



# Defense Business Board

## Business Transformation Advisory Subcommittee

DBB FY25-02

# Supply Chain Illumination in the Department of Defense

*"Leveraging Private-Sector Best Practices to Enhance  
DoD Supply Chain Visibility and Decision Making"*



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An independent Defense Business Board report examining the Department of Defense's supply chain illumination efforts and providing recommendations, based on industry and DoD best practices, to help protect national security and warfighters. References to specific companies, commercial products, processes, or services do not constitute an endorsement or a recommendation by the Department or the U.S. Government.





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## Executive Summary

Geopolitical disruptions, evolving threats, and the complexities of modern supply chains underscore the urgent need to enhance visibility, mitigate risks, and build resilience across supply chain networks. The Department of Defense (DoD or “the Department”) requires robust supply chain illumination (SCI) – i.e., an analytical process that provides transparency and visibility into supply chain entities, products, parts and/or raw materials to identify risks and enable proactive mitigation and assured supply -- to maintain national security and operational readiness in an era of increasing uncertainty.

To inform initiatives aimed at strengthening DoD supply chain illumination, the Defense Business Board (DBB) was tasked to complete a study assessing the Department’s current state, identifying private-sector best practices, and providing actionable recommendations. This Study (or Report), *Supply Chain Illumination in the Department of Defense*, examines how private-sector innovations can enhance DoD’s efforts. It identifies areas for improvement, highlights solutions, and articulates recommendations to improve supply chain transparency, risk management, and resilience.

To assess the challenges and opportunities in DoD supply chain illumination, this Study identified **12 private-sector best practices** that exemplify effective strategies to enhance visibility, resilience, and operational effectiveness. They are:

1. Leadership drives SCI and supply chain risk management (SCRM) transformation and alignment.
2. Centralized data governance establishes data definitions and taxonomies and manages integration.
3. Risk-based assessment processes leverage multiple data sources to prioritize actions.
4. Deep and regular supplier engagement enhances data collection and resilience planning.
5. Illumination efforts focus on critical risk areas first.
6. Outcome-oriented metrics align illumination efforts with enterprise goals.
7. Critical supply chains are mapped with digital Bill of Materials (BOMs) and Software Bill of Materials (SBOMs).
8. SCI, SCRM, and IT leaders implement a defined stack of advanced technologies and modular solutions.
9. Near-real-time monitoring is selectively applied to critical risk areas.
10. SCI, SCRM, HR, and IT teams acquire and build talent internally to integrate legacy and modern technologies.
11. Training on illumination techniques and advanced technologies is actively promoted and incentivized.
12. A long-term vision for SCI guides efforts and addresses long-lead time needs.

Building on these best practices and an assessment of DoD’s current state, the Subcommittee identified **six areas for improvement and 12 recommendations** grounded in private-sector strategies (See pp14-15 for details). While there has been notable progress, it remains too slow to address near-term challenges, fragmented across silos, and hesitant to scale proven pilot initiatives. These shortcomings risk falling behind adversaries and the private sector, driving up costs, and underutilizing effective solutions. Decentralized efforts also leave gaps in leadership accountability, prioritization, and data governance. Addressing these gaps is essential to achieving a unified, resilient, and transparent supply chain. The six areas are:

1. **Drive Illumination Alignment:** Direct Military Departments (MILDEPs) and Defense Agencies to identify and prioritize high-risk supply chain areas for illumination, align efforts with the *Securing Defense-Critical Supply Chains*<sup>1</sup> report, and conduct quarterly accountability reviews.
2. **Centralize Data Governance:** Amend *DoDD 5135.02*<sup>2</sup> to designate USD(A&S) as the Principal Staff Assistant (PSA) for SCRM, adopt a unified risk-based SCRM process, and modernize supplier data-sharing frameworks with secure protocols and appropriate, generally non-financial, incentives.
3. **Focus Illumination Efforts:** Focus visibility efforts on high-priority programs, critical components, and vulnerabilities while implementing outcome-oriented metrics such as on-time delivery and single-source supplier risks to align illumination with mission-critical objectives.
4. **Define Supply Chain Technologies:** Automate Digital BOM/SBOM collection with supplier traceability, map critical supply chains, implement a defined, modular technology stack, and deploy near-real-time monitoring systems for high-risk supply chains and critical items.
5. **Build Integration Capabilities:** Expand Defense Acquisition University (DAU) training programs<sup>3</sup> with structured learning paths on SCI and SCRM techniques and bridge IT and talent gaps in systems engineering integration and analytics through targeted hiring.
6. **Create a Vision to Sustain SCI:** Develop and implement a roadmap aligned with strategic objectives to sustain and evolve illumination capabilities, addressing budgetary and legislative requirements.



Applying private-sector best practices to critical areas of need will help the Department stay ahead of evolving risks. These recommendations provide DoD with a clear set of actions to accelerate supply chain illumination, ensuring both near-term benefits and long-term national security.

## Introduction

### Supply Chain Vulnerabilities in the National Spotlight

The increasing globalization of supply chains has exposed significant vulnerabilities, as disruptions to critical networks reverberate across industries and national borders. Recent geopolitical and environmental events have underscored the urgency of addressing these vulnerabilities<sup>4</sup>:

- **Critical Minerals in China:** China controls most of the global production for critical minerals like gallium, germanium, and antimony, which have widespread military applications.
- **Spruce Pine Mine:** Flooding in 2024 damaged the infrastructure at this mine, which supplies 70% of the world's high-purity quartz for semiconductors.
- **IV Solutions Shortage:** A hurricane in 2023 disrupted the production of IV solutions from a major provider, impacting 60% of the U.S. supply and significantly affecting surgeries nationwide.
- **Israel-Hamas War:** Disruptions in Red Sea trade routes have increased shipping costs and times and reduced shipping traffic by 50%, including a 79% decrease in bulk container shipping.
- **Ukraine-Russia War:** Grain exports through Black Sea trade routes dropped from 60 million tons a year to 30 million tons in two years, threatening food security in Africa and Asia.
- **Microelectronics Shortages:** Global semiconductor shortages have delayed advanced weapon systems, highlighting a reliance on foreign microchip suppliers.
- **Black Powder Shortage:** A 2021 explosion at the sole U.S. black powder facility exposed critical munitions manufacturing dependencies, despite its 2023 reopening.

**Geopolitical Dependencies:**  
~80% of the world's semiconductors are manufactured in Asia, making disruptions in this region a significant risk for global supply chains.

Goldman Sachs – Technology. October 26, 2022.  
<https://www.goldmansachs.com/insights/articles/why-the-chips-act-is-unlikely-to-reduce-the-us-reliance-on-asia>.

These events demonstrate how unmonitored supply chains can disrupt economies and compromise security. For DoD, building a transparent, resilient supply chain is essential to maintaining readiness and addressing international pacing threats.

### Terms of Reference (See Appendix A.)

The Deputy Secretary of Defense tasked the Defense Business Board's Business Transformation Advisory Subcommittee to conduct a Study on supply chain illumination, a critical capability for preserving national security and operational readiness. The Subcommittee was charged with evaluating the current state of the Department of Defense's enterprise-wide efforts, identifying private-sector best practices, and providing actionable recommendations to improve supply chain visibility and risk management. The Study aimed to address the challenges, barriers, and key metrics required to enhance illumination across DoD's supply chain networks. By leveraging insights from both the public and private sectors, the Study focuses on enabling DoD to build a resilient, diverse, and secure supply chain to align with the *National Defense Industrial Strategy (NDIS)*<sup>5</sup> and the *National Defense Authorization Act (NDAA)*<sup>6</sup>.

### Working Definition of Supply Chain Illumination

Supply Chain Illumination can be defined as an analytical process that provides transparency and visibility into supply chain entities, products, parts and/or raw materials to identify risks and enable proactive mitigation and assured supply. It can be further understood as "continual visibility throughout the supply chain, by uncovering and mapping of multi-tier supplier network, to provide an understanding of the tiers of a supply chain, a supply chain map, and vetting of suppliers against a defined set of supply chain criteria to identify and defend against threats."<sup>7 8</sup> Illumination is not static but is an evolving risk view that must be continuously refreshed. Within DoD, achieving such visibility requires data integration, analysis, advanced risk management strategies, and partnerships with the defense industrial base (DIB). These efforts align with DoD's *Strategic Management Plan (SMP) for FY22-26*<sup>9</sup>, *National Defense Industrial Strategy 2023*<sup>10</sup>, and *NDIS Implementation Plan (NDIS-IP) for FY 2025*<sup>11</sup>, which each emphasize the need for robust illumination capabilities to mitigate risks in complex, global supply chains.



## Approach and Methodology

The DBB’s Study was grounded in a thorough review of public- and private-sector practices. During the six-months timeframe, the Subcommittee completed an extensive literature review, analyzing white papers, articles, books, and DoD strategic documents to synthesize findings. The Subcommittee conducted interviews with 22 DoD leaders, 26 private-sector executives, and many subject matter experts. These discussions explored challenges, best practices, and actionable recommendations for improving supply chain illumination. The recommendations in this Report aim to bridge gaps between current DoD efforts and private-sector innovations, ultimately enabling the Department to maintain its operational edge against competition.

## Study Members and Signatures


Mr. Craig Albright and General Joseph Votel (US Army, Ret), Subcommittee Co-Chairs, led the Supply Chain Illumination Study. Contributing members include Honorable Deborah James, Mr. Joe Anderson, Mr. Anand Bahl, Mr. Greg Bowman, Ms. Marachel Knight, Ms. Suzanne Leopoldi-Nichols, Honorable Eric Rosenbach, Mr. Stan Soloway, and Saf Yeboah Amankwah. Member biographies can be reviewed at <https://dbb.defense.gov/Board-Members>.

Ms. Cara Allison Marshall is the DBB Designated Federal Officer (DFO); Captain Chad Graham, US Navy, serves as a DBB Military Assistant and Alternate DFO; Janice Williams, a contractor, serves as researcher, writer, and analyst; and Will McLaury an intern, augmented Study efforts. The DBB team served as primary support officials to this Study.

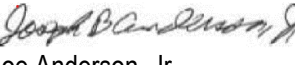
The Subcommittee members presented the Study findings and recommendations to the DBB at an open public meeting on January 13, 2025. After discussion and deliberations, the Board approved the Study with no public comments as documented in Appendix B. Briefing slides presented and approved at the meeting are found in Appendix F.

## DBB’s Business Transformation Advisory Subcommittee Members Signatures

  
Craig Albright  
Subcommittee & Study Chair

  
General Joseph Votel  
(US Army, Ret)  
Subcommittee & Study Co-Chair

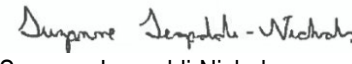
  
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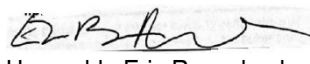
  
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## Private-Sector Best Practices in Supply Chain Illumination

In discussions with industry leaders, interviewers posed several questions including the critical question, “Given your experience, what is your advice to large, complex organizations seeking to rapidly improve their supply chain illumination?” The following is a synthesis of insights gathered from these interviews (See Appendix D for selected case studies).

### Governance, Processes & Policies

**Effective supply chain illumination begins with data-driven leadership that prioritizes actionable insights, operational alignment, and resilience.** Leadership drives supply chain illumination and risk management by uniting priorities and ensuring focus across the organization. Best-practice organizations establish governance frameworks to set data standards, prioritize risks through structured assessments, and drive supplier engagement to increase data collection and resilience planning. These principles ensure supply chains remain transparent, adaptable, and aligned with strategic priorities.

#### 1. Leadership drives supply chain illumination and supply chain risk management transformation and alignment.

Leadership is critical to the success of any business transformation, including SCI initiatives. Best-practice organizations emphasize the need for clear and unified priorities at the leadership level that drive focus and accountability across the organization. One **technology leader** the Subcommittee interviewed provides a compelling example, with its COO leading a transformation focused on advanced analytics and flexible sourcing strategies to build resilience. This exemplar integrates leadership-driven goals with a “people-first” approach to ensure all departments work toward aligned objectives.

Similarly, **another standout company** underscored the importance of leadership in navigating significant system overhauls. The supply chain director advises, “If there is a catalyst to overhaul, then do it. Keep it separate from existing operations, or it will take significantly longer.” This company’s “command center” aligns leadership across teams to enforce strict governance and drive rapid, outcome-focused implementation plans. Leadership alignment on illumination priorities ensures organizational clarity, a culture of accountability and resilience designed to support the success of SCI efforts.

#### 2. Centralized data governance establishes data definitions and taxonomies and manages integration.

Clear data definitions and strong governance frameworks are essential for managing supply chain illumination initiatives. Organizations must ensure data is consistent, accurate, and integrated across systems. **A leading technology provider** exemplifies this approach with its dedicated governance group having responsibility for daily data runs to detect and resolve anomalies (See case study, p33). A senior executive emphasized, “It starts with data accuracy. Data is the source of truth. Garbage in; garbage out.” By cleansing and validating data regularly, this leader ensures a reliable foundation for decisions.

**Another tech leader** demonstrates how a centralized data team enforces consistency and accuracy across a global supply chain by using telemetry and blockchain solutions to standardize and track data throughout the supply chain, while its governance teams ensure data security and quality are upheld. The supply chain director noted, “Visibility means control, management, and security. We think about chain of custody -- from design to order to build to maintenance and final disposition.” Establishing data governance frameworks -- regardless of systems consolidation -- ensures all supply chain stakeholders operate from a common, reliable dataset, enabling effective analysis and action.

#### 3. Risk-based assessment processes leverage multiple data sources to prioritize actions.

A risk-based assessment process allows organizations to prioritize actions based on the most significant threats to their supply chain. Best-practice organizations integrate multiple data sources to assess and rank risks effectively (See case study, p30). **A leading manufacturer** employs a layered risk-based approach, overlaying geographic vulnerabilities with supplier vulnerabilities on supply chain data to focus on the most critical issues. One of its senior vice presidents explained, “We assess risks from multiple sources, layering geographic vulnerabilities with supply chain data to prioritize which issues need addressing first.”

**Single-Source Supplier Risks:**  
6% of companies have complete visibility across supply chains, while 84% lack visibility beyond Tier 1 suppliers, increasing vulnerability to disruptions.

Tive, November 13, 2023.  
<https://www.tive.com/blog/what-is-supply-chain-visibility-all-your-questions-answered>.

**A top government supplier** further illustrates this principle with its “Macro Risk Cube,” which categorizes risks by probability and impact, using red, yellow, and green indicators. One of its leaders remarked, “Focus on the macro risks and trust your suppliers to manage the micro-level challenges.” Leveraging third-party SCRM tools and data, this company evaluates supplier financial health and operational risks, ensuring a targeted approach to mitigating disruptions. A structured, risk-based assessment process allows organizations to allocate resources effectively and address the most pressing vulnerabilities.



#### 4. Deep and regular supplier engagement enhances data collection and resilience planning.

Strong supplier engagement is essential for building trust, enhancing data sharing, and improving supply chain resilience. Since sharing critical data and resiliency plans is often a requirement for doing business, building trust is vital and customers should provide a clear explanation of data use to encourage and gain supplier cooperation. Even when negotiations are challenging, a carefully curated environment that prioritizes collaboration and mutual benefit facilitates successful outcomes.

**A leading manufacturer** provides an excellent model, emphasizing long-term, trust-based relationships with suppliers (See case study, p33). This company works closely with Tier 1 suppliers to develop detailed Bill of Materials and identify sub-tier risks. One senior executive stated, “Visibility comes down to having a full BOM and collaborating with suppliers to understand it. We are all better off working together.”

**Another leading government supplier** has developed supplier relationships that encourage transparency and compliance through non-financial incentives like certifications. The company’s senior vice president explained, “We aggregate demand all the way down to the lowest supplier to ensure guaranteed supply. It is about creating actionable activities to drive resilience in the supply chain.” Regular collaboration with suppliers enhances data accuracy, fosters alignment, and builds a resilient supply chain capable of withstanding disruptions. Together, these best practices in governance process and policy demonstrate how governance and leadership frameworks can transform supply chain management and provide actionable insights to effectively mitigate risks.

**Sub-Tier Suppliers Pose Higher Risks:**  
80% of supply chain issues originate with sub-tier suppliers, demonstrating the need for transparency, compliance, and response plans.

Resilinc, October 2, 2023  
<https://www.procurious.com/procurement-news/mastering-esg-risks-in-supply-chains-cobalt-mining-compliance-and-deep-tier-visibility>

#### Implementation & Performance Metrics

Best-practice organizations approach implementation and performance management by prioritizing critical risk areas for illumination and leveraging outcome-oriented metrics to monitor progress and assess impact. These approaches transform supply chain illumination initiatives into actionable strategies that deliver operational resilience and transparency.

#### 5. Illumination efforts focus on critical risk areas first.

Attempting to illuminate an entire supply chain at once is neither feasible nor efficient. Best-practice organizations prioritize efforts by defining and addressing the most critical risk areas first. One of the **government’s top suppliers** illustrates this approach by aggregating demand for critical materials, such as titanium, to ensure guaranteed supply across its programs. The senior vice president of operations explains, “What we use illumination for is to aggregate demand all the way down to the lowest supplier we have.”

**Focus on Critical Materials:**  
China controls ~70% of the world’s critical rare earth market, crucial for defense and technology industries, creating a dependency for countries like the U.S.

Fortune – Finance/China, September 17, 2024.  
<https://fortune.com/asia/2024/09/17/china-controls-70-of-the-worlds-critical-rare-earth-minerals-finding-an-alternative-is-proving-tough-and-expensive>

Similarly, semiconductors used in advanced avionics systems and precision-guided munitions represent another critical risk area, as these components are essential to the performance of weapon systems. This targeted focus on high-risk areas enables companies to mitigate disruptions effectively while building supply chain resilience (See case study, p31). By concentrating efforts on critical vulnerabilities, organizations can make quick progress in illuminating the most critical areas and begin achieving measurable improvements in supply chain visibility and risk management.

#### 6. Outcome-oriented metrics align illumination efforts with enterprise goals.

Best-practice organizations measure the success of supply chain illumination initiatives through metrics that align with broader organizational goals, such as operational readiness and geographic diversification. One **manufacturing leader** working to build its illumination capabilities exemplifies this by prioritizing high-value components in its resilience efforts and using third-party SCRM tools and data to monitor supplier relationships. A chief supply chain officer remarked, “Success in resilience isn’t just about having data -- it’s about having the right metrics to measure progress toward operational readiness and supply chain agility.” For example, metrics like the average time to recover after a supply disruption provide actionable insights into how quickly the organization can restore operations while minimizing mission impact.”





**Another large government supplier** takes this further by integrating supplier scorecards and performance-based payments into supply chain management. These tools incentivize suppliers to maintain accurate and up-to-date data, ensuring compliance and visibility across tiers. A senior leader from the company explained, “Supplier scorecards tied to delivery reliability and lead-time reduction are essential for aligning supply chain performance with operational goals.” Outcome-oriented metrics like on-time delivery rates and lead time variability focus resources on the areas that matter most, enabling organizations to achieve their strategic objectives while maintaining operational efficiency.

**Inventory Challenges:**  
Nearly 60% of businesses faced inventory shortages during COVID-19 due to poor supply chain visibility.

*The New York Times*, June 1, 2021.  
<https://www.nytimes.com/2021/06/01/business/corona-virus-global-shortages.html>

**Implementation and performance management best practices for supply chain illumination concentrate on prioritizing and addressing critical risks first and using outcome-oriented metrics to ensure efforts are impactful.** By focusing on high-risk areas and adopting metrics tied to strategic goals such as resilience, operational readiness, and cost efficiency, organizations can achieve measurable improvements in supply chain visibility.

### Data, Technology & Analytics

Effective supply chain technologies form the foundation of modern supply chain illumination. Best-practice organizations prioritize mapping critical supply chains driven by digital BOMs and Software BOMs, implementing a defined stack of advanced modular technology solutions, and focusing monitoring efforts on high-risk areas. These approaches balance strategic focus with technological adaptability, driving resilience, operational efficiency, and measurable impact.

#### **7. Critical supply chains are mapped and use digital BOMs and SBOMs.**

Mapping the critical supply chains enables organizations to identify vulnerabilities and prioritize resilience measures. And while not strictly required to map a supply chain, a digital Bill of Materials is a critical tool for effectively mapping a supply chain, as it provides detailed visibility into every component and supplier involved, allowing for comprehensive analysis and identification of potential risks and bottlenecks within the chain; therefore, most companies looking for robust supply chain mapping will heavily rely on a digital BOM system. One **leading manufacturer** exemplifies this approach through its “Design for Supply Chain” process, integrating second-source suppliers, integrating digital Bills of Materials into its operations and leveraging robust governance practices to ensure supply chain resilience.

Similarly, **another leading manufacturer** is transitioning to a digital BOM to streamline data collection and enhance real-time monitoring capabilities. This company’s layered risk-based approach evaluates supply chain vulnerabilities at the component level, ensuring detailed tracking of high-risk items such as batteries and displays. One senior vice president emphasized, “Transitioning to a digital Bill of Materials is critical for real-time supply chain monitoring. Automating data collection improves visibility and reduces our reliance on manual tracking.” Mapping critical supply chains and adopting digital BOMs ensure precise, actionable insights into supply chain operations, enabling organizations to address risks effectively.

#### **8. SCI, SCRM, and IT leaders implement a defined stack of advanced technologies and modular solutions.**

Supply chain illumination requires a planned combination of integrated IT systems and modular solutions to collectively address critical supply chain functions such as visibility, forecasting, ordering, inventory management, and traceability. Best-practice organizations focus on selecting and integrating systems that deliver the most value, minimizing redundancy and ensuring scalability. **A leading government supplier** illustrates this approach by implementing a defined stack that includes a digital BOM system integrated with its Product Lifecycle Management (PLM) software and Enterprise Resource Planning (ERP) platforms, enabling seamless visibility and traceability across tiers. A senior vice president explained, “The key is not having everything but having the right things connected to create a single source of truth.”

Similarly, **a global manufacturer** leverages a transportation management system linked to third-party visibility tools, enabling real-time monitoring of shipments and dynamic rerouting capabilities. This integration with planning and procurement systems enhances decision-making and operational efficiency.

**Another organization** adopts a planning system layered over its ERP to coordinate forecasting and ordering processes, aligning supply chain activities with operational needs. A supply chain executive noted, “Fewer systems with higher integration ensure agility and reduce noise, helping us focus on Return on Investment (ROI) and resilience.”



This approach underscores that no single solution can address all supply chain needs. Instead, implementing a defined stack of integrated systems -- covering core functionalities like Bill of Materials management, inventory, transportation, and analytic -- provides flexibility and precision while enabling data-driven decisions and enhancing resilience.

**Leverage from Advanced Technologies:**  
Companies leveraging advanced supply chain analytics can achieve up to a 15% reduction in logistics costs and a 25% increase in operational efficiency.

Pothuri, Sai. September 20, 2024.  
<https://www.linkedin.com/pulse/importance-supply-chain-analytics-unlocking-insight-sai-pothuri-fhbzc>.

### 9. Near-real-time monitoring is selectively applied to critical risk areas.

Not all supply chain operations require real-time visibility. Leading organizations prioritize near-real-time monitoring for critical components to balance cost efficiency with operational effectiveness. One **leading manufacturer** employs targeted visibility strategies for high-value parts, ensuring dual sourcing and tracking from raw materials to finished products using third-party SCRM tools. A senior executive stated, “Resilience begins with data; without accurate data, no tools will work effectively.”

**Real-Time Visibility:**  
Only ~21% of companies currently have real-time supply chain visibility, highlighting a significant gap in illumination capabilities.

*FinancesOnline*. November 6, 2024.  
<https://financesonline.com/supply-chain-statistics>.

**Another tech leader** similarly prioritizes real-time visibility for first-mile and last-mile logistics while allowing flexibility in less critical areas. The company executive noted, “Real-time visibility is most critical for time-sensitive processes, like transportation logistics, while near-real-time monitoring suffices for other supply chain segments.”

**A leading logistics company** employs control towers for continuous shipment monitoring, emphasizing predictive analytics to preempt potential disruptions. This model combines real-time and near-real-time tracking, ensuring efficient resource allocation while maintaining operational integrity. By implementing near-real-time monitoring systems for critical items, organizations can focus resources on maintaining agility while avoiding unnecessary costs (See case study, p32).

**Data, technology, and analytics are the bedrock of modern supply chain illumination**, providing organizations with the tools to address vulnerabilities and enhance performance. Mapping critical supply chains and using digital BOMs enable granular visibility and precise risk mitigation. Modular technology stacks allow for scalable, flexible solutions, while near-real-time monitoring focuses resources on critical areas to optimize both cost and operational effectiveness. Together, these practices showcase how advanced data-driven solutions can transform supply chain management, ensuring resilience and agility in an increasingly complex global environment.

### Talent, Training & Communications

**Developing a resilient and efficient supply chain demands focused investments in talent, continuous training, and a long-term strategic vision.** Best-practice organizations emphasize equipping their workforce with the skills to integrate legacy and modern technologies, fostering education on illumination tools and techniques, incorporating agile management strategies, and aligning these efforts with organizational goals to ensure sustained success.

### 10. SCI, SCRM, HR, and IT teams acquire and build talent internally to integrate legacy and modern technologies.

Organizations must cultivate a workforce equipped to manage and integrate both legacy systems and modern technologies. One **tech leader** exemplifies this approach with its targeted hiring practices and bi-annual training programs designed to align tech expertise with operational goals. A senior leader emphasized, “We focus on hiring and developing the best. Our teams are trained on integrating new technologies to ensure systems are optimized for evolving supply chain needs.”

**Another leading technology company** also highlights the importance of balancing internal promotions with external hiring to maintain a skilled workforce. Hiring and training programs focus on building capabilities to support data-driven supply chain decisions. This type of focused workforce development is essential, especially given that each of the companies interviewed avoided outsourcing the entire platform or integration responsibility.

### 11. Training on illumination techniques and advanced technologies is actively promoted and incentivized.

Comprehensive training programs are critical for fostering a workforce that understands and adopts supply chain illumination practices. One **leading manufacturer** promotes intellectual curiosity and technical expertise through structured training initiatives designed to encourage experimentation with new tools and processes. A senior executive noted, “Resilience begins with education. We emphasize training to align teams with our broader supply chain goals.”



**Another top government supplier** also integrates training into its cultural fabric, conducting monthly Supply Chain Resiliency Training sessions and maintaining a Center of Excellence to share best practices. These programs ensure employees at all levels understand the importance of supply chain illumination and their professional roles in achieving it.

## 12. A long-term vision for SCI guides efforts and addresses long-lead time needs.

A clear long-term vision for supply chain illumination provides direction and sustains momentum for continuous improvement. **A leading manufacturer** aligns its training and technology investments with a broader strategy focused on resilience and geographic diversification. One senior vice president explained, “Transitioning to a digital Bill of Materials isn’t just about tools -- it is about setting a vision for where we want our supply chain to be in the next decade.”

**A leading SCRM software provider** stresses the need for sustained leadership and consistent priorities to transition from pilot programs to full-scale implementation. Leadership commented, “The lack of a long-term vision hinders scalability. Establishing and communicating a clear strategy is essential to drive results.”

Developing talent, promoting education, and establishing a long-term vision are the cornerstones of effective supply chain illumination. The ability to integrate legacy and modern systems ensures operational adaptability, while comprehensive training programs foster alignment, innovation, and a culture of resilience. A clear, strategic vision unites these efforts, providing the direction and consistency needed to sustain progress and enhance supply chain performance over time.

## Current State of DoD Supply Chain Illumination

### Notable Progress to Date

DoD has made notable progress in supply chain illumination, guided by leadership initiatives that prioritize data integration, risk assessment, and proactive management. These efforts have enhanced transparency and resilience across DoD supply networks, reflecting the Department’s commitment to securing critical supply chains and advancing operational readiness.

During the past three years, DoD has implemented several key initiatives to strengthen supply chain illumination. In 2022, the release of *Securing Defense Critical Supply Chains*<sup>12</sup> provided a foundational analysis of vulnerabilities and recommendations for fortifying supply chains, complemented by the *DoD SCRM Taxonomy Version 1.0*<sup>13</sup>, which standardized terminology for risk management. In 2023, the *DoD SCRM Framework Report Phase I*<sup>14</sup> and *Supply Chain Resiliency & SCRM Resources*<sup>15</sup> introduced practical tools and frameworks for enhancing resiliency and assessing risks. Additionally, the *DoD Strategic Management Plan FY 2022-26*<sup>16</sup> outlined foundational goals and measures to improve enterprise-wide supply chain visibility. More recently, the *National Defense Industrial Strategy 2023*<sup>17</sup> and its accompanying *Implementation Plan for FY 2025*<sup>18</sup> detailed a roadmap for addressing global supply chain challenges and advancing industrial priorities. Initiatives like these collectively underscore DoD’s commitment to building a transparent and resilient supply chain network.

**Strengthening Supply Chain Resilience:**  
Since 2022, DoD has issued seven directives, starting with the *Securing Defense Critical Supply Chains* report, to enhance supply chain visibility and resilience.

In addition to the leadership direction set forth at the Department-wide level, the MILDEPSs and Defense Agencies have undertaken significant initiatives of their own, demonstrating a growing commitment to advancing supply chain illumination within their respective areas of responsibility. These efforts highlight a decentralized yet increasingly cohesive approach to strengthening resilience and transparency across DoD’s supply chains. Examples include:

- **USD A&S:** Established the SCRM Integration Center to **develop and implement an integrated risk management framework** to identify, assess, and recommend actions across DoD supply chain enterprise to mitigate risk.
- **CDAO:** Integrated the **ADVANA Platform** to **centralize supply chain data**, enabling enhanced analytics and visualization across DoD networks.
- **Office of the Assistant Secretary of Defense for Industrial Base Policy (OASD(IBP)):** Implemented the **Defense Industrial Base Monitoring and Analysis Program (DIBMAP)** to improve visibility into industrial base operations and address supply chain gaps.
- **DoD Chief Information Officer (CIO):** Launched the **Fulcrum IT Advancement Strategy**, modernizing IT infrastructure to support supply chain visibility and digital transformation efforts.
- **Defense Logistics Agency (DLA):** Established a dedicated **SCRM Office** employing a metrics-driven approach and **data acumen training** to enhance workforce skills in supply chain risk management.



- DoD Military Services (Air Force, Navy, Marines): The **Assistant Secretary of Defense (Sustainment)** and **Chief Digital and Artificial Intelligence Office (CDAO)** launched the **SCREEn Program** to address supply chain risks and ensure the availability of mission-critical components for the F-35 fleet.
- Army: The Joint Program Executive Office (JPEO) for Armaments & Ammunition developed a **Structured Query Language (SQL) database** and visualization tools to track inventory and monitor supply chain risks in real-time.
- Navy: The **Program Executive Office (PEO) for Integrated Warfare Systems Advanced Obsolescence Management** initiatives, leveraging predictive analytics to prevent disruptions in critical system components.

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***F-35 Case Study: Responding to Congressional Mandates for Visibility and Compliance, SCREEn Strengthens Ability to Effectively Manage Supply Chain Risks Through Illumination***

*In August 2022, F-35 production was halted when a fifth-tier subcontractor disclosed non-compliant specialty metals in turbomachine pumps, prompting a National Security Waiver to resume operations. Program managers leveraged SCREEn (Supply Chain Risk Evaluation Environment), an AI-optimized tool within ADVANA, to digitize BOMs, illuminate microelectronics and propulsion supply chains, and track over 40,000 parts to assess alternate suppliers. By integrating government, commercial, and public data, SCREEn prioritizes risks, enables mitigation strategies, and provides decision-ready analytics. In the future, SCREEn and other SCRM tools could illuminate supply chain risks much earlier in the acquisition lifecycle, underscoring their critical role in preventing future specialty material disruptions and foreign ownership, control, or interest (FOCI), and in strengthening resilience and meeting congressional mandates for visibility and compliance.<sup>19 20</sup>*

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DoD's recent initiatives underscore its commitment to improving supply chain illumination. By addressing vulnerabilities, standardizing risk management practices, and leveraging advanced technologies, the Department is strengthening its ability to respond to global challenges and safeguard critical operations. These efforts represent a foundation for continued progress in supply chain transparency and resilience. However, accelerating this progress is critical to meeting the demands of today's global environment.

### **Six Key Areas of Improvement for DoD Supply Chain Illumination**

DoD has made notable advancements in integrating data, assessing risks, and enhancing transparency across its supply networks. However, important gaps persist in governance, data sharing, the generation of actionable insights, and scaling these initiatives. Transitioning from successful pilots to scalable, integrated solutions capable of meeting evolving operational requirements remains a critical challenge. Moving beyond pilots to implement enterprise-wide, cohesive technology solutions is a necessary next step. The following is a summary of improvement areas identified in our evaluation of current state.

#### **1. Leadership alignment on illumination priorities is lacking.**

While DoD has issued clear guidance on securing defense-critical supply chains, stronger direction and alignment with supply chain illumination priorities is required to translate strategy into meaningful progress. Current efforts lack the cohesion needed to drive accountability and ensure leadership at all levels integrates illumination objectives into operational practices. Closing this gap will enable the Department to better connect strategic goals with actionable, enterprise-wide outcomes.

#### **2. Data governance, management and integration, is mostly decentralized**

DoD's governance structure and SCRM processes face limitations in enforcing data management and integration. While USD(A&S) is designated as the SCRM integrator, and is coordinating with the SCRM Integration Center, it lacks the explicit authority under DoDD 5135.02 to establish and enforce standardized data protocols. This gap undermines the Department's ability to achieve effective supply chain illumination and requires updated directives to empower centralized oversight.

**Secure Data Sharing Needed:**

Supply chain cyberattacks increased by 51% in 2021, emphasizing the need for secure data sharing and collaboration.

*TechRepublic*, April 13, 2022.

<https://www.techrepublic.com/article/supply-chain-cyberattacks-jumped-51-in-2021>.

Fragmented risk assessment processes and inconsistent data standards further hinder DoD's ability to generate actionable insights. Combined with outdated frameworks and legal barriers that limit access to supplier data, these challenges exacerbate vulnerabilities across supply networks. Secure protocols and incentivized collaboration with suppliers will be critical to building trust, enhancing visibility, and fostering a more resilient supply chain ecosystem.



### 3. Broad-based approaches to enterprise-wide illumination are slowing progress.

DoD's broad-based approach to enterprise-wide visibility often prioritizes comprehensive datasets over addressing critical risks, slowing progress in securing essential supply chain nodes. Additionally, current supply chain metrics are largely transactional, lacking alignment with strategic objectives such as risk reduction, resilience, and mission-critical readiness. Shifting to a more focused, outcome-driven approach will be essential for accelerating improvements and achieving strategic goals.

### 4. The Department lacks a defined stack of supply chain technologies

The absence of standardized practices for Digital Bills of Materials (BOMs) and Software Bills of Materials (SBOMs) limits DoD's ability to achieve supplier traceability and mitigate risks across critical supply chains. Establishing consistent Digital BOM standards, with integration across suppliers, is essential for improving visibility, traceability, and resilience.

**Supply Chain Visibility Lacking:**  
The average DoD supply chain spans 5-6 Tiers, often lacking visibility beyond Tier 1 or 2 suppliers.

Outdated tools, siloed systems, and the absence of a defined technology stack have slowed progress in supply chain modernization. A technology stack refers to a suite of technologies used to develop and manage applications, including programming languages, frameworks, databases, front-end and back-end tools, and Application Programming Interfaces (APIs). For supply chain illumination, the stack should include tools such as demand planning and forecasting systems, supply chain orchestration and analytics platforms, procurement intelligence tools, transportation and warehouse management systems, and cloud-based solutions for integration and real-time connectivity.

Fragmented governance and inconsistent data-sharing policies have further compounded these challenges, creating disjointed data environments that limit interoperability and delay actionable insights. This fragmentation prevents the timely monitoring of supply chains and the mitigation of operational risks for high-priority components during disruptions. Adopting federated governance policies, standardizing traceability practices, and focusing on targeted, real-time monitoring for high-risk areas are essential to addressing these vulnerabilities and enabling effective supply chain illumination.

### 5. DoD has not yet committed to internal integration and the talent required to provide necessary support.

DoD faces significant talent shortages in systems integration, advanced analytics, and emerging technologies, hindering its ability to modernize and deploy modular supply chain technologies effectively. Gaps in training on supply chain illumination techniques and tools further leave personnel underprepared to implement and sustain these initiatives. Private-sector interviews highlighted the importance of developing and maintaining robust organic capabilities to successfully integrate and sustain agile SCI and SCRM solutions. This represents a shift from DoD's reliance on external resources and calls for rethinking workforce development priorities, career paths, and investments. Addressing these challenges will require structured learning paths, innovation incentives, and enhanced cross-departmental collaboration to build expertise and capacity.

### 6. There is no long-term SCI vision to guide future efforts.

Although SCRM and visibility are integrated into DoD strategic plans, the Department lacks a cohesive long-term vision to advance supply chain illumination. This absence of forward planning for coordinated capabilities, budgetary alignment, and legislative support hampers the development of adaptable and enduring solutions to evolving supply chain challenges.



## Summary of Recommendations (See Appendix C for more details.)

The purpose of this Study was to evaluate and deliver actionable recommendations to enhance DoD supply chain illumination. This included analyzing the current state of enterprise-wide efforts, identifying private-sector best practices, and addressing the Department's unique challenges and barriers. Building on the six areas for improvement outlined above, this recommendations section translates those findings into **six targeted areas for action**. Each area features recommendations aligned with private-sector best practices, insights from the current state, and tailored strategies for DoD. These recommendations aim to close critical gaps and accelerate progress toward resilient, transparent, and adaptive supply chain networks.

- 1.1 **Leadership Alignment on Illumination Priorities:** Direct Military Departments and Defense Agencies to identify and prioritize high-risk supply chain areas for illumination, align efforts with the Securing Defense-Critical Supply Chains report, and conduct quarterly accountability reviews. (OSD and USD(A&S), 6 months)

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2. **Data Governance:** Amend DoDD 5135.02 to designate USD(A&S) as the PSA for SCRM—adopt a unified risk-based SCRM process and modernize supplier data-sharing frameworks with secure protocols and non-financial incentives.
- 2.1 **Affirm USD(A&S)'s Authority for SCI and SCRM:** Revise DoDD 5135.02 to formally designate USD(A&S) as PSA for SCI and SCRM, accountable to DoD leadership for driving implementation, enforcing data governance, and coordinating Department-wide SCI and SCRM efforts. (OSD with execution by USD(A&S), 3-12 months)
- 2.2 **Adopt a Risk-Based SCRM Process:** Implement a DoD-wide taxonomy and process to address critical risks like geographic vulnerabilities and single-source dependencies, focusing on actionable insight. (USD(A&S), 6-12 months)
- 2.3 **Facilitate Supplier Data Sharing:** Mandate contract clauses reflect modern data-sharing practices, secure protocols, and incentives to improve supplier collaboration and resilience. (USD(A&S), 6-12 months)

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3. **Focus on High-Risk Areas First:** Focus visibility efforts on high-priority programs, critical components, and vulnerabilities while implementing outcome-oriented metrics such as on-time delivery and single-source supplier risks to align illumination with mission-critical objectives.
- 3.1 **Prioritize Risk Areas for Illumination:** Focus visibility efforts on high-priority programs, critical components, and major vulnerabilities concurrently, avoiding broad, unfocused initiatives. (USD(A&S), 3 months)
- 3.2 **Implement Outcome-Oriented Performance Metrics:** Implement metrics such as on-time delivery and single-source supplier risks to align visibility efforts with strategic resilience and mission-critical outcomes. (USD(A&S), 6 months)

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4. **Supply Chain Technologies:** Map critical supply chains, automate Digital BOM/SBOM collection with traceability, implement a defined, modular technology stack, and deploy near-real-time monitoring systems for high-risk supply chains and critical items.
- 4.1 **Map the Critical Supply Chains and Implement Digital BOM/SBOM:** Automate data collection for Digital BOM/SBOM with traceability to streamline risk identification and enhance visibility across critical systems and components. (USD(A&S) supported by DLA, MILDEPs, and Defense Agencies, 6-12 months)
- 4.2 **Implement a Defined Technology Stack with Federated Data Governance Policies:** Deploy a modular stack of advanced supply chain technologies leveraging commercial tools for flexibility and scalability, complemented by federated data governance policies that enable MILDEPs and Defense Agencies to configure systems independently while ensuring interoperability. (USD(A&S) with CDAO and CIO, and execution from MILDEPs and Defense Agencies, 12-18 months)
- 4.3 **Deploy Near-Real-Time Monitoring Systems in Select Risk Areas:** Focus monitoring on high-risk components with refresh rates of at least 15 minutes to 1 hour, providing actionable insights to decision-makers for rapid risk mitigation. (USD(A&S) with CDAO, 6-12 months)



5. **Integration Capabilities:** Bridge IT talent gaps in system integration and analytics through targeted hiring and expand DAU training programs with structured learning paths on SCI and SCRM techniques.
  - 5.1 **Bridge Critical IT, SCI, and SCRM Talent Gaps:** Address IT talent shortages in system integration and analytics through targeted hiring, contracting, and partnerships, leveraging private sector. (USD(P&R) with CTMO, 12 months)
  - 5.2 **Expand Training on SCI and SCRM Techniques:** Extend DAU training to include structured learning paths in SCI and SCRM, fostering innovation and building expertise across DoD. (DAU, 6-12 months)
- 
- 6.1 **Establish a Long-Term Vision to Guide Illumination Efforts:** Build on existing DoD strategic management plans and strategies to develop an illumination roadmap aligned with strategic goals to sustain and evolve illumination efforts, incorporating data standards and modular technologies. Ensure alignment with budget and legislative requirements to drive progress and adaptability. (USD(A&S), 12 months)

## Conclusion

### Good Early Progress, But Need Leadership, Data Standardization, and Systems/Tools to Scale

The Department of Defense has made notable progress in integrating data, assessing risks, and enhancing transparency across its supply networks. These advancements demonstrate a strong commitment to strengthening supply chain resilience. However, substantial gaps remain in governance, data sharing, tools, and the generation of actionable insights, underscoring the need for significant, sustainable progress.

### Supply Chain Vulnerabilities Demand Urgent, Focused Action

Global supply chain disruptions have highlighted the urgency of addressing critical risks, such as geographic dependencies, foreign ownership, control or interest (FOCI), and reliance on single-source suppliers. These vulnerabilities affect national security and operational readiness, requiring focused, decisive action. The Department must prioritize efforts to mitigate these risks by enhancing supply chain visibility and resilience.

### Pathway to Success Requires Enhancing Technology Capability and Strengthening Partner Collaboration

Modernizing frameworks, leveraging advanced technologies, and fostering collaboration with private-sector partners are essential steps to address critical deficiencies. Standardizing data practices, having a defined technology stack, closing IT talent gaps, implementing federated governance models, and enabling near-real-time monitoring will be pivotal in achieving meaningful progress. Adopting these approaches will position DoD to respond proactively to emerging threats and sustain operational superiority.

### A Vision for Supply Chain Illumination Will Ensure Adaptability

Finally, DoD must establish a cohesive long-term vision for supply chain illumination, aligned with its strategic objectives. Forward planning that integrates budgetary and legislative priorities will ensure adaptability and resilience against evolving risks. By balancing near-term actions with a forward-looking perspective, DoD can build a robust, transparent supply chain network capable of supporting its mission in an increasingly complex global environment. This vision will not only secure the present but also safeguard the future of U.S. defense capabilities.



# Appendix A: Terms of Reference



DEPUTY SECRETARY OF DEFENSE  
1010 DEFENSE PENTAGON  
WASHINGTON, DC 20301-1010

AUG 16 2024

## MEMORANDUM FOR DEFENSE BUSINESS BOARD

SUBJECT: Terms of Reference — Supply Chain Illumination

Lack of visibility into the complex global supply chains for the systems, equipment, and supplies upon which our military depends creates risk to the Department's ability to respond to crises. Illumination into defense-related supply chains allows the Department of Defense (DoD) to anticipate disruptions, reduce vulnerabilities, and strengthen resilience to supply shocks.

An enterprise-wide review and comparison to private sector practices will strengthen current efforts to shed light on supply chain risks. Therefore, I direct the Defense Business Board ("the Board"), working through its Business Transformation Advisory Subcommittee ("the Subcommittee"), to evaluate and provide recommendations to improve the DoD supply chain illumination. As a part of this review, the Board, working through the Subcommittee, should consider:

- the current state of DoD enterprise-wide supply chain illumination;
- how best-in-class business practices of private-sector supply chain illumination can be applied to DoD;
- the challenges of supply chain illumination and what barriers to visibility impact private sector and DoD effectiveness;
- what metrics or Key Performance Indicators are required to measure success; and,
- any other related matters the Board determines relevant to this task.

I direct the Board to have the Subcommittee submit its findings to the Board for its thorough consideration and deliberation at a properly noticed and open meeting(s), unless the meeting must be closed in accordance with one or more of the exceptions found in subsection 552b(c) of title 5, U.S. Code. The Board will submit its independent recommendations to the Secretary of Defense or the Deputy Secretary of Defense within six months of this Terms of Reference (ToR) approval.

In conducting its work, the Subcommittee and the Board have my full support to meet with Department leaders. The Board staff, on behalf of the Board and the Subcommittee, may request the Office of the Secretary of Defense and DoD Component Heads ("Component Heads") to timely furnish any required information, assistance, or access to personnel to the Board and the Subcommittee. All requests shall be consistent with applicable laws; applicable security classifications; DoD Instruction 5105.04, "Department of Defense Federal Advisory Committee Management Program;" and this ToR.

Material provided to the Board becomes a permanent part of the Board's record. Component Heads are reminded that all data/information provided is subject to public inspection unless the originating Component office properly marks the data/information with the appropriate security classification markings and Freedom of Information Act exemption



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categories before the data/information is released to the Board. The Board has physical storage capability and electronic storage and communications capability on both unclassified and classified networks to support receipt of material up to the Secret level. Each Component Head should remember that Board and Subcommittee members, as special government employee members of a DoD federal advisory committee, will not be given any access to DoD networks, to include DoD email systems.

The Board and the Subcommittee will operate in conformity with and pursuant to the Board's charter; chapter 10 of title 5, U.S. Code (commonly known as "the Federal Advisory Committee Act"); subsection 552b(c) of title 5, U.S. Code; and other applicable federal statutes, regulations, and policy. The Subcommittee and individual Board members do not have the authority to make decisions or provide recommendations on behalf of the Board nor report directly to any federal representative. The members of the Subcommittee and the Board are subject to specific Federal ethics laws, including section 208 of title 18 U.S. Code, governing conflicts of interest, and the Standards of Ethical Conduct regulations in 5 C.F.R., Part 2635.

Thank you in advance for your cooperation in this critical undertaking and your contributions in support of the nation's defense.

cc:

Senior Pentagon Leadership  
Defense Agency and DoD Field Activities Directors  
Advisory Committee Management Officer, DA&M





## Appendix B: Description of Interviewees & Selection Process

This Study interviewed private-sector companies and DoD personnel to identify best practices, challenges, and opportunities, with selections reflecting the complexity and scale of supply chain operations relevant to DoD.

**Selection Criteria** -- The selection process aimed to capture diverse perspectives:

- **Private-Sector Companies:** Selected for their leadership in supply chain innovation, data analytics, and risk management, including both operational supply chain leaders and service providers specializing in cutting-edge risk management solutions.
- **DoD Defense Agencies & Military Departments:** Chosen for their roles in supply chain oversight, illumination, and risk management, initiatives, providing insights from MILDEPs and Defense Agencies.

**Private Sector Interviews (14 Companies, 26 Interviewees)** -- The Study engaged private-sector representatives recognized for excellence in supply chain management. Interviews covered 14 companies and 26 industry experts, grouped as follows:

- **Large Multinational Manufacturers (5 interviews):** Managing complex, multi-tiered global supply chains. Companies include: Dell Technology Co., Flex, Ford Motor Co., Micron Technology, Toyota Motor North America.
- **Technology Companies (3 interviews):** Leaders in advanced analytics, AI, and modular technology solutions to improve supply chain illumination. Companies include: Amazon Web Services, Govini, Resilinc.
- **Services / Logistics / Advisors (3 interviews):** Experts in real-time visibility, predictive analytics, and transportation optimization. Companies include: AECOM, P2P Strategies/Global Supply Chain Task Force, UPS.
- **Defense Contractors (3 interviews):** Focused on supply chains for critical DoD programs, emphasizing security and compliance. Companies include: Lockheed Martin, Northrop Grumman, Sierra Nevada Corp.

**DoD Personnel Interviews (10 Interviews, 22 Personnel)** -- Interviews were conducted with representatives from critical DoD Agencies and MILDEPs, offering valuable insights into supply chain illumination efforts. Participating entities included:

- Office of the Under Secretary of Defense for Acquisition & Sustainment (USD(A&S)), with a focus on SCRM Integration
- Office of the Assistant Secretary of Defense for Industrial Base Policy (OASD(IBP)), with a focus on DIBMAP
- Chief Digital and Artificial Intelligence Office (CDAO), with a focus on ADVANA
- Defense Logistics Agency (DLA)
- Office of the Department of Defense Chief Information Officer (DoD CIO)
- Assistant Secretary of Defense (Sustainment) and Chief Digital & Artificial Intelligence Office (CDAO), with a focus on SCREEn
- Deputy Assistant Secretary of the Army for Sustainment (DASA-Sustainment)
- U.S. Army Joint Program Executive Office Armaments & Ammunition (JPEO A&A)
- Air Force Life Cycle Management Center (AFLCMC)
- Program Executive Office (PEO) (Navy) Integrated Warfare Systems (IWS)

**Interview Process** -- Interviews followed a structured approach to ensure consistency and depth of insights. Each discussion focused on 1) governance, processes and policies; 2) implementation and performance metrics; 3) data, technology and analytics; and 4) talent, training and communication. Each interviewee shared examples of best practices, challenges, and recommendations to improve supply chain illumination within DoD.

The structured interview process with private sector leaders and DoD personnel provided a strong foundation for findings and recommendations, revealing actionable pathways to enhance supply chain resilience and transparency aligned with the Department's strategic objectives.



## Appendix C: Detailed Recommendations

**1.1 Leadership Alignment on Illumination Priorities:** Direct Military Departments and Defense Agencies to prioritize high-risk supply chain areas for illumination, align efforts with the Securing Defense-Critical Supply Chains report, and conduct quarterly accountability reviews.

**Summary of Recommendation:** To advance supply chain illumination with national security priorities, DoD leadership must focus on organizing and aligning MILDEPs and Defense Agencies to prioritize and report their key risk areas. USD(A&S), supported by the Deputy Secretary of Defense, is positioned to lead this effort to require all Components to identify and clarify their critical risks for SCI within 90 days. Quarterly executive reviews will ensure accountability and progress.

**Accountability:** Deputy Secretary of Defense and USD(A&S)

**Time Frame:** Initial risk identification within 90 days; quarterly reviews ongoing.

### Specific Actions:

1. **Direct each MILDEP and Defense Agency to assess, identify, and report** their most critical supply chain risks for illumination, aligned with the defense-critical supply chain focus areas outlined in the *FY 2022 Securing Defense-Critical Supply Chains* report.
2. **Conduct quarterly executive reviews** led by USD(A&S) to assess alignment, track progress, and address gaps in SCI efforts.
3. **Issue/Provide regular, standardized guidance** on SCI and SCRM to ensure a unified approach, while allowing for tailored risk identification and implementation by individual MILDEPs and Defense Agencies.

*This recommendation parallels the DBB's Creating A Digital Ecosystem Study's focus on Governance and Organization (Rec 1-2), assigning DMAG, or similarly scoped body as the leadership authority for developing the Defense Digital Ecosystem and convening an Executive Action Group (EAG) to remove barriers to change.*

**Expected Outcomes:** DoD leadership is driving a focused and coordinated effort to address the highest-priority risks in defense-critical supply chains and clear alignment and accountability of supply chain illumination efforts with national security goals.

### Key Performance Metrics:

- # of Days since last refresh of priority risks by each MILDEP and Defense Agency.

### Why It Matters:

Best-practice organizations align leadership with SCI and SCRM transformation. Engaging DoD leadership in driving prioritization and accountability in managing risks across defense-critical supply chains ensures SCI efforts address the areas of highest strategic importance, reinforcing mission readiness and operational resilience while enhancing DoD's ability to respond to emerging threats.

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## 2.1 Affirm USD(A&S)'s Authority for SCI and SCRM: Revise DoDD 5135.02 to formally designate USD(A&S) as Principal Staff Assistant for SCI and SCRM, accountable to DoD leadership for driving implementation, enforcing data governance, and coordinating Department-wide SCI and SCRM efforts.

**Summary of Recommendation:** Designate USD(A&S) as the PSA for Supply Chain Illumination and Supply Chain Risk Management to centralize leadership, enhance data governance, and promote Department-wide collaboration. This formal designation will solidify USD(A&S)'s authority to lead SCI and SCRM efforts, ensure data standards, and implement governance mechanisms for enterprise-wide progress. To ensure the effectiveness of this recommendation, clear accountability measures must be established, holding USD(A&S) responsible for driving implementation and delivering measurable outcomes.

**Accountability:** Directed by SECDEF or DEPSECDEF, USD(A&S) will be accountable for leading the work outlined in this recommendation, including reporting progress and ensuring measurable results in collaboration with MILDEPs and Defense Agencies.

**Time Frame:** Full implementation within 12 months, with initial actions completed in 3 months.

### Specific Actions:

1. **Update USD(A&S) Charter (3 months):** Revise DoDD 5135.02 to formally designate USD(A&S) as the PSA for SCRM. USD(A&S) is well-positioned to lead responsibilities to include ensuring data standards and integrity, making data integration decisions, coordinating supply chain solutions teams across the Department, and leading enterprise-wide SCI and SCRM initiatives.
2. **Elevate and Staff the SCRM Integration Center (6 months):** Establish a dedicated Deputy Assistant Secretary of Defense for Supply Chain Management (DASD(SCRM)) role or Chief SCRM Officer under ASD(S) to lead the SCRM Integration Center. Allocate initial staffing, including 3 government civilians and 1 senior executive, to execute and oversee the Center's functions.
3. **Form a Data Governance Team (6 months):** Create a centralized data governance team under USD(A&S) to standardize data integrity and ensure alignment across SCRM systems. The team's charter will detail its role in promoting interoperability and making critical data integration decisions.
4. **Coordinate Department-Wide Collaboration (6–12 months):** Organize supply chain solutions teams within each MILDEP and Defense Agency, led by the SCRM Integration Center. These teams will engage key leaders (e.g., J7, J3) to align efforts and advance SCI and SCRM initiatives.
5. **Implement Quarterly Dashboard Reviews (Ongoing):** Establish quarterly dashboard reviews to track progress, monitor metrics, and refine strategies for SCI and SCRM initiatives. These reviews will provide transparency and ensure USD(A&S) remains accountable for delivering measurable outcomes.

*This recommendation aligns with the DBB's Creating A Digital Ecosystem Study's focus on establishing a common vision and taxonomy (Rec 5), across the Department, the Services, various Chief offices ... to deliver a written vision and language ("data dictionary") to be used consistently in the development, sharing, and interoperability of data.*

**Expected Outcomes:** USD(A&S) is formally recognized as PSA for SCRM, creating a unified governance structure for data integrity, cross-departmental collaboration, and supply chain resilience.

### Key Performance Metrics:

- Completion of PSA designation for USD(A&S) within 3 months.
- Progress of staffing and chartering the SCRM Integration Center within 6-12 months.
- Track quarterly progress and key performance metrics on SCI and SCRM initiatives.

### Why It Matters:

Designating USD(A&S) as PSA for SCRM ensures unified leadership, effective governance, and streamlined collaboration across DoD, enabling the Department to address supply chain vulnerabilities with agility and precision.

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## 2.2 Adopt a Risk-Based SCRM Process: Implement a DoD-wide taxonomy and process to address critical risks like geographic vulnerabilities and single-source dependencies, focusing on actionable insight.

**Summary of Recommendation:** To improve supply chain illumination, it is essential for DoD to adopt a risk-based SCRM process focused on generating actionable insights for mitigating critical risks. This approach emphasizes addressing geographic vulnerabilities, single-source dependencies, and high-impact components, rather than striving for exhaustive data accuracy.

**Accountability:** USD(A&S) in collaboration with MILDEPs and Defense Agencies.

**Time Frame:** Full implementation of steps 1-3 within 6-12 months.

### Specific Actions:

1. **Standardize Critical Risk Definitions (6 months):** Issue guidance on a clear taxonomy of critical risks across DoD, ensuring consistent application by MILDEPs and Defense Agencies. Establish reporting standards to track and manage these risks.
2. **Develop Data Requirements for High-Priority Programs (6-12 months):** Create a Data Requirements plan for each high-risk area to generate actionable supply chain data. Define criteria for selecting these high-risk areas and prioritize data elements to inform targeted mitigation actions.
3. **Streamline Risk Reporting (12 months):** Establish a streamlined reporting format to ensure insights are actionable and interventions are effectively prioritized in high-risk areas.

**Expected Outcomes:** MILDEPs and Defense Agencies use a common risk-based process, an agile and targeted SCI and SCRM framework to reduce critical vulnerabilities, enhance DoD's ability to maintain operational readiness, and provide actionable insights to inform resource allocation and risk mitigation strategies.

### Key Performance Metrics:

- % of Programs with standardized critical risk definitions.
- Completion level of the Data Requirements plan for critical areas.
- # of Actionable Insights generated, and Risk Mitigation Actions initiated based on the streamlined reporting process.

### Why It Matters:

A risk-based SCRM approach ensures DoD efforts are concentrated on the most critical vulnerabilities, enabling efficient resource allocation and proactive risk mitigation. Focusing on actionable insights enables DoD to enhance mission readiness and avoid disruptions that may jeopardize operational effectiveness.

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## 2.3 Facilitate Supplier Data Sharing: Mandate contract clauses reflect modern data-sharing practices, secure protocols, and incentives to improve supplier collaboration and resilience.

**Summary of Recommendation:** Increase access to data from private-sector suppliers by mandating contract clauses that reflect modern data-sharing practices. Include modernized contract frameworks, secure protocols, shared risk models, and non-financial incentives, such as reduced regulatory barriers, to enhance collaboration and strengthen resilience across the supply chain. In most best-practice companies, data sharing is not optional; however, these companies have identified ways in which to overcome the reticence and fear of sharing critical data through building trust. DoD must do the same.

**Accountability:** USD(A&S) in collaboration with MILDEPs and Defense Agencies

**Time Frame:** implementation of data-sharing frameworks and secure protocols 6-12 months

### Specific Actions:

1. **Mandate Contract Clauses that Reflect Modern Data-Sharing Practices (6-12 months):** Require data sharing in contracts. Start with new contracts and contracts involving high-risk supply chain items. Modify or remove overly restrictive regulations and modernize data-sharing frameworks to align with current supply chain needs. Introduce non-financial incentives, such as reduced regulatory barriers, enhanced data protection protocols, and shared technology solutions, to encourage supplier participation.
2. **Develop Secure, Standardized Data Access Protocols (6-9 months):** Define clear data requirements, access conditions, and protections between DoD and suppliers to address supplier concerns about privacy and proprietary information. Ensure protocols align supplier data-sharing practices with DoD standards and national security needs.
3. **Build Trust-Based Relationships with Critical Tier 1 Suppliers (6 months):** Identify critical Tier 1 suppliers and hold regular reviews every 4-6 months to assess progress in data sharing and align on actionable improvements.
4. **Implement Shared Risk Models to Enhance Engagement (6-12 months):** Introduce shared risk models where DoD and contractors share accountability for supply chain outcomes, fostering greater transparency and collaboration.

*This recommendation complements the DBB's Creating A Digital Ecosystem Study's focus on fostering public-private partnerships (Rec 3), expanding and formalizing industry participation in the development of solutions.*

**Expected Outcomes:** Increased supplier participation in data sharing, enhanced supply chain visibility, and improved collaborative risk management. A more transparent and resilient supply chain supporting DoD's operational readiness and ability to mitigate risks effectively.

### Key Performance Metrics:

- Completion Rate of Legal and Risk reviews of contract clauses within 6 months.
- # of Updated Supplier Agreements reflecting secure data access protocols and incentives.
- Frequency of Tier 1 Supplier Reviews conducted to assess progress.

### Why It Matters:

Enhanced data-sharing and collaboration with suppliers are critical for maintaining a resilient, transparent supply chain to support DoD's operational readiness and risk management.

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### 3.1 **Prioritize Risk Areas for Illumination:** Focus visibility efforts on high-priority programs, critical components, and major vulnerabilities concurrently, avoiding broad, unfocused initiatives.

**Summary of Recommendation:** To ensure immediate impact, prioritize visibility efforts in the most critical risk areas, such as high-priority systems, programs, parts, and critical items. Target these priority areas concurrently, focusing on the highest-impact vulnerabilities and avoiding broad, unfocused initiatives.

**Accountability:** USD(A&S), in collaboration with MILDEPs and Defense Agencies.

**Time Frame:** Risk identification within 3 months; parallel implementation in critical areas to begin immediately thereafter.

#### **Specific Actions:**

1. **Identify Critical Risk Areas:** Require each MILDEP and Defense Agency to identify the most critical systems, programs, and components essential to mission readiness.
2. **Focus Visibility Efforts:** Implement visibility initiatives across identified critical areas simultaneously to ensure rapid and measurable progress, including scaling pilot programs that have been successful in critical supply chain risk areas.
3. **Optimize Resource Allocation:** Concentrate resources on enhancing visibility in these high-priority areas to maximize impact and avoid inefficiencies.

**Expected Outcomes:** This approach will enable targeted supply chain visibility, mitigating risks in the most critical programs and capabilities while optimizing resource allocation. By focusing efforts on the most impactful areas, DoD will strengthen resilience without requiring exhaustive visibility across all supply chain tiers.

#### **Key Performance Metrics:**

- Identification of Major Parts/Critical Items for high-priority programs within 6 months.
- Reduction in Risk Levels for identified high-priority programs/parts/critical items.

#### **Why It Matters:**

Prioritizing visibility in critical risk areas ensures DoD focuses on the highest-impact supply chain risks, driving resilience, enhancing mission readiness, and effectively allocating resources without pursuing unsustainable, comprehensive visibility.

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### 3.2 **Implement Outcome-Oriented Performance Metrics:** Implement metrics such as on-time delivery and single-source supplier risks to align visibility efforts with strategic resilience and mission-critical outcomes.

**Summary of Recommendation:** Implement outcome-oriented performance metrics to measure supply chain results, such as on-time delivery, inventory levels, single-source supplier risks, and supplier health. Aligning these metrics with organizational goals ensures visibility efforts directly improve resilience, operational effectiveness, and mission-critical outcomes.

**Accountability:** USD(A&S) with DoD MILDEPs and Defense Agencies.

**Time Frame:** Key Performance Indicators development and alignment with strategic goals within 6 months.

#### **Specific Actions:**

1. **Define Outcome-Oriented Performance Metrics:** Develop metrics that reflect tangible supply chain results, such as on-time delivery rates, risk reduction, supplier financial health, and single-source dependency counts.
2. **Align Performance Metrics with Strategic Goals:** Ensure performance metrics reflect DoD's overarching supply chain objectives, empowering visibility efforts to directly support mission-critical outcomes.
3. **Integrate and Track Metrics:** Implement systems to track and monitor performance metrics consistently across divisions, enabling data-driven insights and proactive decision-making.

**Expected Outcomes:** Across the Department, illumination efforts promote outcome-oriented performance metrics that allow DoD to measure and improve supply chain performance effectively, directly linking visibility efforts to strategic goals and enhancing resilience and operational readiness.

#### **Key Performance Metrics:**

- Completion of KPI Development and Integration within 6 months.
- Improvements in Measurable Supply Chain Outcomes (e.g., on-time delivery rates, risk scores, inventory levels).

#### **Why It Matters:**

Outcome-oriented performance metrics ensure that supply chain visibility efforts translate into meaningful performance improvements, optimizing DoD's ability to manage risks, enhance operational readiness, and support mission-critical objectives.

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## 4.1 Map the Critical Supply Chains and Implement Digital BOM/SBOM: Automate data collection for Digital Bill of Materials and Software Bill of Materials with supplier traceability to streamline risk identification and enhance visibility across critical systems and components.

**Summary of Recommendation:** To enhance supply chain visibility and resilience, implement Digital Bills of Materials, including Software Bill of Materials, and traceability to key suppliers/supplier networks for critical items within the major systems/programs/parts. Automating BOM/SBOM data collection for high-priority parts will reduce reliance on manual entry, streamline risk identification, and provide timely insights into supply chain vulnerabilities for decision-making, thereby enhancing overall supply chain resilience.

**Accountability:** USD(A&S), supported by DLA and MILDEPs and Defense Agencies.

**Time Frame:** Define major components/parts within 3-6 months; digitize BOM/SBOM, automate data collection processes, and implement traceability within 12-18 months.

### Specific Actions:

1. **Map the Critical Supply Chains** (e.g., weapons and materiel): Map the supply chain for critical systems, programs, and parts, including sources and points of origin to enhance visibility and risk management.
2. **Prioritize Digitalization of Major Programs/Parts in High-Priority Areas:** Digitize critical parts/critical items within major programs to Digital BOM/SBOM, emphasizing areas with the greatest risk and operational impact.
3. **Implement Traceability:** Define tracking protocols and tracing technologies (e.g., barcode, RFID, vision technology, etc.) to identify products and track movement.
4. **Automate Data Collection Processes:** Deploy automated tools for data collection to minimize manual entry, reduce errors, and support near-real-time visibility into supply chain risks.

*This recommendation aligns with the DBB's Creating A Digital Ecosystem Study (Rec 4), which describes how a collaborative environment will include Product Lifecycle Management Platform which "loads all program Bills of Materials including technical and design specifications, into a joint PLM environment to serve as an authoritative source of truth ... and helps understanding sourcing/supply constraints."*

**Expected Outcomes:** Supply chain mapping and the transition to Digital BOM/SBOM for high-priority programs and parts will provide DoD with enhanced visibility across supply chain. These efforts will enable rapid risk identification and mitigation, strengthen resilience, and improve operational efficiency across mission-critical programs.

### Key Performance Metrics:

- % Accuracy of critical supply chains mapped, including sources and points of origin
- % of Critical Components in high-priority programs transitioned to Digital BOM/SBOMs

### Why It Matters:

Mapping critical supply chains and digitalizing BOM/SBOM ensures DoD can access vital supply chain data with speed and accuracy. These initiatives will enhance visibility, improve risk response, and ensure resilience and readiness in critical supply chains.

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## 4.2 Implement a Defined Technology Stack with Federated Data Governance Policies:

Deploy a modular stack of advanced supply chain technologies leveraging commercial tools for flexibility and scalability, complemented by federated data governance policies.

**Summary of Recommendation:** DoD must implement a modular stack of advanced supply chain technologies, leveraging third-party commercial data and tools for flexibility, scalability, and interoperability across the Department. This technology stack will be complemented by federated data governance policies that enable MILDEPs and Defense Agencies to deploy and configure systems independently while adhering to centralized standards. This approach enables the ability to adapt to emerging requirements and addresses the scale and complexity of DoD operations.

### Accountability:

- **Common Technology Stack Definition:** USD(A&S) with CDAO, CIO, MILDEPs, and Defense Agencies.
- **Federated Data Governance Policies:** USD(A&S) with CDAO, MILDEPs, and Defense Agencies.
- **Modular Stack Implementation:** MILDEPs and Defense Agencies.

**Time Frame:** Definition and Policies 6 months. Tech stack Implementation 12–18 months.

### Specific Actions:

1. **Define a Common Technology Stack:** Develop a modular, open-architecture technology stack that ensures interoperability and enables seamless data sharing across DoD. Leverage commercially available tools and data sources to prioritize cost-effectiveness and compatibility. Allow tailored configurations for distinct operational needs (e.g., PLM systems customized for specific Services but interoperable at the Department level).
2. **Formalize Federated Data Governance Policies:** Establish centralized governance standards to ensure interoperability while enabling MILDEPs and Components to deploy and configure their systems independently. The targeted outcome is separate but interconnected systems.
3. **Deploy and Monitor Implementation:** Roll out the defined technology stack across MILDEPs and Defense Agencies. Establish a framework to evolve and integrate supply chain illumination solutions as new requirements emerge. Monitor adherence to governance policies to maintain consistency and interoperability across the Department.

***This recommendation parallels the DBB's Creating a Digital Ecosystem Study (Recs 4-6, which emphasize developing collaboration platform architecture and roadmap, a common vision and taxonomy and standards for data interface operability throughout the Department) by defining and implementing the supply chain specific architecture.***

**Expected Outcomes:** Enhanced supply chain visibility, interoperability, and adaptability which balances centralized oversight with branch-specific operational needs.

### Key Performance Metrics:

- # of MILDEPs and Defense Agencies contributing to the definition of core tech standards.
- # of Components Implemented (e.g., 2x2 matrix of component and modular solution implemented).
- % of MILDEPs/Components adhering to governance policies.

### Why It Matters:

A modular, interoperable technology stack combined with federated data governance policies ensures DoD can adapt rapidly to evolving operational demands while maintaining data sharing and coordination.

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### 4.3 Deploy Near-Real-Time Monitoring Systems in Select Risk Areas: Focus monitoring on high-risk components with refresh rates of 15 minutes to 1 hour, providing actionable insights to decision-makers for rapid risk mitigation.

**Summary of Recommendation:** Implement near-real-time monitoring systems for critical supply chain risks where downtime or delays would cause significant cost or operational impact. Since monitoring all supply chain items is not feasible, efforts must focus on high-risk components, such as those with geographic or single-source vulnerabilities. By narrowing the illumination focus and integrating data from sources like geopolitical intelligence, supplier health metrics, and industry-specific risk datasets, DoD will establish a manageable, actionable monitoring capability. Identify and prioritize critical areas requiring refresh rates of 15 minutes to 1 hour, with systems designed to provide actionable insights to decision-makers, such as Program Executive Officers and impacted suppliers. Leveraging third-party solutions will ensure scalability and rapid implementation.

**Accountability:** USD(A&S), with CDAO, DLA, MILDEPs, and Defense Agencies.

**Time Frame:** Implement near-real-time monitoring within 6-12 months, starting with highest risk components and regions.

#### Specific Actions:

1. **Identify Critical Risk Areas for Near-Real-Time Monitoring:** Determine which supply chain risk areas require near-real-time monitoring, focusing on areas with high-cost and/or high-impact downtime or reaction risks, such as geographic risks or single-source dependencies.
2. **Define Data Refresh Thresholds:** Establish appropriate refresh rates for monitoring systems based on the criticality of the items, ensuring data updates occur frequently enough to enable timely responses (e.g., every 15 minutes to 1 hour).
3. **Deploy Illumination Tools for Monitoring:** Implement monitoring tools to integrate data from diverse sources such as geopolitical intelligence, supplier health metrics, and industry-specific risk datasets. Leverage third-party solutions to accelerate deployment and scalability.

**Expected Outcomes:** Near-real-time monitoring systems will provide actionable insights for key decision-makers, enabling faster risk mitigation actions and improving supply chain resilience. This targeted approach will enhance DoD's ability to respond and maintain operational readiness.

#### Key Performance Metrics:

- # and Effectiveness of Risk Mitigations triggered by integrated monitoring insights.

#### Why It Matters:

Near-real-time monitoring allows DoD to anticipate and respond to supply chain risks promptly, reducing the potential impact of disruptions on critical operations and strengthening supply chain resilience.

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## 5.1 Bridge Critical IT, SCI, and SCRM Talent Gaps: Address shortages in IT system integration and analytics talent and SCI skills through targeted hiring, contracting, and partnerships, leveraging private sector.

**Summary of Recommendation:** DoD must address critical IT, SCI and SCRM talent gaps by prioritizing the hiring and development of key capabilities through targeted hiring initiatives, contracting, and industry partnerships. Priority areas include systems integration, advanced analytics, and emerging technologies, which are vital for strengthening supply chain illumination and driving innovation. Leveraging private-sector best practices, DoD can rapidly bridge these gaps while building a sustainable foundation for long-term capability enhancement.

**Accountability:** USD(P&R) with the Chief Talent Management Officer and USD(A&S).

**Time Frame:** Identify gaps and implement solutions through hiring/partnerships 12 months

### Specific Actions:

1. **Identify Key Talent Gaps and Capabilities:** Conduct a focused assessment to identify high-priority roles and capabilities needed for supply chain system integration, analytics, and SCI-related technologies.
2. **Develop a Specific SCI/SCRM Workforce Strategy:** Create a strategy that utilizes targeted hiring initiatives (including existing authorities), expanded use of term appointments, and other strategies to rapidly acquire essential talent while creating the foundation for long-term talent sustainability. The perception that DoD cannot compete with the commercial marketplace should drive human capital innovation, as recommended in previous DBB studies.
3. **Leverage Industry Partnerships:** Expand partnerships with private-sector entities and academic institutions to access specialized talent and tools, with a focus on conflict-free integration and engineering capabilities. These collaborations will provide immediate expertise while fostering long-term knowledge transfer.

*This recommendation parallels the DBB's Creating A Digital Ecosystem Study (Rec 13), which assigns OSD(P&R) in collaboration with CDAO to recruit highly specialized and in-demand technical disciplines [talent] that support digital modernization initiatives. This recommendation also parallels several recommendations throughout the DBB's Building a Civilian Talent Pipeline Study.*

**Expected Outcomes:** Filling critical IT, SCI and SCRM talent gaps in the near term will enhance DoD's ability to integrate systems, analyze data, and respond to supply chain risks. These efforts will strengthen operational resilience and position DoD to meet evolving challenges effectively.

### Key Performance Metrics:

- # of Hires and Contractors established in priority IT, SCI and SCRM areas.
- Initiation of Key Partnerships with private-sector organizations and academic institutions.
- Measurable Improvements in supply chain integration and analytics capabilities.

### Why It Matters:

Addressing critical IT, SCI and SCRM talent gaps quickly is essential for modernizing DoD's supply chain operations and ensuring mission readiness. By prioritizing near-term solutions and leveraging private-sector best practices, DoD can build a more resilient and innovative supply chain infrastructure.

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## 5.2 Expand Training on SCI and SCRM Techniques: Extend Defense Acquisition University training to include structured learning paths in SCI and SCRM, fostering innovation and building expertise across DoD.

**Summary of Recommendation:** It is essential for DoD to expand Defense Acquisition University resources and training to explicitly educate personnel on SCI techniques and tools. Include the development of a structured learning path for individuals seeking sequential progression in building expertise in Supply Chain Illumination and Supply Chain Risk Management. Inspired by industry best practices, this initiative will ensure a comprehensive, scalable approach to developing the skills and knowledge required to strengthen DoD's supply chain resilience.

**Accountability:** USD(A&S) with DAU, MILDEPs, and Defense Agencies.

**Time Frame:** Curriculum and program launch within 6-12 months; ongoing improvement.

### Specific Actions:

1. **Expand DAU Training Curriculum to Include SCI Techniques and Tools:** Build out DAU training resources, in support of USD(A&S) to include comprehensive modules on supply chain illumination methods, advanced analytics, and related tools. Align the curriculum with DoD priorities and industry advancements, ensuring it supports USD(A&S)'s broader efforts to build Department-wide expertise in illumination techniques.
2. **Develop Specific Strategies for SCI / SCRM Development Including Sequential Learning Paths for SCI and SCRM:** Create structured, mandatory learning tracks with certification levels (e.g., Levels 1/2/3) tailored to foundational, intermediate, and advanced capabilities. Require specific roles critical to supply chain visibility and risk management to complete these learning paths, while offering optional tracks for generalists and specialists seeking to enhance their expertise.
3. **Integrate MILDEP- and Agency-Specific Learning Elements:** Supplement core training with tailored, component-specific content to address unique operational challenges faced by MILDEPs and Defense Agencies. Promote cross-departmental collaboration by encouraging shared learning experiences.
4. **Incentivize Participation and Innovation:** Recognize and reward individuals and teams who contribute to supply chain innovation and resilience. Use leadership acknowledgment, certifications, and success stories to highlight achievements and encourage broad engagement with SCI and SCRM efforts.

*This recommendation parallels the Digital Ecosystem Study's focus on Talent & Training, and specifically (Rec 12), to "establish distinct digital ecosystem pathways for both military and civilian personnel". This recommendation also parallels several recommendations throughout the DBB's Building a Civilian Talent Pipeline Study.*

**Expected Outcomes:** Expanding DAU resources and introducing structured learning paths will enhance DoD personnel's understanding of SCI and SCRM and promote innovation and collaboration.

### Key Performance Metrics:

- # of Certification Completions by personnel completing sequential learning paths.
- Frequency of Innovative Contributions recognized through the incentive system.

### Why It Matters:

Extending DAU resources and creating learning paths for SCI and SCRM will equip DoD workforce with the advanced knowledge and skills needed to address supply chain vulnerabilities, fostering operational resilience and supporting mission-critical objectives.

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## 6.1 Establish a Long-Term Vision to Guide Illumination Efforts: Build on existing DoD strategic management plans and strategies to develop an illumination roadmap aligned with strategic goals to sustain and evolve illumination efforts, incorporating data standards and modular technologies. Ensure alignment with budget and legislative requirements to drive progress and adaptability.

**Summary of Recommendation:** The Department must establish a long-term vision to sustain and expand supply chain illumination efforts, aligning with the *DoD Strategic Management Plan* and *National Defense Industrial Strategy*. This vision needs to address long-lead budgetary and legislative requirements and include a flexible management framework that incorporates defined data-sharing standards, modular technology adoption, and outcome-oriented performance metrics. By providing a detailed roadmap for continuous assessment and improvement, this vision will enable DoD to adapt to evolving supply chain risks, enhance sub-tier visibility, and leverage emerging technologies effectively.

**Accountability:** USD(A&S) in collaboration with MILDEPs and Defense Agencies.

**Time Frame:** Review and integrate progress within 6 months; develop the illumination roadmap within 18 months.

### Specific Actions:

1. **Review and Integrate Progress from Existing Plans (6 months):**
  - Conduct a comprehensive review of progress against the *FY 2022–2026 Strategic Management Plan*, *National Defense Industrial Strategy 2023*, and the *NDIS Implementation Plan for FY 2025*.
  - Identify successes, overlaps, and areas needing acceleration, with a focus on sub-tier visibility, collaboration with primes, and modular technology deployment.
2. **Develop a Comprehensive Illumination Roadmap (12 months):**
  - Define specific actions and milestones for supply chain illumination, building on insights from the review, including:
    - **Sub-Tier Visibility:** Focus on identified critical risk areas, integrating digital BOMs and leveraging SCRM-TAC capabilities.
    - **Defined Modular Technology Stack:** Focus on sustained deployment and integration.
    - **Prime Collaboration:** Formalize engagement mechanisms with defense primes and address incentives, generally non-financial, to strengthen sub-tier supplier networks.
    - **Outcome-Oriented Performance Metrics:** Define and implement indicators aligned to organizational goals to measure visibility, resilience, and risk mitigation progress.
3. **Accelerate Immediate Actions (18 months):**
  - Focus on programs to improve visibility and risk management for Tiers 3–5 suppliers in critical areas.
  - Prioritize collaboration with primes to identify vulnerabilities and build successes to inform rollout.

**Expected Outcomes:** A clear and structured vision for supply chain illumination that enables DoD to sustain and evolve its capabilities while fostering resilience, adaptability, and alignment with long-term strategic goals and prioritized funding

**Key Performance Metrics:** Completion of review and roadmap on time.

### Why It Matters:

A long-term vision for supply chain illumination ensures DoD remains resilient and adaptable, with forward planning for budgets and legislative requirements critical to sustaining readiness, efficiency, and mission success.

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## Appendix D: Case Studies

References to specific companies, commercial products, or services do not constitute an endorsement or a recommendation by the Department of Defense, the Defense Business Board, or the U.S. Government.

### Dell Technologies Case Study: Prevention to Supply Chain Disruptions ~ Risk-Based Assessment Framework ~



*Dell borrowed its Risk Based Assessment approach from the Intelligence community – bringing in all sources of information to scope initial risks and requiring a diversification plan, for possible disruptions, from all sub-tiers. This means, on the supply side of analysis, Dell overlays key challenges from trusted data on top of possible risks that include geographic, environmental, sole-source suppliers, rare Earth minerals mapping, product/supplier traceability, acquisitions, transportation/labor, and government regulations and NDAA strategy, or tariffs. This ensures resilience plans are in place for high-risk regions, including lower-tier suppliers' information to help map illumination and to increase near-real-time visibility into monitoring activities worldwide.*

*Since before Covid-19, Dell has focused on geo diversification to address tariffs in 2018 and geopolitical risks to evaluate supply chain vulnerabilities. In response, Dell was prepared within 12-18 months for the next wave of tariffs. The company was able to pull in suppliers to move to Mexico, Taiwan, and other regions, and six years later, Dell's transformation to establish a regional approach, from components to final assembly manufacturing, produced diversification that improves competitiveness.*

*Dell maintains a commitment to maintaining healthy relationships with suppliers. A significant evolution was Dell's initiative to create supplier hubs near assembly plants. This move not only sped up the production process but also enabled better collaboration and problem-solving between Dell and its suppliers.*

*Dell's Risk-Based Assessment Framework is a broad and proactive approach to managing supply chain risks, maintaining operational activities, and minimizing the impact of disruptions. It includes the following strategic programs:*

- 1. **Defense-in-Depth and Defense-in-Breadth** uses multiple layers of controls to mitigate threats that could be introduced into the supply chain, ensuring there are several barriers to potential risks.*
- 2. **Global Operations Supply Chain Resilience** focuses on resilience and business continuity, aligning with international standards like ISO 22301 and ensuring critical operations can continue even during disruptive events.*
- 3. **Crisis Management** coordinates the company's response to events that could negatively impact operations. This program involves cross-functional teams and clear communication and escalation flows.*
- 4. **Supply Chain Visibility and Continuous Monitoring** ensures visibility and identify potential disruptions early; this involves analyzing data from various sources to detect any anomalies or issues that could impact operations.*
- 5. **Supplier Audits and Assessments** are conducted to ensure suppliers comply with Dell's standards for quality, sustainability, and ethical practices. These audits help identify potential risks and areas for improvement.*
- 6. **Collaboration with Suppliers** closely to ensure adherence to Dell's standards and practices and includes providing training and support to help suppliers improve their processes and performance.*
- 7. **Secure Development Lifecycle** incorporates security measures throughout the development lifecycle of its products, including firmware digital signing, penetration testing, and BIOS protections.*

*In recent years, Dell's supply chain has continued to evolve, leveraging the power of digitization and AI to enhance its efficiency and transparency. With these tools, Dell can now forecast demand with pinpoint accuracy and improve its logistics. **Dell is transitioning to a digital Bill of Materials to enhance automation and analysis.** Digital threads weave through every stage of the supply chain, from production to delivery, to enable near real-time monitoring and data analysis and a crystal-clear panorama, where each process is visible, trackable, and optimizable.<sup>21</sup>*



## F-35 Case Study: SCREEn Strengthens Ability to Manage SCR Effectively ~ Supporting Readiness and Performance ~



*The production of F-35 fighter jets was temporarily halted due to the discovery of an adversary-made alloy in the magnets of the jet's turbomachine pumps. The Defense Federal Acquisition Regulation Supplement (DFARS) prohibits the use of certain specialty metals from specific countries, and sourcing from this region violated this U.S. regulation. Production was halted for a month until DoD issued a National Security Waiver to allow the F-35 aircraft to resume despite the presence of the no-compliant specialty metals, since the magnet does not transmit information or compromise the integrity of the aircraft and since the waiver was deemed necessary for national security interests.<sup>22</sup>*

*The F-35 SCRM illuminates its microelectronics and propulsion supply chains to detect risks, identify IP theft of Foreign Ownership, Control, and Influence (FOCI), inform decision-making to mitigate disruptions. With more than 40-thousand parts, Lockheed Martin digitized BOMs for hundreds of Tiers 1 and 2 suppliers through a program called SCREEn, Supply Chain Risk Evaluation Environment; to date, 153 risks were identified and 17 of those prioritized risks were presented for recommended mitigation. **SCREEn is an Ai-optimized system, built within ADVANA, designed to interface across the Enterprise network that combines data on risk and parts/components from a variety of sources to evaluate capability suitable at all echelons from Program Offices to OSD.** It is an integral Case Management system to continuously monitor for issue tracking, data sharing, and cross-org coordination and collaboration throughout the process from possible risk identification to mitigation.*

*SCREEn maximizes the use of analytic tools and mitigation strategies to proactively identify and address trends, vulnerabilities, and potential disruptions through.<sup>23</sup>*

- **Data Integration:** SCREEn integrates government data with commercially and publicly available information to provide a holistic view of the supply chain. This helps identify potential risks and vulnerabilities.
- **Risk Identification and Prioritization:** The tool uses advanced analytics and machine learning to identify and prioritize risks within the supply chain. This allows for timely and effective decision-making.
- **Mitigation Modeling:** SCREEn provides decision-ready analytics for supply chain resiliency, enabling the F-35 Joint Program Office to develop and implement risk mitigation strategies.
- **Visualization and Reporting:** The tool offers analytic visualization environments in both classified and non-classified settings, making it easier to communicate and streamline risk mitigation activities across DoD.
- **Enhanced Readiness:** By leveraging SCREEn, the F-35 program aims to enhance operational readiness and ensure the reliability and security of its supply chain.

*Although the F-35 has experienced cost overruns and production concerns, SCREEn's implementation strengthens the F-35 program's ability to manage supply chain illumination and risks effectively, ultimately supporting the readiness and performance of the aircraft.*



## Flex Pulse Center Case Study: Supply Chain Illumination Aids in Navigating Shortages & Shutdowns ~ During Geopolitical Disruptions, Reducing China-centric Dependence ~



The Coronavirus pandemic shut down the world's manufacturing center in China, disrupting supply chains and underscoring the dangers of a globalized economy. Faraway factories, once celebrated for delivering lower costs now seemed a fatal vulnerability. For Flex Ltd., a Singapore-based manufacturer with 100 facilities in 30 countries and with 21 factories in China closed for weeks, the consequences were particularly acute. The crisis peaked when Flex factories faced shortages of 8,000 individual items — roughly five times what Flex dealt with on a typical day. If the shortfalls of electronic components such as memory chips, connectors, and LCD panels were not quickly resolved, production of a wide array of goods would grind to a halt. Additionally, a plunge in trans-Pacific air travel created obstacles for manufacturers who depended heavily on airlines to move goods and people. **At practically every step,**

**Flex capitalized on the practice of supply chain illumination to proactively trouble-shoot and navigate shortages, shutdowns, and relationships to redirect business operations.**

Using a wall-size, touch-screen display, supply chiefs at a California command center tracked the status of 16,000 suppliers and more than 1 million individual parts using a data analytics tool called Pulse. Its cloud-based system provided near real-time information on every .0005-cent screw to each integrated circuit costing hundreds of dollars as well as a cohesive view of the multinational operation. Pulse data enabled Flex to filter its supply chain by specific locations, not just the country of origin and eventually, to include new information on suppliers' financial health. Flex flagged every part originating from China, reconfirming orders with both suppliers and customers to ensure everything ordered was in production and still needed. And, for parts needed immediately, Flex scoured the globe for alternative suppliers; one single missing part can bring down a line. Customers increasingly demanded regional production networks instead of a single global chain.

As the pandemic reshaped global demand, some Flex factories suddenly were producing too many parts while others were not producing at all, causing an excess stockpile in some inventory from the patchwork of operating factories around the world when Asia was shut down. As a result, inventory had increased by \$101 million from the previous quarter; **holding extra inventory in an era of just-in-time deliveries is expensive, so Flex began tagging affected parts and rerouting supplies.** Upgrades to software applications used to transform digitalization efforts; centralize data governance; and track production thousands of miles away provided information to better identify, in near real-time, supply chain risks, challenges, and disruptions.

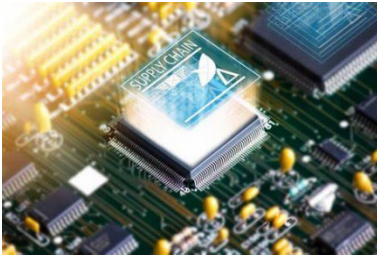
Flex's evolution demonstrates the pandemic-turbocharged trends in globalization already in motion when the virus first flared; armed with data and facing an unpredictable world, Flex recalculated the balance between cost and resilience, reassessed the priority for efficiency of production to certainty of delivery, and imagined a less-China-centric economy.

Flash forward to 2024, Flex's centralized data governance has continued to improve its command center practice of utilizing KPI dashboards to map processes and subprocesses and their impact, to make data-driven decisions from a single-source of truth, and to analyze metrics for inventory reduction, cost savings, and action-tracker success rates. For example, program office execution improved from 12-14% to 64% with the use of Flex Pulse. Initially, over 14 months, Flex Pulse removed \$600 million in inventory in cost savings or inventory avoidance, resulting in \$32 billion over eight years. And, material reduction in labor required and labor costs reduced a four-hour daily bock of time to ten minutes for 10,000 employees charged with analyzing data. Flex leverages data and supply chain illumination tools to accelerate speed and accuracy of processes and enhance supply chain resilience and efficiency.<sup>24</sup>





## Micron Technology Case Study: Data-Driven Supply Chain Visibility Relies on Quality Data ~ Integrated Technology with Advanced Analytics ~



*Micron Technology's supply chains are finite, decentralized, agile 'mini operating models', with manufacturing closer to the point of purchase and with flexible supplier contracts to mitigate any impact of global supply shortages. The decentralized supply chain model ensures geographic diversity, with manufacturing spread across different regions to reduce exposure to risks and operational continuity across its production lines.*

*Micron has developed a comprehensive supply chain quality management system to operate on multiple levels and to capitalize on accurate and timely data as the foundation for decision-making, enabling end-to-end visibility from raw materials to product delivery. **Because visibility is crucial for managing risks and aligning supply with demand, Micron maintains robust data governance, reviewing data daily to detect anomalies, manage global sourcing, and ensure reliable operations.** Technology integration utilizing advanced analytics, AI, machine learning, and flexible sourcing strategies improve forecasting, scenario planning, and operational efficiency.*

- *Descriptive Analytics provides an informational layer for near-real-time data visibility across the supply chain.*
- *Predictive Analytics offers forecasting and scenario planning to anticipate shortages and optimize sourcing.*
- *Prescriptive Analytics recommends actions, such as adjusting capacity or stock levels, based on historical data and predictive insights.*
- *Cognitive Analytics incorporates AI and machine learning to guide decision-making and enhance resilience by simulating potential disruptions and their impact.*

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## Toyota Motor North America Case Study: Toyota Survives When the Chips are Down ~ Trusted Relationships with Suppliers Critical ~



*During the Covid-19 pandemic, Toyota Motor North America (TMNA) faced significant supply chain disruptions as its 45-day inventory buffer, designed for crisis management, dwindled, leading to production cuts. Leveraging trust-based relationships with suppliers, Toyota learned from these challenges the criticality of establishing and maintaining deep relationships with its supply chain to optimize inventory management. This approach set the foundation for Toyota to become more competitive and North America's top-selling automaker in 2021.*

*Toyota's ability to sustain a transparent and resilient supply chain continues to rely on deep supplier partnerships, further enhancing data collection and resilience planning. Long-term, collective relationships with suppliers are crucial for ensuring transparency, including working closely with Tier 1 suppliers to collaborate on the selection of sub-tiers; understanding the Bill of Materials for suppliers; setting clear expectations for data sharing; identifying bottlenecks; and mitigating delays. This approach has proven successful to triangulate risks, despite not directly purchasing from sub-tier suppliers.*

*This best practice has helped Toyota consistently earn the highest score among six major automakers in a North American OEM-Supplier Working Relations Index (WRI) study. This practice for Toyota has yielded a clear, positive supplier relations benefit -- following more investment in innovation and technology, sharing of technology, and supplier support.<sup>25 26</sup>*



## Appendix E: Disclosures

This Study, DBB FY25-02, *Supply Chain Illumination in DoD*, is a product of the Defense Business Board and herein are offered as advice and do not represent DoD policy. The DBB's Business Transformation Advisory Subcommittee presented this Study and its findings and recommendations to the Board's members during an open public meeting on Monday, January 13, 2024. After discussion and deliberations, Board members unanimously approved this Study. Briefing slides presented are in Appendix F. No public comments were received.

The Secretary of Defense established the DBB in 2002 to provide the Secretary and Deputy Secretary of Defense with independent advice and recommendations on how "best business practices" might apply to the overall management of DoD. DBB's members, appointed by the Secretary of Defense, are senior corporate leaders with demonstrated executive-level management and governance expertise in large organizations. Board members are experienced in creating reliable and actionable solutions to complex issues guided by proven best business practices.

Authorized by the Federal Advisory Committee Act of 1972 (Chapter 10 of Title 5, U.S. Code) and governed by the Government in the Sunshine Act of 1976 (Section 552b of Titles 5, U.S. Code), 41 CFR 102-3.140, and other appropriate federal and DoD regulations, the DBB is a federal advisory committee whose members volunteer their time to examine issues and develop recommendations and effective solutions to improve DoD management and business processes.



## Appendix F: DBB Presentation Slides to the Board



# Presentation, Deliberation, and Vote on *Supply Chain Illumination* in the Department of Defense Study

Business Transformation Advisory Subcommittee

Mr. Craig Albright, Chair  
GEN Joseph Votel, USA (Ret), Co-Chair

## SUPPLY CHAIN ILLUMINATION IN THE DEPARTMENT OF DEFENSE



*Leveraging Private-Sector Best Practices to Enhance  
DoD Supply Chain Visibility and Decision Making*

Business Transformation Advisory Subcommittee

January 13, 2025

DBB FY 25-02



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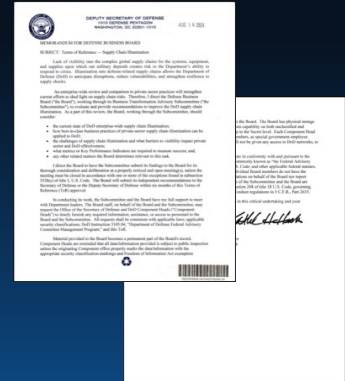
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## Terms of Reference

- Provide actionable recommendations to improve DoD supply chain illumination (SCI) and supply chain risk management (SCRM) – a **critical capability for preserving national security and operational readiness**;
- Evaluate the current state of DoD enterprise-wide efforts and determine how to apply private-sector best practices across the Department to build a resilient, diverse, secure supply chain aligned with the NDIS and NDAA;
- Address the challenges of, and barriers to, illumination ; and
- Define appropriate metrics to measure success.



## Definition & Key Points

### Supply Chain Illumination

#### Working Definition

- An analytical process that provides transparency and visibility into supply chain entities, products, parts and/or raw materials to identify risks and enable proactive mitigation and assured supply.
- “Continual visibility throughout the supply chain, by uncovering and mapping of multi-tier supplier network, provides an understanding of the tiers of a supply chain, a supply chain map, and vetting of suppliers against a defined set of supply chain criteria to identify and defend against threats.”
- An evolving (not static) risk view that must be continuously refreshed.

#### Useful Application

- Enable organizations to
  - Identify and mitigate supply chain risks.
  - Provide situational awareness for strategic planning.
  - Enable data-driven, proactive decision-making.
  - Enhance transparency and supplier collaboration.
  - Streamline operations and reduce costs.



## Supply Chain Disruptions & Vulnerabilities in the National Spotlight

In today's world, it is impossible to ignore the impact of globalization on the supply chain, as nearly every level of the supply chain is affected. Disruptions happen every day, all around us.

- **Critical Minerals in China:** China controls most of the global production for critical minerals like gallium, germanium, and antimony, which have widespread military applications.
- **Spruce Pine Mine:** Flooding in 2024 damaged the infrastructure, which supplies 70% of the world's high-purity quartz for semiconductors.
- **Baxter International:** A hurricane in 2023 disrupted production of IV solutions, impacting 60% of the U.S. supply.
- **Israel-Hamas War:** Disruptions in Red Sea trade routes have increased shipping costs and times and reduced shipping traffic by 50%, including a 79% decrease in bulk container shipping.
- **Ukraine-Russia War:** Grain exports through Black Sea trade routes dropped from 60 million tons a year to 30 million tons in two years, threatening food security in Africa and Asia.
- **Microelectronics Shortages:** Global semiconductor shortages have delayed advanced weapon systems, highlighting a reliance on foreign microchip suppliers.
- **Black Powder Shortage:** A 2021 explosion at the sole U.S. black powder facility exposed critical munitions manufacturing dependencies, despite its 2023 reopening.



## Approach & Methodology

### Study Approach

- ✓ Conducted six months of study;
- ✓ Completed extensive literature review, including white papers, published articles and books, and DoD strategic plans and supply chain reports;
- ✓ Interviewed 22 current and former DoD Agency and Military Department leaders, 26 private-sector industry executives, and many supply chain industry practitioners and subject matter experts; and
- ✓ Asked every interviewee: "Given your experience, what is your recommendation to a large, complex organization such as the Department of Defense, seeking to rapidly improve its supply chain illumination?"

### Supply Chain Illumination Best Practices





## 12 Best Practices

### Governance, Processes & Policies

1. Leadership drives SCI and SCRM transformation and alignment.
2. Centralized data governance establishes data definitions and taxonomies and manages integration.
3. Risk-based assessment processes leverage multiple data sources to prioritize actions.
4. Deep and regular supplier engagement enhances data collection, trust, and resilience planning.

### Data, Technology & Analytics

7. Critical supply chains are mapped with digital Bill of Materials (BOMs) and Software Bill of Materials (SBOMs).
8. SCI, SCRM, and IT leaders implement a defined stack of advanced technologies and modular solutions.
9. Near-real-time monitoring is selectively applied to critical risk areas.

### Implementation & Performance Metrics

5. Illumination efforts focus on critical risk areas first.
6. Outcome-oriented metrics align illumination efforts with enterprise goals.

### Talent, Training & Communications

10. SCI, SCRM, HR, and IT teams acquire and build talent internally to integrate legacy and modern technologies.
11. Training on illumination techniques and advanced technologies is actively promoted and incentivized.
12. A long-term vision for SCI guides efforts and addresses long-lead time needs.



## Current State *Notable Early Progress*

Current state of leadership direction and initiatives reflect notable progress in data integration, risk assessment, and proactive management, enhancing transparency and resilience across DoD supply networks.

### DoD Leadership Direction

#### 2022

- ✓ Securing Defense Critical Supply Chains; OSD - Feb 2022
- ✓ DoD SCRM Taxonomy Version 1.0; ASD(S) - Nov 2022

#### 2023

- ✓ DoD SCRM Framework Report Phase I; ASD(S) - Feb 2023
- ✓ Supply Chain Resiliency & SCRM Resources; DAU - Feb 2023
- ✓ DoD Strategic Management Plan FY 2022 -26; OSD - Mar 2023
- ✓ National Defense Industrial Strategy 2023; OSD - Nov 2023

#### 2024

- ✓ National Defense Industrial Strategy Implementation Plan for FY 2025; USD(A&S) - Oct 2024

### DoD Agency and MILDEP Initiatives

- ✓ USD (A&S) SCRM Integration Center
- ✓ CDAO's ADVANA Platform Integration
- ✓ OASD (IBP)'s DIBMAP for Industrial Base Visibility
- ✓ DLA's SCRM Office, Metrics-Driven Approach, and Data Acumen Training
- ✓ DoD CIO's Fulcrum IT Advancement Strategy
- ✓ DoD (Air Force, Navy, Marines) F-35 JPO & CDAO's SCREEn Program for F-35 Supply Chain
- ✓ The Army's JPEO for Armaments & Ammunition SQL Database and Visualization Tools
- ✓ The Navy's PEO for Integrated Warfare Systems Obsolescence Management



## Current State

### Six Areas for Improvement

1. Leadership alignment on illumination priorities is lacking.

2. Data governance, management, and integration is mostly decentralized.

3. Broad-based approaches to enterprise-wide illumination are slowing progress.

4. The Department lacks a defined stack of supply chain technologies.

5. DoD has not yet committed to internal integration and the talent required to provide necessary support.

6. DoD has no long-term SCI vision to guide future efforts.



## Applying Best Practices to DoD

### Finding

*Leadership alignment on illumination priorities is lacking*

### Best Practice

- Leadership drives SCI and SCRMM transformation and alignment.

### Recommendations

- **1.1 Leadership Alignment on Illumination Priorities:** Direct Military Departments and Defense Agencies to identify and prioritize high risk supply chain areas for illumination, align efforts with the Securing Defense Critical Supply Chains report and Conduct quarterly accountability reviews. (OSD and USD(A&S), 6 months)





## Applying Best Practices to DoD

### Finding

*Data governance, management, and integration is mostly decentralized*

#### Best Practices

- Centralized data governance establishes data definitions and taxonomies and manages integration.
- Risk-based assessment processes leverage multiple data sources to prioritize actions.
- Deep and regular supplier engagement enhances data collection and resilience planning.

#### Recommendations

- **2.1 Affirm USD(A&S)'s Authority for SCI and SCRM:** Revise DoDD 5135.02 to formally designate USD(A&S) as PSA for SCI and SCRM, accountable for centralizing leadership, enforcing data governance, and coordinating Department -wide SCI and SCRM efforts. (OSD with execution by USD(A&S), 3-12 months)
- **2.2 Adopt a Risk-Based SCRM Process:** Implement a DoD -wide taxonomy and process to address critical risks like geographic vulnerabilities and single -source dependencies, focusing on actionable insight. (USD(A&S), 6-12 months)
- **2.3 Facilitate Supplier Data Sharing** Mandate contract clauses reflect modern data -sharing practices, secure protocols, and incentives to improve supplier collaboration and resilience. (USD(A&S), 6-12 months)



## Applying Best Practices to DoD

### Finding

*Broad -based approaches to enterprise -wide illumination are slowing progress*

#### Best Practices

- Illumination efforts focus on critical risk areas first.
- Outcome-oriented metrics align illumination efforts with enterprise goals.

#### Recommendations

- **3.1 Prioritize Risk Areas for Illumination** Focus visibility efforts on high priority programs, critical components, and major vulnerabilities concurrently, avoiding broad unfocused initiatives. (USD(A&S), 3 months)
- **3.2 Implement OutcomeOriented Performance Metrics** Implement metrics such as ontime delivery and single-source supplier risks to align visibility efforts with strategic resilience and missioncritical outcomes. (USD(A&S), 6 months)



## Applying Best Practices to DoD

### Finding

*The Department lacks a defined stack of supply chain technologies*

#### Best Practices

- Critical supply chains are mapped and enhanced with digital Bill of Materials (BOMs) and Software Bill of Materials (SBOMs).
- SCI, SCRM, and IT leaders implement a defined stack of advanced technologies and modular solutions.
- Near-real-time monitoring is selectively applied to critical risk areas.

#### Recommendations

- **4.1 Map the Critical Supply Chains and Implement Digital BOM/SBOM:** Automate data collection for Digital BOM/SBOM with traceability to streamline risk identification and enhance visibility across critical systems and components. (USD(A&S) supported by DLA, MILDEPs, and Defense Agencies, 6-12 months)
- **4.2 Implement a Defined Technology Stack with Federated Data Governance Policies:** Deploy a modular stack of advanced supply chain technologies leveraging commercial tools for flexibility and scalability, complemented by federated data governance policies that enable MILDEPs and Defense Agencies to configure systems independently while ensuring interoperability. (USD(A&S) with execution from MILDEPs and Defense Agencies, 12-18 months)
- **4.3 Deploy Near-Real-Time Monitoring Systems in Select Risk Areas:** Focus monitoring on high-risk components with refresh rates of at least 15 minutes to 1 hour, providing actionable insights to decision-makers for rapid risk mitigation. (USD(A&S), 6-12 months)



## Applying Best Practices to DoD

### Finding

*DoD is not committed to internal integration and talent required*

#### Best Practices

- SCI, SCRM, HR, and IT teams acquire and build talent internally to integrate legacy and modern technologies.
- Training on illumination techniques and advanced technologies is actively promoted and incentivized.

#### Recommendations

- **5.1 Bridge Critical IT, SCI, and SCRM Talent Gaps:** Address IT talent shortages in system integration and analytics through targeted hiring, contracting, and partnerships, leveraging private sector. (USD(P&R) with CTMO, 12 months)
- **5.2 Expand Training on SCI and SCRM Techniques:** Extend DAU training to include structured learning paths in SCI and SCRM, fostering innovation and building expertise across DoD. (DAU, 6-12 months)



## Applying Best Practices to DoD

### Finding

*There is no long -term SCI vision to guide future efforts*

### Best Practices

- A long-term vision for SCI guides efforts and addresses long-lead time needs.

### Recommendations

- **6.1 Establish a Long-Term Vision to Guide Illumination Efforts** Build on existing DoD strategic management plans and strategies to develop an illumination roadmap aligned with strategic goals to sustain and evolve illumination efforts, incorporating data standards and modular technologies. Ensure alignment with budget and legislative requirements to drive progress and adaptability.  
(USD(A&S), 12 months)



## Conclusion

- Good Early Progress, But Need Leadership, Data Standardization, and Systems/Tools to Scale
- Supply Chain Vulnerabilities Demand Urgent, Focused Action
- Pathway to Success Requires Enhancing Technology Capability and Strengthening Partner Collaboration
- A Vision for Supply Chain Illumination Will Ensure Adaptability



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