Identifying and Mitigating Industrial Base Risk for the DoD: Results of a Pilot Study

Sector-by-Sector, Tier-by-Tier (S2T2) Fragility and Criticality Assessments

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Outline

- Scoping the Problem
- Methodology
- Results
- Findings
- Next Steps
Acquisition, Technology and Logistics Manufacturing and Industrial Base Policy

MIBP Mission: Ensure access to robust, secure and innovative industrial capabilities to fulfill short- and long-term National Security requirements
Budget Swings Have Significant Consequences for the Industrial Base

Contractors & their vendors during

**Upswings:**
- Acquire resources to address their schedule and performance requirements
- Resources may be limited due to demand

**Downswings:**
- Decide how much of that capability they can afford to maintain or
- Decide to exit the defense market
Will Warfighter Get Support When Needed?

- Capitalism: Markets will right-size based on demand
  - Companies enter when it is profitable, and exit otherwise
- Many capabilities used by defense exist during upswings and downswings
  - Capabilities “easy” to reproduce; low barriers to entry
  - Market has alternatives or substitutes
- But some capabilities are sensitive to defense procurement swings
  - Small or no market without defense
  - Little slack available during upswings
  - Difficult to balance capital investments, specialized labor with large budget changes
S2T2 Provides Approach for IB Risk Assessment

**S2T2 Program Vision**

- Develop a collaborative, repeatable, fact-based DoD-wide internal ability to evaluate the impact of acquisition decisions on the industrial base (IB)
- Monitor and assess
  - Industry readiness, competitiveness, ability to innovate, and financial stability
- Supply analysis to decisionmakers
  - To support investment decisions for preservation and transformation of the IB to support national security objectives

**S2T2 Program Objectives**

- Integrate IB considerations into acquisition strategy decision making
- Identify successful IB management efforts
- Reduce duplication of effort in OSD and Services
- Establish early warning indicators
- Identify Industrial Base risk, particularly at the lower tiers of the supply chain

Leverage a statistically-validated & standardized Fragility & Criticality (FaC) assessment process to analyze risk across the tiers of the Industrial Base.
## S2T2 FaC Process

<table>
<thead>
<tr>
<th>Process Activity</th>
<th>Action</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select Sector/SubSector</td>
<td>Scope the problem (existing risk assessments; program shutdowns)</td>
<td>Preliminary Sector Taxonomy</td>
</tr>
<tr>
<td>Search Available Data</td>
<td>Identify IB-related risks &amp; related capabilities/products</td>
<td>Expanded Taxonomy and Product Supplier Pairs</td>
</tr>
<tr>
<td>FaC Screening/Filtering</td>
<td>Focused set of IB-related risks for further assessment</td>
<td>Screened IB/Issues</td>
</tr>
<tr>
<td>Conduct FaC Matrix Assessment</td>
<td>Facilitated scoring, based on standardized criteria, by SMEs</td>
<td>FaC Risk Matrix</td>
</tr>
<tr>
<td>Validate &amp; Mitigate</td>
<td>SME “deep dive” into IB risk areas; facility visits</td>
<td>High Risk IB Issues</td>
</tr>
</tbody>
</table>

**S2T2: iterative, repeatable, collaborative, fact-based**
Assessments Provide Guidance for Action

- Zoom Threshold: 40%
  - Not Stated
  - Not FaC
  - Watch
  - Further Analysis
  - Action Required
  - Ongoing Mitigation

- Criticality vs. Fragility

- Decrease Label Size
- Increase Label Size

- Plot Specific Item(s) vs. Plot Capability or Firm/Product Pair

- Replot Chart
FaC Pilots Provide Insights and Direction

- Key lessons learned
- Test analytic framework
- Refine factor definitions
FaC Pilots: Some Key Lessons Learned

★ FaC process well-suited to assessing a portfolio of suppliers supporting similar capabilities, and deriving cross-cutting solutions
  ★ Program-specific FaC’s that repeat IB assessments reveal little new information

★ Some criticality factor definitions ambiguous, redundant; Some fragility factors are difficult to obtain

★ Insure the taxonomy is standardized
  ★ Map results to taxonomy
FaC Pilots: Test Analytic Framework (1 of 2)

★ Conclusion: Pilots improved understanding of factor definitions and scoring

★ Combine FaC-Matrix data from pilot assessments
  ★ Consistent scoring?
  ★ Redundant factors?
  ★ Contribution to criticality/fragility constructs?
  ★ Missing factors?

★ Empirical tests: Weights
  ★ Different weights employed, but same core set of factors deemed “most important”
  ★ Applying uniform weights to combined data set do not alter the observed outcomes from individual FaC’s
Empirical tests: Redundant factors

- Pilots indicated redundant, difficult factors
- Eliminating sub-set of fragility factors from combined data set do not alter the observed outcomes from individual FaC’s

Statistical tests: Criticality

- Factor analysis: Identified 2 unique sets of factors consisting of 5 items: Defense unique, skilled labor, design intensity, reconstitution cost, availability of alternatives
- Cronbach’s Alpha: 5 items reliably measure the same latent construct
- Combined construct: “niche capabilities,” “difficult to replace if lost”
- Empirical application of sub-set of criticality factors do not alter the observed outcomes from individual FaC’s
FaC Pilots: Refine Definitions, Weights

- **Criticality:** “critical niche products,” “difficult to replace if lost”
  - Pilots suggest missing factor: *equipment and facility*
  - Pilots suggest clarification: “Reconstitution” to consider impact on DoD relative to *time* to restore the capability, if lost
  - 6 factors consistent with construct, equal weights

- **Fragility:** “risk of exit by current *supplier*, risk current *market* cannot meet requirements”
  - Pilots suggest doing deep dive to gain factory-floor perspective when warranted
  - 4 factors consistent with construct, equal weights: 2 supplier, 2 market
  - Improve data collection for supplier information
S2T2 Fragility and Criticality Criteria: Refined based on FY13 Pilot Assessments

**Capability = technology, part, component, product**

**Criticality:**
- Characteristics that make a specific *Capability* difficult to replace if disrupted

- Defense unique capability
- Skilled labor requirements
- Defense Design requirements
- Facility & Equipment requirements
- Reconstitution time
- Availability of Alternatives

**Fragility:**
- Characteristics that make a specific *Capability* likely to be disrupted

- Financial Outlook *(Current provider)*
- DoD Sales *(Current provider)*
- Firms in Sector *(Existing market)*
- Foreign Dependency *(Existing market)*

S2T2: collaborative, iterative, repeatable, fact-based
Tools for FY14 FaC Assessments

- **FaC-List** – collect information so that it is more easily shared
- **FaC-Matrix** – include options to identify and isolate areas of interest
- **FaC-Validation** – template to document results more consistently
- **FaC-Summary** – guidelines to communicate findings
Next Steps for FaC Process

- Conduct pilot FaC assessments for skills
- Improve capture and sharing of FaC data
- Data mining to improve fragility ratings
Leadership Awareness

Deputies Management Action Group (DMAG) chaired by DEPSECDEF

- Spring 2013 – Include Industrial Base Considerations in POM planning.
- Late 2013 – Resource Decision Memorandum for remedial actions on imminent industrial base risks.
- Late 2014 – Industrial Base DMAG requested by USD (AT&L), to be informed by 2014 assessments.

2014 Industrial Base Assessment milestone: DEPSECDEF DMAG
BACK-UP CHARTS
Four Principle Types of Decision Points

★ Individual Program Acquisitions
  ☆ Milestone A
  ☆ Milestone B
  ☆ Milestone C
  ☆ Termination

★ Budget Cycle / Portfolio Reviews
  ☆ Annual/Bi-annual
  ☆ Secular defense build/shrink
  ☆ Annual Report

★ Long-Term Working Groups
  ☆ Defense Production Act (DPA) Study Groups
  ☆ Supply Chain Risk Management
  ☆ DIB Information Assurance
  ☆ Critical Infrastructure Program
  ☆ Space Industrial Base Council/Critical Technologies Working Group
  ☆ Joint Industrial Base Working Group (JIBWG)
  ☆ NATIBO

★ Emergent Issues
  ☆ CFIUS/M&A
  ☆ Individual Company Issues
  ☆ Individual Program Issues
  ☆ External event
  ☆ Surge

Having current & complete analyses of the IB enhances DoD Senior Leader decision-making & allows timely identification of the impacts of program changes!
Assumptions

★ DoD will never have complete Industrial Base visibility
  ☆ But, most areas of the industrial base are not critical or fragile.
  ☆ S2T2/FaC approach quickly winnows out non-critical capabilities to focus attention – and resources – on areas of potential risk

★ IB Assessment Process
  ☆ Should take maximum advantage of information routinely produced as part of the normal business process
  ☆ Must accommodate flexibility where warranted and uniformity where required
  ☆ Is iterative and seeks to continuously expand DoD’s insight into IB capability and constraints.
<table>
<thead>
<tr>
<th>Rating</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology, part. Criticality = Characteristics that make a specific product or service difficult to replace if disrupted.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Defence Unique</strong></td>
<td>Q: To what degree is the market for this capability <strong>commercial</strong>?</td>
<td>80% or more commercial market</td>
<td>30-60% commercial. Low barriers to enter market</td>
<td>30-60% commercial. Significant and costly barriers to entry</td>
<td>20% or less commercial. Relatively low barriers to entry</td>
</tr>
<tr>
<td><strong>Skilled labor requirement</strong></td>
<td>Q: To what degree are <strong>specialized skills</strong> needed and available to integrate, manufacture or maintain this capability?</td>
<td>Minimal special skills. Expertise commonly available or easily obtained.</td>
<td>Specialized skills, but processes well documented. No workforce issues.</td>
<td>Highly specialized skills, no workforce issues near term.</td>
<td>Highly specialized skills, potential workforce issues near term (e.g. limited specialists available)</td>
</tr>
<tr>
<td><strong>Defence design requirements</strong></td>
<td>Q: To what degree is <strong>defense-specific knowledge</strong> required to reproduce this capability, an alternative, or the next generation design?</td>
<td>Designs are commercially available. Minimal defense-related knowledge required.</td>
<td>Designs are commercially available, but some defense-specific (non-commercial) knowledge required.</td>
<td>Specialized and defense-specific, no workforce issues near term</td>
<td>Specialized and defense specific, potential workforce issues near term (e.g., limited availability)</td>
</tr>
<tr>
<td><strong>Facility &amp; Equipment requirements</strong></td>
<td>Q: Are <strong>specialized equipment or facilities</strong> needed to integrate, manufacture, or maintain this capability?</td>
<td>Minimal. Equipment/facilities are common</td>
<td>Limited. Alternative sources can produce similar products.</td>
<td>Moderate. (e.g., qualification of production line; specialized skills or technology)</td>
<td>Specialized</td>
</tr>
<tr>
<td><strong>Reconstitution Time</strong></td>
<td>Q: What is the impact on the DoD in <strong>time to restore</strong> this capability if it is lost?</td>
<td>Minimal time impact to restore</td>
<td>Limited time impact to restore</td>
<td>Moderate time impact to restore</td>
<td>Significant time impact to restore</td>
</tr>
<tr>
<td><strong>Availability of Alternatives</strong></td>
<td>Q: To what degree are <strong>cost, time, and performance-effective alternatives available</strong> to meet DoD needs?</td>
<td>&quot;Drop-ins&quot; exist and are currently used in other programs</td>
<td>Alternatives exist. Low/limited impact to substitute</td>
<td>Moderate impact to incorporate substitute alternatives</td>
<td>Significant impact to use substitute alternatives</td>
</tr>
<tr>
<td>Rating</td>
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</tr>
<tr>
<td>Fragility = indicator of whether the Department will receive what it needs when it needs it from (1) the current provider, (2) the existing market</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Financial Outlook (current provider)</strong></td>
<td>Q: What is the risk of this facility going out of business or exiting the market for this capability?</td>
<td>Very low risk. Viable and stable. (e.g. excellent overall financial rating and strong product line)</td>
<td>Moderate risk. (e.g. financial indicators risk or risk of the facility ceasing capability production are moderate)</td>
<td>Strong risk.</td>
<td>Severe exit. Imminent exit (e.g., firm going out of business or facility leaving the business line)</td>
</tr>
<tr>
<td><strong>DOD Sales (current provider)</strong></td>
<td>Q: How much total sales for this facility are from DoD contracts?</td>
<td>Mixed DoD and non-DoD Market</td>
<td>Significant but not dominant DoD or non-DoD market</td>
<td>Dominance: &gt;80% or &lt;20% in total DoD sales</td>
<td></td>
</tr>
<tr>
<td><strong>Firms in Sector (existing market)</strong></td>
<td>Q: How many firms currently participate in this firm's market for this capability?</td>
<td>More than 10</td>
<td>6 to 10</td>
<td>3 to 5</td>
<td>2</td>
</tr>
<tr>
<td><strong>Foreign Dependency (existing market)</strong></td>
<td>Q: What is the dependence on foreign sources for this capability?</td>
<td>Domestic suppliers</td>
<td>1 or 2 domestic supplier(s), foreign source(s) may exist</td>
<td>Current foreign source, but domestic supplier(s) exist</td>
<td>Only foreign source(s) exist, potential for domestic source</td>
</tr>
</tbody>
</table>
Statistical Testing Results

★ Criticality Items

★ Factor Analysis identified 3 factors (eigenvalue > 1)
  ● Note Factor Analysis “factor” interrelated variables

★ Factor 1: Defense Unique, Skilled Labor, Design Intensity, Reconstitution Cost
★ Factor 2: Availability of Alternatives
★ Factor 3: Long-lead time (inverse)

Factor Matrix

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
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<td>-.465</td>
<td>.108</td>
</tr>
<tr>
<td>FAC02</td>
<td>-.178</td>
<td>.396</td>
<td>.112</td>
</tr>
<tr>
<td>FAC03</td>
<td>.655</td>
<td>-.196</td>
<td>.004</td>
</tr>
<tr>
<td>FAC04</td>
<td>.734</td>
<td>.002</td>
<td>.013</td>
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<tr>
<td>FAC05</td>
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<td>.655</td>
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<tr>
<td>FAC09</td>
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Scren Plot

1 2 3