



# **U.S. SPACE INDUSTRY 'DEEP DIVE'**

#### A COLLABORATION BETWEEN THE DOC AND THE USAF, NASA, AND NRO

**FINAL DATASET FINDINGS** 

Supply Chain 2014 GSFC, Greenbelt, MD October 22, 2014 Jason Bolton Trade and Industry Analyst BIS, Office of Technology Evaluation

#### 'Deep Dive' Briefing Subject Areas



## 'Deep Dive' Study Background Partnership and Objectives

#### Partnership:

• Data collection effort between Commerce, Air Force, NASA and NRO.

#### Goal:

• To gain an understanding of the supply chain networks supporting the development, production and sustainment of products and services supporting the defense, intelligence, civil and commercial space segments.

#### **Objectives:**

- a) <u>Map</u> the space industrial base supply chain in unprecedented detail;
- b) Identify interdependencies between respondents, suppliers, customers and USG agencies;
- c) <u>Benchmark</u> business practices, competitiveness factors, financial health, STEM, etc.; and
- d) <u>Share data with USG partners</u> to enhance strategic planning, outreach and collaboration.

## **'Deep Dive' Study Background** Sample Composition

Respondents by Type of Organization			
Commercial Companies	3,585		
Universities	125		
Non-Profit Organizations	49		
U.S. Government Agencies	21		
Total	3,780		

Respondents by Average Annual<br/>Net Sales (2009-2012)Very Small<br/>(Less than \$10M)1,648Small<br/>(\$10 - 50M)929Medium<br/>(\$50 - 250M)498Large<br/>(\$250M - 1B)234

Very Large (Greater than

**\$1B**)

**No Sales** 

62% are small businesses, as defined by the Small Business Administration

Only 52% of sample indicated they provide products/services to the space sector

Source: U.S. Department of Commerce, Bureau of Industry and Security, U.S. Space Industry Deep Dive Assessment, 2014. 165

#### **'Deep Dive' Study Background** Sector Participation



Source: U.S. Department of Commerce, Bureau of Industry and Security, U.S. Space Industry Deep Dive Assessment, 2014.

## 'Deep Dive' Study Background Who Does What?

- HTS, NAICS, PSC, other codes deemed largely inadequate for study.
- Need for greater fidelity to more accurately portray the supply chain network across over 205 USG space programs.
- Product and Service List comprised of 360 products and services located in 16 general segments.

#### **Product and Service 16 Segments:**

- A. Spacecraft & Launch Vehicles
- B. Propulsion Systems & Fuels
- C. Navigation & Control
- D. Communications Systems
- E. Space Survivability, Environmental Control...
- F. Payload Instruments & Measurement Tools
- G. Ground Systems
- H. Non-Earth Based Surface Systems

- I. Power Sources & Energy Storage
- J. Electronic Equipment
- K. Computer Hardware & Robotics
- L. Software
- M. Materials, Structures, and Mechanical Systems
- N. Manufacturing Tools & Specialty Equipment
- O. Services
- P. Research & Development
- Source: U.S. Department of Commerce, Bureau of Industry and Security, U.S. Space Industry Deep Dive Assessment, 2014.

## 'Deep Dive' Study Sample Findings Leading Product Areas

M48 - Precision machined parts						222
J8 - Connectors					196	
L7 - Modeling, analysis, and visualization software	ə 164					
I11 - Wires and cables (electrical)	164					
K1 - Computers and data processing equipment	155					
M2 - Plates, sheets, etc.	153					
D1 - Antennas/antenna systems				15	51	
M54 - Other space-related materials, structures, or				14	9	
M1 - Bars and rods	148					
M40 - Fasteners (screws, nuts, bolts, clips,				145	5	
M3 - Pipes and tubes	143					
J34 - Other space-related electronic equipment				142		
J5 - Circuit boards				137		
J17 - Integrated circuits/semiconductors (excluding				123		
J12 - Fiber optics (conductors, cables, switches,				120	# of Res	pondents
	0	50	100	150	200	250

Source: U.S. Department of Commerce, Bureau of Industry and Security, U.S. Space Industry Deep Dive Assessment, 2014.

#### **'Deep Dive' Study Sample Findings** *Capabilities Facing Financial Risk*



**# Product and Service Areas** 

### 'Deep Dive' Study Sample Findings Support for USG Agencies



**# of Respondents** 

### **'Deep Dive' Study Sample Findings** Shared Government Risk



#### **Cross-cutting relationships can be viewed by product (360+) and program (205+)**

#### Space Launch System (SLS)

- 417 entities in supply chain map
- 49 respondents indicated potential loss of viability/solvency with a sudden decrease in USG demand
- 12 respondents were identified as high/severe financial risk
- SLS affiliated respondents support over 249 USG space programs

Source: U.S. Department of Commerce, Bureau of Industry and Security, U.S. Space Industry Deep Dive Assessment, 2014.

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#### 'Deep Dive' Study Sample Findings

#### Potential Impacts from Sudden Decline in USG Space-Related Demand

	Pursuit of other U.S. customers
	Pursuit of new product/service lines
	Loss of personnel with key skills
	Reduced participation in U.S. Government contracts
	Decreased canital expenditures
	Decreased capital expenditures
	Decreased research & development expenditures
	Disproportionate reduction in sales revenue
	Increased product/service costs
	Reduction or elimination of particular product lines
	Pursuit of other non-U.S. customers
	Loss of organization viability or solvency
	Elimination of all participation in U.S. Government contracts
	Sale of key production equipment
	Other
0	



#### **'Deep Dive' Study Sample Findings** 2009-2012 Change in Space-Related Customer Demand by Business Line



"Increases in Demand" less "Decreases in Demand"

Source: U.S. Department of Commerce, Bureau of Industry and Security, U.S. Space Industry Deep Dive Assessment, 2014.

### **'Deep Dive' Study Sample Findings** *Exposure to Space-Related Sales*\*



Need to understand the potential impact of USG policy decisions on respondents, space-related or otherwise

\*1,646 respondents declared that they had no "space-related" sales

### **'Deep Dive' Study Sample Findings Single and Sole Source Suppliers\***



Source: U.S. Department of Commerce, Bureau of Industry and Security, U.S. Space Industry Deep Dive Assessment, 2014.

### 'Deep Dive' Study Sample Findings Counterfeit Reporting by Type



#### 'Deep Dive' Study Sample Findings Fluctuations in Engineers, Scientists, R&D Staff



Source: U.S. Department of Commerce, Bureau of Industry and Security, U.S. Space Industry Deep Dive Assessment, 2014.

#### 'Deep Dive' Study Sample Findings Engineers, Scientists and R&D Staff—Age Range

**All Respondents** 





## **'Deep Dive' Study Sample Findings Potential Impact of Export Control Reform**

- Based on proposed regulations, OTE identified 155 product/service areas in the survey that *may* move to the CCL under Export Control Reform
- 1,941 respondents provide at least one of these 155 product/service areas
  - 1,288 of these respondents do not currently utilize the U.S. export control system for space-related products/services
  - 865 of those 1,288 respondents are small businesses

### **'Deep Dive' Study Sample Findings** Location of Top Space-Related Countries\*

Canada			
France			
United Kingdom			
Germany			
Japan			
India			
Italy			
Spain			
China			
South Korea			
Russia			
Israel			
The Netherlands			
Australia			
Sweden			
Mexico			
Brazil			
Singapore			
Turkey			
Norway			
* Based on total number of products/services sent to customers in each country.			

- Space-related exports to highlighted country destinations may be eligible for Strategic Trade Authorization (STA) license exception.\*\*
- 754 non-U.S. customers identified in the 13 highlighted countries.

\*\*Only includes countries in Country Group A:5

#### New 'Deep Dive' Report Released Impact of U.S. Export Controls on the Space Industrial Base www.bis.doc.gov/DIB

U.S. SPACE INDUSTRY "DEEP DIVE" ASSESSMENT:

IMPACT OF U.S. EXPORT CONTROLS On the Space Industrial Base



Additional reports:

- Employment in the Space
  Industrial Base
- Small Businesses and the Space Industrial Base
- Challenges in the Space
  Industrial Base

## **'Deep Dive' Study Sample Findings** Select Assessment Takeaways

- 1. Organizations that are more dependent on space exhibit greater signs of stress.
- 2. Uncertainty about USG space plans limits industry's ability to plan investment and their desire to enter/remain in the space market.
- 3. Variability of space demand has adversely impacted many respondents' desire to continue to serve USG customers.
- 4. An aging workforce and lack of properly skilled workers are major challenges to the long-term health of the U.S. space industrial base.
- 5. USG space acquisition practices are costly, hinder competition, and limit industry's desire to remain in or enter the space market.

### Industry Outreach *Program Packages*\*

**'Deep Dive' Respondent Declared Interest in Available U.S. Government Assistance Programs and Services** 

Program	Frequency
Business development	715
R&D programs	527
SBIR and STTR contracts	492
Global export opportunities	443
Training Opportunities	416
Export licensing (ITAR/EAR)	405
Manufacturing technology development	395
Financing	353
USG procurement guidelines/e-commerce	346
Marketing assessment skills	329
Product/service development	314
Energy/environmentally conscious manufacturing	213
Patents and trademarks	196
Country Commercial Guides	60

#### \*Fact sheet packages sent to 1,300+ respondents and available at: <u>www.bis.doc.gov/SpaceDeepDiveResults</u>

### Industry Outreach MEP/NIST Activities

Leveraging Existing U.S. Government Resources

- Initiating pilot program with National Institute for Standards and Technology's Manufacturing Extension Partnership (MEP)
  - MEP offices in nearly every state
  - MEP offices staffed to service small-to-medium size firms
- Conduct supplier onsite visits
- Engage with industry stakeholders at conferences/trade shows
- Engage Patent and Trademark Office (PTO) to support small-tomedium size businesses:
  - Helps advance Export Control Reform (ECR) roll-out

## Industry Outreach MEP/NIST Activities



## Ongoing USG and Industry Support Issue I: Integrated Planning and Outreach

Sub-issues:

- 1. Lack of visibility or uncertainty about USG strategic direction
- 2. Lack of transparency on requirements, program applications, qualification requirements and timing
- 3. Variability of demand/Government purchasing volatility
- 4. Little direct outreach to companies on needs, requirements and opportunities
- 5. Few clear points of contact for industry within government

## Ongoing USG and Industry Support Issue 2: Workforce

#### Sub-issues:

- 1. Fluctuations in engineers, scientists and R&D staff
- 2. Aging workforce
- 3. Lack of proper skills/qualifications
- 4. Lack of experienced workers
- 5. Geographic issues
- 6. Competition for employees
- 7. Citizenship issues
- 8. Security clearance issues

## Ongoing USG and Industry Support Issue 3: Health of the Space Industrial Base

#### Sub-issues:

- 1. Individual financial stress experienced by respondents
- 2. Vulnerability to USG space-related demand
- 3. Dependence on USG for funding of R&D initiatives
- 4. Investments in capital expenditures

## Ongoing USG and Industry Support Issue 4: USG Acquisition Policies & Practices

#### Sub-Issues:

- **1.** Insufficient upfront information on contract requirements
- 2. Cost of bid process is prohibitive for small companies
- 3. Government contracts are seen as less attractive than commercial opportunities
- 4. Difficulty presenting the U.S. Government with new and innovative products

## Ongoing USG and Industry Support NDIA Collaboration

- In March 2014 both the House and Senate Armed Services Committees requested input from the National Defense Industrial Association (NDIA) to support ongoing legislative initiatives concerning acquisition reform.
- Initiative allowed for industry and USG stakeholders to identify problems currently in the acquisition process, discuss their root causes and recommend possible legislative and regulatory solutions.
- OTE provided NDIA top-level findings and comments on acquisition reform and implications for the defense supply chain based on aggregated results from its 'Deep Dive' assessment.
- Issue areas communicated by OTE concerning USG acquisition reform include:
  - Insufficient upfront and timely information on contract requirements;
  - Cost of bid process is prohibitive for many small companies;
  - USG contracts are seen as less attractive than commercial contracts; and
  - Difficulty presenting USG with new and innovative products to meet current/future requirements.

## Ongoing USG and Industry Support Strategic Materials Assessments

- Developed three separate surveys in partnership with the Defense Logistics Agency, gathering data for the 2010-2013 period on:
  - Titanium and magnesium
  - High modulus carbon fiber and bismaleimide (BMI) resin
  - Five rare earth elements: dysprosium, erbium, neodymium, terbium, and ytterbium
- Objectives:
  - a) Map the supply chains for these materials using three separate surveys based on variations from a common template
  - b) Identify interdependencies between respondents, suppliers, customers, and USG agencies
  - c) Benchmark trends in business practices, competitiveness issues, financial health, etc. across multiple tiers of the industrial base
- Surveys focused on companies engaged in raw material production and procurement, and lower tier manufacturers and distributors

### New Project Space-Related Propulsion Systems

- Working with NASA's Marshall Space Flight Center and the National Institute for Rocket Propulsion Systems (NIRPS).
- Gather detailed data on U.S. propulsion supply chain to assess impact of USG procurement decisions on the industrial base.
- Using Defense Production Act (DPA) authority to expand and refresh data collected by OTE Space 'Deep Dive' and the Aerospace Corporation.

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 For copies of OTE's industrial base assessments, see: <u>www.bis.doc.gov/dib</u>

• For results from this 'Deep Dive' assessment, see: <u>www.bis.doc.gov/SpaceDeepDiveResults</u>





## BACKUPS

#### **'Deep Dive' Study Sample Findings** *Understanding the Collective Problem*

Top 10 Issues and Chall Respondents' Long-T	enges Affecting 「erm Viability			Issues More Commonly Affecting Larger Respondents	
Domestic Competition				Domestic Competition	
Labor Costs				Foreign Competition	
Proposed Cuts to USG Space Programs				Variability of Demand	
Foreign Competition				Export Controls	
Variability of Demand					
Healthcare				Issues More Commonly Affecting Smaller Respondents	
Taxes				Healthcare	
Government Acquisition Process				Taxes	
Skills Retention				Labor Costs	
Government Regulatory B	urden		7	Difficulty Presenting Innovative Products to the USG	
	2,000+ comments from respondents on these topics		Barriers to Entry in Commercial Space Market		

#### **'Deep Dive' Study Sample Findings** Leading USG Space Programs with Non-U.S. Suppliers



#### **'Deep Dive' Study Background** *Financial Performance Measures*

Profitability				
Operating Profit Margin	EBIT/Pre-	Tax Margin	Net Profit Margin	
Liquidity/Solvency				
Current Ratio	)		Quick Ratio	
Leverage				
Debt Ratio		Debt-To-Equity		
Business Activity				
Inventory Turnover		R&D Intensity		
Default Probability				
Z-Score A		Z-Score B		

\* Based on 354 high, 1,096 moderate and 2,117 low risk respondents

### **'Deep Dive' Study Background** *Financial Scorecard Risk Designation*



\* Based on 354 high, 1,096 moderate and 2,117 low risk respondents



\* Based on 354 high, 1,096 moderate and 2,117 low risk respondents

Source: U.S. Department of Commerce, Bureau of Industry and Security, U.S. Space Industry Deep Dive, 2013.