



U.S. SPACE INDUSTRY 'DEEP DIVE'

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

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Office of Technology Evaluation (OTE)



MISSION:

OTE is the focal point within BIS for assessing:

- The effectiveness of export controls
- The capabilities of the U.S. industrial base to support the national defense

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OTE Industry Assessments - Background

- Under the Defense Production Act of 1950 and Executive Order 12656, ability to survey and assess:
 - Economic health and competitiveness
 - Defense capabilities and readiness
- Enable industry and government agencies to:
 - Share data and collaborate in order to ensure a healthy and competitive industrial base
 - Monitor trends and benchmark industry performance
 - Raise awareness of diminishing manufacturing and technological capabilities
- More than 50 industry studies & 140+ surveys

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OTE Industry Assessments - Background

- Mandatory Data Collection Authority under Section 705 of the Defense Production Act.
- Surveys cleared by Office of Management and Budget (OMB) under the Paperwork Reduction Act.
- Data is exempt from Freedom of Information Act (FOIA) requests.
- Initiated for the Military Services, other Government Agencies, Industry Associations, Congress, and other interested parties.

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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.

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U.S. Space Industry 'Deep Dive' Assessment - Background (cont.)

- The 'Deep Dive' survey was distributed to approximately 9,150 organizations, including companies, universities, non-profits, and USG agencies.
- This list was assembled from over 20,000 contributions from our survey partners, previous survey data, and other agency stakeholders (Army, Navy, etc.).
- The companies in this initial mailing represent all tiers of the space-related supply chain – Primes, sub-assembly manufacturers, electronic distributors, software developers, sheet metal providers, engineering service companies, etc.
- Planned second wave of surveys – the suppliers of suppliers – in Fall 2012.

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Status at 30 Days Since Initial Mailing:

Survey Status	Number of Organizations
Outstanding	7,346
Working	687
Exempt	454
Out of Business	28
Acquired by Another Company	44
Extension	158
Incomplete	270
Complete	180

- Nine month collection divided into three month waypoints.
- Each waypoint offers an opportunity to collect, compile, analyze, and share preliminary data.
- The first waypoint in September 2012.

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Survey Content

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Survey Topics

- Codes: DUNS, CAGE, NAICS, PSC
- Mergers & Acquisitions, Joint Ventures
- 205 USG Space Programs – USAF, NASA, NOAA, MDA, Army, Navy
- 16 Major Product & Service Segments including:
 - R&D and Services
 - Equipment and Materials
 - Spacecraft
- Suppliers for Respondents' selected Products & Services (U.S. and non-U.S.)
- Customers for Respondents' selected Products & Services (U.S. and non-U.S.)

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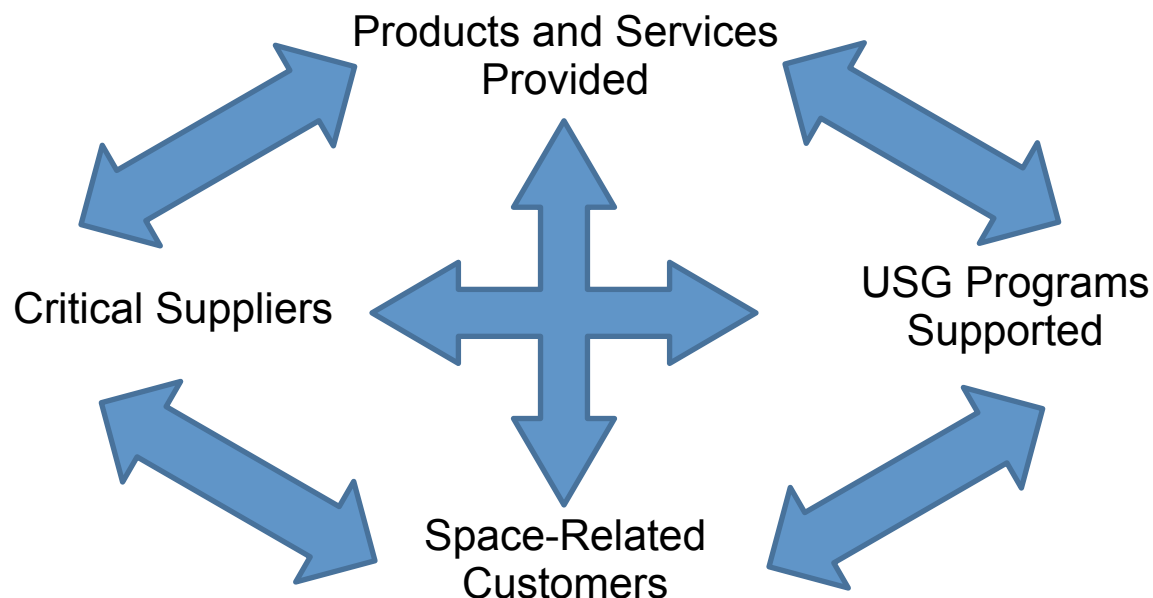
Survey Topics (cont.)

- Inventory
- Rare Earth Elements and Counterfeiting Issues
- Top competitors (U.S. and non-U.S.)
- Competitive Challenges
- Impacts of decreased USG demand
- Sales
- Financials
- Research & Development
- Capital Expenditures
- Employment
- Areas of Potential USG assistance for Respondents

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The Core of the Survey: Data Connectivity

OTE and the partner agencies sought to design a survey template that connects four major question areas, providing a flexible and powerful tool to give structure to the U.S. space industrial base.



All of these areas are connected by the Product and Service List.

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The Product and Service List

- The Product and Service List is comprised of 360 individual products and services, grouped into 16 general segments.
- 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

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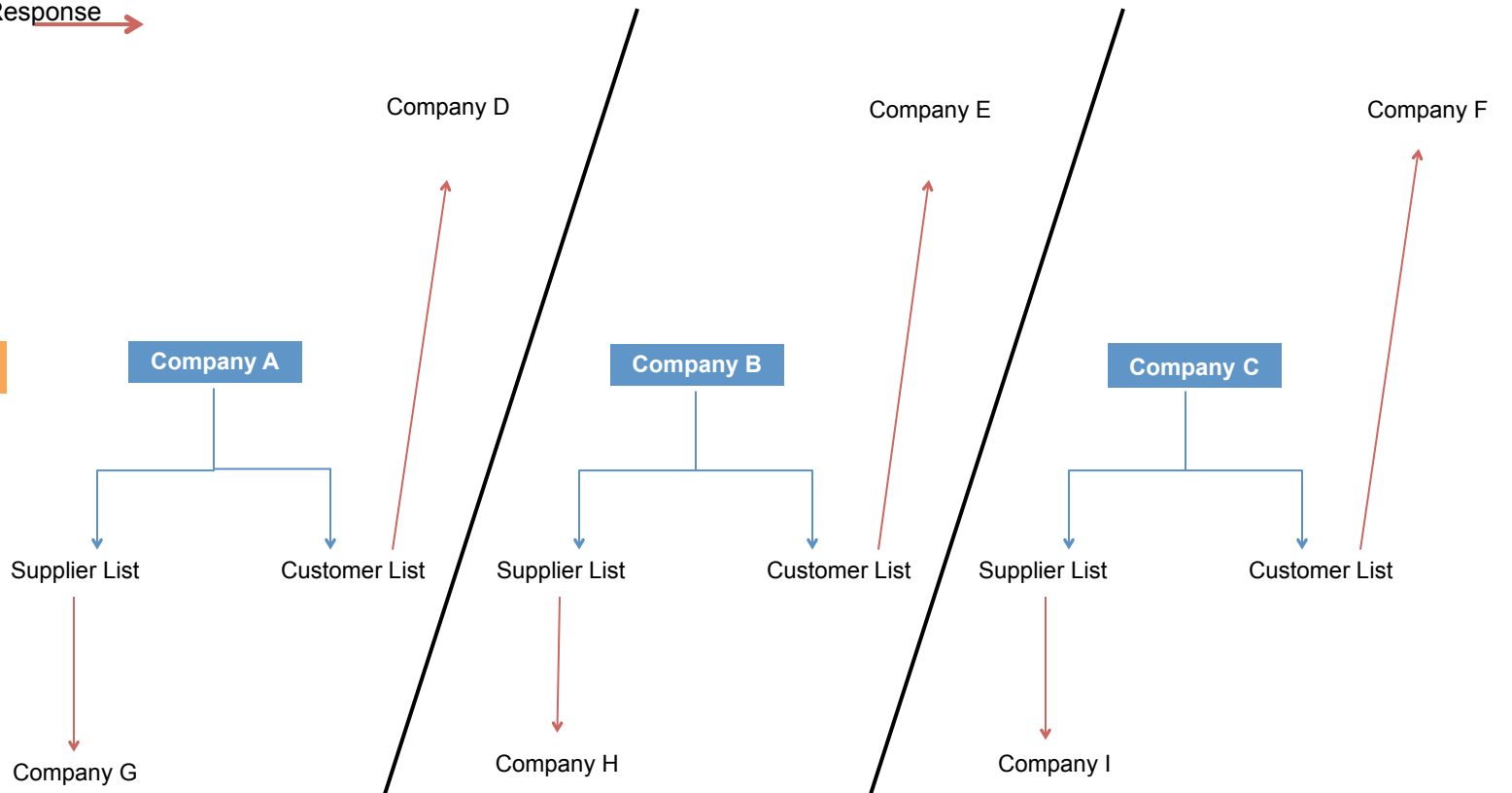
The Product and Service List (cont.)

- Why create a Product and Service List? It provides a uniform structure that links all survey questions.
 - In other words, we created a unique identifier to quickly connect different survey questions without having to spend time refining and editing the data.
 - Example: In our survey, we have one code for Integrated Circuits. Other surveys often rely on open-ended inputs that make the data hard to use.
 - In the later case, multiple inputs are entered differently but are intended to be the same. Integrated Circuits, ICs, Integrated Circuit, Int. Circuit are all different inputs.
 - The Product and Service List creates uniformity **within and across the surveys.**
- Having a Product and Service List allows us to identify:
 - All manufacturers of a particular product;
 - Suppliers that support the manufacture of that product;
 - USG programs that utilize on that product;
 - Suppliers that allow the respondent to make that product for a USG program;

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Link through Survey Response →

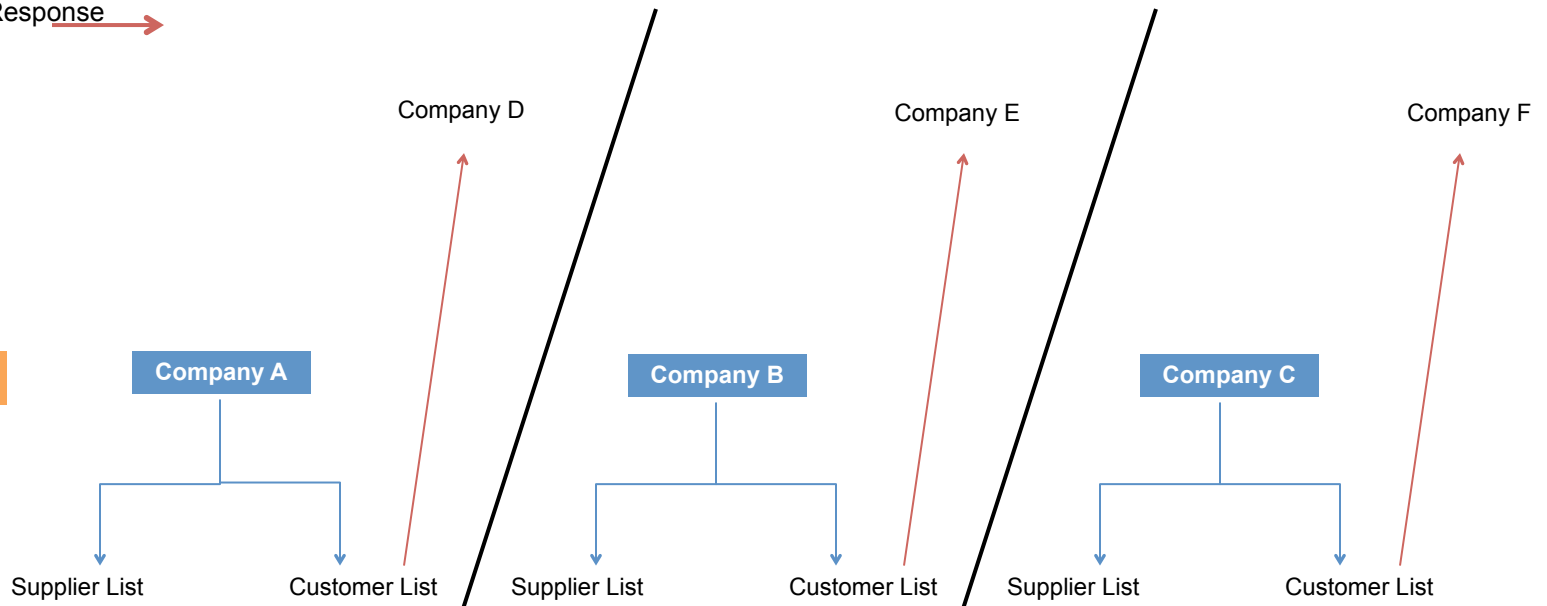
First Survey Wave



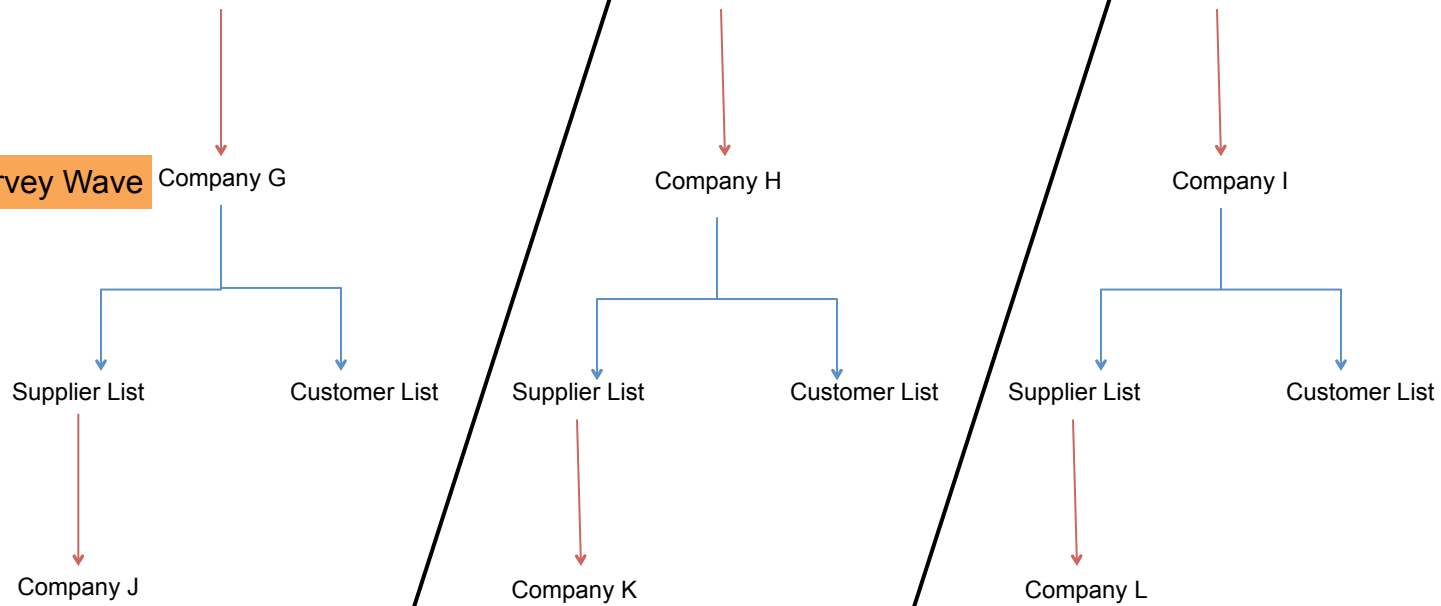
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Link through Survey Response →

First Survey Wave

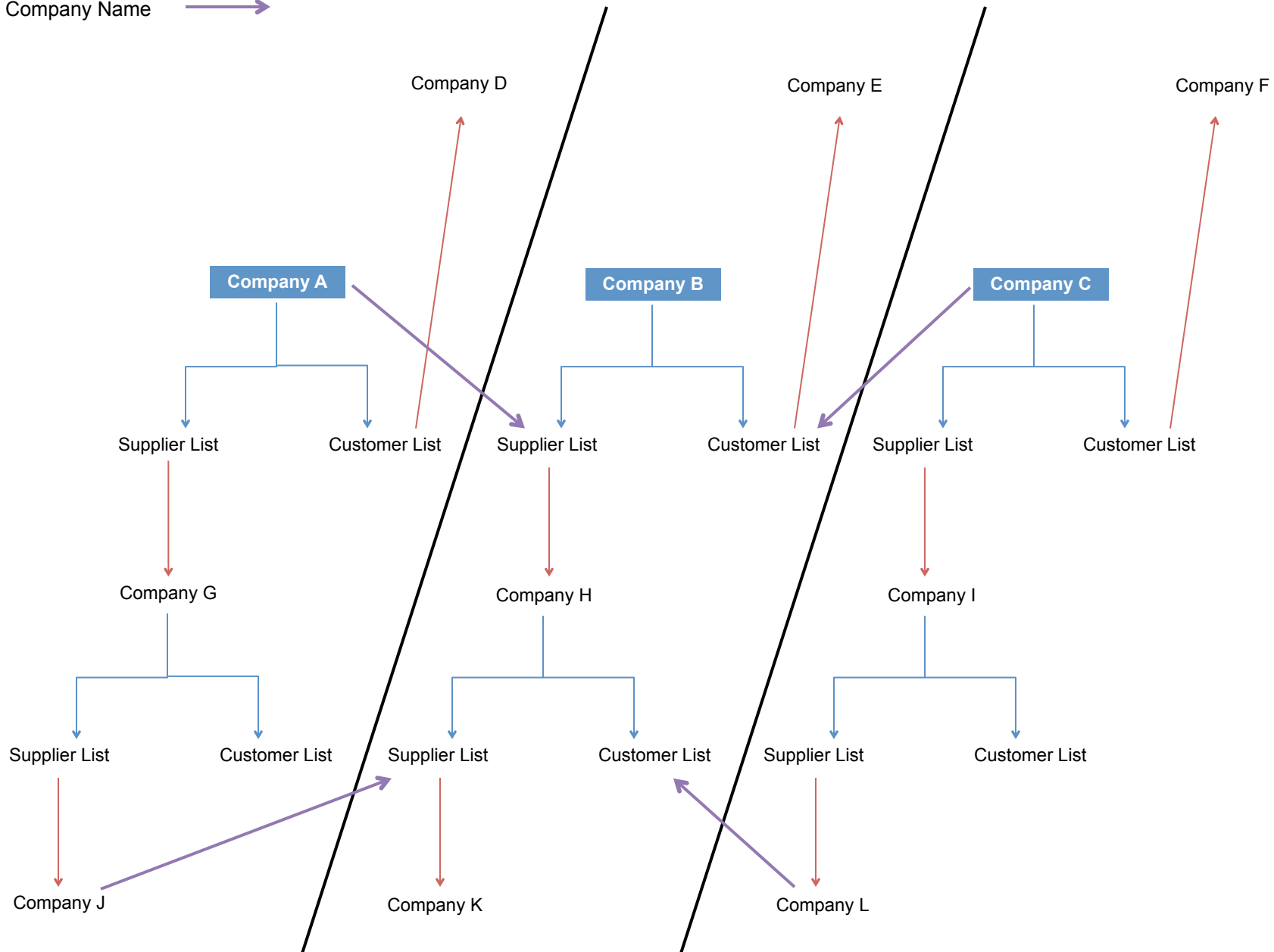


Second Survey Wave



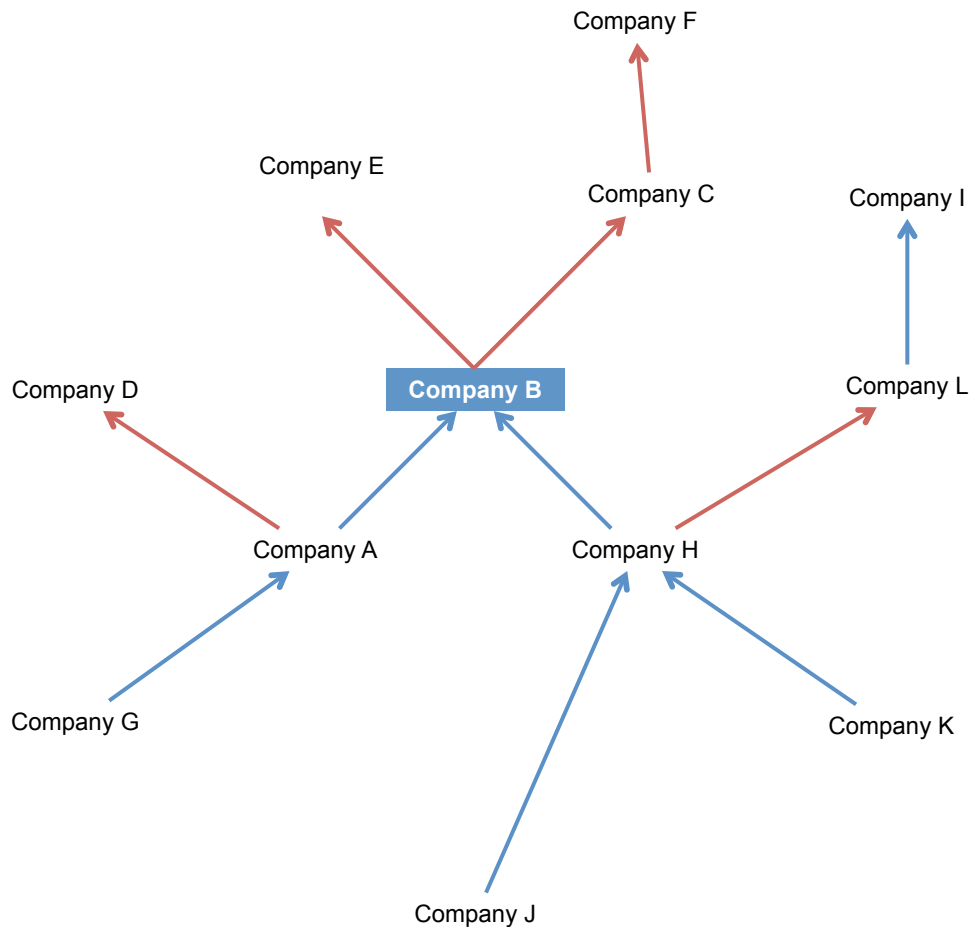
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Link through Company Name →



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Space Supply Chain From Company B's Perspective



Similar constructs can be developed by program or product/service

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Section-by-Section Overview

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Relationship with the U.S. Government

(Survey Section 10)

- Respondents identify whether they are currently providing space or non-space related support to any USG agency.
 - Helps us identify the critical nodes in the supply chain that can have interagency impacts.
 - Starting point for prioritization and **interagency collaboration**.
- Discussion of specialty, low-volume, space-related products and services. Are respondents:
 - **Capable** of providing them?
 - **Willing** to provide them?
 - Open to USG incentives or reforms to provide them. If so, what are they?

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Demand and Production

(Survey Section 11)

- Are respondents vulnerable to variability in USG and commercial demand?
 - Organizations that are highly vulnerable to changes in USG programmatic or purchasing changes.
 - Can commercial demand can make up for changes in USG demand?
- Specific impacts a sudden decrease in USG will have on their organization.
 - Trends in particular industrial base sectors (e.g. manufacturing vs. distribution vs. research & development)
 - Helps to create a risk profile for each respondent. What capabilities might we lose?
- Do respondents still want to be a part of the USG's space industrial base?
 - We ask them directly and receive detailed explanations.
 - What factors are influencing their decisions?
 - **Are they going to be there when you need them next time?**

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Sales

(Survey Section 12)

- Breaking out sales based on U.S./Non-U.S. location, space vs. non-space related, USG and commercial, etc.
- How much influence does the USG have over a respondent's decision-making?
 - A higher percentage of USG sales means your decisions may have great impact on a company's operations and viability.
 - A very low percentage of USG sales may mean that your ability to influence their decisions is extremely limited.
 - Understanding this customer segmentation is very important!

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Export Controls

(Survey Section 13)

- Questions detailing the impact of U.S. export controls on space-related sales.
 - Pertains to the International Traffic in Arms Regulations (ITAR) and the Export Administration Regulations (EAR).
- Not only an estimate of lost export sales, but questions detailing behavioral changes that have impacted international competitiveness, including:
 - Alterations to space-related R&D;
 - Relocation of manufacturing operations;
 - Creation of incentives for the “design-out” of U.S. origin space products;
 - Elimination of space-related product/service lines.
- Data should provide a comprehensive snapshot of the impact of export controls on the U.S. space industry.

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Financial Health

(Survey Section 14)

- Respondents are asked to provide detailed financial information (Corporate or Business Unit) – particularly important for privately held companies.
- Identify respondents that are under short- and long-term financial stress.
 - Monitor common warning signs.
 - Cross-reference to:
 - Products and Services to identify at risk capabilities.
 - USG space programs supported to identify potential disruptions and assess their impact.

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Research & Development and Capital Expenditures

(Survey Section 15-16)

- Identify trends in space-related innovation.
- Uncover the primary sources of space-related innovation and investment in the industrial base.
 - See the difference between general R&D spending and space-specific R&D.
- Isolate the previous and potential future impacts of reductions in USG space-related spending on R&D and Capital Expenditures.
- Discussion of the difficulties in bringing initial research to production and market.
 - Can the USG assist companies in being independently successful with their innovative products and services?

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Employment

(Survey Section 17)

- Employment trends over time, with specific focus on issues related to Engineers, Scientists, and R&D Staff
- Full time employees working on space-related projects.
 - Does space keep them employed?
- Aging workforce issues, particularly with regard to Engineers, Scientists, and R&D Staff.
- Discussion of the ability to hire skilled workers.
 - Do respondents have open positions that they are having trouble filling?
 - What issues are they finding? Lack of workforce skills? Visa difficulties?

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Outreach

(Survey Section 18)

- OTE created a question that allows respondents to ask for more information about federal and state government programs that may assist their organization. Topics included:
 - Business development (joint ventures, new markets, etc.)
 - Product/service development
 - Manufacturing technology development
 - Financing (access to capital, loans, etc.)
 - Exporting and export licensing assistance
 - Patents and trademarks
 - SBIR/STTR contracts
- An excellent opportunity for interagency collaboration, leveraging existing resources, in order to directly assist respondents supporting the space industrial base.

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Enhanced Analytical Capabilities

- Linking different survey sections allows for new insights that may be useful for a broader audience.
- Small Businesses - Every question can be sorted by type of small business.
 - What capabilities do small businesses have?
 - Are they having trouble securing R&D funding?
 - Are small businesses more vulnerable to counterfeits than larger businesses?
- Business Lines – Every question can be sorted by respondent's business lines.
 - Are respondents focused on product & design engineering experiencing slower growth compared to integration- or manufacturing-based respondents?
 - Are raw material providers vulnerable to shifts in USG demand?
 - Are manufacturers having difficulty finding material finishing or preparation companies?
- There are many other ways to link different questions and sections, independently or with assistance from OTE.

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Moving Forward

- The DOC, USAF, NASA, and NRO team has created a flexible baseline model that can be adjusted to suit other critical sectors.
- The Deep Dive survey is the latest, most innovative survey OTE has constructed. It is a significant leap forward from an analytical perspective.
 - Uniform backbone structure that links different survey sections.
 - Dynamic drop-down menus that allow for easier survey completion.
 - Integration of different question areas for more intuitive analysis.

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Working With BIS/OTE

- We look forward to continuing collaboration on the Space Industry Deep Dive assessment.
- The data collection and assessment will provide many opportunities for additional projects, outreach to industry, and further interagency cooperation.
- We welcome opportunities to work with your organization on other industry or technology specific topics.

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