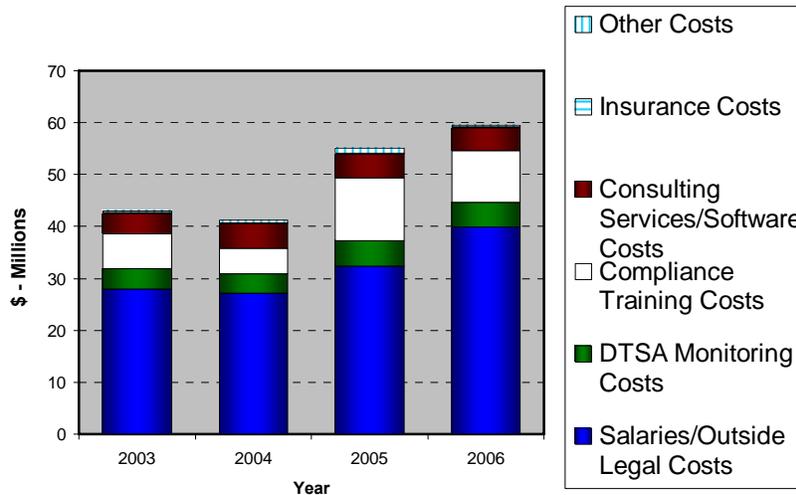
The study team analyzed four factors—lost sales, financial/personnel costs, changes in company behavior or operations, and unintended consequences of export controls. It is evident from Table 4.1-1 that lost sales attributed to the licensing process are predominantly ITAR-related. Companies reported \$2.35B of ITAR-related potential sales lost due to the licensing process from 2003 to 2006, an average of \$588M annually. This loss represents about 1% of total U.S. space industry revenues. This analysis represented the best available approach to arriving at a lost sales number resulting from license processing problems (rejections, lead times, approved license conditions and restrictions, etc.); it does not include lost market opportunities.

Table 4.1-1. License Application & Decision History Summary (2003-2006)

Source: DOC Survey Q12, Space-Related License Applications & Decision History

	Total Sales Attributed to Licensing (\$Thousands)		Lost Sales Attributed to Licensing (\$Thousands)		Lost Sales as a % of Total Sales	
	ITAR	EAR	ITAR	EAR	ITAR	EAR
2003	1,569,329	63,642	712,440	0	45.4%	0.0%
2004	2,341,712	19,413	502,128	0	21.4%	0.0%
2005	6,166,348	118,149	627,600	421	10.2%	0.4%
2006	3,225,673	8,481	511,250	250	15.8%	2.9%

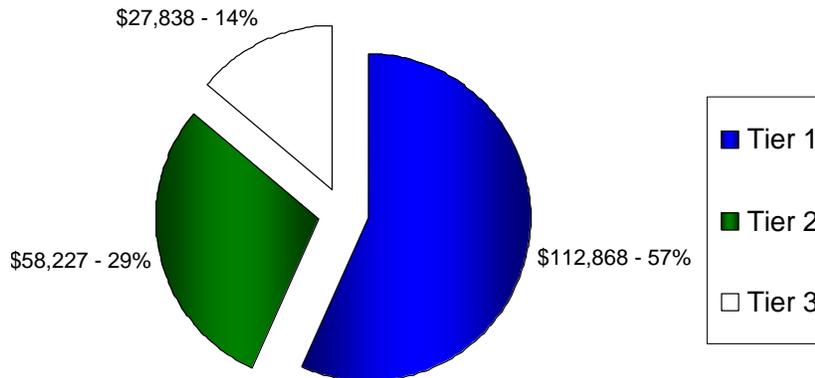
The annual financial costs of complying with export controls are shown in Figure 4.1-1. Space industry-wide compliance costs averaged \$49M per year in 2003-2006. Salaries and outside legal costs comprised the majority (64%) of the total with training costs second at 17% of the total. Since 2003, costs increased 37% across all tiers, with the majority of the growth in the salaries and outside legal costs categories.



Source: DOC Survey Q17, Export Licensing Conditions

Figure 4.1-1. Total Export Control Compliance Cost

Total costs (2003-2006) are shown by tier level in Figure 4.1-2. Although Tier 1 accounts for over half of the costs, Tier 2 and Tier 3 combined report significant costs of over \$85M for the four-year period.



Source: DOC Survey Q17, Export Licensing Conditions

Figure 4.1-2. Financial Costs of Export Control Compliance - All Tiers (\$K)

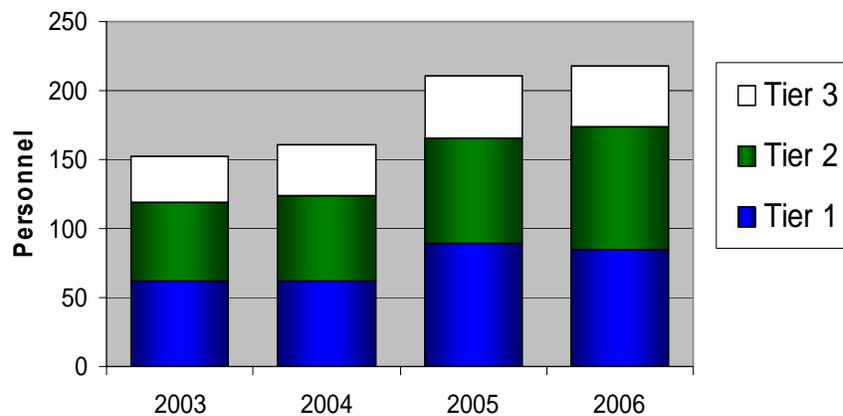
As part of the analysis, the study team determined the burden of export controls to see if there was a difference by tier. Table 4.1-2 illustrates the total burden rate by tier level, which is computed by dividing total compliance costs by total foreign sales. The financial costs of export controls increased from 1% in Tier 1 to almost 8% in Tier 3. Given the difference in total sales between Tier 1 and Tier 3 this is not surprising, but as a percentage of space sales, the financial burden was higher in the lower tiers.

Table 4.1-2. Export Control Burden

Source: DOC Survey Q17, Export Licensing Conditions and Q5, Space-Related Defense and Non-Defense Sales (2003-2006)

Total Export Control Burden				
	2003	2004	2005	2006
Tier 1	0.9%	0.9%	1.5%	1.1%
Tier 2	2.0%	2.1%	3.1%	1.9%
Tier 3	8.0%	7.6%	6.2%	7.7%

The survey looked at the number of export control personnel employed—about half of the companies surveyed reported export control staffing, which is consistent with the number of companies that are exporting. As shown in Figure 4.1-3, the number of export control personnel grew from approximately 150 in 2003 to 220 in 2006. Since export sales were fairly level (\$3.75B in 2003 to \$3.9B in 2006), the increase highlights an increasing administrative burden.



Source: DOC Survey Q21, Employment

Figure 4.1-3. Employment – Total Export License Staff (ITAR/EAR)

The annual figure represents less than 1% of the total space workforce reported in the survey. Further analysis shows the average number of export control full-time equivalents (FTEs) per company decreased by tier (2006 data)—4.25 FTEs in Tier 1; 1.9 in Tier 2; and 1.2 in Tier 3, which is consistent with the size and amount of space sales in the lower versus higher tiers. With foreign sales much less in lower tiers (\$2.8B in Tier 1 versus \$995M in Tier 2 and \$123M in Tier 3 in 2006), representative sales per export control staff member decreases significantly by tier level. Most small companies did not employ in-house export control staff. These companies hired expertise as needed.

The sales ratio for Tier 1 over Tier 3 is 16:1 (see Table 4.1-3). This is another indication of the added relative expense of export controls for lower tier companies.

Table 4.1-3. Average Foreign Sales per Export Control Staff Member

Source: DOC Survey Q5, Space-Related Sales and Q21, Employment

Average Foreign Sales (\$K) / Export Control Personnel				
	2003	2004	2005	2006
Tier 1	\$24,198	\$19,714	\$11,202	\$16,620
Tier 2	\$4,588	\$4,300	\$4,275	\$6,406
Tier 3	\$1,029	\$1,008	\$997	\$1,290

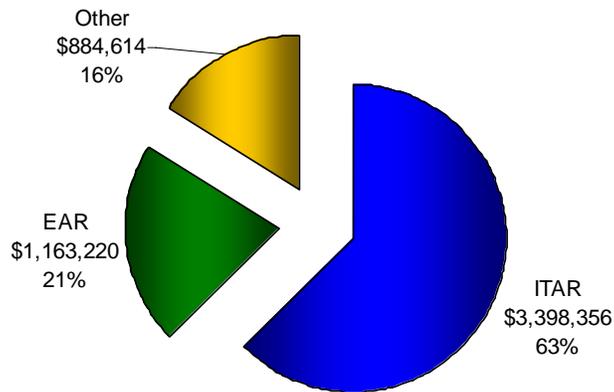
In view of lost foreign sales and total export control costs, companies made changes in business behavior or operations. Some 25% of Tier 1 and Tier 3 companies and 30% of Tier 2 have considered limiting their business activities to domestic customers due to past experiences with denials, conditions, and delays. Sixteen percent of companies said they had decided not to apply for licenses in the future. However, many companies feel they cannot ignore international business opportunities. Survey data show that when companies did make changes to their business model (25% of companies in survey), they focused on reorganizing or increasing resources allocated to international business (mostly Tier 1 and some Tier 2) or changing sales and marketing efforts to focus on domestic customers only (primarily 2nd and 3rd Tiers).

Over a third of all companies reported an impact from “ITAR-Free” items in responding to the survey (31% of Tier 1, 44% of Tier 2, and 33% of Tier 3). Survey comments on ITAR-Free can be summarized with three points: 1) European products have access to more markets; 2) European companies choose to buy ITAR-Free; and 3) an ITAR-Free marketing strategy creates negotiation leverage for the competition.

This “ITAR-Free” business strategy also is supported by the European Union, according to U.S. companies. The ESA has directed European companies to find non-U.S. sources for space products and has funded development of competing products to avoid ITAR requirements. To compete against this EU strategy and other competitors, U.S. companies have had to alter their business operations – often to the detriment of their U.S. suppliers. U.S. companies are purchasing items from foreign vendors because of heritage and/or a looser regulatory environment. This has ramifications for the U.S. base as foreign suppliers become more competitive in the domestic market, which ultimately could lead to additional competition in a market currently dominated by U.S. firm.

4.2 What Licensing Conditions Were Described by the U.S. Space Industry?

The study team looked at three factors concerning ITAR/EAR licensing conditions—foreign sales by export regime and buyer, approved/denied ITAR applications, and license processing times. As shown in Figure 4.2-1, there are two primary export regimes that control the export of space products and services: ITAR and EAR. The “other” category includes export regimes regulated by other U.S. government agencies, such as the Department of the Treasury. Most of industry’s sales of space products and services are regulated by ITAR (63%) whereas the EAR controlled 21%. By tier, ITAR controls 87% of Tier 1’s exports, 28% of Tier 2, and 42% of Tier 3.

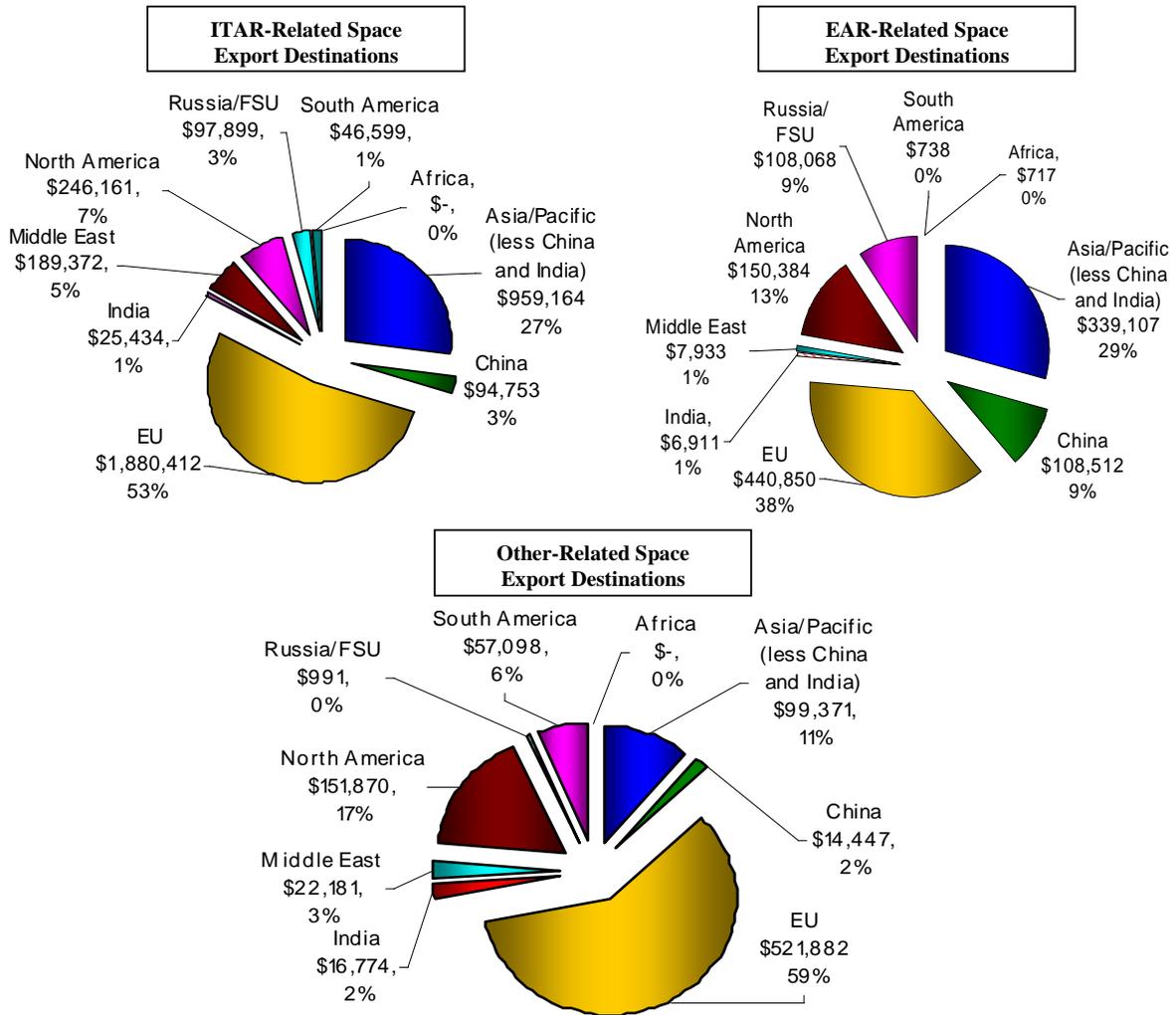


Source: DOC Survey Q9, Exports of Space Products and Services

Figure 4.2-1. Space Sales by Export Control Regime in \$K (2003-2006)

The total dollars shown in Figure 4.2-1 (\$5B) are less than the total sales dollars (\$14B) over the same period because the question only asked for the top 5 countries. However, the percentage breakout is consistent.

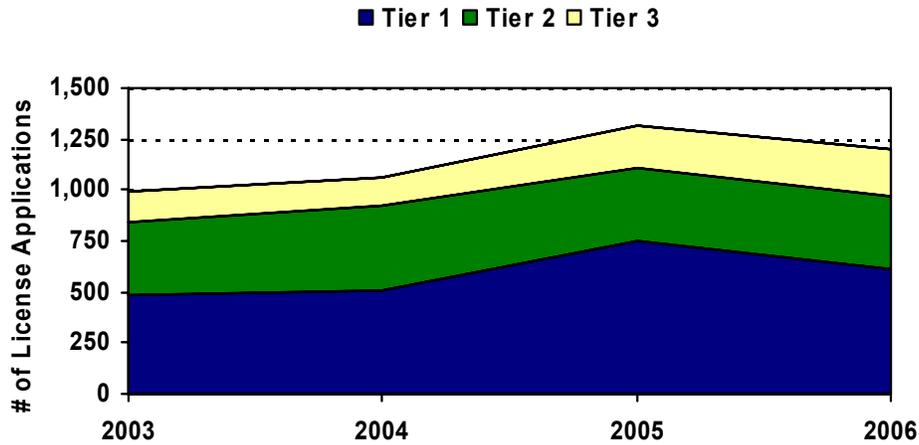
Further, as shown in Figure 4.2-2, most of these products/services are sold to European Union or Asia/Pacific countries (80% ITAR, 67% EAR, and 70% other regimes). Overall, about 50% of exports are to Europe and 25% to the Asia/Pacific region.



Source: DOC Survey Q9, Exports of Space Products and Services

Figure 4.2-2. Space Export Destinations by Export Control Regime in \$K (2003-2006)

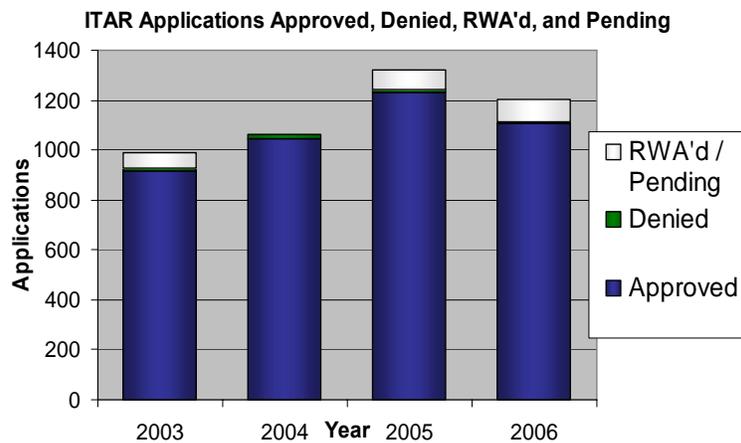
The total number of ITAR license applications increased by 22% since 2003 from 987 to 1,205 with over half attributed to Tier 1 (Figure 4.2-3). Tier 1 applications increased from 479 to 613 or 30% while Tier 3 grew from 144 to 239 or 66%. Tier 2 applications remained relatively constant.



Source: DOC Survey Q12, Space-Related License Applications & Decision History

Figure 4.2-3. ITAR License Applications by Tier

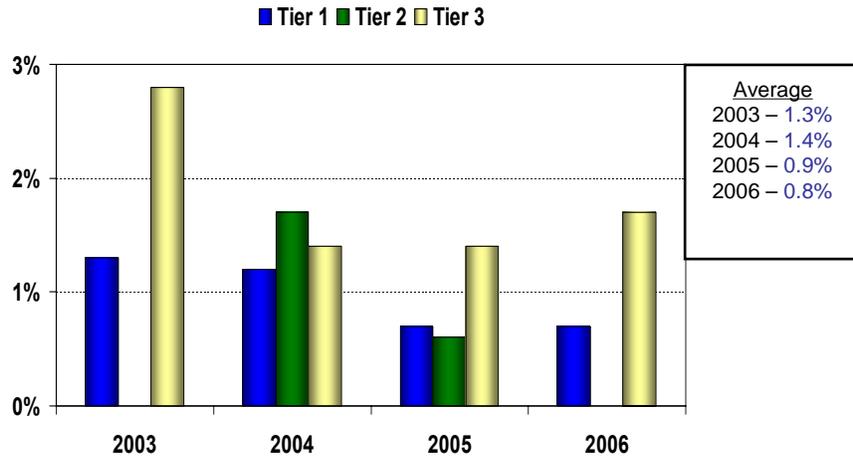
Two questions in the survey addressed license application processing history and conditions. Over the last 4 years, survey respondents have averaged 1100-1200 applications per year (see Figure 4.2-4). Across all tiers, less than 1% of total applications were denied in the same time period, whereas a little over 4% were returned without action (RWA) or were pending.



Source: DOC Survey Q12, Space-Related Licensing Application and Decision History. Note: RWA/Pending derived as remainder of Total Applications minus Approved and Denied

Figure 4.2-4. ITAR Application Processing

Figure 4.2-5 also shows the percentage of ITAR applications denied vary by Tier. Although less than 1% were denied across all tiers, Tier 3 companies averaged over 1.8%.



Source: DOC Survey Q12, Space-Related Licensing Application and Decision History.
 Note: RWA/Pending derived as remainder of Total Applications minus Approved and Denied

Figure 4.2-5. ITAR Applications Denied (%)

The product groupings associated with denied ITAR applications appear in Figure 4.2-6. About 56% of these denials involved services and spacecraft to about the same degree.

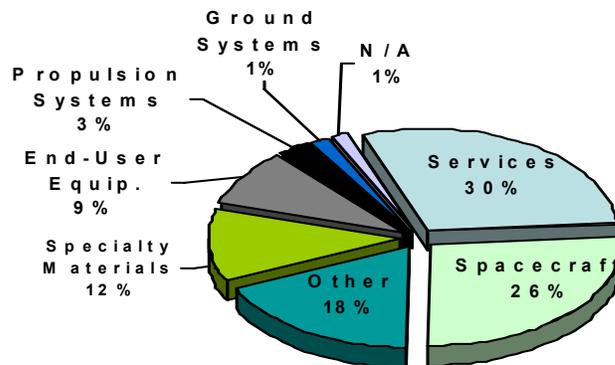
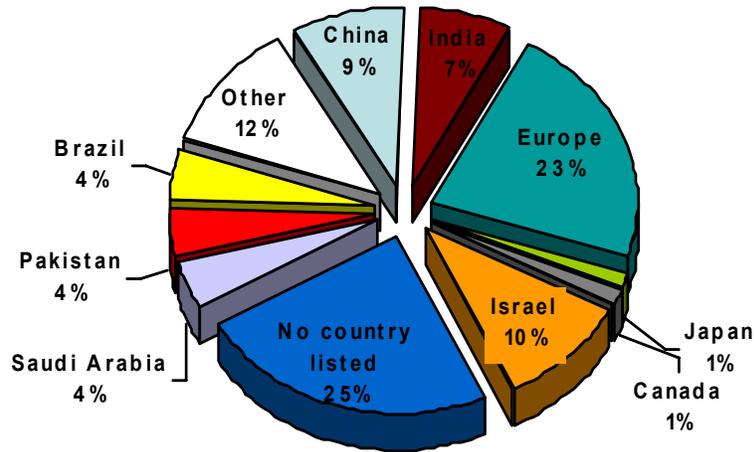


Figure 4.2-6. Product Groupings of Denied ITAR Applications (2003-2006)

It can be seen in Figure 4.2-7 that about 25% of denied ITAR license application destinations are from Europe, Japan or Canada, our top customers for U.S. space products and services. Europe in Figure 4.2-7 includes Norway, France, the United Kingdom, Denmark, Italy, Switzerland, and the Netherlands.



Source: DOC Survey Q13A-D, Space Products and Services Denied Export Licenses

Figure 4.2-7. Destinations of Denied ITAR Applications

Table 4.2-1 below shows that the average Technical Assistance Agreement (TAA) processing time has doubled over the reporting period. TAAs, granted by the U.S. Department of State, include marketing, proposal meetings/phone calls, international cooperation, and permission to hire foreign nationals. Industry’s comments identified burdens and issues associated with TAAs. TAA processing time is of particular concern because companies cannot initiate technical discussions and participate in bid and proposal activity until the TAA is approved.

Table 4.2-1. Export Licensing – TAAs (2003-2006)

Source: DOC Survey Q17A Export Licensing Conditions TAA

	TAA Submitted	TAA Approved	% Approved	TAA avg. time (days)
2003	508	439	86%	52
2004	610	565	93%	59
2005	829	722	87%	85
2006	698	627	90%	106

4.3 What Remedies Were Suggested by Industry?

The BIS survey provided industry an opportunity to suggest improvements to current U.S. export control processes. The number one recommendation (60% of responses) was to “revise or relax ITAR/EAR restrictions” and/or “review lists of controlled items more frequently—remove the item if it is no longer appropriate or move it to another list.” In the final analysis, 53% of the respondents reported some or all of their products should not be subject to ITAR/EAR given that the products represent the current state-of-practice and are available from multiple sources globally. The number two suggestion (23% of the responses) was that government should “streamline or expedite the export control process.” In their analysis, this would help companies by improving predictability (scheduling) and shortening timelines.¹³

Specific “streamlining of anomaly resolution” procedures for repair/return of components, systems, subsystems and technologies were suggested by industry. Suggestions fell into two categories as shown in Table 4.3-1.

Table 4.3-1. Anomaly Resolution Procedures

Source: DOC Survey Q17, Export Licensing Conditions

Survey Comments on Anomaly Resolution Procedures for Returns and Repairs	
Issue exemptions for repair/return of controlled items	Expedite/streamline the documentation and/or process for repairs/returns
(All Tiers) To alleviate [licensing delays], recommend developing an exemption to allow U.S. companies to return hardware to the original foreign source of manufacture for repair/refurbishment/rework (similar to the exemption that currently exists to authorize U.S. hardware to be returned for the same reasons).	(Tier 2) Revise the policy requiring an item to be returned prior to a replacement being sent—this causes unreasonable downtime.
(Tier 1) Allow discussion of launch vehicle anomaly investigation conclusions to be included in the standard insurance TAA rather than requiring a separate license (similar to the current policy for satellite anomalies).	(Tier 2) Streamline “re-export approval” process—currently they take almost as long as the original export.
(Tier 1) Allow for waiver of identical data that is being provided under several very similar licenses (e.g. manufacturer would not need to send in the identical fleet anomaly briefing on [a product] to DOD DTSA for 10 different customers 10 different times).	(Tier 1) Expedite by issuing certain blanket licenses in advance for NATO countries or pre-approved companies.
(Tier 1) Make release of relevant government spacecraft anomaly data allowed with government customer permission the standard proviso instead of having to request it, and not always get it, which leads to a reclama.	

¹³DOC Survey Q18.

Companies were also asked to comment on license requirements for TAAs applied to meetings (domestic and foreign), insurance applications, or phone calls. Suggestions centered on either issuing waivers or expediting the process (see Table 4.3-2).

Table 4.3-2. TAAs for Meetings/Insurance/Phone Calls

Source: DOC Survey Q17, Export Licensing Conditions

Survey Comments on License Requirements for Meetings/Insurance/Phone Calls	
Issue Waivers	Expedite/Reform the Process
<p>(Tier 1) The additional expense of \$300K+ for DTSA costs could be enough for U.S. companies to lose an international program. In addition, the added delays for technical data review (15 days) or requesting DTSA monitors (45 days for overseas meetings), greatly impacts critical program schedules. The DTSA requirements need to be removed at a minimum for NATO and major ally programs.</p>	<p>(Tier 1) Reduce the notification time for DTSA monitoring—currently requires 45 days for international meetings. Reduce the notification time from 45 to 15 days for European Union countries, and other major allies, Canada, Japan, New Zealand, etc. The current monitoring requirements limit U.S. ability to compete and to be effectively provided quick communications when an anomaly occurs, which is very dissatisfying to customers.</p>
<p>(Tier 3) Include a provision for meetings/phone calls at a proposal stage without a license or TAA required where basic compliance and performance parameters can be disclosed and discussed.</p>	<p>(Tier 2) TAAs could be made to be effective upon signature of individual parties, as opposed to requirements for all signatories to be obtained before the TAA is effective. New parties could then be added without a formal amendment.</p>
<p>(Tier 3) A potential improvement for the licensing requirement concerning meetings would be to add additional exemptions to allow for marketing meetings to take place where technology/products can be discussed more liberally without the need of a license; however, without exchanging details of design and/or development of a product.</p>	<p>(Tier 1) Requiring monitoring of meetings, telephone calls, and launch campaigns that do not involve sensitive technologies is an egregious waste of government resources. DTC [Defense Trade Controls] needs to take the time to distinguish projects that actually involve sensitive technologies with potential military applications from those that only use benign commercially available components that every other country already possesses. DTC's overly broad practice of requiring monitoring of, for example, all 'technical' conversations that occur with Russians, is, again, a waste of the government's time and resources, and an unwarranted bureaucratic and financial burden for the domestic company involved.</p>
<p>(Tier 3) The record-keeping requirements in export regulations related to marketing meetings or phone calls should be reviewed, since they present an onerous responsibility for U.S. companies to track and maintain.</p>	

The survey also asked how companies would modify the U.S. Congressional role in export controls. Again, comments focused on expediting/reforming the process and increasing the Congressional notification threshold (dollar amount). Table 4.3-3 summarizes their inputs.

Table 4.3-3. Comments on U.S. Congressional Role

Source: DOC Survey Q17, Export Licensing Conditions

Survey Comments on U.S. Congressional Role in Export Controls	
Expedite/Reform Congressional Notification Process	Increase Congressional Notification Threshold (\$ Amount)
(Tier 1) Congressional notification has consistently been identified as the least timely, transparent, and predictable part of the process. In particular, informal pre-notification, which is not subject to any deadlines, should be eliminated and the Javits Report should be used as a pre-notification vehicle.	(Tier 1) Monetary thresholds should be raised by \$25-50M before triggering the process. Expedited pre-notification processing/handling could reduce the uncertainties posed by the Congressional approval process.
(Tier 1) The requirement for Congressional notification adds a minimum of 2 months to the license review process, which bring the average cycle to 6 months to receive approval. Given the shorter and shorter delivery requirements, 6 months is unacceptable. In addition, once the Congressional process is started, industry has no insight into where the license is or when the official clock starts.	(Tier 2) The dollar value threshold for Congressional Notification needs to be raised significantly - for both NATO Plus countries as well as for all other countries.
(Tier 2) Currently, there is no transparency in this process and it can add between 6 to 9 months processing time for submissions. Also, the notification process should not be contingent upon an awarded contract - in a number of instances international customers have refused to award a contract until U.S. business is able to prove that Congressional notification and approval has been received. Of course, because a case cannot be notified until a contract is provided, we were unable to provide this assurance for the customer. Cases should not be held for submission while Congress is out of session as this adds significant time to the process. Further, cases should be processed as they are received out of interagency review - sending them up to Congress in "batches" further exacerbates the delays.	(Tier 2) The thresholds that trigger Congressional notification are now too low given today's economics and should be raised.

5.0 SUMMARY

5.1 Key Findings

U.S. company space sales have continued to grow over the last ten years, with sales increasing 10-15% over the 2003-2006 period. Export sales accounted for no more than 6-10.5% of total annual revenues during the same four year period. U.S. global market share has decreased since ITAR policy changes were implemented in 1999. In the last several years, the U.S. space industry has faced strong and growing competition in the global space market. European firms and foreign government purchasing policies have been the primary competitive challenge to U.S. industry. Foreign firms advertise systems as “ITAR-Free” to gain leverage in contract negotiations. A number of countries are requiring “ITAR-Free” when issuing Requests for Proposals (RFPs).

Table 5.1-1 summarizes findings with respect to the past and current global space marketplace and the U.S. space industry’s competitiveness in the global market. It includes the U.S. space industry’s outlook and perception of its position, its foreign competitors’ position in the market, and barriers to entering foreign markets.

Table 5.1-1. Section II Summary

Global Marketplace	Competitiveness	Market Share
Global space sales have been on an upward trend the last 10 years, led by growth in the services sector.	Industry has been confident in its capabilities and ability to capture sales in the domestic market (2008-2012).	U.S. share of global satellite manufacturing revenue has decreased since ITAR changes were implemented—from 63% in 1996-1998 to 52% in 1999-2001 and 41% in 2002-05.
U.S. sales are dominated by domestic non-defense services and ground equipment. U.S. Government spending is a key underpinning. Foreign sales represent a small and flat fraction of total sales (6% to 10.5% over the last four years). About half of the survey respondents reported export sales, the majority of which are destined to Europe/Asia-Pacific and require an ITAR license.	There is broad industry consensus on difficulty in capturing sales in the foreign market (2008-2012).	U.S. share of all commercial communications satellite manufactured has decreased 19 percent since the ITAR policy change in 1998.
	Industry focused on foreign competition primarily in spacecraft/components and launch services segments. The primary competitor is Europe, and to a lesser degree, the Asia-Pacific region (primarily our allies).	The U.S. share of GEO commercial communications satellites manufactured has decreased 10 percent since 1998.
	Industry claims the export control licensing requirements are a significant barrier to competitiveness, followed by internal purchasing preferences.	The U.S. Expendable Launch Vehicle industry has lost significant global market share primarily due to price competition

U.S. space companies, most notably large aerospace manufacturers, have managed domestic consolidation, global competition and changes in commercial and military demand to remain financially viable by decreasing debt, increasing productivity, and reducing costs. Upward trends in space related research expenditures (mostly in Tiers 2 and 3) and employment have followed the trend in domestic sales. These findings are offset by a decline in global market share, development delays in several large military satellite programs, and instability in commercial sales forecasts. ITAR is one of many factors driving overall industry health. Table 5.1-2 summarizes findings on the health of the domestic space industry.

Table 5.1-2. Section III Summary

Financial Viability	R&D	Workforce	International Relationships
The space manufacturing portion of the industrial base is currently exhibiting stable financial conditions with the exception of launch subsystems/materials.	R&D has grown an average of 8% per year with investment in innovation occurring primarily in the sub-tiers in an attempt to remain competitive.	Total space employment across survey respondents increased 22% from 2003 to 2006.	Space industry contractual relationships are driven by competition and the most significant foreign relationship category is Manufacturer.
Commercial space services companies, especially those starting up, face high risk and high entry cost expected in an emerging market with many competitors.	Tier 2 and Tier 3 are spending the majority of R&D and Tier 1 is heavily leveraging government-sponsored R&D. Tier 1 R&D (as a percent of sales) is in part skewed due the significant amount of sales from services firms which traditionally have low R&D expenditures	No layoffs due to export controls were identified within 2003 to 2006.	The majority of foreign purchases, sales and formal business relationships by US firms were with companies in countries with which the US has military treaties and alliances. However, export controls issues were treated the same regardless of the country involved.

The ITAR requirements impact the U.S. space industry in several ways. Lost sales destined for U.S. allies are significant (average \$588M annually). There have been a number of firms in all tiers that have not applied for export licenses (half of the companies surveyed) due to real or perceived problems with navigating the licensing process. Other companies have changed or plan to change their business models to cope with ITAR and have considered or are currently considering a change to focus on domestic customers only. The impact in terms of license denials has not been severe (less than 1% of applications denied). The cost of export control compliance has averaged \$49M annually over last 4 years. Table 5.1-3 lists the impacts identified by industry's assessment of past/current licensing conditions (processing, conditions, and timelines).

Table 5.1-3. Section IV Summary

ITAR Impacts	Cost of Compliance	Unintended Consequences
Impacts vary by tier, but are more pronounced at lower tiers.	Export control compliance averages \$49M per year industry-wide.	"ITAR-Free" is an example of foreign competition exploiting ITAR as an impediment to U.S. company effective competition.
63% of all foreign sales are controlled by ITAR. Tier 2 foreign sales are increasing as is the percentage of Tier 2 sales controlled by ITAR. 50% of sales are to the EU and 25% to Asia/Pacific area.	Compliance costs have grown 37% in 2003-2006, primarily due to export control personnel and outside legal costs.	Export controls limit access to foreign components, intellectual capital, and the foreign national workforce.
There were 67 ITAR denials (1% of total filed) reported from 2003 to 2006.	The burden of compliance has grown significantly for lower tier companies. As a percent of foreign sales, the cost burden for Tier 3 has been 8 times that of Tier 1.	
Foreign sales lost due to the ITAR process in 2003-2006 averaged \$588M annually.		
TAA processing time has grown from 52 days in 2003 to 106 days in 2006.		

Industry provided several recommendations regarding export control administration. The number one recommendation was to relax control list restrictions: number two was that the government should streamline or expedite the export control process and improve transparency. Other suggestions related to issuing exemptions/waivers for anomaly resolutions and license requirements for meetings, increasing dollar threshold for the U.S. Congressional notification, and improving timeliness.

5.2 Conclusions

The U.S. space industry has been generally healthy and very competitive in the domestic commercial and defense markets. The global space market has changed, however, since 1998. U.S. companies now face strong foreign competition and declining global market share. Future U.S. leadership in the domestic commercial market and the health and competitiveness of several space industry segments could be challenged by the growth of foreign competitors. European satellite manufacturing in particular could challenge current U.S. domestic dominance.

ITAR has either directly or indirectly precipitated the global competition and is a significant impediment to the U.S. space industry's ability to market to foreign buyers. Lost sales are significant. The licensing and TAA processes impact competitiveness and a significant number of firms at all tiers are either not applying for export licenses and/or may be changing their business model and many are focusing on domestic customers only. Some foreign firms advertise systems as "ITAR-Free." This impacts Tier 2 and 3 suppliers exporting into foreign

systems. Compliance costs are not generally substantial but have been relatively greater for lower tier companies. To maintain and enhance the U.S. competitive position in the global market, ITAR processes need to be frequently reviewed and adjusted, as appropriate. ITAR staffing at the DOS and DTSA should be reviewed and adjusted to ensure personnel and funding levels align with the number of applications processed. Restrictions regarding sales to U.S. allies should also be re-examined to reflect geo-political and economic considerations. The ability to win additional major space system sales will have spillover benefits for all tiers of U.S. space industrial base and overall U.S. national security.

6.0 APPENDICES

6.1 Acronyms

AFRL	–	Air Force Research Laboratory
AIA	–	Aerospace Industries Association
BIS	–	Bureau of Industry and Security
CCL	–	Commerce Control List
COMMSAT	–	Communication Satellite
DDTC	–	Directorate of Defense Trade Controls
DOC	–	Department of Commerce
DOD	–	Department of Defense
DOS	–	Department of State
DTSI	–	Defense Trade Security Initiative
EAA	–	Export Administration Act
EAR	–	Export Administration Regulations
ESA	–	European Space Agency
FAA	–	Federal Aviation Administration
GEO	–	Geosynchronous Orbit
IBIC	–	Industrial Base Information Center
IRAD	–	Independent Research and Development
ITAR	–	International Traffic in Arms Regulations
LEO	–	Low Earth Orbit
M&A	–	Merger and Acquisition
NASA	–	National Aeronautics and Space Administration
NATO	–	North Atlantic Treaty Organization

NOAA	–	National Oceanic & Atmospheric Administration
NRO	–	National Reconnaissance Office
NSSIB	–	National Security Space Industrial Base
NSSO	–	National Security Space Office
OFAC	–	Office of Foreign Assets Control
R&D	–	Research and Development
RWA	–	Returned Without Action
SIA	–	Satellite Industry Association
SIBC	–	Space Industrial Base Council
TAA	–	Technical Assistance Agreement
TREASURY	–	Department of the Treasury
USML	–	United States Munitions List
VSAT	–	Very Small Aperture Terminal

6.2 U.S. Space Industry Financial Summary

6.2.1 IBIC Independent Financial Analysis

Financial ratings for publicly traded companies are based on an analysis of selected Standard and Poors financial data for the last five fiscal years, when available. Otherwise, the analysis is based on the company's US Securities and Exchange Commission (SEC) forms (10-K, 8K, 8-Q, etc.) or the company's annual reports.

Financial ratings for privately held companies are based on a review and analysis of available credit information, using Experian or Dun & Bradstreet databases. Experian provides Days Beyond Term (DBT) information, i.e. the average number of days past invoice due date for payments by that company. Dun & Bradstreet provides either an overall credit rating when it has current information, or a Paydex score which can be used to predict DBT's. A Paydex score is provided if D&B has received a sufficient sample of credit payment experiences.

The following table provides the criteria used to determine financial ratings:

Table 6.2-1. Financial Risk Definitions

Financial Risk Rating	Criteria
Low	<ul style="list-style-type: none"> • Good to strong financial condition. Financial metrics are concentrated at the upper end of the scale. Economic forecasts show continued good to strong performance. Reductions in government contracts would have only a limited impact on viability.
Moderate	<ul style="list-style-type: none"> • Financial condition is stable but sensitive to market conditions. Economic forecasts show relatively consistent performance with some possibility for significant change. Some management corrective action is warranted. Reductions in government contracts could have a negative impact on viability.
High	<ul style="list-style-type: none"> • Financial condition is serious and may indicate a near-term bankruptcy. One or more financial metrics are at or below the critical stage. Market pressures could readily influence this entity. Government intervention is a possibility if a unique technology exists.

From Standard and Poors, IBIC draws up to 5 years of the following financial measures and charts several for analysis.

Table 6.2-2. Selected Five Years Corporate Financial Data (example)

Company (\$M)	02	03	04	05	06
Sales	1,141.949	1,801.605	2,172.135	2,366.193	2,801.956
Operating Income	136.094	223.682	275.543	276.786	303.892
Net Income (Loss)	67.921	69.327	124.287	162.305	153.540
Total Long Term Debt	207.909	867.638	820.856	1,076.000	1,131.353
Total Stockholders' Equity	198.332	556.801	477.924	564.200	686.359
Working Capital	40.860	299.389	284.263	377.294	401.674
Order Backlog	2,242.200	5,600.000	5,200.000	5,100.000	5,000.000
Return on Assets	7.723	3.894	5.197	5.728	5.091
Current Ratio	1.140	1.805	1.664	1.881	1.930
Equity Growth Rate	43.361	22.805	24.905	31.149	24.555
Quick Ratio	0.828	1.186	1.120	1.367	1.481
% of LT Debt/Equity	104.8%	155.8%	171.8%	190.7%	164.8%
% of LT Debt/Sales	18.2%	48.2%	37.8%	45.5%	40.4%
R&D-Company Sponsored	11.575	20.589	26.849	28.936	37.929
Capital Expenditures	24.755	42.884	54.171	58.754	62.600
LT Debt/Op Inc	1.528	3.879	2.979	3.887	3.723

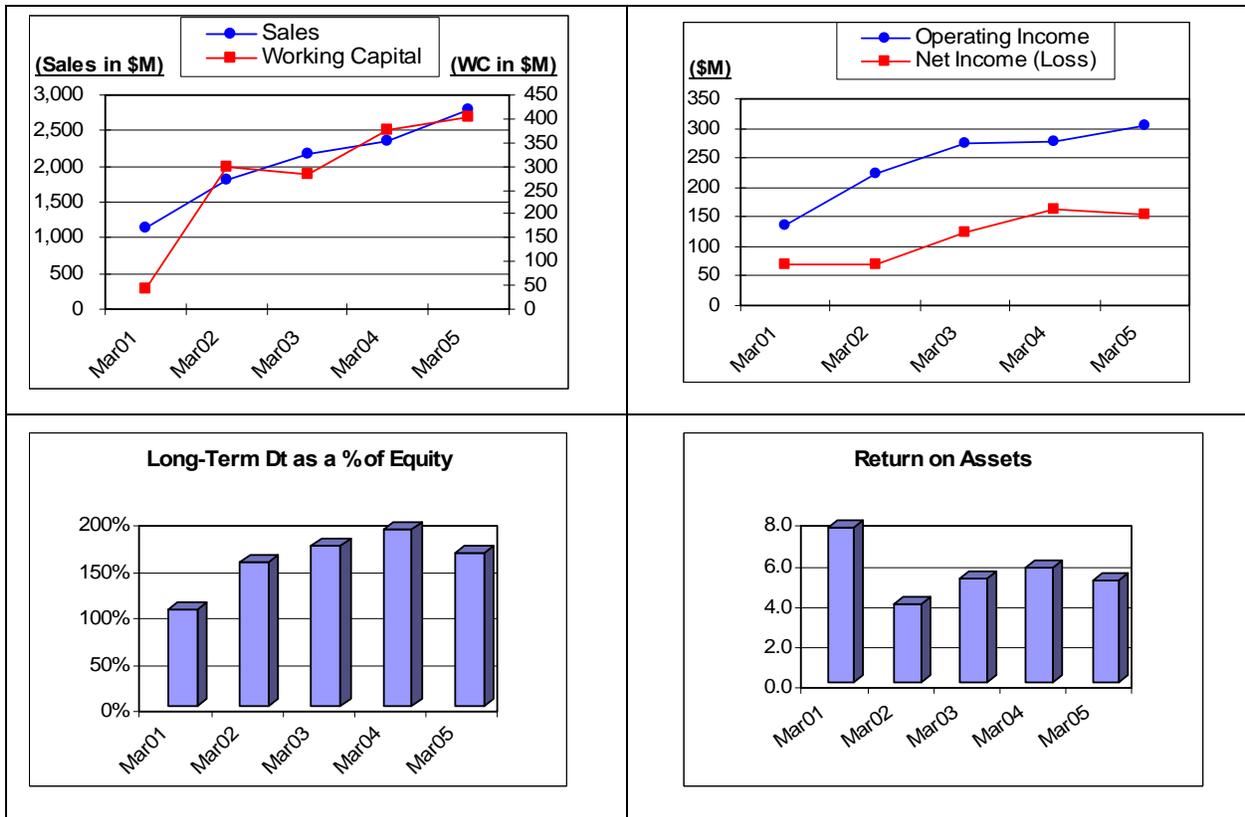


Figure 6.2-1. Sample Charts - Selected Financial Data

6.2.2 Income Statement Analysis

Survey respondents were asked to provide income statement data regarding their space-related business. The data for all companies was consolidated into one financial statement in addition to being broken out by tier. Summary income statement data including common size financial statements can be found in this appendix following this narrative explanation. The common size financial statements depict all income statement items as a percent of sales. Common size statements allow for an easy analysis of individual line items on the income statement over time.

Note: Gross profit, operating expenses, non-operating expenses, and net income may not equate to the sum/difference of their respective components (i.e. net sales – cost of goods sold may not equal gross profit). This was the case if certain companies either failed to include specific revenue/expense items in the respective income statement entry or if certain entries were left blank entirely. Furthermore, certain companies may have included negative entries for certain revenue/expense items that should have been positive. Negative numbers are indicated in parenthesis ().

To facilitate analysis of the income statement, all expense line items including, cost of goods sold, selling, general and administrative expenses, depreciation, total operating expenses, interest expense, other non-operating expenses, total non-operating expenses, and provision for income taxes, were converted to non-negative numbers in order to properly construct the common-size financial statements. Most of the remaining line items including gross profit, operating income, income before income taxes, and net income, were not altered, as each could be either positive or negative.

All Companies

Net income increased from a loss of (\$243.4M) in 2003 to a gain of nearly \$3.3B in 2006. Profit margins for the same time period increased from (0.5) percent to 4.4 percent. Gross profit steadily increased during the time period with a significant jump of over 22 percent from 2004 to 2005. This jump was also reflected in net income, which grew from a net loss of (\$2.4B) to a net profit of \$3.29 billion. Figure 6.2-2 shows that profit margins trended closely to net income.

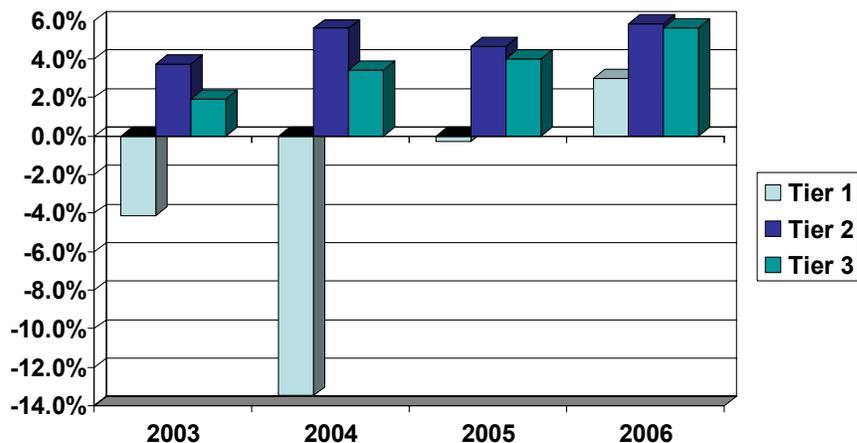


Figure 6.2-2. Profit Margins by Tier

Gross margins remained consistent at an average 25 percent for all companies over the four-year period. Operating expenses, a large percent of sales in 2003 (20.1 percent), decreased steadily down to 16.2 percent in 2006. The largest component of operating expenses was selling, general and administrative expenses, representing an average 16.6 percent of sales over the time period.

Tier 1

After experiencing a net loss for three straight years (2003-2005), Tier 1 companies rebounded in the black with net income at nearly \$1.1 billion in 2006. Following a similar pattern to that of all companies, Tier 1 companies experienced a strong increase in financial viability from 2004-2005. Even though profit margins remained negative at (0.3) percent in 2005, the group witnessed a substantial change from a profit margin of (13.5) percent in 2004.

Gross margins averaged 26.7 percent of sales over the four-year period with slight increases every year. Tier 1 companies had selling, general, and administrative expenses as the largest component of operating expenses at an average 21.8 percent. With an almost doubling of selling, general, and administrative expenses from 2003 to 2004, operating expenses did decrease following 2004. Profit margins for the group eventually reached the black in 2006 at 3 percent, up from (4.1) percent in 2003.

Tier 2

Unlike Tier 1, Tier 2 companies provided healthy financial data for all years in the study. Net income was positive each year, increasing from over \$705 million in 2003 to \$1.7 billion in 2006. Profit margins also followed suit increasing 53 percent from 3.8 percent in 2003 to 5.8 percent in 2006.

Tier 2 gross margins averaged a low 22.8 percent for the period compared to the aggregate of companies at 25 percent. Operating income was also significantly lower than the group and Tier 1 at an average 13.4 percent. As was the case with Tier 1, selling, general, and administrative expenses represented the largest portion of operating expenses from 2003 to 2006; however the number steadily decreased over time.

Tier 3

Tier 3 fared exceptionally well with profit margins positive for all four years. The increase in net income (and thus profit margins) over the period was due to a significant drop in cost of goods sold from 2005 to 2006. This one-time drop led to an increase in profit margins from 4 percent to 5.6 percent. Net income for this group never reached over a billion from 2003 to 2006, with a high of \$480 million in 2006.

Gross margins were slightly lower at an average 22.1 percent compared to Tier 2 companies. Moreover, selling, general, and administrative expenses represented the largest component of operating expenses at an average 8.1 percent. Overall, Tier 3 companies had the lowest operating expenses as a percent of sales at 7.8 percent in 2006. This compares to 12.7 percent and 21.1 percent for Tier 2 and Tier 1, respectively in 2006.

Common Size Income Statement for All Companies

	2003	2004	2005	2006
Net Sales (and Other Revenue)	100.0%	100.0%	100.0%	100.0%
Cost of Goods Sold	76.5%	75.6%	74.4%	72.2%
Gross Margin	23.5%	24.3%	25.5%	25.4%
Selling, General and Administrative Expenses	15.6%	21.4%	15.9%	13.4%
Depreciation	4.5%	3.6%	2.9%	2.8%
Total Operating Expenses	20.1%	25.0%	18.7%	16.2%
Operating Income	1.8%	-2.3%	5.0%	8.1%
Interest Expense	2.1%	1.2%	1.3%	1.3%
Other Non-Operating Expenses	2.1%	1.5%	0.4%	0.7%
Total Non-Operating Expenses	4.2%	2.8%	1.7%	2.0%
Income Before Income Taxes	0.8%	-3.9%	4.7%	7.6%
Provision for Income Taxes	1.6%	2.8%	1.8%	2.8%
Profit Margin	-0.5%	-4.1%	2.2%	4.4%

Common Size Income Statement for Tier 1 Companies

	2003	2004	2005	2006
Net Sales (and Other Revenue)	100.0%	100.0%	100.0%	100.0%
Cost of Goods Sold	76.1%	74.9%	72.3%	71.7%
Gross Margin	24.5%	25.5%	28.2%	28.8%
Selling, General and Administrative Expenses	18.4%	31.6%	20.9%	16.2%
Depreciation	8.1%	6.3%	5.1%	4.9%
Total Operating Expenses	26.5%	37.9%	25.9%	21.1%
Operating Income	-3.8%	-14.2%	0.3%	5.2%
Interest Expense	2.2%	0.9%	1.1%	1.0%
Other Non-Operating Expenses	3.6%	2.7%	0.4%	1.0%
Total Non-Operating Expenses	5.8%	3.7%	1.5%	2.0%
Income Before Income Taxes	-3.8%	-15.4%	1.2%	6.4%
Provision for Income Taxes	1.5%	3.5%	1.1%	3.1%
Profit Margin	-4.1%	-13.5%	-0.3%	3.0%

Common Size Income Statement for Tier 2 Companies

	2003	2004	2005	2006
Net Sales (and Other Revenue)	100.0%	100.0%	100.0%	100.0%
Cost of Goods Sold	77.0%	76.5%	76.2%	75.9%
Gross Margin	22.1%	22.8%	22.9%	23.5%
Selling, General and Administrative Expenses	14.0%	12.2%	11.9%	11.8%
Depreciation	0.9%	1.1%	0.9%	0.9%
Total Operating Expenses	14.9%	13.3%	12.8%	12.7%
Operating Income	8.1%	9.7%	9.9%	10.9%
Interest Expense	2.0%	1.6%	1.5%	1.9%
Other Non-Operating Expenses	0.4%	0.4%	0.3%	0.4%
Total Non-Operating Expenses	2.4%	1.9%	1.8%	2.3%
Income Before Income Taxes	5.5%	7.7%	8.2%	8.7%
Provision for Income Taxes	1.7%	2.2%	2.5%	2.7%
Profit Margin	3.8%	5.6%	4.6%	5.8%

Common Size Income Statement for Tier 3 Companies

	2003	2004	2005	2006
Net Sales (and Other Revenue)	100.0%	100.0%	100.0%	100.0%
Cost of Goods Sold	76.6%	76.1%	77.0%	61.3%
Gross Margin	23.3%	23.9%	22.9%	18.1%
Selling, General and Administrative Expenses	8.3%	8.5%	8.1%	7.6%
Depreciation	0.3%	0.2%	0.3%	0.2%
Total Operating Expenses	8.5%	8.7%	8.4%	7.8%
Operating Income	6.7%	8.4%	7.9%	10.0%
Interest Expense	1.9%	1.4%	1.2%	0.7%
Other Non-Operating Expenses	0.9%	0.2%	0.9%	0.1%
Total Non-Operating Expenses	2.7%	1.6%	2.0%	0.9%
Income Before Income Taxes	5.6%	6.9%	7.4%	9.2%
Provision for Income Taxes	1.8%	1.9%	2.1%	2.2%
Profit Margin	1.9%	3.4%	4.0%	5.6%

6.3 U.S. Department of Commerce, Bureau of Industry and Security, Defense Industrial Base Assessment: U.S. Space Industry

**DEFENSE INDUSTRIAL BASE ASSESSMENT:
U.S. SPACE INDUSTRY**



SCOPE OF ASSESSMENT

The U.S. Department of Commerce, Bureau of Industry and Security (BIS), Office of Technology Evaluation, in support of Defense Science Board (DSB) studies and in coordination with the U.S. Air Force, the National Security Space Office (NSSO), the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration (NASA) and others, is conducting a survey of the U.S. space industry. The principal goal of this data collection is to analyze the health and competitiveness of the space industry in terms of industrial, financial and economic performance. This includes an analysis of the effects of foreign competition and export controls on the industry's ability to meet the demands of defense and commercial markets.

RESPONSE TO THIS SURVEY IS REQUIRED BY LAW

A response to this survey is required by law (50 U.S.C. app. Sec. 2155). Failure to respond can result in a maximum fine of \$10,000, imprisonment of up to one year, or both. Information furnished herewith is deemed confidential and will not be published or disclosed except in accordance with Section 705 of the Defense Production Act of 1950, as amended (50 U.S.C App. Sec. 2155). Section 705 prohibits the publication or disclosure of this information unless the President determines that its withholding is contrary to the national defense. Information will not be shared with any non-government entity, other than in aggregate form. The information will be protected pursuant to the appropriate exemptions from disclosure under the Freedom of Information Act (FOIA), should it be the subject of a FOIA request.

Notwithstanding any other provision of law, no person is required to respond to nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a currently valid OMB Control Number.

BURDEN ESTIMATE AND REQUEST FOR COMMENT

Public reporting burden for this collection of information is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information to BIS Information Collection Officer, Room 6883, Bureau of Industry and Security, U.S. Department of Commerce, Washington, D.C. 20230, and to the Office of Management and Budget, Paperwork Reduction Project (OMB Control No. 0694-0119), Washington, D.C. 20503.

ORGANIZATION OF SURVEY INSTRUMENT	
Sub-Section Titles	Number
Table of Contents	NA
Electronic Instructions	NA
Who Must Respond	NA
General Instructions	NA
Company Information	1.a-1.c
Terminology	NA
Product and Services Type Listing	2.
Domestic and Foreign Corporate Relationships	3.a-3.b
Mergers and Acquisitions	4.
Space-Related Defense & Non-Defense Sales	5.
Top 10 Products - Production & Sales (2003-2007)	6.a-6.e
Top 5 U.S. and Foreign Procurements - Products/Services	7.a-7.d
Reasons for Foreign Sourcing	8.
Exports of Space Products and Services – 2003-2007	9.
Domestic and Export Market Forecasts	10.a-10.b
Foreign Competitors (2003-2006)	11.
Space-Related Licensing Application and Decision History (2003-2006)	12.
Space-Related Products and Services - Licensing (2003-2006)	13.
Space Products and Services: Denied Export Licenses (2003-2006)	13.a-13.d
Space Products and Services: Export Licenses Approved but Sales Lost (2003-2006)	14.a-14.d
Space Products and Services: License Approved, Sale Made, Follow-On Lost (2003-2006)	15.a-15.d
Company View on Seeking Future Export Licenses	16.
Export Licensing Conditions	17.a-17.d
Competitiveness Factors and Industry Outlook	18.
Financials - Income Statement (Corporate or Business Unit)	19.a-19.b
Financials - Balance Sheet (Corporate or Business Unit)	20.a-20.b
Employment	21.a-21.b
Research and Development	22.a-22.b
Certification and Comments	23.-24.

GENERAL INSTRUCTIONS

ESTIMATES ARE ACCEPTABLE

It is not our desire to impose an unreasonable burden on any respondent. If information is not available from your records in the form requested, you may furnish estimates. Also, because your calendar year 2007 data will not be complete at the date of submission, please provide estimates.

CERTIFICATION

Please be certain to complete **Question 23** “Certification” on the penultimate page once your Company/Business Unit has completed the survey.

POINTS OF CONTACT

Question related to the survey should be directed to Teresa Telesco, Assistant Analyst, (202) 482-4959 (ttelesco@bis.doc.gov), Jason Bolton, Trade and Industry Analyst, (202) 482-5936 (jbolton@bis.doc.gov), Ryan Hajen, Trade and Industry Analyst, (202) 482-6294 (rhajen@bis.doc.gov) or Brad Botwin, Program Director, Defense Industrial Base Assessments, (202) 482-4060 (bbotwin@bis.doc.gov). Our facsimile number is (202) 482-5361.

MAILING ADDRESS

**Brad Botwin, Program Director
Office of Technology Evaluation, RM 1093
U.S. Department of Commerce
1401 Constitution Avenue, NW
Washington, DC 20230**

ELECTRONIC INSTRUCTIONS

Please refer to the letter from the Bureau of Industry and Security, Office of Technology Evaluation. The letter includes required identification, login, and password information. The Web electronic survey is the official version to submit.

Buttons and links on the electronic form:

1. DO NOT use your browser's Back and Forward buttons; they are disabled. Use only the buttons described below.
2. The **Next** button saves the contents of a page and takes you to the next page in question order.
3. The **Previous** button saves the contents of a page and takes you to the previous page in question order.
4. The **Save and Exit** button saves your responses and temporarily exits, allowing you to return at any time to change or add to your responses.
5. The **Submit** button on the final page completes the survey. You cannot make any further changes or return to the survey once you submit.
6. You may **go directly to any section of the survey** by using the drop-down section menu at the bottom of each page and pressing the **Go** button. You may also **go to the table of contents page** by clicking on the link at the top of each page. However, using the buttons at the bottom of the page for **Next** or **Previous** is the normal way of proceeding through the survey sequentially.
7. **A blank survey in PDF** using Adobe Acrobat may be printed from any page for your reference by clicking on the link at the bottom of each page. Please DO NOT fill out and submit this printed version. NOTE: you may find it convenient to use your browser's print function to print individual pages as necessary. **This applies, in particular, to Question 2.**
8. You may also **view/print/save a preliminary filled-in Adobe Acrobat (PDF)** version of the survey from the bottom of any page. You may also view/print/save a PDF version of the survey after you click **Submit** on the last page. This is an unofficial copy for your reference. If you have a pop-up blocker enabled in your browser, and want to print/save a PDF copy of your questionnaire responses, you may need to temporarily disable pop-up blocking in order to allow opening of the Adobe Acrobat window.

Entering values:

1. When **entering dollar values or other numeric values**, you may enter a value with or without commas. If you do not, commas will be entered for you. Do not enter a dollar sign for currency amounts. You may enter a minus sign in front of amounts, if appropriate.
2. Enter **dates** numerically as mm/dd/yyyy.
3. **Total amounts** will be calculated for you. Do not enter anything in total row and/or column cells in the data tables.

WHO MUST RESPOND/EXEMPTION

Did your Company/Business Unit manufacture products or provide services for the space industry, or integrate products and/or services for the space industry, at any time since January 1, 2003?

If "Yes," please select "Yes" and continue filling out the survey by pressing the Next button below.

If "No," please select "No" and complete the "Exemption From Survey" box on the next page by pressing the Next button below.

Please Check Here: Yes No

EXEMPTION FROM SURVEY

If your Company's/Business Unit's operations do not fall within any of the space products and/or services, as defined in **Question 1.b** "Product and Service Type Listing" you may be exempt from completing this survey. Please notify one of the contacts listed in "Points of Contact" to verify your status. Once you have received **verbal verification** of your exemption, please fill out the following:

Briefly explain the products and/or services provided by your Company/Business Unit.

*In addition, complete **Question 1.a** "Company Information" and **Question 23** "Certification."*

1.a COMPANY INFORMATION

Please provide the name, address, and phone number of your Company/Business Unit.

	Enter information here:
Company Name	
Division/Business Unit Name	
Street Address	
Suite Number	
City	
State	
Zip Code	
Phone Number <u>and</u> Extension	
Fax Number	
Company/Business Unit Web Address	

1.b BUSINESS DESCRIPTION

Please select "Yes" for the categories that describe your space-related products and/or services operations and business. Also, provide a short description of your business in the box provided below.
The following categories best describe my Primary Company Focus:

	Check <input checked="" type="checkbox"/> here if Yes:
Integration	
Manufacturing	
Operation	
Validation/Testing	
R&D	
Professional Services	
Other	

1.c OWNERSHIP

Please indicate the entities and/or individuals holding 5 percent or more of your Company's voting rights.

If not applicable, check here and go to Question 2.

Parent Entity or Individual Name			
Percentage Owned			%
Address			
City			
State			
Zip Code			
Country			

Parent Entity or Individual Name			
Percentage Owned			%
Address			
City			
State			
Zip Code			
Country			

Parent Entity or Individual Name			
Percentage Owned			%
Address			
City			
State			
Zip Code			
Country			

DEFINITIONS USED IN SURVEY

AUTHORIZING OFFICIAL – An executive officer of the Company/Business Unit or other individual who has the authority to execute this survey on behalf of the Company/Business Unit.

COMMODITY CLASSIFICATION (CCAT) – A commodity classification (CCAT) request is used to determine the regulatory treatment of a particular product or service under the Export Administration Regulations.

COMMERCIAL SALES – All sales to industry that are not directly related to defense programs.

COMMODITY JURISDICTION (CJ) – A commodity jurisdiction (CJ) request is used to determine whether an item or service is subject to the export licensing authority of the Department of Commerce or the Department of State. A CJ determination, performed by the Department of State, will only identify the proper licensing authority for an item, and is not a license or approval to export.

CURRENT ASSETS – Refers to cash, accounts receivable, inventory, marketable securities, pre-paid expenses and other assets convertible to cash within one year. Such assets shall refer to current assets held by the Company/Business Unit as a whole, or to a specific business unit, as determined by each particular question referring to Current Assets.

CURRENT LIABILITIES – Refers to accounts payable, notes payable, current maturities and accrued liabilities. Such liabilities shall refer to current liabilities held by the Company/Business Unit as a whole, or to a specific business unit, as determined by each particular question referring to Current Liabilities.

DEFENSE SALES – Sales to domestic and foreign military purchasers.

EXPORT ADMINISTRATION REGULATIONS (EAR) – The EAR controls the export, re-export and activities of dual-use items. The EAR are administered by the U.S. Department of Commerce.

FIRM or COMPANY – An entity that owns, controls or otherwise is affiliated with one or more U.S. entities that, directly or indirectly, manufactures, produces, provides services for and/or integrates products and/or services pertaining to space products and services. Such entity may be an individual proprietorship, partnership, joint venture, business trust, laboratory, cooperative, entity subject to a U.S. Bankruptcy Court or other corporation (including any subsidiary entity in which the U.S. entity owns more than 50 percent of the outstanding economic or voting interest).

FOREIGN-MADE – Any space-related products and/or services for which 50 percent or more of the value-added of such item (excluding distribution, advertising and other marketing costs) was produced or otherwise generated outside the United States.

INTERNATIONAL TRAFFIC IN ARMS REGULATIONS (ITAR) – The ITAR control the export and import of defense articles and defense-related services. The U.S. Department of State administers the ITAR.

OPERATING INCOME – Gross profits less operating expenses (sales and marketing costs, R&D, and general and administrative costs, including salaries).

DEFINITIONS USED IN SURVEY *continued*

OPERATING PROFIT/LOSS – Operating income less interest expenses, all other expenses and losses on disposals.

SALES – Refers to the Company's/Business Unit's sales of space-related products and/or services before interest and taxes.

SPACE PRODUCTS/SERVICES – Refers to satellites, spacecraft subsystems, electronic components, space materials, and ground communication equipment. The "Products and Service Type Listing" includes these products, as specified and enumerated in Question 2 of this survey.

SPACE QUALIFIED PRODUCTS – Products designed, manufactured, and tested to meet special electrical, mechanical, and environmental requirements to make possible their use in the launch and deployments of satellite or high-altitude flight systems.

TOTAL ASSETS – Refers to all tangible and intangible assets, including fixed assets and Current Assets. Such assets shall refer to total assets held by the Company/Business Unit as a whole, or to a specific business unit, as determined by each particular question referring to Total Assets.

TOTAL LONG-TERM LIABILITIES – Refers to all debt with maturity dates greater than one year from issuance, and including mortgages, lease payments, pensions, revolving notes, and general debt. Such liabilities shall refer to long-term liabilities held by the Company/Business Unit as a whole, or to a specific business unit, as determined by each particular question referring to Long-Term Liabilities.

UNITED STATES – "United States" or "U.S." includes the 50 states, Puerto Rico, the District of Columbia, the island of Guam, the Trust Territories, and the Virgin Islands.

UNREGULATED EXPORTS – Exports that do not require an export license or are exempt from licensing requirements.

U.S. GOVERNMENT SALES – All sales to the U.S. Department of Defense, U.S. Intelligence Community, or civilian agencies of U.S. Government, such as the National Aeronautics and Space Administration (NASA) and U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA).

U.S. CONTENT – Percent of products and/or services produced, conducted, created or otherwise generated within the United States, as defined herein.

2. PRODUCT AND SERVICE TYPE LISTING (A-J)				
<i>(Check all that apply)</i>				
<input checked="" type="checkbox"/>	Primary Company Focus	A	Services	<input checked="" type="checkbox"/>
	Integration	A1	Commercial Satellite Operation	
	Manufacturing	A1A	Broadcast	
	Operation	A1B	Communication / Data	
	Validation / Testing	A1C	Remote Sensing	
	R&D	A2	Professional Services	
	Professional Services	A2A	Spacecraft	
	Other	A2A1	Product Assurance, Quality Control, Safety	
		A2A2	Assembly, Integration and Testing	
		A2A3	Systems Engineering	
		A2A4	Program Management	
		A2A5	Performance, Analysis and Simulation	
		A2A6	Architecture Design	
		A2B	Launch	
		A2B1	Operations	
		A2B2	Product Assurance, Quality Control, Safety	
		A2B3	Assembly, Integration and Testing	
		A2C	Ground	
		A2C1	Operations	
		A2C2	Maintenance	
		A3	Other (please specify here)	
		B	End User Equipment	
		B1	Communication/Data	
		B2	Navigation	
		B3	Other (please specify here)	

2. PRODUCT AND SERVICE TYPE LISTING – continued				
<i>(Check all that apply)</i>				
C	Spacecraft			Spacecraft continued
C1	Communications		C6	Attitude Determination and Control
C1A	Antenna Technology		C6A	Sensors
C1B	Microwave Technology		C6B	Stabilization Hardware
C1C	Digital Technology		C6C	Momentum Wheel
C1D	Switching equipment		C6D	Rendezvous and Docking
C1E	Transponder		C6E	Guidance and Navigation
C1F	Laser Technology		C6F	Software
C1G	Software		C7	Propulsion (spacecraft)
C2	Energy Generation		C7A	Chemical Propulsion Technology
C2A	Solar Cell Technology		C7B	Electric Propulsion Technology
C2B	Solar Array Technology		C7C	Cold Gas Propulsion Systems
C2C	Power Generators (excluding solar)		C8	Payload
C3	Energy Storage		C8A	Optical Components
C3A	Batteries		C8B	Infrared Detectors
C3B	Other Energy Storage Equipment		C8C	Visible Detectors
C3C	Power Conditioning		C8D	Nuclear Detectors
C4	Thermal Control		C8E	Hyper-Spectral Detectors
C4A	Blankets		C8F	Radar Components
C4B	Coatings		C8G	Software
C4C	Cryogenics		C8H	Atomic Clocks
C4D	Heaters		C9	Space Electronics
C4E	Radiators		C9A	Data Handling & Storage
C4F	Heat Pipes		C9B	Integrated Circuits / Semiconductors
C5	Structural		C9C	Fiber Optics
C5A	Hydraulics, Valves, Actuators, Pneumatics		C9D	Traveling Wave Tubes
C5B	Mechanisms (gimbals, antennas, arrays, masts, etc.)		C9E	Radiation-Hardened/Tolerant Electronics
C5C	Safety, Destruction Technology; Pyrotechnics		C9F	Timing Devices
C5D	Metalworking		C9G	Memory
			C9H	Microprocessors
			C9I	Other Components
			C10	Micro-Satellites
			C11	Other (please specify here)

2. PRODUCT AND SERVICE TYPE LISTING – <i>continued</i>					
<i>(Check all that apply)</i>					
D	Propulsion Systems			Propulsion Systems <i>continued</i>	
D1	Liquid Fuel Booster		D7	Structural System	
D1A	Chamber		D7A	Inter-stage	
D1B	Propellant		D7B	Fairings	
D1C	Igniter		D7C	Skirt	
D1D	Nozzle		D8	Launch Related Materials	
D2	Solid Rocket Booster		D8A	Ablatives	
D2A	Casing		D8B	Advanced Composites	
D2B	Igniter		D8C	Fibers	
D2C	Propellant		D9	Rocket Engines and Motors	
D2D	Nozzle		D9A	Solid	
D2E	Thrust Control		D9B	Liquid	
D3	Electrical Power		D10	Telemetry	
D3A	Generator		D11	Software	
D3B	Battery		D12	Other (please specify here)	
D3C	Harness				
D4	Operating System				
D4A	Hydraulic				
D4B	Pneumatic				
D4C	Electro-Mechanical				
D5	Guidance Systems				
D5A	GPS				
D5A1	Receivers				
D5A2	Processor				
D5B	Inertial				
D5B1	Gyroscope				
D5B2	Processor				
D5B3	Controls				
D6	Safety System				
D6A	Destruct Receiver				
D6B	Ordnance				
D6C	Navigation devices				

2. PRODUCT AND SERVICE TYPE LISTING – <i>continued</i>					
<i>(Check all that apply)</i>					<input checked="" type="checkbox"/>
E	Ground Systems				
E1	Ground Antennas				
E2	Telemetry, Tracking and Control Equipment				
E3	Software				
E4	Mission Data Processing Equipment				
E5	Communications Equipment				
E6	Other (Please identify)				
F	Specialty Materials				
F1	Thermal Coatings				
F2	Optical Coatings				
F3	Protective Coatings				
F4	Structures				
F5	Substrates				
F6	Composites				
F7	Optics				
F8	Other (Please identify)				
G	Other				
G1	Other (Please identify)				
G2	Other (Please identify)				

3.a DOMESTIC CORPORATE RELATIONSHIPS

Instructions: Please (1) **Identify significant contractual relationships** that your Company/Business Unit has with **other U.S. business entities**; and (2) **Describe the nature of these contractual relationships** by checking the box of the categories provided, or by providing written explanations in the space below.

Name of Domestic Business Entity	City	State	Type(s) of Relationships <input checked="" type="checkbox"/> (Check all that apply)									
			Joint venture <input type="checkbox"/>	Percent Stake in Joint Venture %	Licensor	Licensee	Manufacturer	Service Provider	Service Integrator	Co-production Relationship	Product Integrator	Other: [Please describe in Comments box.]
1.												
2.												
3.												
4.												
5.												
6.												
7.												
8.												

Comments →

Instructions: Please describe any additional aspects of the domestic business relationship(s) that your Company/Business Unit has with one or more of the business entities identified above.

Comments →

3.b FOREIGN CORPORATE RELATIONSHIPS

Instructions: Please (1) Identify significant contractual relationships that your Company/Business Unit has with other foreign business entities; and (2) Describe the nature of these contractual relationships by checking the box of the categories provided, or by providing written explanations in the space below.

Name of Foreign Business Entity	City	Country	Type(s) of Relationships <input checked="" type="checkbox"/> (Check all that apply)										
			Joint venture <input checked="" type="checkbox"/>	Percent Stake in Joint Venture %	Licensor	Licensee	Manufacturer	Service Provider	Service Integrator	Co-production Relationship	Product Integrator	Other: [Please describe in Comments box.]	
1.													
2.													
3.													
4.													
5.													
6.													
7.													
8.													

Comments →

Instructions: Please describe any additional aspects of the foreign business relationship(s) that your Company/Business Unit has with one or more of the business entities identified above.

Comments →

4. MERGERS & ACQUISITIONS

Instructions: For calendar years 2003 through 2006, was your Company/Business Unit involved in any space-related merger or acquisition activity? [Check Appropriate Box]

Note: If you answered **“Yes,”** please complete the description table below for each (up to ten) merger and acquisition that your Company/Business Unit engaged in for the **2003-2006** period.

#	Year of Transaction	Main Entity/Entities Involved in Transaction	Dollar Value of the Transaction (in \$ thousands)	Purchase of a Company	Percent of Ownership	Merger of Equals	Percent of Ownership	Acquired by a Company	Percent of Ownership
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									

5. SPACE-RELATED DEFENSE & NON-DEFENSE SALES

Instructions: Please provide sales data for calendar years 2003-2007 for your defense and non-defense space-related products and/or services.

Note: Total **Defense** and **Non-Defense** must equal **Total** in the right column. The combination of **Domestic Sales** and **Foreign Sales** must equal **Total Sales** in the bottom row.

	2003 <i>(in \$ thousands)</i>			2004 <i>(in \$ thousands)</i>			2005 <i>(in \$ thousands)</i>			2006 <i>(in \$ thousands)</i>			2007 (estimate) <i>(in \$ thousands)</i>		
	Defense	Non-Defense	Total	Defense	Non-Defense	Total									
Domestic Sales \$															
Foreign Sales \$															
Total Sales \$															

6.a TOP 10 PRODUCTS – PRODUCTION & SALES – 2003

Instructions: Please provide the information requested below on each of your Company’s/Business Unit’s top 10 (as measured by sales) space-related products and/or services for **2003 only**, including “Product or Service Code Number,” “Defense” or “Non-Defense Sale,” “Total Sales Value,” “U.S. Sales Value” and “Foreign Sales Value.” In addition, please identify the “Production Levels,” “Maximum Production Capacity” and “U.S. Content” for each product or service. Complete the product information in descending order. Begin with your best (#1) selling **space-related** product or service and end with your tenth (#10) best selling **space-related** product or service.

2003 Top Ten Products	Product or Service Code [from Question 2]	<input checked="" type="checkbox"/> [Check Appropriate Box]		Total Sales (in \$ thousands)	U.S. Sales Value (in \$ thousands)	Foreign Sales Value (in \$ thousands)	Production Levels (Units/Year)	Maximum Production Capacity (Units/Year)	U.S. Content (%)
		Defense Sales	Non-Defense Sales						
#1									
#2									
#3									
#4									
#5									
#6									
#7									
#8									
#9									
#10									

6.b TOP 10 PRODUCTS – PRODUCTION & SALES – 2004

Instructions: Please provide the information requested below on each of your Company’s/Business Unit’s top 10 (as measured by sales) space-related products and/or services for **2004 only**, including “Product or Service Code Number,” “Defense” or “Non-Defense Sale,” “Total Sales Value,” “U.S. Sales Value” and “Foreign Sales Value.” In addition, please identify the “Production Levels,” “Maximum Production Capacity” and “U.S. Content” for each product or service. Complete the product information in descending order. Begin with your best (#1) selling **space-related** product or service and end with your tenth (#10) best selling **space-related** product or service.

2004 Top Ten Products	Product or Service Code [from Question 2]	<input checked="" type="checkbox"/> [Check Appropriate Box]		Total Sales (in \$ thousands)	U.S. Sales Value (in \$ thousands)	Foreign Sales Value (in \$ thousands)	Production Levels (Units/Year)	Maximum Production Capacity (Units/Year)	U.S. Content (%)
		Defense Sales	Non-Defense Sales						
#1									
#2									
#3									
#4									
#5									
#6									
#7									
#8									
#9									
#10									

6.c TOP 10 PRODUCTS – PRODUCTION & SALES – 2005

Instructions: Please provide the information requested below on each of your Company’s/Business Unit’s top 10 (as measured by sales) space-related products and/or services for **2005 only**, including “Product or Service Code Number,” “Defense” or “Non-Defense Sale,” “Total Sales Value,” “U.S. Sales Value” and “Foreign Sales Value.” In addition, please identify the “Production Levels,” “Maximum Production Capacity” and “U.S. Content” for each product or service. Complete the product information in descending order. Begin with your best (#1) selling **space-related** product or service and end with your tenth (#10) best selling **space-related** product or service.

2005 Top Ten Products	Product or Service Code [from Question 2]	<input checked="" type="checkbox"/> [Check Appropriate Box]		Total Sales (in \$ thousands)	U.S. Sales Value (in \$ thousands)	Foreign Sales Value (in \$ thousands)	Production Levels (Units/Year)	Maximum Production Capacity (Units/Year)	U.S. Content (%)
		Defense Sales	Non-Defense Sales						
#1									
#2									
#3									
#4									
#5									
#6									
#7									
#8									
#9									
#10									

6.d TOP 10 PRODUCTS – PRODUCTION & SALES – 2006

Instructions: Please provide the information requested below on each of your Company’s/Business Unit’s top 10 (as measured by sales) space-related products and/or services for **2006 only**, including “Product or Service Code Number,” “Defense” or “Non-Defense Sale,” “Total Sales Value,” “U.S. Sales Value” and “Foreign Sales Value.” In addition, please identify the “Production Levels,” “Maximum Production Capacity” and “U.S. Content” for each product or service. Complete the product information in descending order. Begin with your best (#1) selling **space-related** product or service and end with your tenth (#10) best selling **space-related** product or service.

2006 Top Ten Products	Product or Service Code [from Question 2]	<input checked="" type="checkbox"/> [Check Appropriate Box]		Total Sales (in \$ thousands)	U.S. Sales Value (in \$ thousands)	Foreign Sales Value (in \$ thousands)	Production Levels (Units/Year)	Maximum Production Capacity (Units/Year)	U.S. Content (%)
		Defense Sales	Non-Defense Sales						
#1									
#2									
#3									
#4									
#5									
#6									
#7									
#8									
#9									
#10									

6.e TOP 10 PRODUCTS – PRODUCTION & SALES – 2007 *projected*

Instructions: Please provide the information requested below on each of your Company’s/Business Unit’s top 10 (as measured by sales) space-related products and/or services for **2007 only**, including “Product or Service Code Number,” “Defense” or “Non-Defense Sale,” “Total Sales Value,” “U.S. Sales Value” and “Foreign Sales Value.” In addition, please identify the “Production Levels,” “Maximum Production Capacity” and “U.S. Content” for each product or service. Complete the product information in descending order. Begin with your best (#1) selling **space-related** product or service and end with your tenth (#10) best selling **space-related** product or service.

2007 Top Ten Products	Product or Service Code [from Question 2]	<input checked="" type="checkbox"/> [Check Appropriate Box]		Total Sales (in \$ thousands)	U.S. Sales Value (in \$ thousands)	Foreign Sales Value (in \$ thousands)	Production Levels (Units/Year)	Maximum Production Capacity (Units/Year)	U.S. Content (%)
		Defense Sales	Non-Defense Sales						
#1									
#2									
#3									
#4									
#5									
#6									
#7									
#8									
#9									
#10									

7.a PROCUREMENTS – TOP FIVE U.S. PRODUCTS/SERVICES

Instructions: For calendar year 2006, please list the five most significant products and/or services (i.e., by value added to your space-related business) that your company procures from domestic suppliers. If your product and/or service is not in **Question 2**, provide a description in the space provided. *[Please include captive/internal producers.]*

						<input checked="" type="checkbox"/> [Check Appropriate Box]				
#	Product/Service Code (from Question 2)	Domestic Source Company Name	City	State	Is this supplier a sole source?		Are alternate U.S. sources available?		Is there a foreign source available?	
					Yes	No	Yes	No	Yes	No
1.										
2.										
3.										
4.										
5.										

Description:

7.b PROCUREMENTS – TOP FIVE FOREIGN PRODUCTS/SERVICES

Instructions: For calendar year 2006, please list the five most significant products and/or services (i.e., by value added to your space-related business) that your company procures from foreign suppliers. If your product and/or service is not in **Question 2**, provide a description in the space provided. *[Please include captive/internal producers.]*

						<input checked="" type="checkbox"/> [Check Appropriate Box]				
#	Product/Service Code (from Question 2)	Foreign Source Company Name	City	Country	Is this supplier a sole source?		Are alternate foreign sources available?		Is there a U.S. source available?	
					Yes	No	Yes	No	Yes	No
1.										
2.										
3.										
4.										
5.										

Description:

8. REASONS FOR FOREIGN SOURCING

Instructions: For the five products and/or services cited in Question 7.b on “Foreign Procurement”, please identify ALL the reasons your Company/Business Unit procured these products and/or services from Foreign vendors. If your reason is not included here, provide rationale in the space provided.

Reasons for Procuring Products and/or Services from Foreign Vendors

(Check all that apply)

#	Product/Service Code (from Question 3)	Better Quality	Not Made in the U.S.	Less Expensive	Better Technology	Business Relationship	Trade Offset Arrangement	Service after Sale	Foreign Subsidies	Customer Preference	Other (specify in comments below)
1.											
2.											
3.											
4.											
5.											

Comments:

9. EXPORTS OF SPACE PRODUCTS AND SERVICES – 2003-2007

Did your Company/Business Unit export space-related products and/or services in calendar years 2003-2007? [Check Box] → **No** **Yes**

Top Exports of Space Products & Services By Country – 2003-2007

Instructions: Based upon export sales, please list in descending order the top five countries to which your Company/Business Unit exported space-related products for years **2003-2007**. Exports include sales to foreign distributors, resellers, retailers, brokers, or consumers of related products and/or services, regardless of whether your Company's/Business Unit's products and/or services are subsequently resold to U.S. customers.

Export Sales
[in \$ thousands]

Note: The combination of sales for exported products reported for the **ITAR, EAR** and **Other** categories must equal **Total** annual exports for that country.

Country		ITAR (in \$ thousands)	EAR (in \$ thousands)	Other* (in \$ thousands)	Total (in \$ thousands)
2003	1.				
	2.				
	3.				
	4.				
	5.				
2004	1.				
	2.				
	3.				
	4.				
	5.				
2005	1.				
	2.				
	3.				
	4.				
	5.				
2006	1.				
	2.				
	3.				
	4.				
	5.				
2007 <i>(projected)</i>	1.				
	2.				
	3.				
	4.				
	5.				

*Other represents non-ITAR, non-EAR licensing procedures implemented by the U.S. Federal Government.

10.a DOMESTIC MARKET FORECAST				
Instructions: Describe expectations for your Company's/Business Unit's domestic space-related business for the calendar year 2008-2012 period. <i>[Check appropriate expectation.]</i>	<input checked="" type="checkbox"/> <i>[Check Appropriate Box]</i>			
	Declines	No Changes/ Flat	Moderate Growth	Significant Growth
1. What types of systems, subsystems, components, technologies and services are most likely to be in greatest demand by your domestic customers in the 2008-2012 period? <i>[Please describe in the space provided below.]</i>				
Response:				
2. Will your Company/Business Unit be well positioned to compete in the domestic market in the 2008-2012 period? <i>[Please describe in the space provided below.]</i> If "Not at All," indicate below the primary reasons. <i>[Check appropriate answer.]</i>				
	<input checked="" type="checkbox"/> <i>[Check Appropriate Box]</i>			
	Strongly	Moderately	Poorly	Not at All
Response:				

10.b EXPORT MARKET FORECAST				
Instructions: Describe expectations for your Company's/Business Unit's export of space-related products and/or services for the calendar year 2008-2012 period. <i>[Check appropriate expectation.]</i>	<input checked="" type="checkbox"/> <i>[Check Appropriate Box]</i>			
	Declines	No Changes/ Flat	Moderate Growth	Significant Growth
1. What types of systems, subsystems, components, technologies and services are most likely to be in greatest demand by your foreign customers in the 2008-2012 period? <i>[Please describe in the space provided below.]</i>				
Response:				
2. Will your Company/Business Unit be well positioned to compete in foreign markets in the 2008-2012 period? <i>[Check appropriate box.]</i> If "Not at All," indicate below the primary reasons.				
	<input checked="" type="checkbox"/> <i>[Check Appropriate Box]</i>			
	Strongly	Moderately	Poorly	Not at All
Response:				
3. For the forecasted 2008-2012 period, please identify the three foreign markets (countries) you anticipate to be the most viable customers for your Company's/Business Unit's space-related products and/or services. <i>[Please do not use abbreviations.]</i>				
	1.			
	2.			
	3.			

11. FOREIGN COMPETITORS – 2003-2006

Instructions: Please list the Top Ten Foreign Products and/or Services (by sales, largest to smallest) that competed directly with your Company's/Business Unit's space-related products and/or services from calendar year 2003-2006. Also, specify what factors make foreign producers' products competitive relative to your Company's/Business Unit's products.

[For "Code" and "Name" Please use the Product and Service Type Listing in Question 2.]

Top Ten Foreign Products and/or Services	Product or Service Code	Foreign Product Name	Foreign Company Name	Country	<input checked="" type="checkbox"/> (check all that apply)											
					Cost	Product Performance	Product Quality	Access to Raw Materials	Bonus Features/ Services	Delivery Time/ Scheduling	Foreign Exchange	Export Licensing Requirements	Trade/Offset Arrangements/Subsidies	Ability to Pay Bribes/Kickbacks	Other (specify in comments below)	
#1																
#2																
#3																
#4																
#5																
#6																
#7																
#8																
#9																
#10																

Comments:

12. SPACE-RELATED LICENSING APPLICATION & DECISION HISTORY – 2003-2006

	<i>Total Number of License Applications Filed</i>		<i>Total Number of Licenses Approved</i>		<i>Total Number of Licenses Denied**</i>		<i>Total Sales* Attributable to Approved Licenses:</i>		<i>Total Lost Sales Attributable to License Process:</i>	
	Regulatory Regime		Regulatory Regime		Regulatory Regime		Regulatory Regime		Regulatory Regime	
<i>Year</i>	<i>ITAR #</i>	<i>EAR #</i>	<i>ITAR #</i>	<i>EAR #</i>	<i>ITAR #</i>	<i>EAR #</i>	<i>ITAR (in \$ thousands)</i>	<i>EAR (in \$ thousands)</i>	<i>ITAR (in \$ thousands)</i>	<i>EAR (in \$ thousands)</i>
2003										
2004										
2005										
2006										

* Sales = Sales of products and/or services realized from licenses.

** Does not include *Returned Without Action (RWAs)*

13. SPACE PRODUCTS AND SERVICES – Licensing – 2003-2006

Questions 13.a-16 pertain to your Company's/Business Unit's space-related business and overall experience with export licensing processes for calendar years **2003-2006**. The questions are divided into the following **four** sections:

Space Products and Services: Denied Export Licenses	13.a-13.d
Space Products and Services: Export Licenses Approved but Sales Lost	14.a-14.d
Space Products and Services: License Approved, Sale Made, Follow-On Lost	15.a-15.d
Company Views on Seeking Future Export Licenses	16.

13.a SPACE PRODUCTS AND SERVICES: DENIED EXPORT LICENSES – 2003

Instructions: For space-related products and/or services denied an export license in calendar year 2003, please: 1) State the type of product and/or service your Company/Business Unit was attempting to export and indicate with a check in the box whether it applied to the ITAR or EAR licensing regimes; 2) Include the “License Number” for each product and/or service listed; 3) Provide other information requested regarding “Potential Customer,” “Destination Country,” “Intended End Use” and “Estimated Export Value”; 4) Indicate in the box whether a competitor offered a “Comparable Item”; 5) Identify the Company(ies)/Business Unit(s) that won the award, if known; and 6) Provide additional comments for up to 3 examples relating to the listed product and/or service examples from #1-10 in the “Comments” sections.

Product or Service Code	Regulatory Regime		License Number	Potential Customer	Destination Country	Intended End Use	Estimated Export Value <i>(in \$ thousands)</i>	Competitor Had Comparable Item		Winning Company(ies)/ Business Unit(s) <i>(If known)</i>
	ITAR	EAR						Yes	No	
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Proceed to the Next Page to List 2004 Export License Denials

13.b SPACE PRODUCTS AND SERVICES: DENIED EXPORT LICENSES – 2004

Instructions: For space-related products and/or services denied an export license in calendar year 2004, please: 1) State the type of product and/or service your Company/Business Unit was attempting to export and indicate with a check in the box whether it applied to the ITAR or EAR licensing regimes; 2) Include the “License Number” for each product and/or service listed; 3) Provide other information requested regarding “Potential Customer,” “Destination Country,” “Intended End Use” and “Estimated Export Value”; 4) Indicate in the box whether a competitor offered a “Comparable Item”; 5) Identify the Company(ies)/Business Unit(s) that won the award, if known; and 6) Provide additional comments for up to 3 examples relating to the listed product and/or service examples from #1-10 in the “Comments” sections.

Product or Service Code	Regulatory Regime		License Number	Potential Customer	Destination Country	Intended End Use	Estimated Export Value <i>(in \$ thousands)</i>	Competitor Had Comparable Item		Winning Company(ies)/ Business Unit(s) <i>(If known)</i>
	ITAR	EAR						Yes	No	
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Proceed to the Next Page to List 2005 Export License Denials

13.c SPACE PRODUCTS AND SERVICES: DENIED EXPORT LICENSES – 2005

Instructions: For space-related products and/or services denied an export license in calendar year 2005, please: 1) State the type of product and/or service your Company/Business Unit was attempting to export and indicate with a check in the box whether it applied to the ITAR or EAR licensing regimes; 2) Include the “License Number” for each product and/or service listed; 3) Provide other information requested regarding “Potential Customer,” “Destination Country,” “Intended End Use” and “Estimated Export Value”; 4) Indicate in the box whether a competitor offered a “Comparable Item”; 5) Identify the Company(ies)/Business Unit(s) that won the award, if known; and 6) Provide additional comments for up to 3 examples relating to the listed product and/or service examples from #1-10 in the “Comments” sections.

Product or Service Code	Regulatory Regime		License Number	Potential Customer	Destination Country	Intended End Use	Estimated Export Value <i>(in \$ thousands)</i>	Competitor Had Comparable Item		Winning Company(ies)/ Business Unit(s) <i>(If known)</i>
	ITAR	EAR						Yes	No	
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Proceed to the Next Page to List 2006 Export License Denials

13.d SPACE PRODUCTS AND SERVICES: DENIED EXPORT LICENSES – 2006

Instructions: For space-related products and/or services denied an export license in calendar year 2006, please: 1) State the type of product and/or service your Company/Business Unit was attempting to export and indicate with a check in the box whether it applied to the ITAR or EAR licensing regimes; 2) Include the “License Number” for each product and/or service listed; 3) Provide other information requested regarding “Potential Customer,” “Destination Country,” “Intended End Use” and “Estimated Export Value”; 4) Indicate in the box whether a competitor offered a “Comparable Item”; 5) Identify the Company(ies)/Business Unit(s) that won the award, if known; and 6) Provide additional comments for up to 3 examples relating to the listed product and/or service examples from #1-10 in the “Comments” sections.

Product or Service Code	Regulatory Regime		License Number	Potential Customer	Destination Country	Intended End Use	Estimated Export Value <i>(in \$ thousands)</i>	Competitor Had Comparable Item		Winning Company(ies)/ Business Unit(s) <i>(If known)</i>
	ITAR	EAR						Yes	No	
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Finished with this Section

14.a SPACE PRODUCTS AND SERVICES: EXPORT LICENSES APPROVED BUT SALES LOST – 2003

Instructions: This table pertains to instances where, in calendar year 2003, export licenses were granted, but a sale was lost because of the lengthy approval process and/or export licensing conditions. Please: 1) State the type of product and/or service your Company/Business Unit was authorized to export and indicate with a check in the box whether it applied to the ITAR or EAR licensing regimes; 2) Include the "License Number" for each product and/or service listed; 3) Provide other information requested regarding "Potential Customer," "Destination Country," "Intended End Use" and "Estimated Export Value"; 4) Indicate with a check in the box whether a competitor offered a "Comparable Item"; 5) Identify the Company(ies)/Business Unit(s) that won the award, if known; and 6) Provide additional comments for up to 3 examples from the listed products and/or services in #1-10 in the "Comments" section below.

Product or Service Code	Regulatory Regime		License Number	Potential Customer	Destination Country	Intended End Use	Estimated Export Value <i>(in \$ thousands)</i>	Competitor Had Comparable Item		Winning Company(ies)/ Business Unit(s) <i>(If known)</i>
	ITAR	EAR						Yes	No	
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Proceed to the Next Page to list examples of licenses approved in 2004, but a sale was lost.

14.b SPACE PRODUCTS AND SERVICES: EXPORT LICENSES APPROVED BUT SALES LOST – 2004

Instructions: This table pertains to instances where, in calendar year 2004, export licenses were granted, but a sale was lost because of the lengthy approval process and/or export licensing conditions. Please: 1) State the type of product and/or service your Company/Business Unit was authorized to export and indicate with a check in the box whether it applied to the ITAR or EAR licensing regimes; 2) Include the "License Number" for each product and/or service listed; 3) Provide other information requested regarding "Potential Customer," "Destination Country," "Intended End Use" and "Estimated Export Value"; 4) Indicate with a check in the box whether a competitor offered a "Comparable Item"; 5) Identify the Company(ies)/Business Unit(s) that won the award, if known; and 6) Provide additional comments for up to 3 examples from the listed products and/or services in #1-10 in the "Comments" section below.

Product or Service Code	Regulatory Regime		License Number	Potential Customer	Destination Country	Intended End Use	Estimated Export Value <i>(in \$ thousands)</i>	Competitor Had Comparable Item		Winning Company(ies)/ Business Unit(s) <i>(If known)</i>
	ITAR	EAR						Yes	No	
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Proceed to the Next Page to list examples of licenses approved in 2005, but a sale was lost.

14.c SPACE PRODUCTS AND SERVICES: EXPORT LICENSES APPROVED BUT SALES LOST – 2005

Instructions: This table pertains to instances where, in calendar year 2005, export licenses were granted, but a sale was lost because of the lengthy approval process and/or export licensing conditions. Please: 1) State the type of product and/or service your Company/Business Unit was authorized to export and indicate with a check in the box whether it applied to the ITAR or EAR licensing regimes; 2) Include the “License Number” for each product and/or service listed; 3) Provide other information requested regarding “Potential Customer,” “Destination Country,” “Intended End Use” and “Estimated Export Value”; 4) Indicate with a check in the box whether a competitor offered a “Comparable Item”; 5) Identify the Company(ies)/Business Unit(s) that won the award, if known; and 6) Provide additional comments for up to 3 examples from the listed products and/or services in #1-10 in the “Comments” section below.

Product or Service Code	Regulatory Regime		License Number	Potential Customer	Destination Country	Intended End Use	Estimated Export Value <i>(in \$ thousands)</i>	Competitor Had Comparable Item		Winning Company(ies)/ Business Unit(s) <i>(If known)</i>
	ITAR	EAR						Yes	No	
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Proceed to the Next Page to list examples of licenses approved in 2006, but a sale was lost.

14.d SPACE PRODUCTS AND SERVICES: EXPORT LICENSES APPROVED BUT SALES LOST – 2006

Instructions: This table pertains to instances where, in calendar year 2006, export licenses were granted, but a sale was lost because of the lengthy approval process and/or export licensing conditions. Please: 1) State the type of product and/or service your Company/Business Unit was authorized to export and indicate with a check in the box whether it applied to the ITAR or EAR licensing regimes; 2) Include the “License Number” for each product and/or service listed; 3) Provide other information requested regarding “Potential Customer,” “Destination Country,” “Intended End Use” and “Estimated Export Value”; 4) Indicate with a check in the box whether a competitor offered a “Comparable Item”; 5) Identify the Company(ies)/Business Unit(s) that won the award, if known; and 6) Provide additional comments for up to 3 examples from the listed products and/or services in #1-10 in the “Comments” section below.

Product or Service Code	Regulatory Regime		License Number	Potential Customer	Destination Country	Intended End Use	Estimated Export Value <i>(in \$ thousands)</i>	Competitor Had Comparable Item		Winning Company(ies)/ Business Unit(s) <i>(If known)</i>
	ITAR	EAR						Yes	No	
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Finished with this Section

15.a SPACE PRODUCTS AND SERVICES: LICENSE APPROVED, SALE MADE, FOLLOW-ON LOST – 2003

Instructions: For calendar year 2003, did your Company/Business Unit lose follow-on business with foreign customers as a consequence of export control-related issues, even though an export license was approved and a sale was made? If “Yes,” please: 1) State the type of product and/or service your Company/Business Unit was licensed to export and indicate with a check in the box whether it applied to the ITAR or EAR licensing regimes; 2) Include the “License Number” for each product and/or service listed; 3) Provide other information requested regarding “Potential Customer,” “Destination Country,” “Intended End Use” and “Estimated Lost Follow-On Export Value”; 4) Identify the Company(ies)/Business Unit(s) that won the follow-on business, if known; and 5) Provide additional comments for up to three example(s) (from listed products and/or services #1-10) in the “Comments” sections below.

Product or Service Code	Regulatory Regime		License Number	Potential Customer	Destination Country	Intended End Use	Estimated Lost Follow-On Export Value <i>(in \$ thousands)</i>	Winning Company(ies)/ Business Unit(s) of Follow-On Business <i>(If known)</i>
	ITAR	EAR						
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Proceed to the Next Page to List 2004 Lost Follow-On Space- Related Business.

15.b SPACE PRODUCTS AND SERVICES: LICENSE APPROVED, SALE MADE, FOLLOW-ON LOST – 2004

Instructions: For calendar year 2004, did your Company/Business Unit lose follow-on business with foreign customers as a consequence of export control-related issues, even though an export license was approved and a sale was made? If “Yes,” please: 1) State the type of product and/or service your Company/Business Unit was licensed to export and indicate with a check in the box whether it applied to the ITAR or EAR licensing regimes; 2) Include the “License Number” for each product and/or service listed; 3) Provide other information requested regarding “Potential Customer,” “Destination Country,” “Intended End Use” and “Estimated Lost Follow-On Export Value”; 4) Identify the Company(ies)/Business Unit(s) that won the follow-on business, if known; and 5) Provide additional comments for up to three example(s) (from listed products and/or services #1-10) in the “Comments” sections below.

Product or Service Code	Regulatory Regime		License Number	Potential Customer	Destination Country	Intended End Use	Estimated Lost Follow-On Export Value <i>(in \$ thousands)</i>	Winning Company(ies)/ Business Unit(s) of Follow-On Business <i>(If known)</i>
	ITAR	EAR						
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Proceed to the Next Page to List 2005 Lost Follow-On Space-Related Business.

15.c SPACE PRODUCTS AND SERVICES: LICENSE APPROVED, SALE MADE, FOLLOW-ON LOST – 2005

Instructions: For calendar year 2005, did your Company/Business Unit lose follow-on business with foreign customers as a consequence of export control-related issues, even though an export license was approved and a sale was made? If “Yes,” please: 1) State the type of product and/or service your Company/Business Unit was licensed to export and indicate with a check in the box whether it applied to the ITAR or EAR licensing regimes; 2) Include the “License Number” for each product and/or service listed; 3) Provide other information requested regarding “Potential Customer,” “Destination Country,” “Intended End Use” and “Estimated Lost Follow-On Export Value”; 4) Identify the Company(ies)/Business Unit(s) that won the follow-on business, if known; and 5) Provide additional comments for up to three example(s) (from listed products and/or services #1-10) in the “Comments” sections below.

Product or Service Code	Regulatory Regime		License Number	Potential Customer	Destination Country	Intended End Use	Estimated Lost Follow-On Export Value <i>(in \$ thousands)</i>	Winning Company(ies)/ Business Unit(s) of Follow-On Business <i>(If known)</i>
	ITAR	EAR						
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Proceed to the Next Page to List 2006 Lost Follow-On Space-Related Business.

15.d SPACE PRODUCTS AND SERVICES: LICENSE APPROVED, SALE MADE, FOLLOW-ON LOST – 2006

Instructions: For calendar year 2003, did your Company/Business Unit lose follow-on business with foreign customers as a consequence of export control-related issues, even though an export license was approved and a sale was made? If “Yes,” please: 1) State the type of product and/or service your Company/Business Unit was licensed to export and indicate with a check in the box whether it applied to the ITAR or EAR licensing regimes; 2) Include the “License Number” for each product and/or service listed; 3) Provide other information requested regarding “Potential Customer,” “Destination Country,” “Intended End Use” and “Estimated Lost Follow-On Export Value”; 4) Identify the Company(ies)/Business Unit(s) that won the follow-on business, if known; and 5) Provide additional comments for up to three example(s) (from listed products and/or services #1-10) in the “Comments” sections below.

Product or Service Code	Regulatory Regime		License Number	Potential Customer	Destination Country	Intended End Use	Estimated Lost Follow-On Export Value <i>(in \$ thousands)</i>	Winning Company(ies)/ Business Unit(s) of Follow-On Business <i>(If known)</i>
	ITAR	EAR						
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Comments – from License Examples
#1-10 here →

Comments:

Finished with this Section

16. COMPANY VIEWS ON SEEKING FUTURE EXPORT LICENSES		
<div style="text-align: right; font-size: small;"><i>check <input checked="" type="checkbox"/> here →</i></div> A. Has your Company/Business Unit decided not to apply for export licenses because of past experiences with denials, conditions or extended delays? Please explain in “Comments” below.	Yes	No
<i>Comments:</i>		
<div style="text-align: right; font-size: small;"><i>check <input checked="" type="checkbox"/> here →</i></div> B. Has your Company/Business Unit changed or considered changing its business model in response to export requirements? Please explain in “Comments” below.	Yes	No
<i>Comments:</i>		
<div style="text-align: right; font-size: small;"><i>check <input checked="" type="checkbox"/> here →</i></div> C. Has your Company/Business Unit considered limiting its business activities or product lines to domestic customers only? Please explain in “Comments” below.	Yes	No
<i>Comments:</i>		
<div style="text-align: right; font-size: small;"><i>check <input checked="" type="checkbox"/> here →</i></div> D. Has your Company/Business Unit been impacted by European company offerings of “ITAR-free” products and/or services? Please explain in “Comments” below.	Yes	No
<i>Comments:</i>		
<div style="text-align: right; font-size: small;"><i>check <input checked="" type="checkbox"/> here →</i></div> E. Does your Company/Business Unit believe that some or all of its products and/or services should not be subject to ITAR/EAR regulations? Please explain in “Comments” below.	Yes	No
<i>Comments:</i>		

17.a EXPORT LICENSING CONDITIONS								
Has your Company/Business Unit applied for a Technical Assistance Agreement (TAA) or Manufacturer License Agreements (MLA)? <i>check <input checked="" type="checkbox"/> here →</i>							Yes	No
If “Yes,” 1.) How many were submitted ? 2.) How many were approved ? 3.) How long did the process take, on average?	Calendar Year	Number Submitted		Number Approved		Average Processing Time (in days)		
		<i>TAA</i>	<i>MLA</i>	<i>TAA</i>	<i>MLA</i>	<i>TAA</i>	<i>MLA</i>	
	2003							
	2004							
	2005							
2006								
Have amendments , conditions , return shipments and/or other related factors involving the receipt of an export license for performance of a TAA or MLA negatively impacted your business? <i>check <input checked="" type="checkbox"/> here →</i>							Yes	No
If “Yes,” 1) provide the licensing numbers related to the TAA or MLA and 2) explain the negative impacts resulting from the TAA and/or MLA.	<i>Comments:</i>							
Do non-U.S. export control regimes give your competitors an advantage in the marketplace? <i>check <input checked="" type="checkbox"/> here →</i>							Yes	No
If “Yes,” identify the countries (up to three) and describe the competitive advantage realized by your competitor(s) through obtaining licenses in those particular countries.	Country	Competitive Advantage						
	1.							
	2.							
	3.							

17.b EXPORT LICENSING CONDITIONS

Has your Company/Business Unit ever submitted a Commodity Jurisdiction (CJ) or Commodity Classification (CCAT) request?							check <input checked="" type="checkbox"/> here →	Yes	No
If “Yes,” 1.) How many were submitted ? 2.) How many were resolved ? 3.) How long did the process take, on average?	Calendar Year	Number Submitted		Number Resolved		Average Processing Time (in days)			
		<i>CJ</i>	<i>CCAT</i>	<i>CJ</i>	<i>CCAT</i>	<i>CJ</i>	<i>CCAT</i>		
	2003								
	2004								
	2005								
	2006								
Have the CJ or CCAT processes negatively impacted your space-related business ?							check <input checked="" type="checkbox"/> here →	Yes	No
If “Yes,” provide examples of the negative impacts on your space-related business resulting from Commodity Jurisdiction (CJ) or Commodity Classification (CCAT) requests.		Comments:							

17.c EXPORT LICENSING CONDITIONS *continued*

Has your Company/Business Unit received a license application Returned Without Action (RWA) from the U.S. Federal Government?							check <input checked="" type="checkbox"/> here →	Yes	No
If “Yes,” 1.) How many RWAs were received and applications resubmitted ? 2.) How many RWAs were due to inadequate submission or regulatory prohibition ?	Calendar Year	RWA Numbers				RWA Rationale			
		<i>RWA - Number Received</i>		<i>RWA - Number Resubmitted</i>		<i>RWA due to Inadequate Submission</i>		<i>RWA due to Regulatory Prohibition</i>	
		<i>ITAR</i>	<i>EAR</i>	<i>ITAR</i>	<i>EAR</i>	<i>ITAR</i>	<i>EAR</i>	<i>ITAR</i>	<i>EAR</i>
	2003								
	2004								
2005									
2006									
Please comment below on any other <u>concerns</u> related to RWA determinations.									
Comments:									

17.d EXPORT LICENSING CONDITIONS *continued*

Please estimate the **financial costs of complying with export controls** in terms of the following categories from 2003-2006.

Calendar Year	Salaries/Outside Legal <i>(in \$ thousands)</i>	DTSA* Monitoring <i>(in \$ thousands)</i>	Compliance Training <i>(in \$ thousands)</i>	Consulting Services/Software <i>(in \$ thousands)</i>	Insurance <i>(in \$ thousands)</i>
2003					
2004					
2005					
2006					

Please comment below on any other **concerns** or **difficulties** related to the financial costs of compliance.

Comments:

How would you **modify** the **anomaly resolution** procedures in the licensing process, regarding the **repair/return** of components, systems, subsystems and technologies? *[Please respond in the comment box.]*

Comments:

How would you **modify** the license requirements concerning **meetings** (domestic and foreign), **insurance** or **phone calls**? *[Please respond in the comment box.]*

Comments:

How would you **modify** the U.S. Congressional role in the export licensing process? This involves, for example, the required issuance of **pre-licensing briefings** (pre-briefs) to Congress in advance of certain ITAR-controlled export license approvals. *[Please explain in the comment box.]*

Comments:

*DTSA is the Defense Technology Security Administration

18. COMPETITIVENESS FACTORS AND INDUSTRY OUTLOOK

PAST ACTIONS TO IMPROVE COMPETITIVENESS

Please describe the actions your Company/Business Unit <i>has taken</i> in the Last Five Years to improve your competitiveness in the space market?	<i>Comments:</i>
--	------------------

FUTURE PLANS TO IMPROVE COMPETITIVENESS

Please describe the actions your Company/Business Unit <i>plans to take to improve your competitiveness over the Next Five Years.</i>	<i>Comments:</i>
---	------------------

U.S. GOVERNMENT ACTIONS

Please indicate what actions, policy changes or regulatory reforms the Federal Government could implement to improve your Industry's and/or Company's/ Business Unit's overall competitiveness.	<i>Comments:</i>
---	------------------

EFFECT OF GOVERNMENT EXPENDITURES

How have **space-related** spending and allocations by the U.S. Department of Defense, NASA, NOAA, and other agencies impacted your Company/Business Unit in the following categories?

Products and Services	<i>Response →</i>
Personnel/Staffing	<i>Response →</i>
Operations	<i>Response →</i>

Please describe the strategies your Company/Business Unit has developed to respond to the above issues.

Response →

BARRIERS TO ENTRY IN FOREIGN COUNTRIES

Please provide the five most significant barriers to entry faced by your Company/Business Unit when attempting to market products in foreign countries. [Note: List in order of relevance/impact; #1 is the most significant barrier.]	#	Country	Barrier to Entry
	1.		
	2.		
	3.		
	4.		
	5.		

19. FINANCIALS – INCOME STATEMENT FOR SPACE-RELATED BUSINESS

Instructions: Organizations that operate as part of a larger company with non-space-related business operations should provide income statement data only for their **Space-Related Business**. [Please provide estimates if actual figures are not available.]

Corporate Figures represented below ← check here
Business Unit Figures represented below

My Company/Business Unit operates on a: <input checked="" type="checkbox"/> here →		Fiscal Year	2003 (in \$ thousands)	2004 (in \$ thousands)	2005 (in \$ thousands)	2006 (in \$ thousands)	2007 (est.) (in \$ thousands)
		Calendar Year					
A.	Net Sales (and other revenue)						
B.	Cost of goods sold						
C.	Gross Profit						
D.	Selling, general and administrative expenses						
E.	Depreciation						
F.	Total Operating Expenses						
H.	Operating Income						
I.	Interest Expense						
J.	Other non-operating expenses						
K.	Total Non-Operating Expenses						
L.	Income before income taxes						
M.	Provision for income taxes						
N.	Net Income						

BUSINESS CONFIDENTIAL – Per Section 705(d) of the Defense Production Act

20.a FINANCIALS – BALANCE SHEET

Instructions: Organizations that operate as part of a larger company with non-space-related business operations should provide balance sheet data only for their **Space-Related Business**. [Please provide estimates if actual figures are not available.]

Corporate Figures represented below		← Check <input checked="" type="checkbox"/> here
Business Unit Figures represented below		

My Company/Business Unit operates on a: <input checked="" type="checkbox"/> here →	Fiscal Year		2003	2004	2005	2006	2007 (est)
	Calendar Year						

A. Current Assets (in \$ thousands)

1.	Cash						
2.	Marketable securities						
3.	Accounts receivable, net						
4.	Inventories						
5.	Prepaid expenses						
6.	Other current assets (please specify)						
7.	Total current assets						

B. Non-Current Assets (in \$ thousands)

8.	Property, plant and equipment						
<i>Break-out capital expenditures. (Do not double count PP&E in "Total Non-Current Assets.")</i>	9. - Property						
	10. - Buildings						
	11. - Machinery & Equipment						

12.	Investments						
13.	Intangibles (patents, trademarks, goodwill)						
14.	Less accumulated depreciation						
15.	Other assets (please specify)						
16.	Total non-current assets						
17.	Total assets						

C. Liabilities and Owners' Equity (in \$ thousands)

D. Current Liabilities (in \$ thousands)

18.	Accounts payable						
19.	Estimated tax liability (e.g., income taxes payable)						
20.	Accrued expenses						
21.	Long-term debt (current portion) due in 1 year						
22.	Other current liabilities (please specify)						
23.	Total current liabilities						

E. Non-Current Liabilities (in \$ thousands)

25.	Long-term debt (less current portion)						
26.	Deferred income taxes						
27.	Other long-term liabilities (please specify)						
28.	Total non-current liabilities						
29.	Total liabilities						

F. Owners' Equity (in \$ thousands)

30.	Common stock						
31.	Additional paid-in capital						
32.	Total paid-in capital						
33.	Retained earnings						
34.	Less treasury stock (stock repurchase)						
35.	Total owners' equity						
36.	Total Liabilities and Owners' Equity*						

*Note: Please report any significant one-time events on the next page of this survey.

20.b FINANCIALS – BALANCE SHEET <i>continued</i>	
Reporting of Significant One-Time Events	
Corporate Events represented below	<input type="checkbox"/>
Business Unit Events represented below	<input type="checkbox"/> ← Check <input checked="" type="checkbox"/> here
Year	Instructions: Please provide an explanation of any significant one-time events that would skew assessments of the economic performance of your Company/Business Unit.
2003	<i>Comments:</i>
2004	<i>Comments:</i>
2005	<i>Comments:</i>
2006	<i>Comments:</i>
2007(est.)	<i>Comments:</i>

BUSINESS CONFIDENTIAL – Per Section 705(d) of the Defense Production Act

21.a EMPLOYMENT

OCCUPATIONAL BREAKDOWN – WORKFORCE – U.S.

For the calendar years listed below, please provide the average number of **space-related** full-time equivalent employees (**35-40 hours/week for a full 12 months**) in your Company's/Business Unit's products/services operations.

Please fill in the table below as it corresponds **only** to your **domestic** operations and full-time equivalent workers.*

Corporate Employment Figure represented below ← here

Business Unit Employment Figures represented below ← here

Professional Occupation		2003 #	2004 #	2005 #	2006 #	2007 (est.) #
1.	Administrative Staff (Front Office)					
2.	Production Managers/Supervisors					
3.	Development Staff					
4.	Research Staff					
5.	Production Line Workers					
6.	Support Technicians					
7.	Quality Control					
8.	Test Operators					
9.	Export License Personnel (ITAR & EAR)					
10.	Sales and Marketing					
11.	Operations and Maintenance					
12.	Other					
13.	Total Employment*					

Education Level		2003 #	2004 #	2005 #	2006 #	2007 (est.) #
14.	BA/BS degree only					
15.	Master's-educated level					
16.	PhD educated level					
17.	Total Degree Staff					

From 2003 through 2007, were personnel related to your space business permanently terminated or furloughed as a result of denials and/or processing delays of export license applications? here →

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Furloughed & Terminated		2003 #	2004 #	2005 #	2006 #	2007 (est.) #
18.	Furloughed Due to Export Controls					
19.	Total Furloughed (all operations)					
20.	Terminated Due to Export Controls					
21.	Total Terminated (all operations)					

*Total need not include all categories if there are personnel redundancies listed.
 ** Full-time equivalent refers to part-time workers who, in the aggregate, work a 35-40 hour work-week (e.g., 10 part-time employees working 20 hours/week for a full 12 month period each are the full-time equivalent of five full-time employees for that 12 month period).

21.b SPACE-RELATED EMPLOYMENT PRACTICES

Has your Company/Business Unit had any trouble hiring personnel in its <u>core competencies</u> for its <u>space-related</u> business? If “ Yes ,” explain in the box below.	Yes	No
check <input type="checkbox"/> here		

Response →

How has export license compliance complicated the hiring/training of personnel in your Company/Business Unit? Please respond in the box below.

Response →

BUSINESS CONFIDENTIAL – Per Section 705(d) of the Defense Production Act

22.a RESEARCH AND DEVELOPMENT

Instructions: Companies/organizations whose sole focus is space-related products should report Corporate-wide R&D expenditures. Those companies/organizations that are part of a larger company with other non-space-related business operations should report R&D expenditure figures only at the space-related Business Unit level. Please specify whether you are reporting Corporate R&D figures or Business Unit R&D figures with a check in the corresponding box.

SPACE-RELATED R&D – EXPENDITURES BY FUNCTION

Corporate R&D	<input type="checkbox"/>	← check <input checked="" type="checkbox"/> here
Business Unit R&D	<input type="checkbox"/>	

R&D Expenditures Supporting Space-Related Activities
(in \$ thousands)

CATEGORY	2003	2004	2005	2006	2007 (est.)
Basic Research					
Applied Research					
Product Development					
Process Development					
Total R&D					

22.b SPACE-RELATED R&D – FUNDING SEGMENT BY SOURCE

Corporate R&D	<input type="checkbox"/>	← check <input checked="" type="checkbox"/> here
Business Unit R&D	<input type="checkbox"/>	

R&D Funding Sources for Space-Related Activities
(in \$ thousands)

CATEGORY	2003	2004	2005	2006	2007 (est.)
Parent Company (internal)					
Federal Government					
State and Local Government					
U.S. Private Entity [Includes industry, universities, and all other non-governmental organizations.]					
Foreign Investors [Includes private, industry, governments, and universities.]					
Other (please specify in box below)					
Total R&D					

Other →	Comment →

23. CERTIFICATION

The undersigned certifies that the information herein supplied in response to this questionnaire is complete and correct to the best of his/her knowledge. It is a criminal offense to willfully make a false statement or representation to any department or agency of the United States Government as to any matter within its jurisdiction. (18 U.S.C.A. 1001 (1984 & SUPP. 1197))

Company Name	
Company's Internet Address	
Name of Authorizing Official	
Title of Authorizing Office	
Email Address	
Phone Number <u>and</u> Extension	
Date Certified	
<i>If POC is different than above-named, include below</i>	
Point of Contact Name	
Title of Point of Contact	
Email Address	
Phone Number <u>and</u> Extension	

<i>Please check <input checked="" type="checkbox"/> if you would like a free copy of the final report.</i>	<input type="checkbox"/>	<i>← <input checked="" type="checkbox"/> here</i>
--	--------------------------	---

24. COMMENTS (optional)

In the box below, please provide any additional comments or any other information you wish to include regarding your **space-related** products and service(s) operations or other related issues.

Comments →

Please approximate <u>how many hours</u> it took to complete the Space Industrial Base survey.	<input type="text"/>
--	----------------------

[End]