U.S. SPACE INDUSTRY 'DEEP DIVE'

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

FINAL DATASET FINDINGS

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

U.S. Space Industry ‘Deep Dive’ Assessment - Background

- Partnership with the U.S. Air Force, National Aeronautics and Space Administration, and the National Reconnaissance Office.

- The principle goal is to gain an understanding of the intricate supply chain network supporting the development, production, and sustainment of products and services across the defense, intelligence, civil, and commercial space sectors.

- Objectives:

  a) Map the space industrial base supply chain in unprecedented detail;

  b) Identify interdependencies between respondents, suppliers, customers, and USG agencies;

  c) Benchmark trends in business practices, competitiveness issues, financial health, etc. across many tiers of the industrial base; and

  d) Share data with USG stakeholders to better inform strategic planning, targeted outreach, and collaborative problem resolution.

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

Survey Topics

(Covers 2009-2012)

- Financials
- Research & Development
- Capital Expenditures
- Employment
- Mergers & Acquisitions
- Sales
- Areas of Potential USG assistance for Respondents
- Impacts of decreased USG demand

- 205 USG Space Programs
- Suppliers (U.S. & non-U.S.)
- Customers (U.S. & non-U.S.)
- Top competitors (U.S. & non-U.S.)
- Codes: DUNS, CAGE, NAICS, Inventory
- Rare Earth Elements and Counterfeiting Issues
- Challenges to Competitiveness

This presentation only scratches the surface of our data.

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

Overview of Respondents

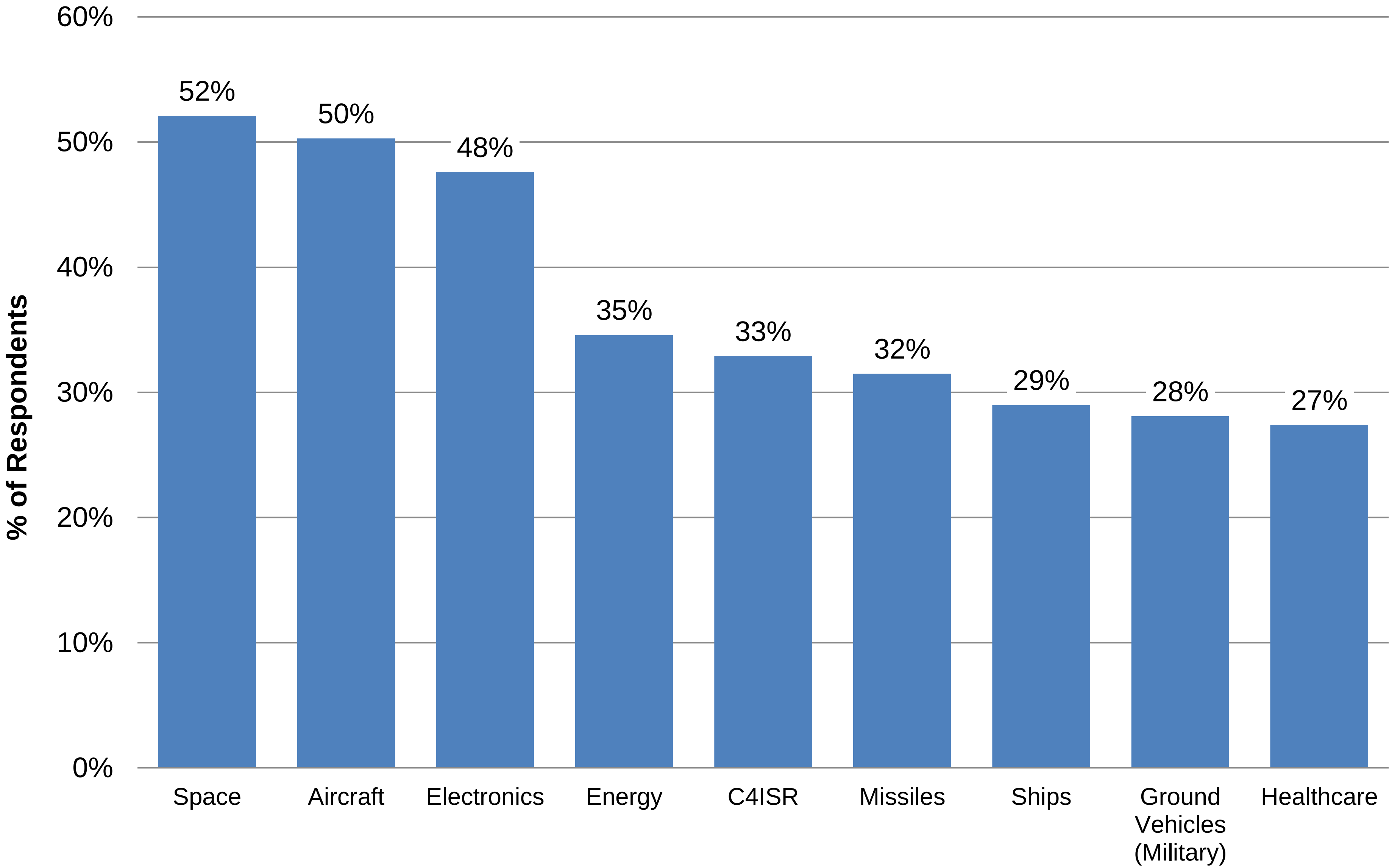
Respondents by Type of Organization	
Commercial Companies	3,585
Universities	125
Non-Profit Organizations	49
U.S. Government Agencies	21
Total	**3,780**

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

Respondents by Average Annual Net Sales (2009-2012)	
Very Small (Less than $10M)	1,648
Small ($10 – 50M)	929
Medium ($50 – 250M)	498
Large ($250M – 1B)	234
Very Large (Greater than $1B)	165
No Sales	306

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

Involvement in Market Segments



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

Structure of the DOC Survey

Created 16 general segments comprised of 360 individual products & services.

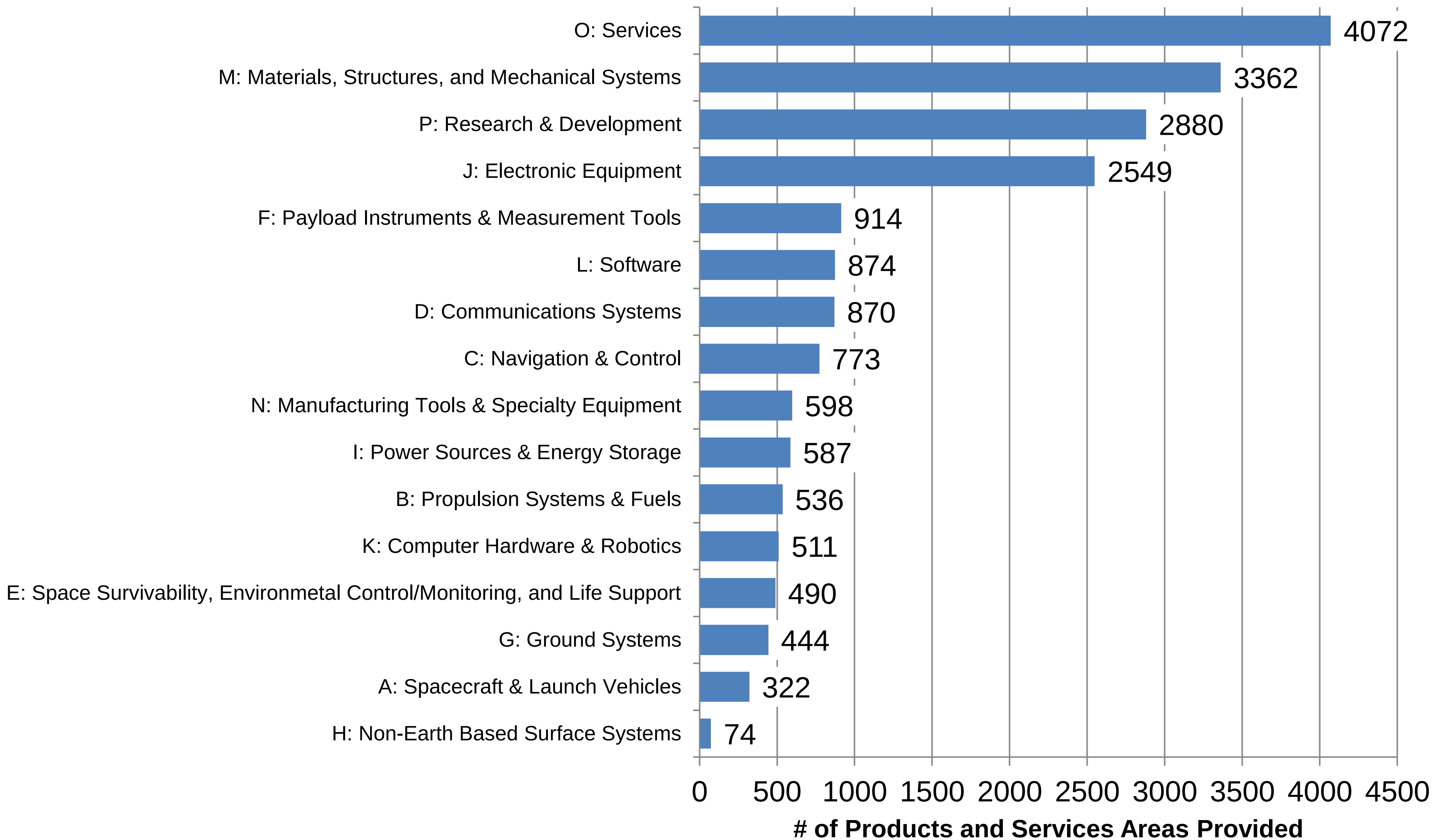
Product and Service Segments:

A. Spacecraft & Launch Vehicles
B. Propulsion Systems & Fuels
C. Navigation & Control
D. Communications Systems
E. Space Survivability, Environmental Control/Monitoring, and Life Support
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

Respondents detail their critical suppliers, customers, and involvement in over 205 USG space programs.

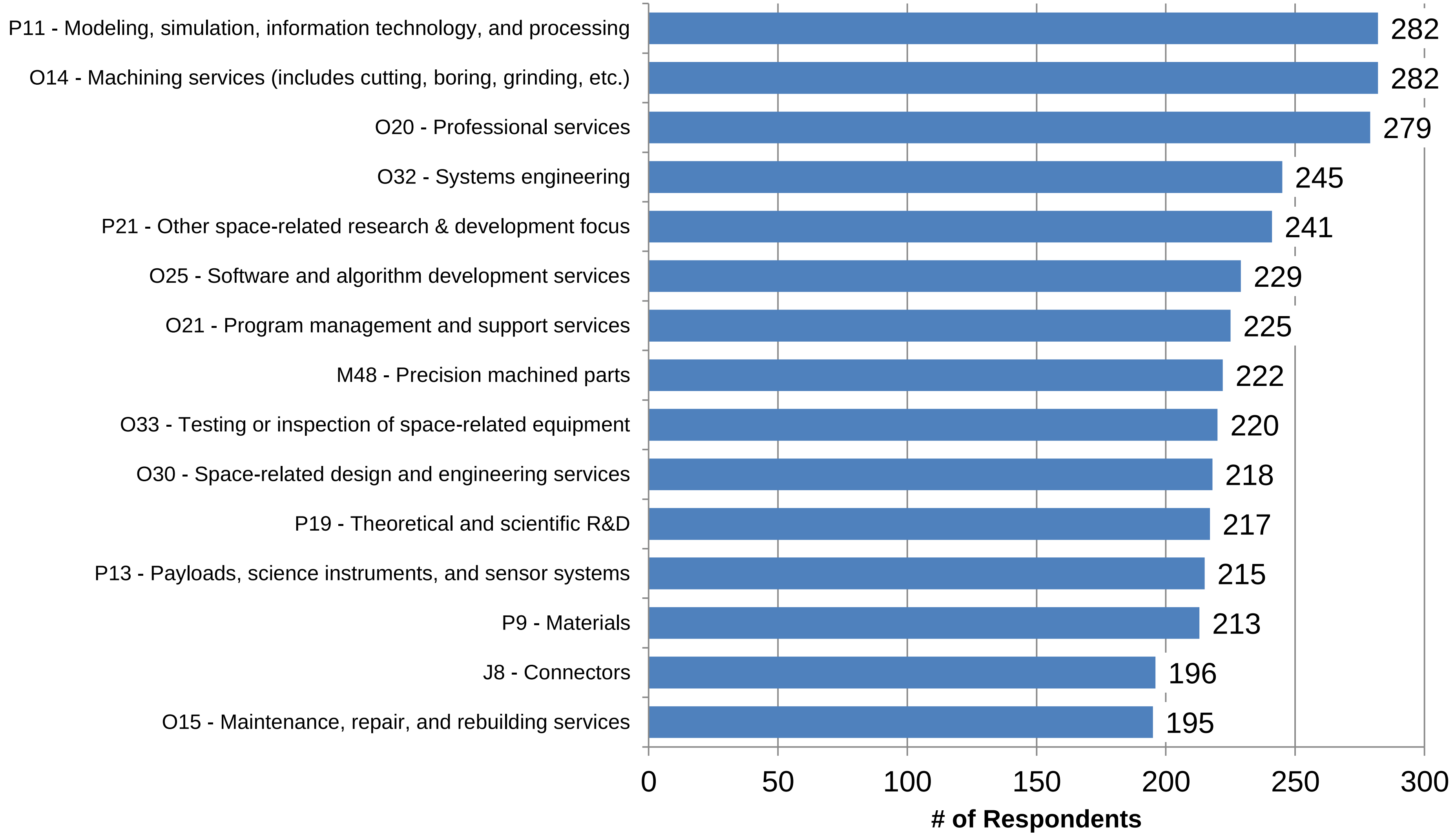
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive Assessment*, May 2013.

Products and Services Provided by Segment



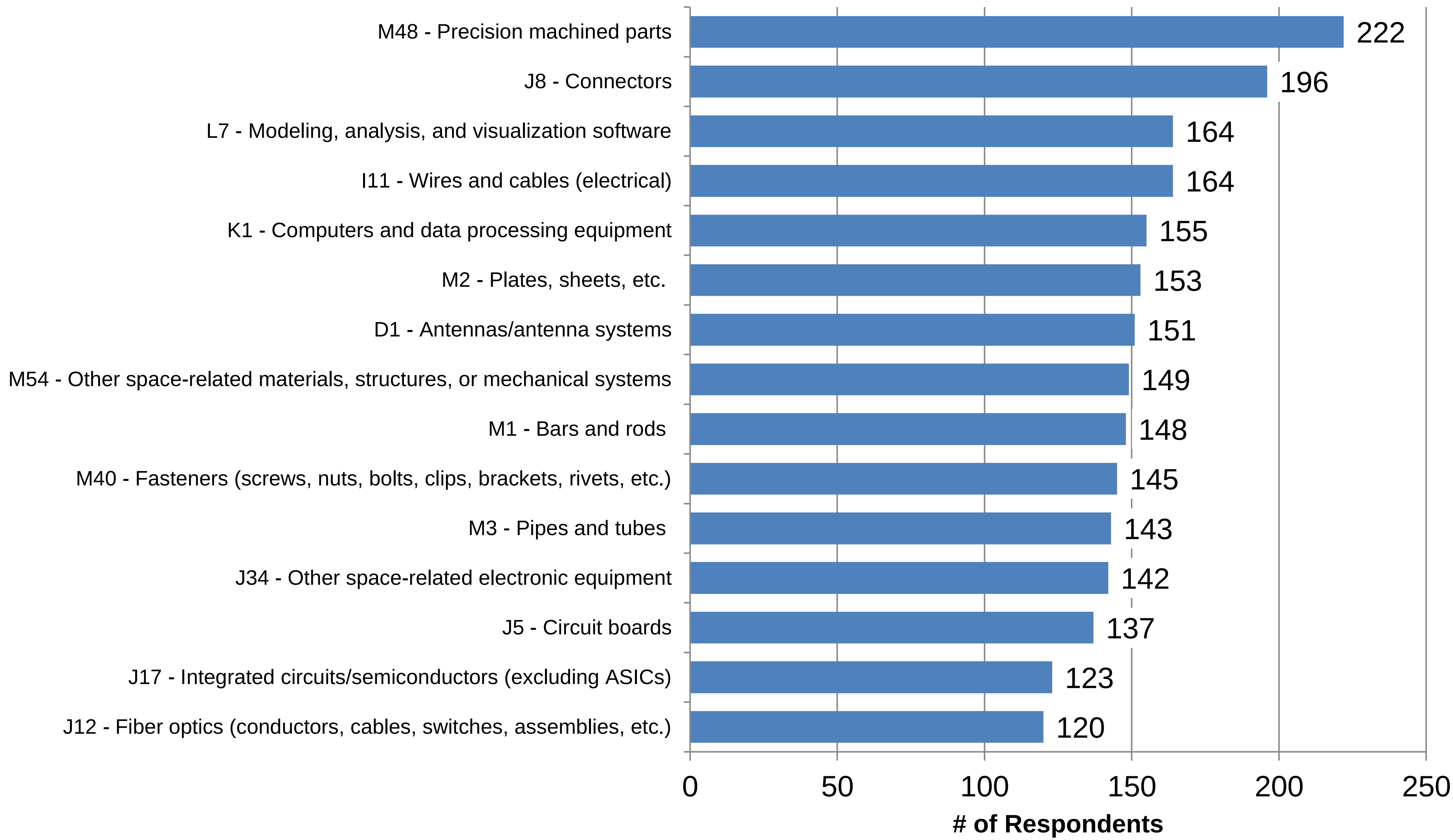
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive Assessment, May 2013.

Top 15 Product/Service Areas Provided by Respondents – All Segments



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

Top 15 Product/Service Areas Provided by Respondents – Excluding Services and R&D

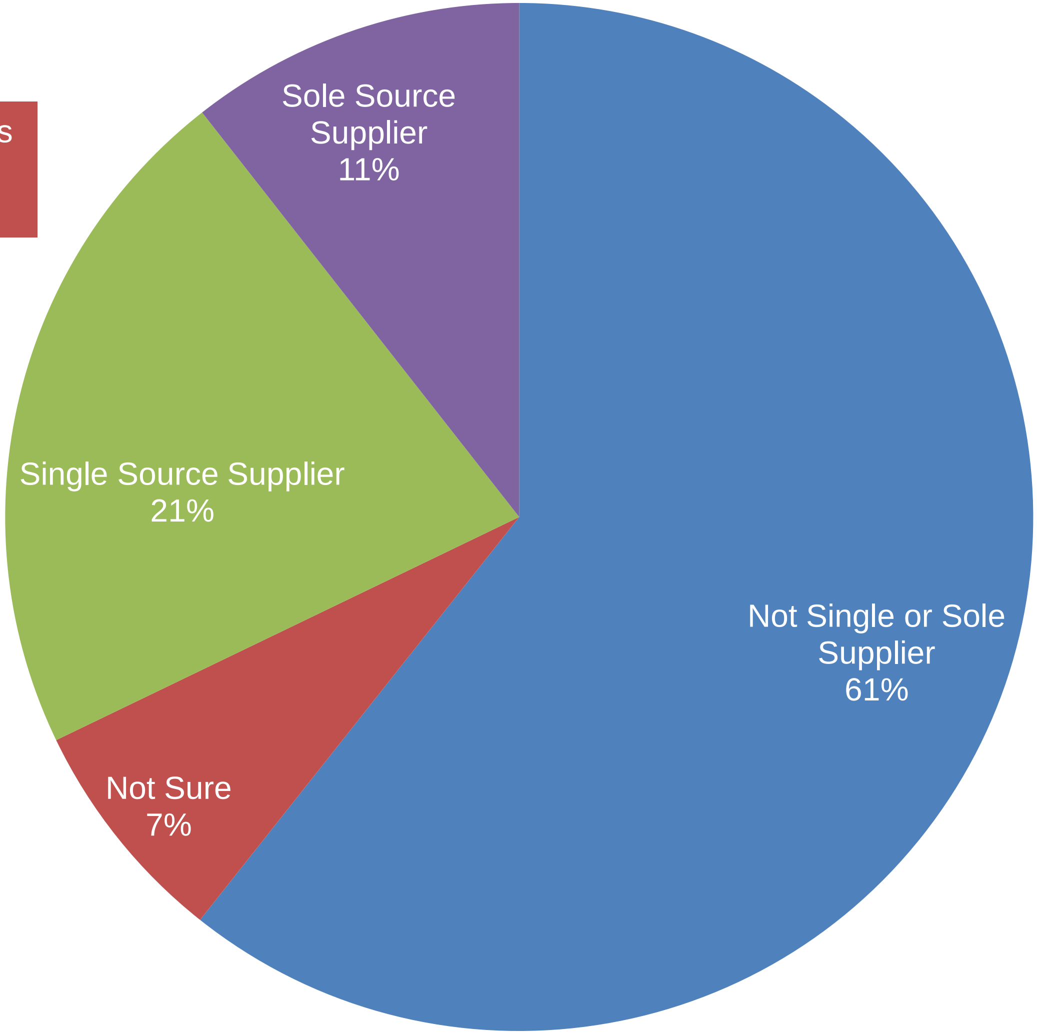


Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive Assessment, May 2013.

Single and Sole Source Suppliers*

2,200+ products/services provided by sole source suppliers.

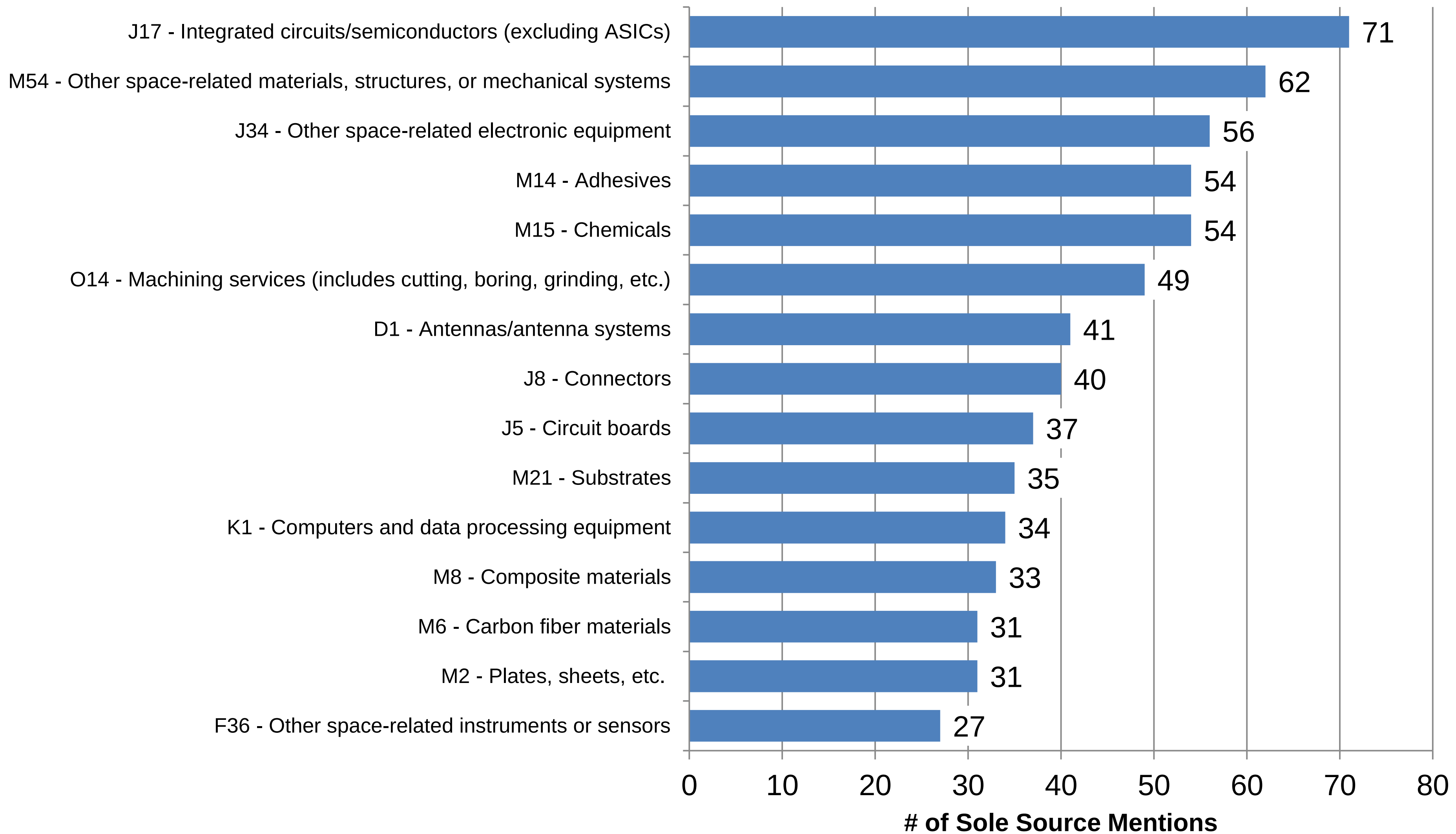
7,361 unique critical suppliers.



* As a percentage of total products/services provided.

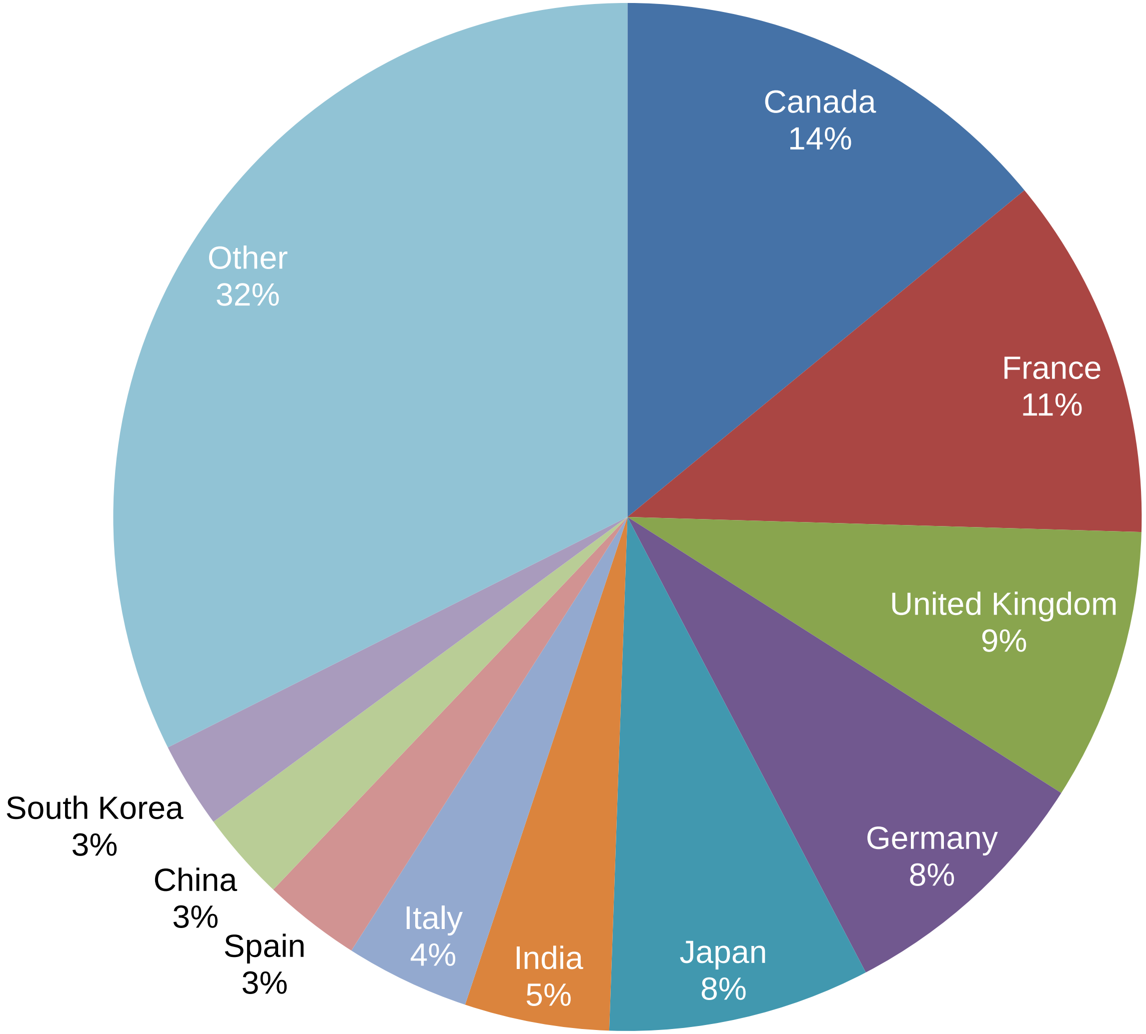
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive Assessment*, May 2013.

Top 15 Sole Source Product and Service Areas Provided by Suppliers



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

Location of Non-U.S. Based Space-Related Customers*



3,934 unique customers.

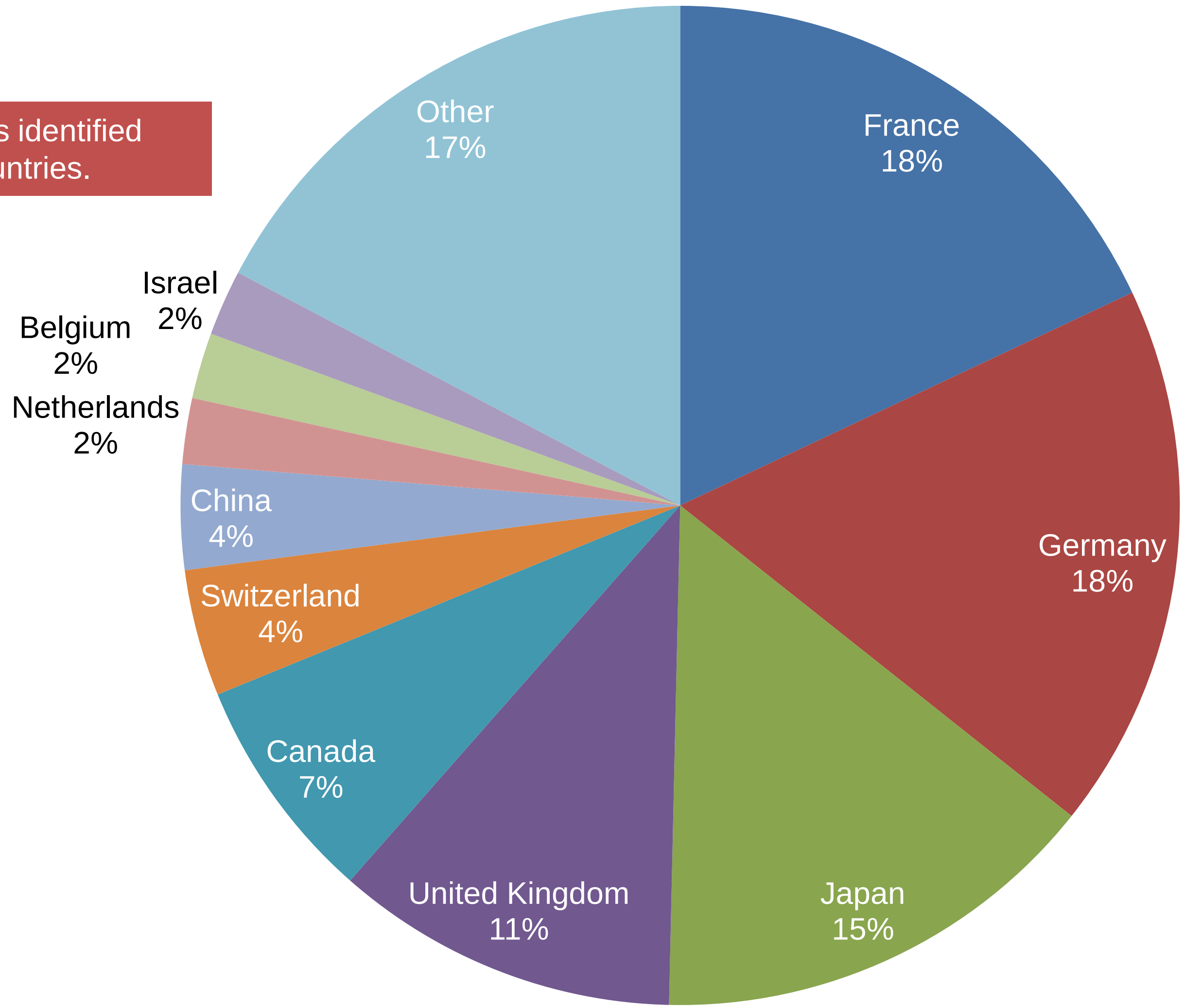
* As a percentage of the total number products and services provided,

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

Location of Non-U.S. Based Competitors*

Competitors identified from 41 countries.

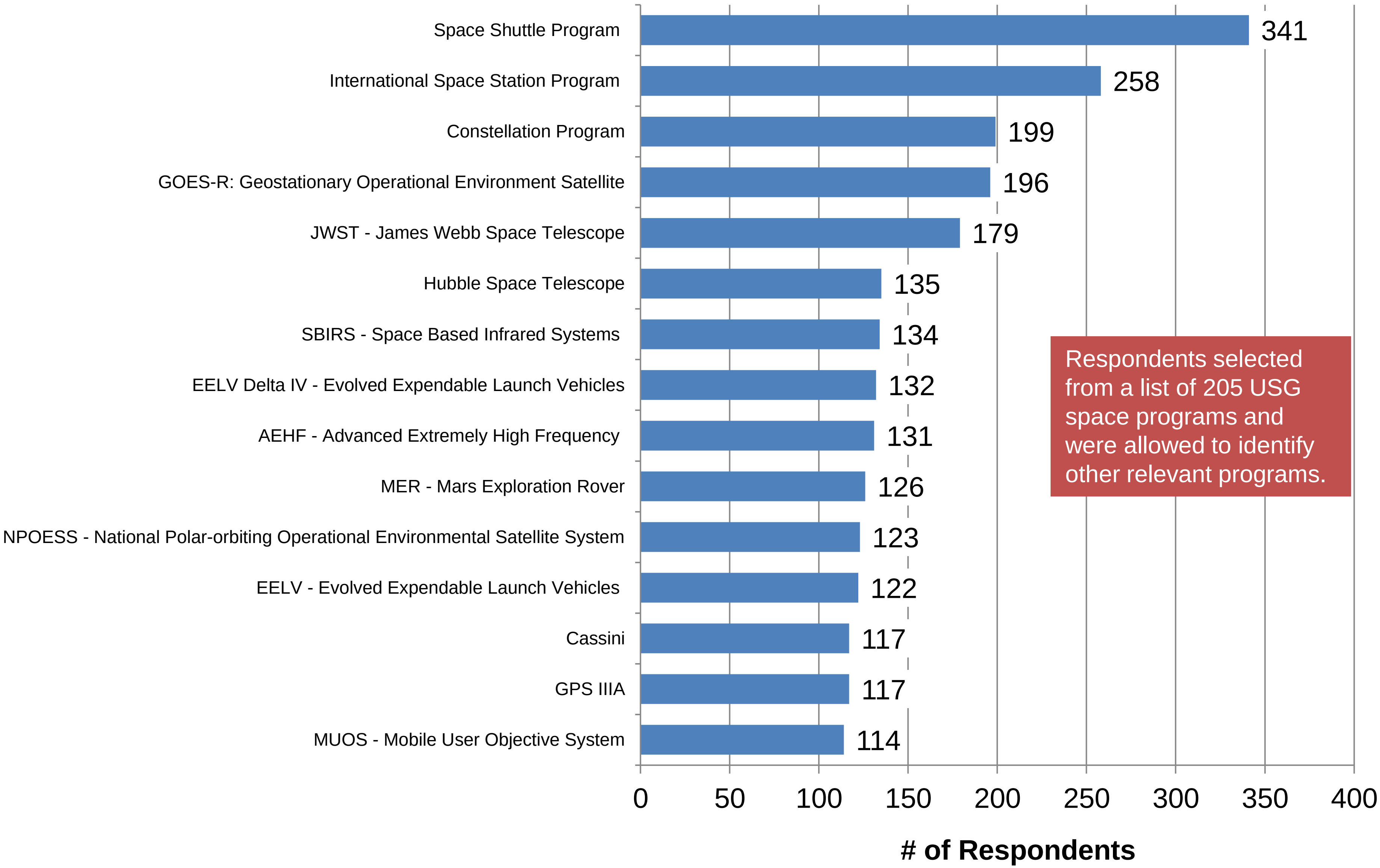
2,832 unique competitors.



* As a percentage of the total number of mentions.

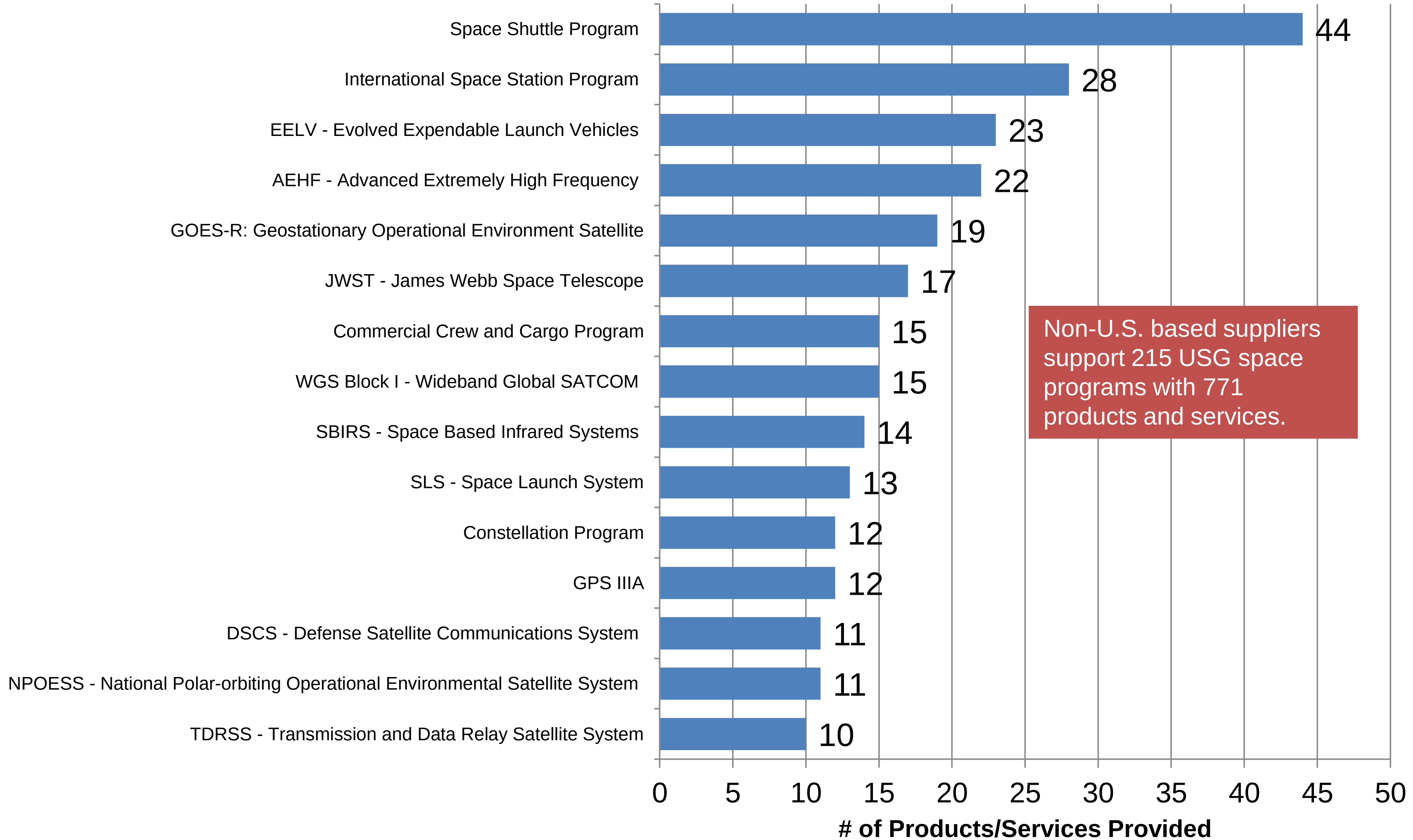
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive Assessment*, May 2013.

Support for USG Space Programs Based on Respondent Participation



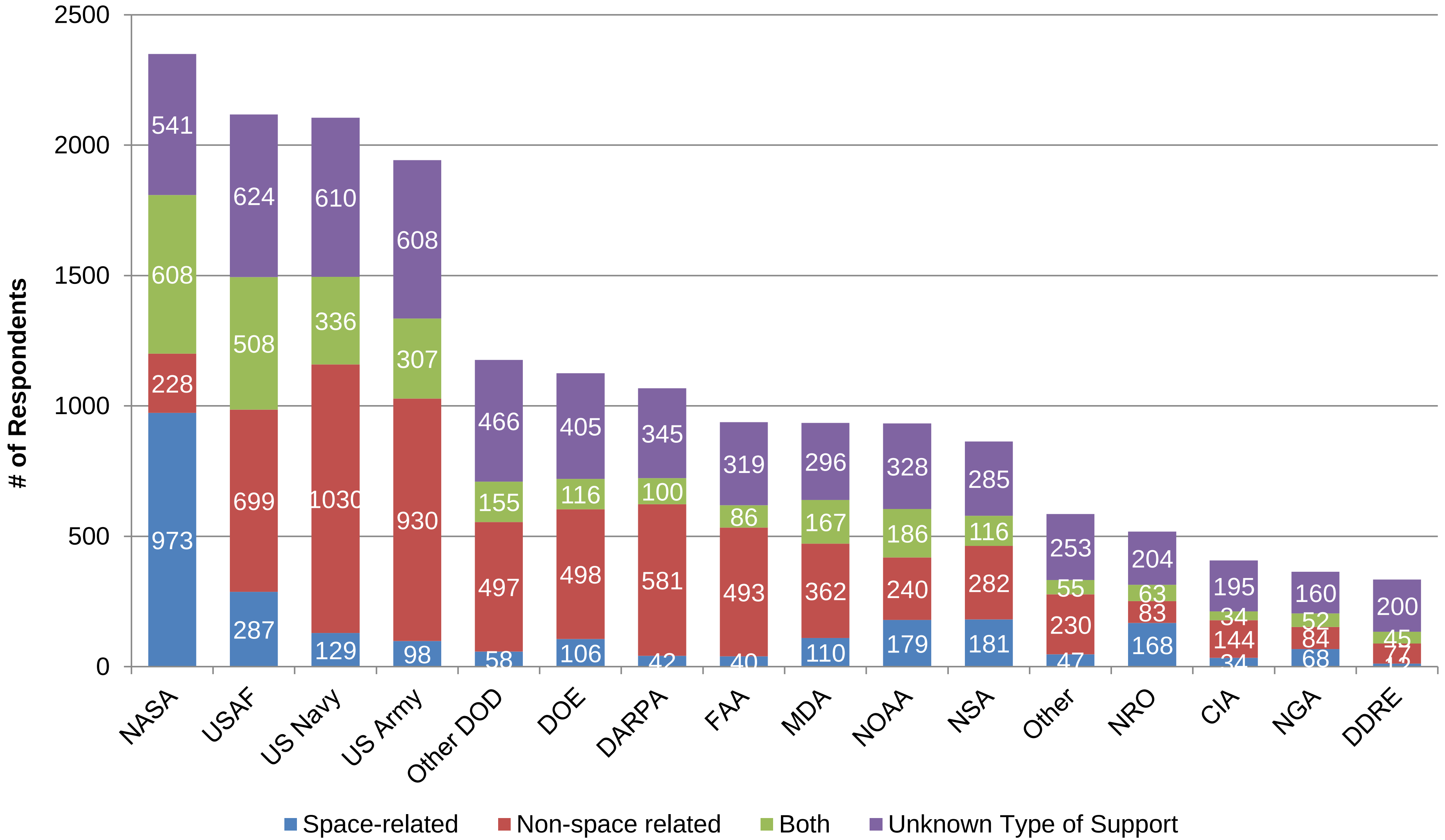
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive Assessment*, May 2013.

USG Space Programs with the Greatest Non-U.S. Based Supplier Support



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

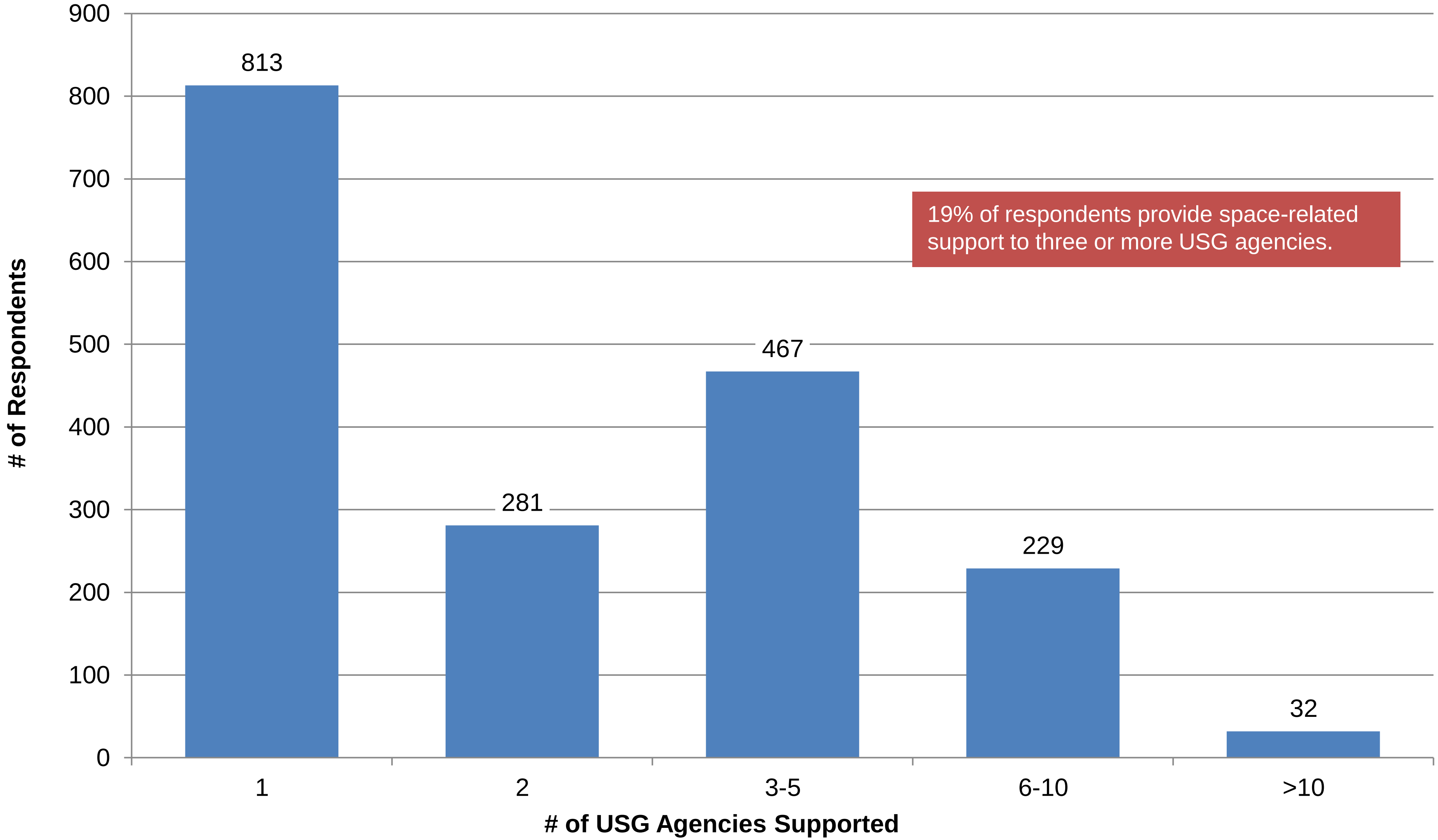
Support for USG Agencies*



* This identification of support is not tied to a specific USG program.

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

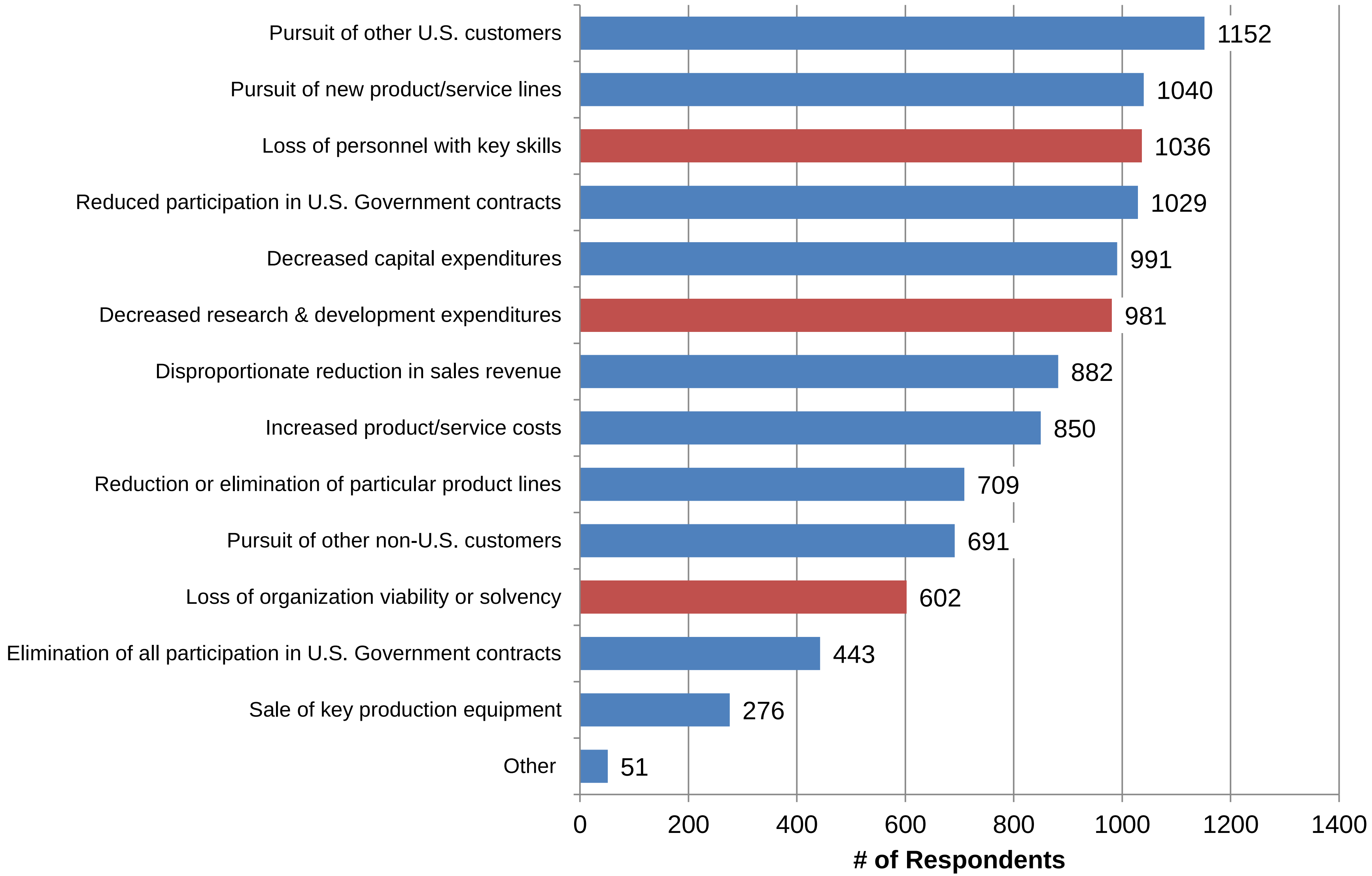
Respondents Providing Space-Related Support to Multiple USG Agencies*



* A combination of “space-related” support and “both” responses.

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

Potential Impacts of a Sudden Decrease in USG Space-Related Demand



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

Variability in Demand
- Continued Desire to Work With USG

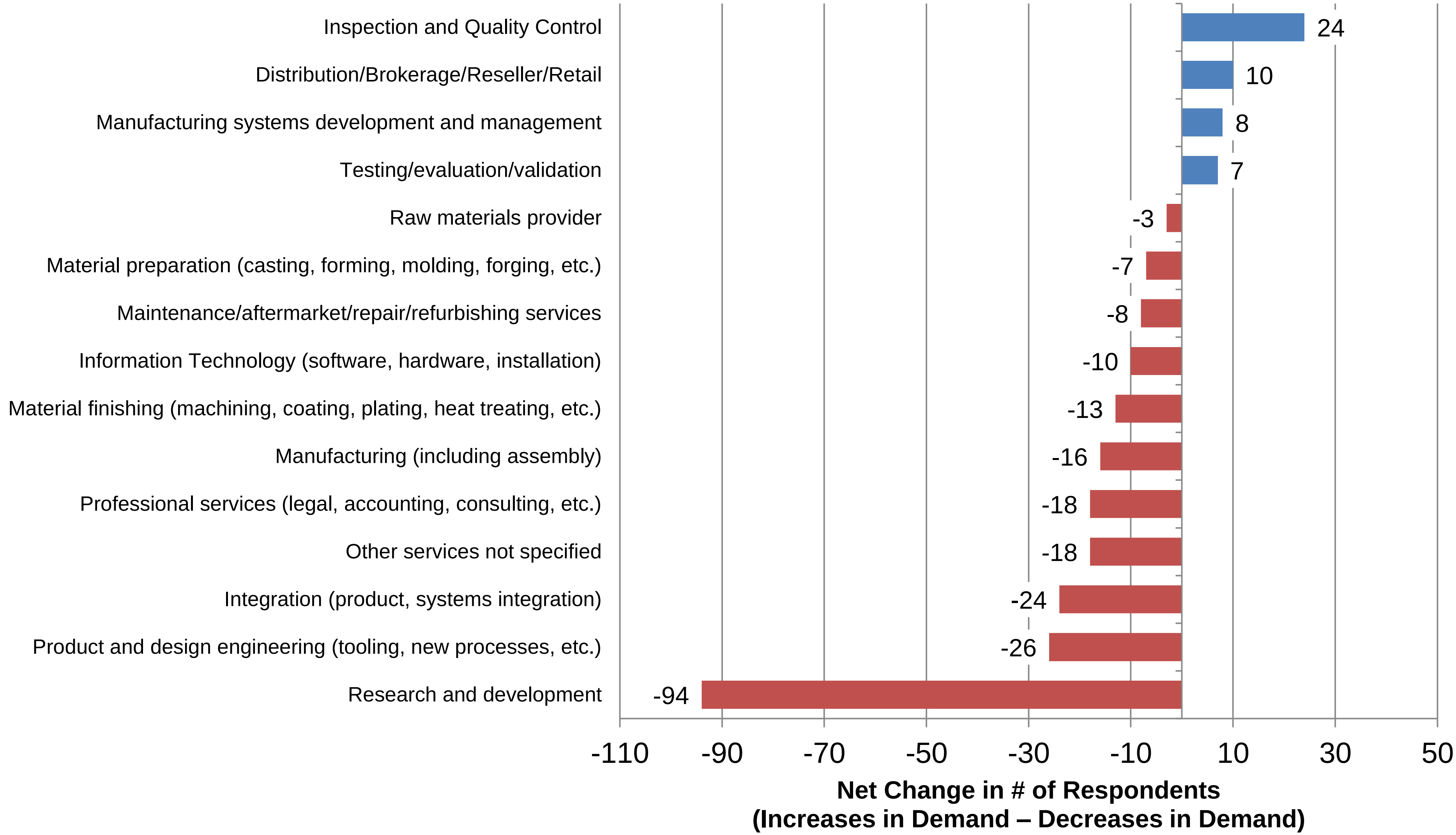
18 percent (666 of 3,780) of respondents said that variability in demand from the USG for space-related products and services have somewhat or significantly adversely impacted their desire to serve these customers.

Adverse Impacts:

- “Variation in year-to-year R&D budgets over the last 2 - 3 years due to changes in program priorities, federal budget pressures, cancellation of key programs has had a significant negative impact on our business stability over those years. Hiring and other long range investments have been strongly affected” – Very small company.
- “The decrease in USG space programs has fundamentally changed the outlook for several of our clients and just as importantly it has significantly impacted several potential clients resulting in a drastically reduced demand for services we provide. Consequently, while we are still interested in this segment, the market outlook is much more somber than it was just 2-3 years ago” – Very small company.
- “Desire unchanged, just fewer opportunities” – Very small company.
- “This is the work we do and we love it. We do it by choice. We are very dependent on the US government, but we couldn't do the same work in any other context. So we just keep doing it, even if it's not always stable. A lot of great talent is leaving the industry because of this, though. The massive NASA layoffs of last year are a sad example of that” – Very small company.
- “We invested approximately one man-year plus tens of thousands of dollars to develop a product for our customer only for them to buy only three units. Due to the customer's lack of business, we have effectively cancelled the product” – Large company.
- Respondent has “prepared plans to terminate space-related production and focus on aerospace markets due to declining volume and increasing volatility of space-related sales” – Medium company.

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

Net Change in Space-Related Customer Demand for Respondents' Business Lines (2009-2012)



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

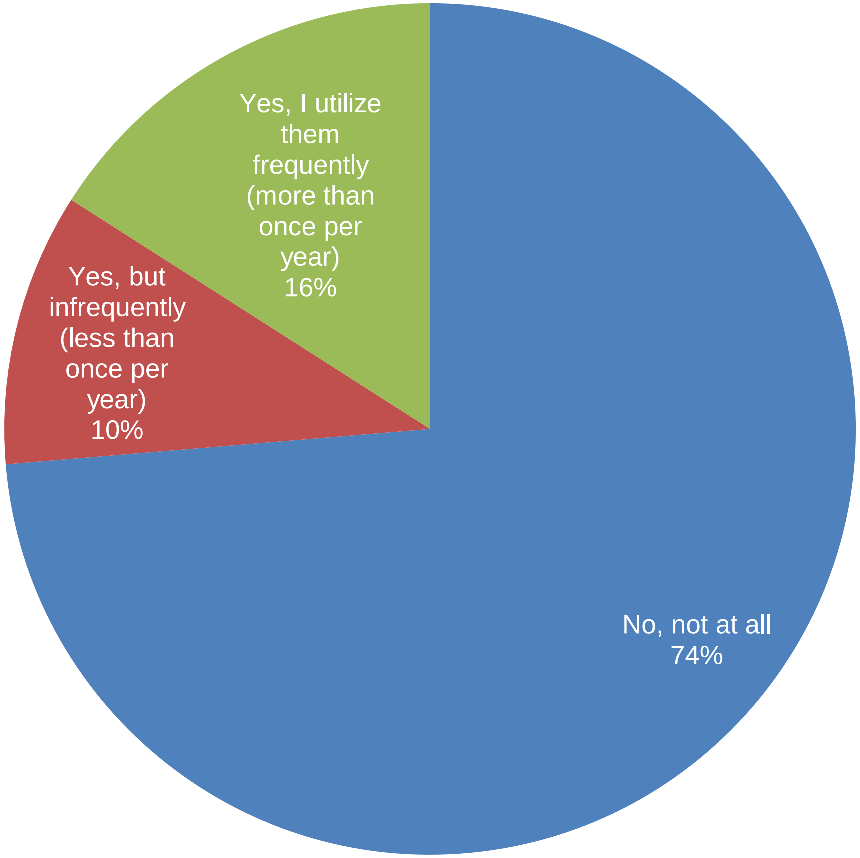
Decrease in Space-Related Customer Demand for Respondent's Business Lines (2009-2012)

Decrease in Research & Development	
Very Small	174
Small	60
Medium	32
Large	20
Very Large	16
No Sales	29
Total	**331**

Decrease in Product and Design Engineering	
Very Small	96
Small	54
Medium	39
Large	14
Very Large	11
No Sales	11
Total	**225**

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

Utilization of U.S. Export Control System (ITAR/EAR) for Space-Related Products/Services



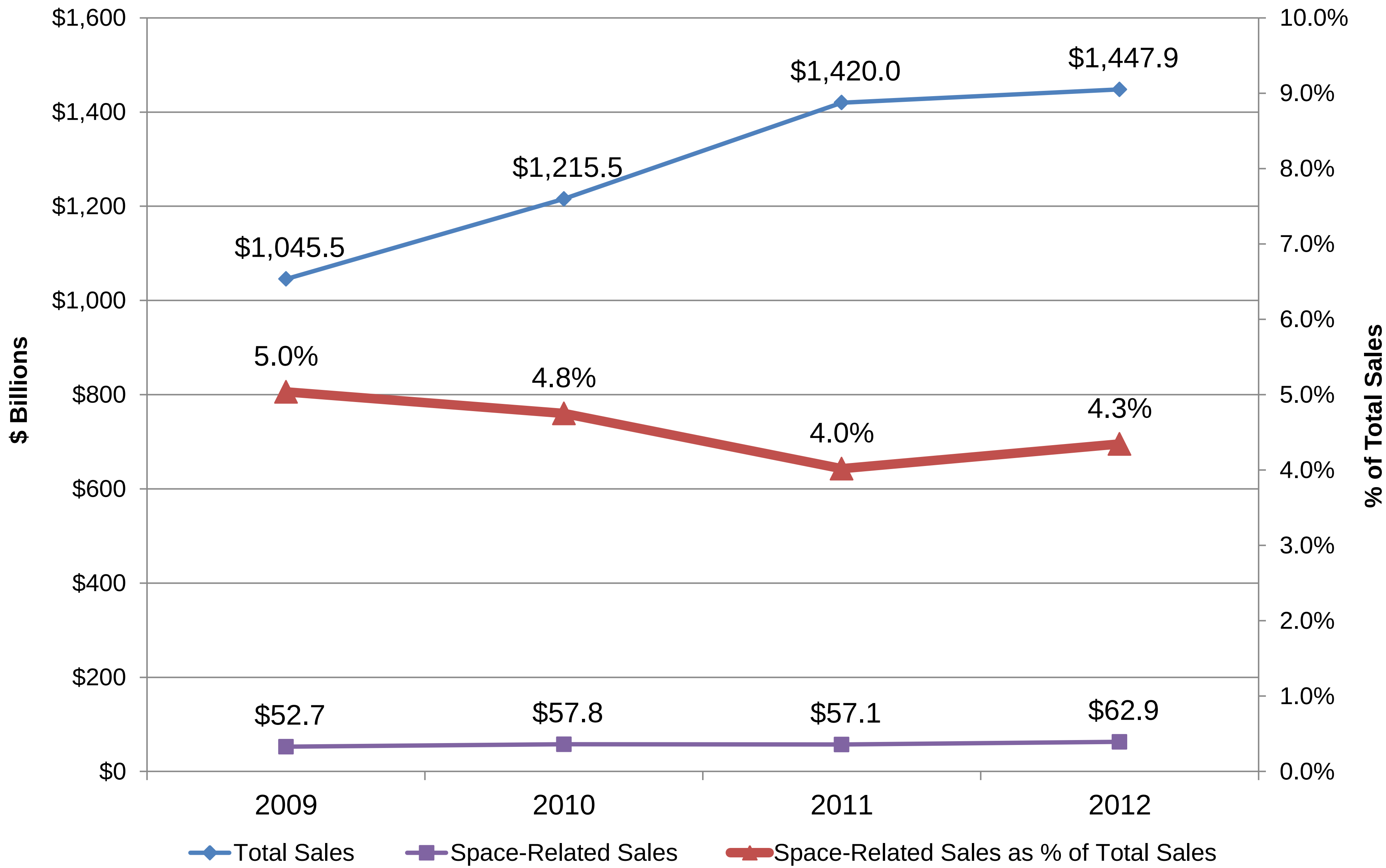
Impacts of U.S. Export Regulations on Space-Related Products and Services

Impact	% of Respondents*
Avoided the export of space-related products or services subject to ITAR-related controls	34%
Incentivized non-U.S. organizations to “design-out” or avoid buying U.S. origin space-related products or services	26%
Incentivized non-U.S. organizations to offer “ITAR-free” space-related products or services	22%
Avoided the export of space-related products or services subject to EAR-related controls	20%
Contributed to the creation of non-U.S. companies/business lines in direct competition with the organization’s space-related products or services	15%
Altered space-related R&D expenditures	12%
Caused the abandonment or alteration of space-related business lines	10%
Caused re-location of space-related production/R&D facilities outside the United States due to regulatory burdens	2%

* Based on 995 respondents that selected “Yes” to utilizing U.S. export controls for space-related products.

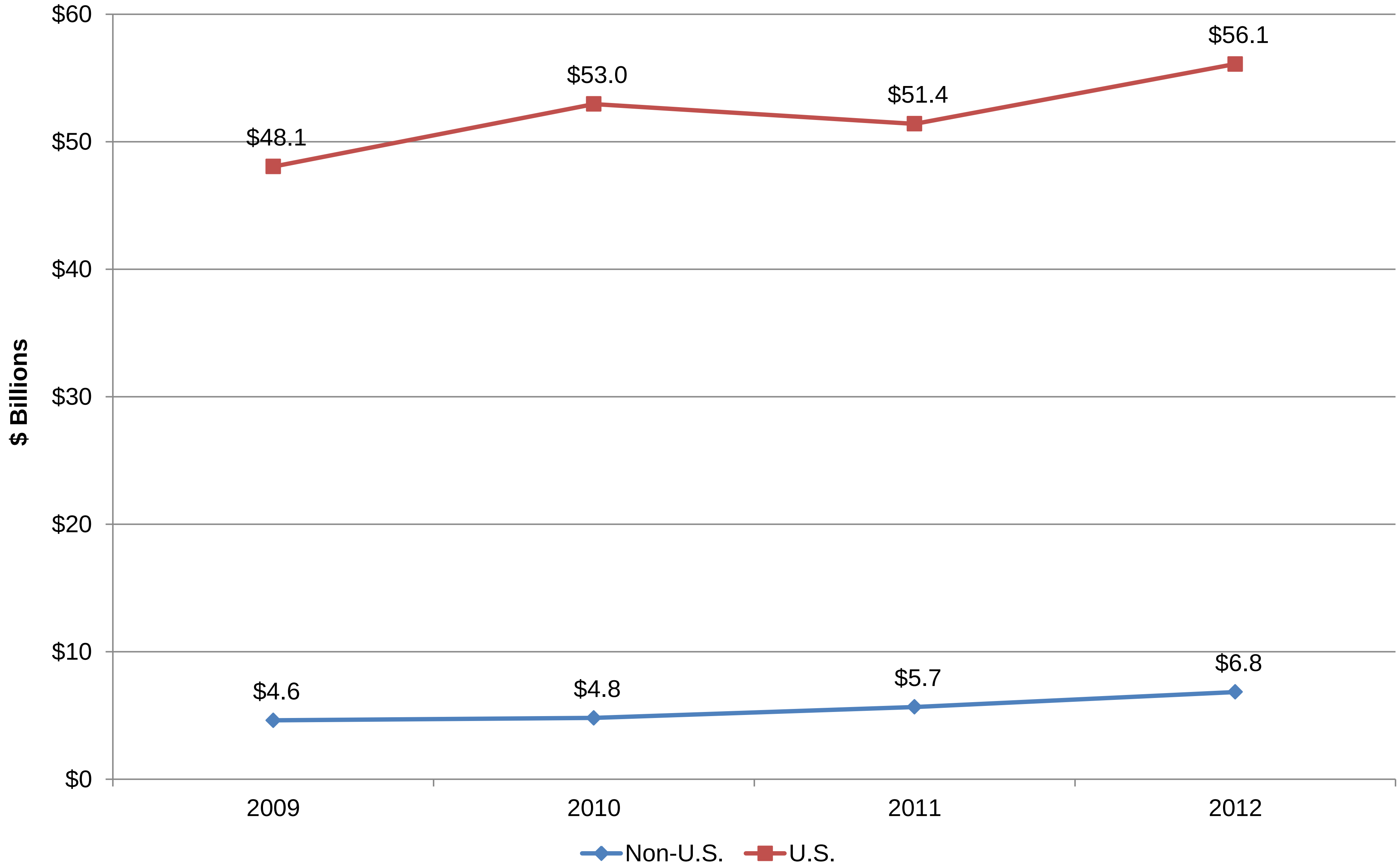
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive Assessment*, May 2013.

Total Sales vs. Space-Related Sales (2009-2012)



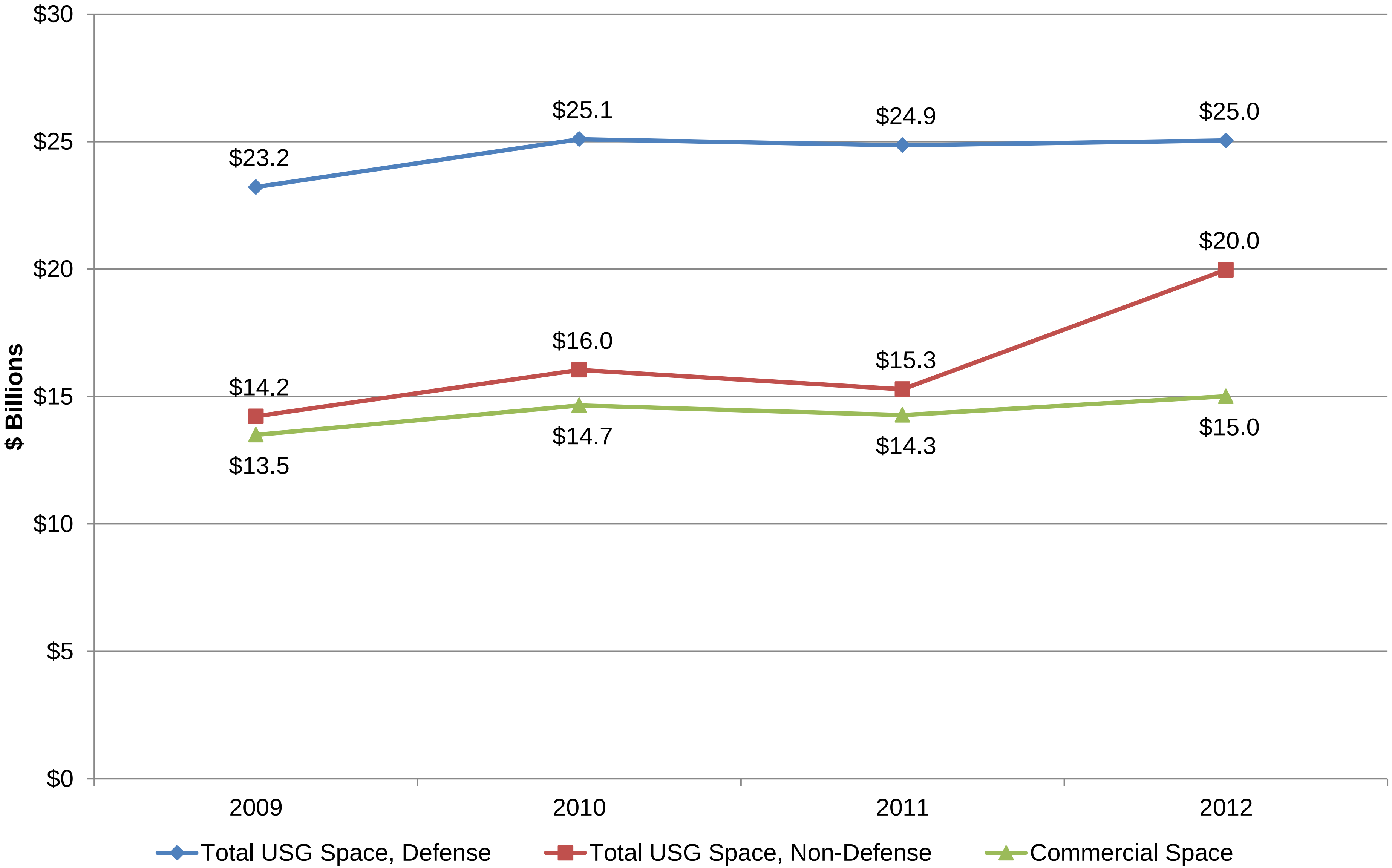
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive Assessment, May 2013.

Total Space-Related Sales by Location (2009-2012)



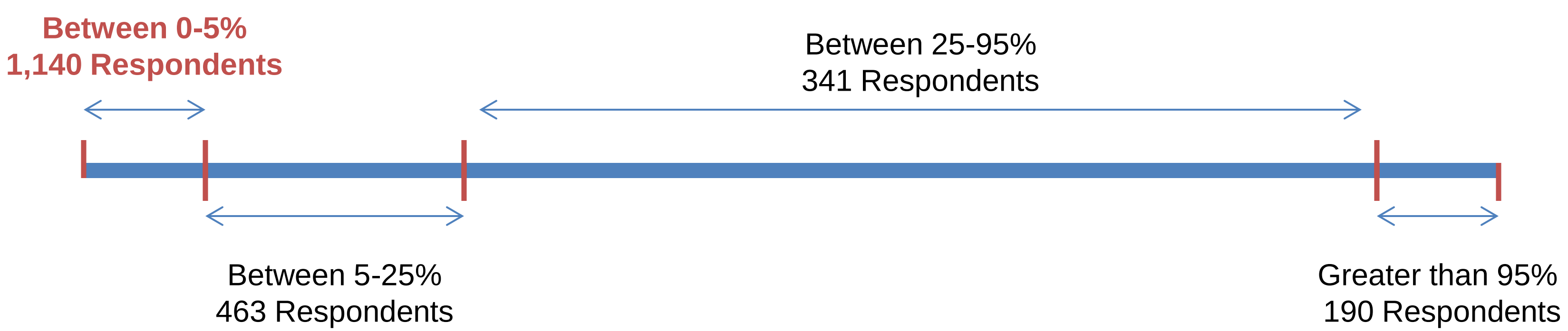
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive Assessment, May 2013.

Total Space-Related Sales by Customer (2009-2012)



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

Exposure to Space-Related Sales*

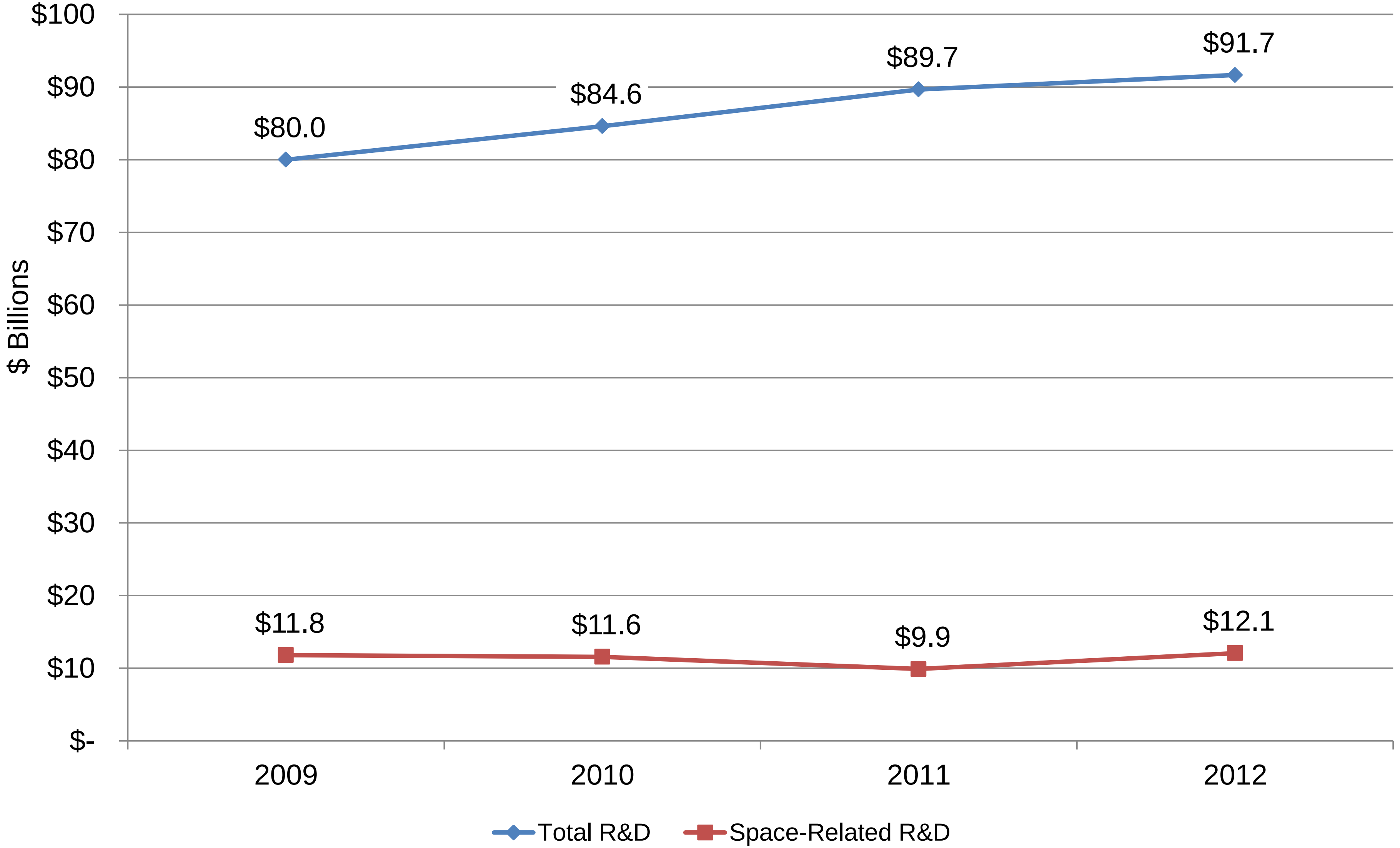


Need to understand the potential impact of USG policy decisions on respondents, space-related or otherwise.

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

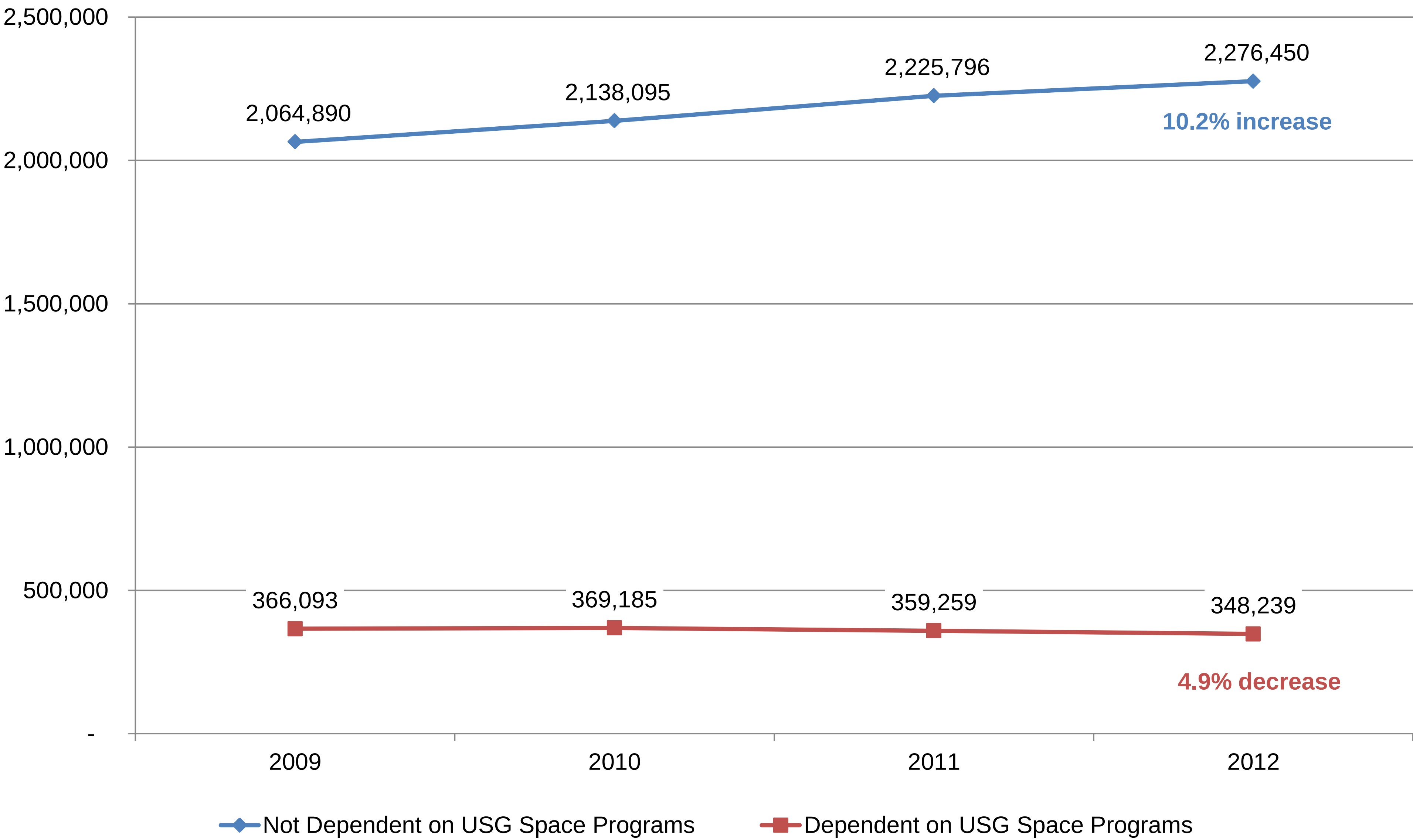
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive Assessment*, May 2013.

Total Research and Development Expenditures (2009-2012)



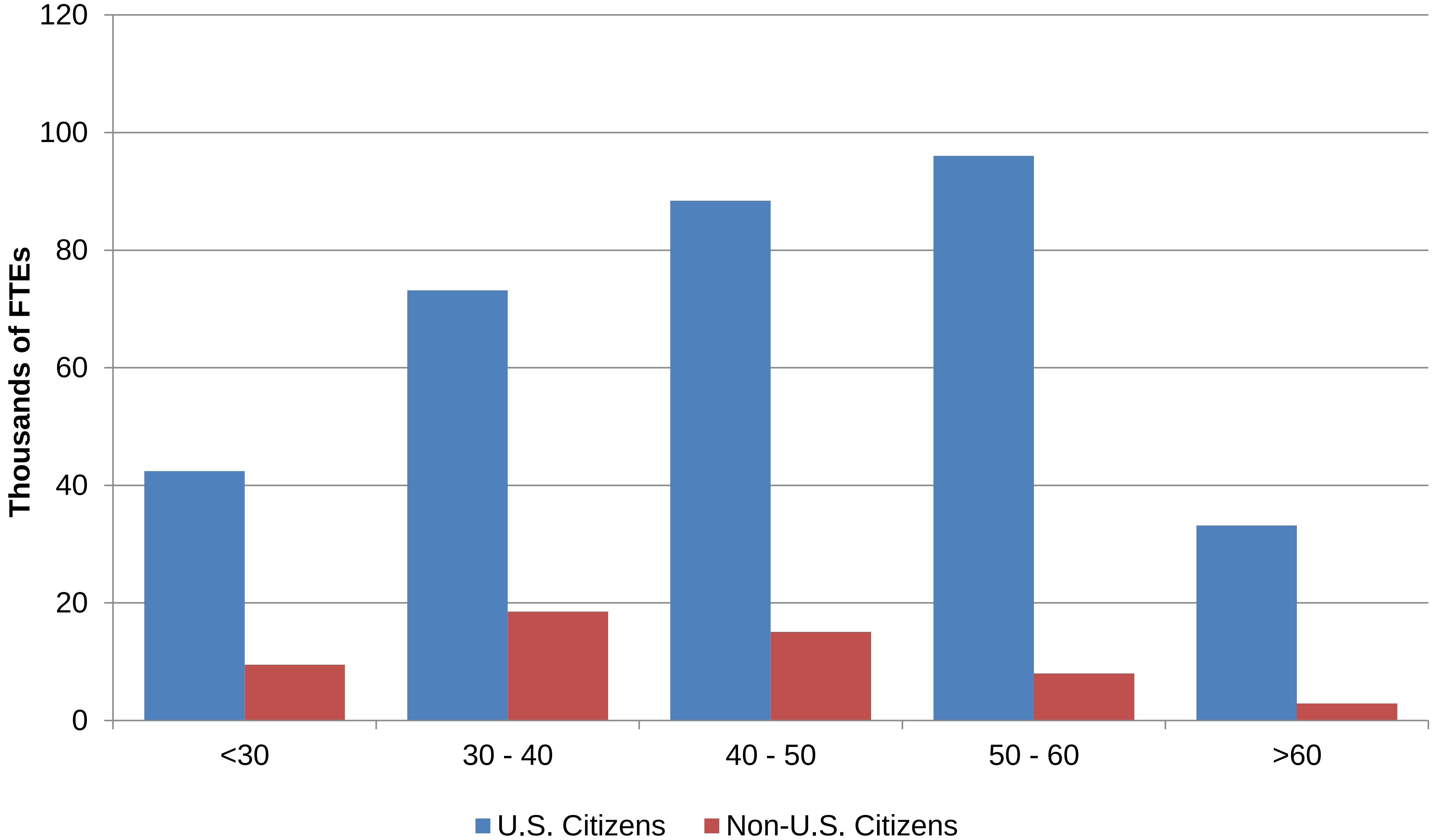
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive Assessment, May 2013.

Full Time Employees – Dependence on Current USG Space Programs



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

Age Range of Engineers, Scientists, and R&D Staff*



* Excluding universities

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

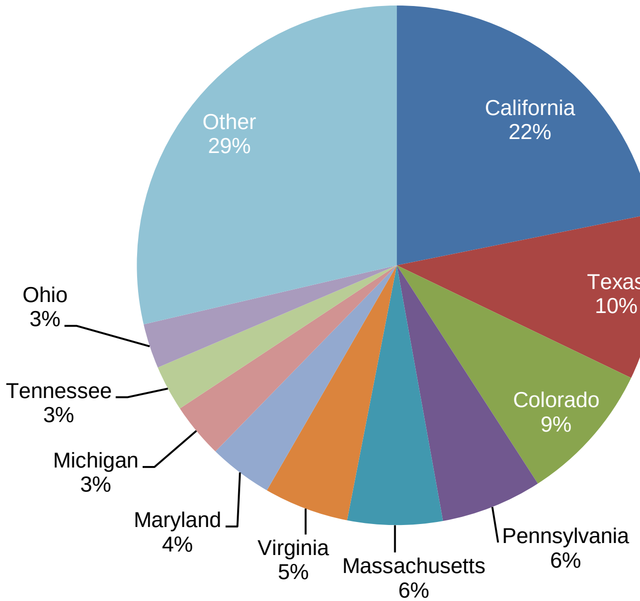
Unfilled Vacancies for Skilled Positions

- Respondents identified how many **unfilled vacancies** they currently have for the following positions:
  - Engineers, Scientists, and R&D Staff
  - Production Line Workers
  - Testing Operators, Quality Control, & Support Technicians
- 1,234 respondents (33 percent) **currently have 24,836 vacancies** for these positions.

Why are these vacancies unfilled?

1. Lack of proper skills
2. Difficulty attracting workers to manufacturing
3. Geographic difficulties
4. Instability of demand

Vacancies by State



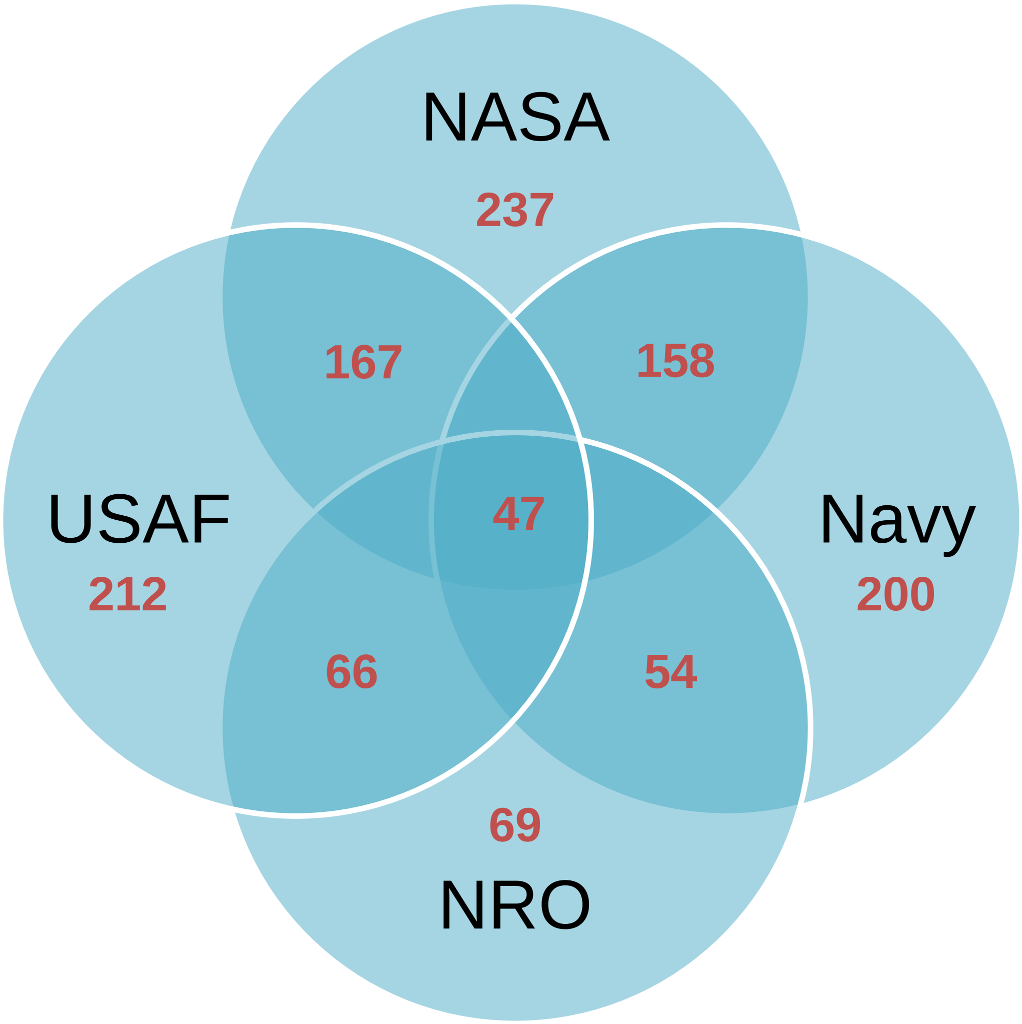
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive Assessment*, May 2013.

BRINGING IT TOGETHER:

Cross-Cutting Data for More Effective Analysis

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

Shared Government Risk



354 respondents were determined to be financially high/severe risk.*

Sample of four USG agencies and their shared supplier risk.

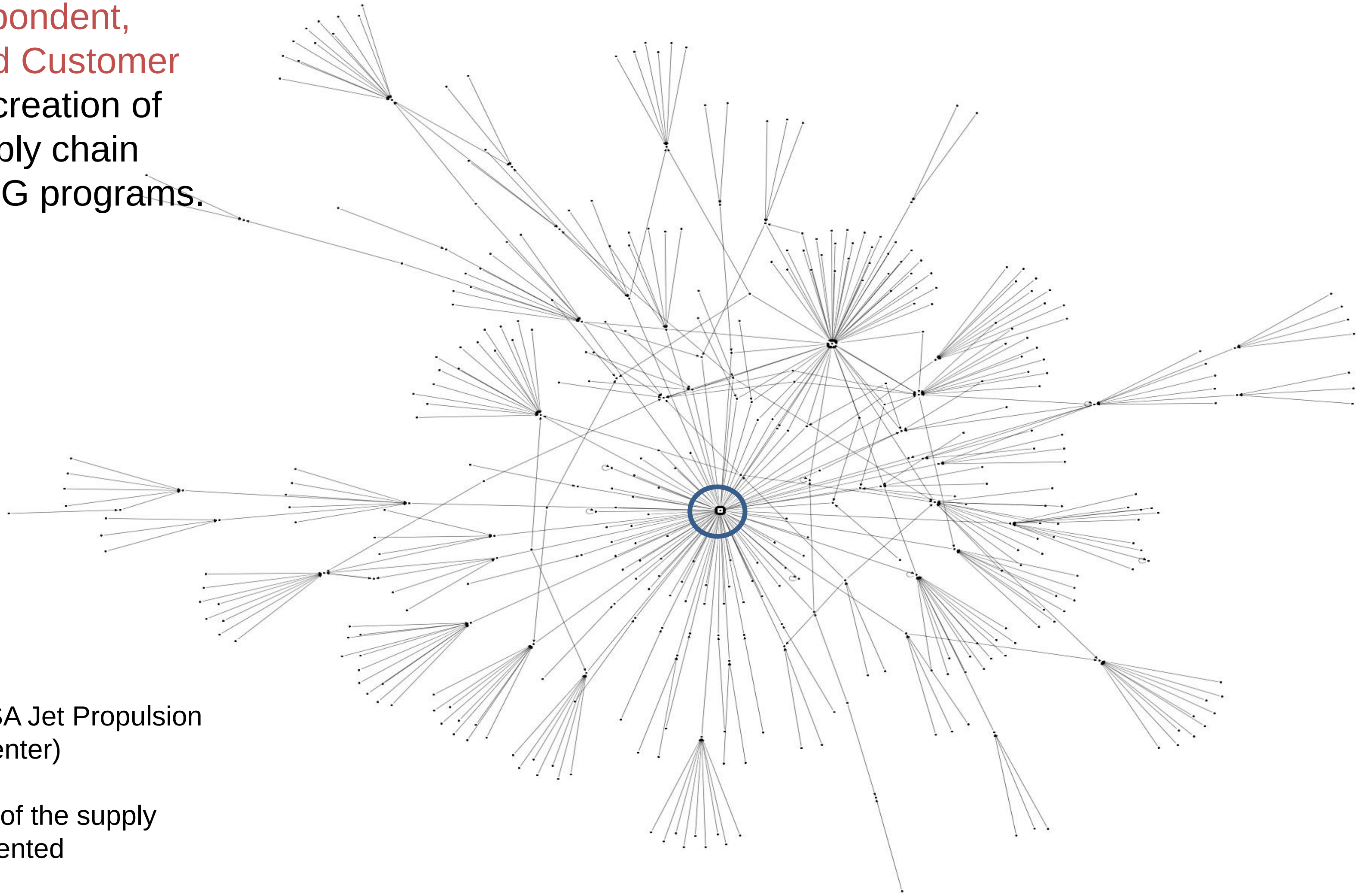
Cross-cutting relationships can be viewed by product or program.

* Based on a series of financial risk measures, taking into account profitability, liquidity, leverage, and others.

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

Supply Chain Mapping:
Mars Science Laboratory (MSL) Curiosity Rover

Linking Respondent, Supplier, and Customer data allows creation of detailed supply chain maps for USG programs.



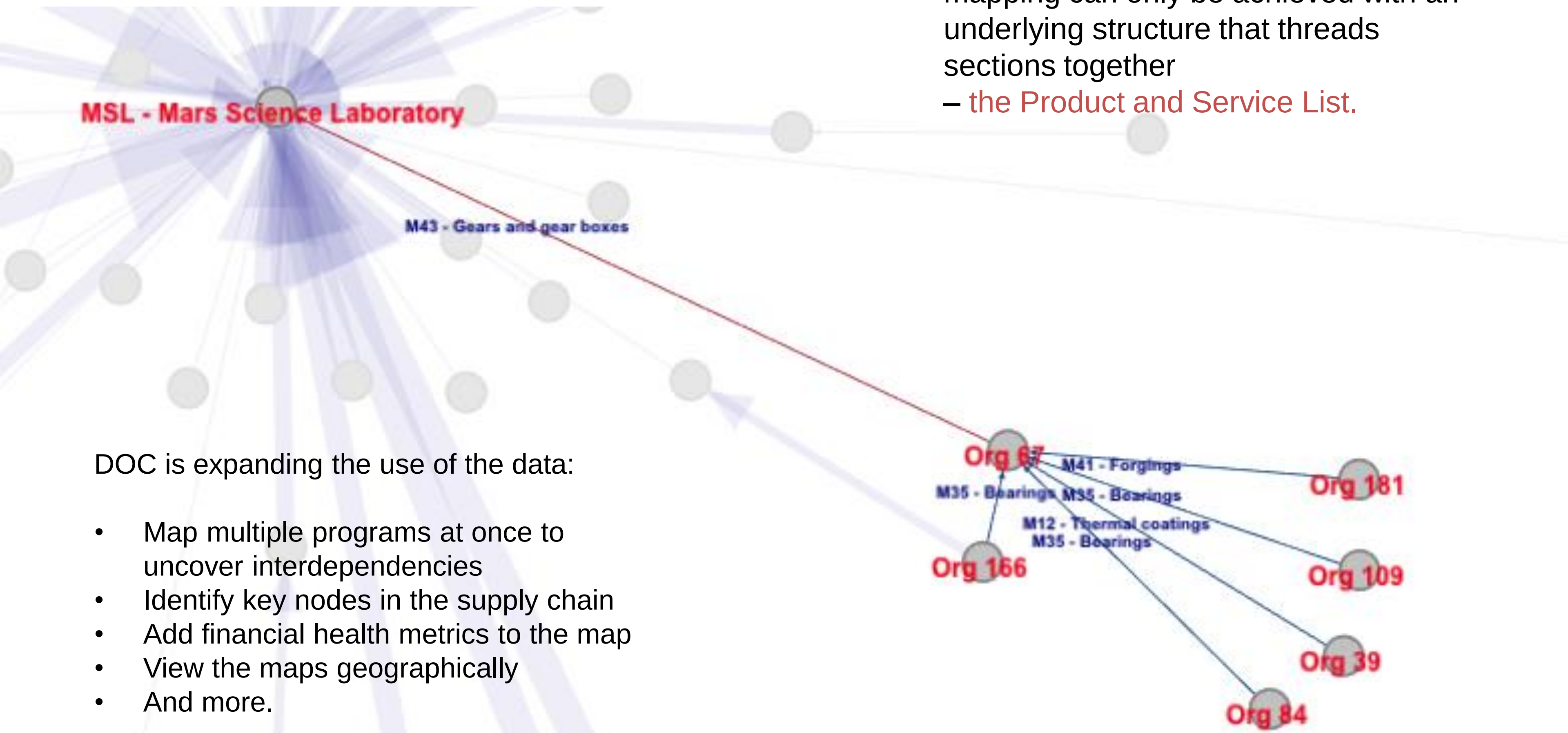
Customer – NASA Jet Propulsion Laboratory (at center)

Approx. six tiers of the supply chain are represented

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

Mars Science Laboratory (MSL) Curiosity Rover - Detailed View

This level of detail in supply chain mapping can only be achieved with an underlying structure that threads sections together
– the Product and Service List.

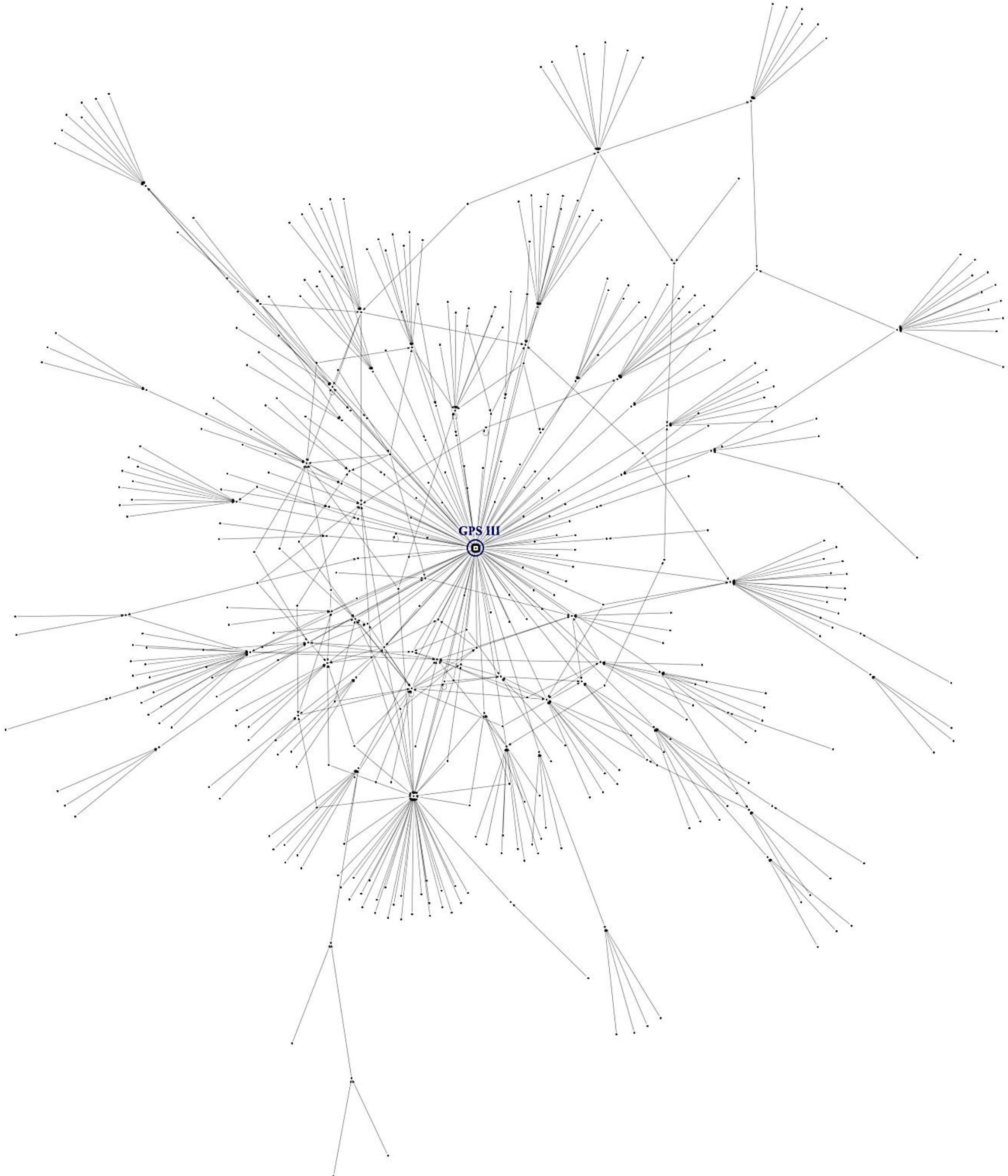


DOC is expanding the use of the data:

- Map multiple programs at once to uncover interdependencies
- Identify key nodes in the supply chain
- Add financial health metrics to the map
- View the maps geographically
- And more.

Partner organizations can tailor these maps to their specific needs.

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



GPS III

462 entities in supply chain map.

43 respondents – indicated potential loss of viability/solvency with a sudden decrease in USG demand.

GPS III respondents support over 236 USG space programs. Most prominently:

- GOES-R (NOAA)
- AEHF (USAF)
- MUOS (U.S. Navy)
- SBIRS (USAF)
- Other GPS Systems

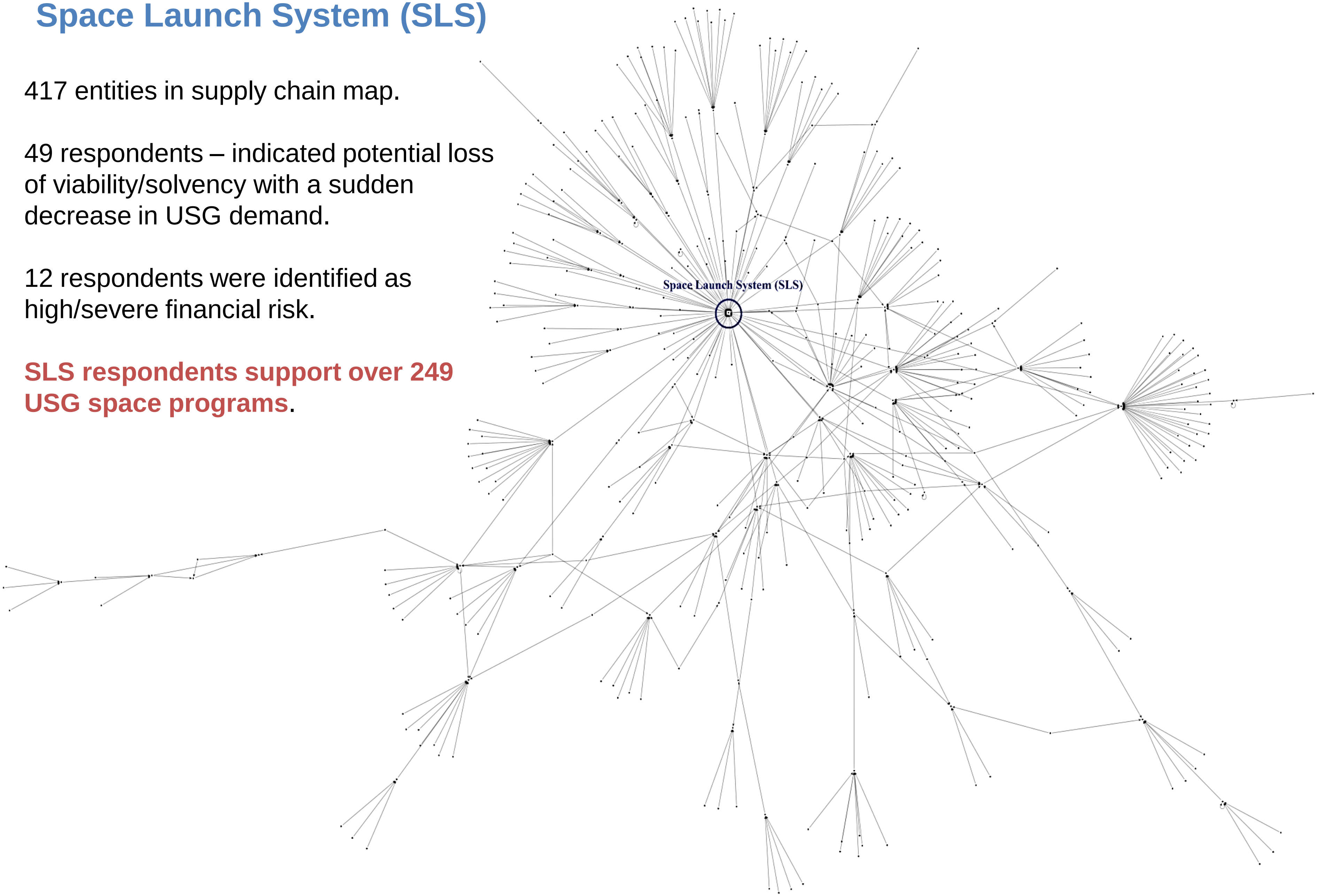
Space Launch System (SLS)

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 respondents support over 249 USG space programs.



Strategic Environment: "Understand the Collective Problem"

Top 10 Issues and Challenges Affecting Respondents' Long-Term Viability
Domestic Competition
Labor Costs
Proposed Cuts to USG Space Programs
Foreign Competition
Variability of Demand
Healthcare
Taxes
Government Acquisition Process
Skills Retention
Government Regulatory Burden

Issues More Commonly Affecting Larger Respondents
Domestic Competition
Foreign Competition
Variability of Demand
Export Controls

Issues More Commonly Affecting Smaller Respondents
Healthcare
Taxes
Labor Costs
Difficulty Presenting Innovative Products to the USG
Barriers to Entry in Commercial Space Market

We have 2,000+ comments from respondents on these topics.

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

Sample Comments Related to Government Acquisition Reform

- “More direct and transparent understanding of needs and opportunities” – Small company.
- “More willingness to pursue, developed, off-the shelf products” – Large company.
- “Advanced notice of opportunities, rapid contracting, monthly progress payments” – Very small company.
- “DARPA has a cyber fast-track program that can make a decision and put small businesses on contract within 2 weeks of receipt of proposal. If the space-related government did that, we could give them more responsive service” – Very small company.
- “Help us find and understand where subcontracting opportunities exist at the prime contractors and within existing programs” – Large company.

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

Respondents Interested in Available USG Assistance Programs and Services	
Program	# of Respondents
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
Government procurement guidelines and e-commerce	346
Marketing assessment skills	329
Product/service development	314
Energy and environmentally conscious manufacturing	213
Patents and trademarks	196
Country Commercial Guides	60

Leverage existing USG resources to give something back to survey respondents.

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

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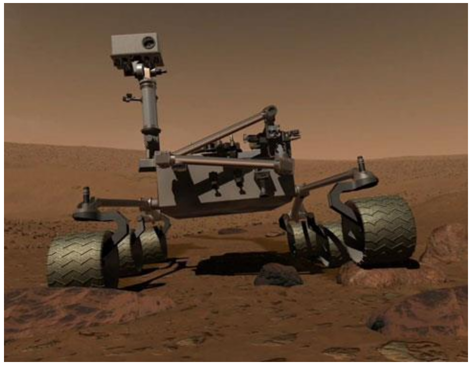
- http://www.bis.doc.gov
  - Under 'Defense Industrial Base Programs.'

- **For further results from this assessment, see: www.bis.doc.gov/SpaceDeepDiveResults**



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