



REIMAGINING THE OIB OF THE FUTURE

SEMINAR 13: ORGANIC INDUSTRIAL BASE (OIB) INDUSTRY STUDY

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Preface

With Russia's invasion of Ukraine and China's emergence as a near-peer competitor, the nation faces a critical inflection point. The Department of Defense (DoD) can innovate and embrace technologies and processes to strengthen industrial base effectiveness or continue to rely on legacy processes that struggle to keep pace with competitors.

The Academic Year 2021-2022 Organic Industrial Base (OIB) Seminar at the Eisenhower School for National Resource Strategy oriented on the forecasted needs of the warfighter in the year 2040¹ and the maintenance, repair, and overhaul (MRO) services necessary to sustain those needs. A multitude of challenges currently face the OIB, but there is an equal number of opportunities. To capitalize on the opportunities, the Deputy Assistant Secretary of Defense for Materiel Readiness challenged the OIB seminar to design the OIB of the future.

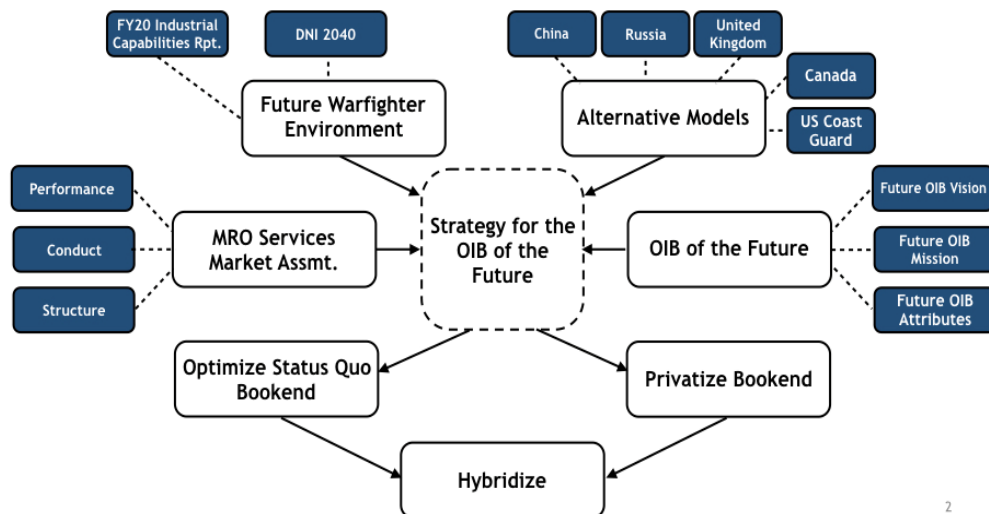


Figure 1

The design process required several deliberate steps and functions. Figure 1 addresses the methodology the OIB seminar followed throughout the semester to assess, design, and reverse engineer the future OIB. This paper reviews the current state of the MRO services market and OIB,

projects the future environment in 2040, identifies the desired future state of the OIB, analyzes alternative models, and generates recommendations to build the OIB of the future.

This paper leverages the previous OIB industry study's *Readiness Enabler Model (REM)*, what an economist would call a readiness production function, to further express the OIB's challenges and opportunities. The five factor input elements of human capital, infrastructure, governance, finance, and materiel enable insight into the MRO services market's ability to provide the services necessary to sustain and provide readiness for the DoD to meet the requirements in the Interim National Security Strategic Guidance (INSSG) and National Defense Strategy.²

Chapter 1: Overview of the Current MRO Services Market & DIB

Following the end of the Cold War, the DoD allowed the Defense Industrial Base (DIB) to merge, diminish, and increase reliance on the global supply chain.³ Recently, Congress and the Government Accountability Office (GAO) have renewed interest in the significant issues and challenges in the DIB infrastructure and its supply chains. DoD must leverage geopolitical events, Congressional interest in improving the OIB, and a new DoD leadership pivot towards the OIB of the future to continue to meet the MRO services needs of the warfighter.⁴

Defense MRO Services Market: The defense MRO services market is a competitive, oligopolistic market ecosystem where DIB firms compete to provide materiel readiness via services and products that meet warfighter demands. The market fits the description of an oligopolistic market based on the firm concentration ratio where the top four firms in the market account for more than 40% of the industry's sales, the high barriers to market entry from governance, technical data rights, and capital costs, and the market sensitivity to economies of scale. This market also contains high barriers to exit because of several governance rules.

The MRO services market contains two first-tier suppliers: 1) the OIB and 2) the Commercial Industrial Base (CIB). The OIB consists of 23 Government-Owned/Government-Operated (GOGO) depots, arsenals, and shipyards. The CIB consists of all defense contractors providing MRO services. Second-tier suppliers are not as large as the public depots or the Original Equipment Manufacturers (OEMs) that generally comprise the CIB and provide sub-assembly support for small systems.⁵

The MRO services market is both a monopsony and a bilateral monopoly on the buyer's side. Before contract award, the market functions as a monopsony - with the government as the sole buyer. However, following the contract award, the market converts to a bilateral monopoly between the contractor and the government. Second-tier buyers in the market are international partners.

The Structure-Conduct-Performance (SCP) model provides a framework for analyzing the MRO services market. The S-C-P model allows a stakeholder to evaluate and understand the interplay between the market structure, the conduct of firms within the market, and performance criteria used by firms to assess value creation.⁶ The Porter's Five Forces model (Figure 2) guides an evaluation of the structure, the strategic game board assesses conduct, and the OIB REM facilitates performance evaluation.

MRO Services Market Structure - Porter's Five Forces: The OIB and CIB developed specialized expertise to operate in their competitive environments within the MRO services ecosystem. The relationship between OIB and CIB is intertwined based on interdependencies of supply chains, personnel expertise, and capital capabilities and capacities. The OIB and CIB compete as suppliers. However, numerous rules, laws, and restrictions prohibit actual market firm-

to-firm competition. The rivalry amongst competitors, suppliers' bargaining power, and buyers' bargaining power have the most significant impact on the MRO services market.

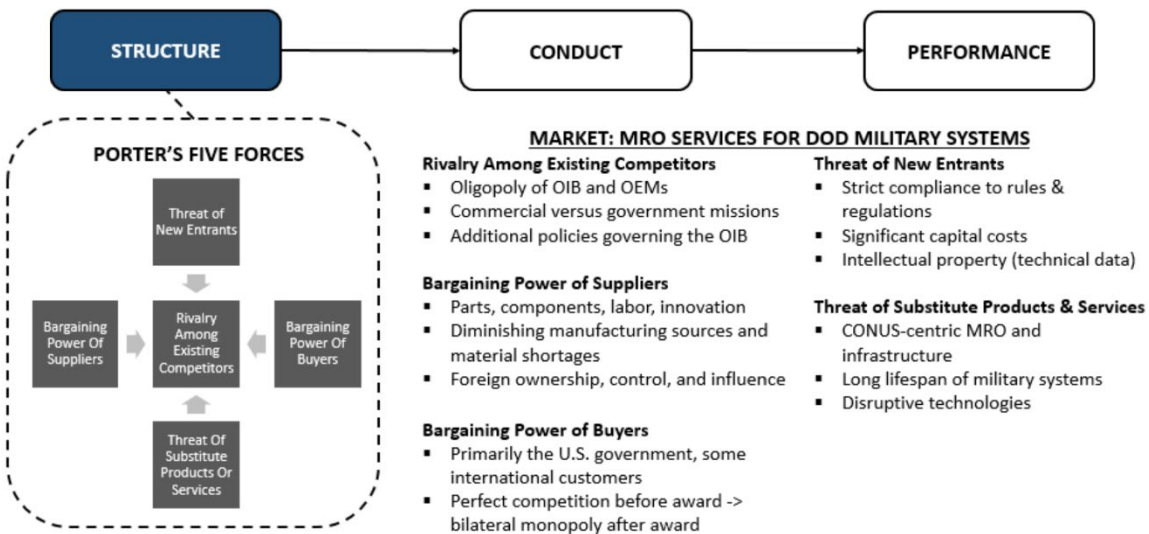


Figure 2: Porter's Five Forces Analysis

Rivalry: Competition among rivals in the market is low due to the oligopolistic nature of the market. Two primary Title 10 US Code sections govern the rivalry between the OIB and CIB. Section 2466, the “50-50 rule” dictates that the OIB performs at least 50% of the work in the market. OIB expertise is in *optimizing maintenance against the headwinds of variable requirements, a highly competitive labor market, intense Diminishing Manufacturing Sources and Material Shortages (DMSMS), and outdated infrastructure*. The CIB's expertise offers more *innovation at a market-accepted cost*. An OEM’s ownership of a Technical Data Package (TDP) or the designation of “Core” workload results in limited competition among the prime vendors and public depots. Core workload “includes those capabilities that are necessary to maintain and repair the weapon systems and other military equipment (including mission-essential weapon systems or materiel not later than four years after achieving initial operational capability, but excluding systems and equipment under special access programs, nuclear aircraft carriers, and commercial products or commercial services) that are identified by the Secretary, in consultation with the

Chairman of the Joint Chiefs of Staff, as necessary to enable the armed forces to fulfill the strategic and contingency plans prepared by the Chairman of the Joint Chiefs of Staff.”⁷

Power of suppliers: Suppliers at all tiers in the market are subject to the volatility of the global supply chain and the effects of DMSMS. However, suppliers can charge a premium to their sole DoD customer to recoup the costs incurred from these issues in the MRO services market. The availability of skilled workers also impacts the supplier’s contribution to the market - a shortage of skilled workers negatively impacts production. Access to TDP and digital twins further enhances suppliers' power and influences the market. Disturbances to and changes in costs associated with these supplies directly impact the industry’s production capacity and profit.

Power of buyers: As a monopsony before contract award and bilateral monopoly after, the government gives up bargaining power to industry. This bilateral relationship does not foster conditions that result in value creation or innovation in the market. The 50-50 rule and Core requirements further limit the bargaining power of the buyers because these codes dictate the source of repair for specific warfighter capabilities and prohibit open competition. With the structure of the MRO services market explained, the next step in the S-C-P framework is to evaluate the firms’ behavior and conduct in the market.

MRO Services Market Conduct - Strategic Game Board: Roberto Buaron developed the strategic game board, a framework to evaluate the strategies and conduct of individual businesses. Applying this framework to the DIB highlights the similarities and differences between the OIB and CIB, as shown in Table 1.

OIB	Game Board	CIB (MRO Services)
<ul style="list-style-type: none"> - natural competitive advantage - Most sense WRT CORE - Be ready to surge - DWCF pricing and 50-50 dictate completion location 	Where to Compete	<ul style="list-style-type: none"> - if they are the OEM, they typically get the MRO contract - Compete to get production contract - One-stop shop to get award
<ul style="list-style-type: none"> - Centers of Industrial and Technical Excellence - Expertise - PPPs - Parts fabrication 	How to Compete	<ul style="list-style-type: none"> - Lowball on OEM/production bid and overbid on sustainment contract - Increase complexity of TDPs in order to raise price - Lobbying
<ul style="list-style-type: none"> - Compete on what's given to them as result of vertical integration with customers - Compete when told via commands, Depot Source of Repair (DSOR) decisions, and Program Managers 	When to Compete	<ul style="list-style-type: none"> - early in the process with prototyping and production contracts - Often stop competing before DoD wants them to exit the competition

Table 1

OIB and CIB Missions and Definition of Readiness: The conduct of the two providers in the MRO services market diverges due to differing missions. The mission of the OIB “is to maintain, reset, and repair the platforms, equipment, and supplies of the Armed Forces...and must be postured to support peacetime while being agile enough to respond during a mobilization, a contingency, or an emergency.”⁸ The OIB mission also includes an obligation to maintain capability readiness in service of warfighter needs (Table 2). Finally, one unique component of the OIB’s mission is the implied requirement that the OIB provide a place of employment for local communities. This element of the OIB's mission receives periodic influence from local, state, and federal level elected officials. By contrast, the CIB orients on a single mission of optimizing profit.

Capability Readiness
The Availability of military assets when called upon

Table 2

To achieve readiness requirements, the OIB must balance the readiness enablers of infrastructure, human capital, material, finance, and governance (Figure 3)⁹. The OIB must also activate its full capacity to support contingency operations, scheduled maintenance, and corresponding backlogs caused by contingency priorities in a mobilization environment. To maintain a surge, the OIB and CIB must expand their capacity to meet increased warfighter demands while simultaneously decreasing the number of units held at depots and delegating quality repair efforts to field activities.¹⁰ The structure and conduct of the MRO services market directly impact DIB firm performance in both positive and negative ways.



MRO Services Market Performance - OIB Readiness Enablers Model: Traditional economic analysis of a company’s performance includes assessing if the company is creating value at an acceptable level of risk and requires an analysis of the company’s financial performance. It is not easy to assess the performance of this market for three reasons. First, the OIB depots seldom track or report financial statements consistent with commercial sector standards. This behavior prevents complete financial analysis of depot performance. Second, if performance data is collected, it is typically inaccessible. Third, the service components track and report metrics according to internal standards; the lack of standardization across the DoD prevents practical analysis. The OIB REM will suffice for performance analysis rather than present OIB performance with incomplete information.

Governance: Between Congressional oversight, legislative constraints, NDAAAs, OSD, and Joint Staff oversight, significant governance constraints apply to the MRO services market.

Governance constraints restrict the DoD from executing the autonomy and flexibility to drive firm behaviors and performance towards desired ends in MRO business dealings. This behavior hinders DoD efforts to change OIB and CIB expertise towards an optimized model that ultimately improves warfighter support.

Infrastructure: Despite meeting the minimum investments required by Section 2476 of Title 10, USC, “the six percent rule,” more than half of the OIB depot facilities are in “poor” condition. Depot equipment is beyond its expected useful service life at most facilities, and the depots lack the metrics and processes to effectively track and assess the impacts of inefficiencies caused by infrastructure and equipment deterioration.¹¹ Additionally, a May 2022 GAO report addresses backlogged facility projects as a further reason for deteriorating OIB facilities and equipment.¹²

Human Capital: Factory workers, artisans, engineers, machinists, and computer scientists are necessary to ensure quality production and maintenance practices across the DIB. However, the current MRO services market workforce faces considerable shortfalls: an aging workforce nearing retirement with an inadequate stream of younger workers to backfill vacancies, a lagging disinterest in manufacturing and industrial jobs nationwide, under-pay in the Federal sector in comparison to otherwise comparable private-sector employment, and growing mismatch of jobs and skills necessary for OIB modernization. Technologies of the future will require a workforce able to bridge legacy artisan trades with modern STEM knowledge in robotics, cyber-defenses, artificial intelligence (AI), data science, and other non-touch labor skills.

Finance: The Defense Working Capital Fund (DWCF) drives depots to operate like a business. However, this construct requires depots to “operate on a break-even basis.” This obligation prevents the depots from making a profit and disincentives innovation.¹³ This restriction hinders innovation and limits infrastructure reinvestment beyond the mandated *six percent* rule.

The depots strive to generate revenue to recover the total cost of operations and maintain an accumulated operating result (AOR) of zero.¹⁴ Depots calculate unit costs by adjusting for anticipated workload, labor costs, projected overhead costs, and non-labor costs for the budget year and prior-year gains or losses as reflected by the AOR.¹⁵ Carryover insulates the depots during continuing resolutions and reduces risk to the supply chain. Changes to the DWCF construct require congressional and legislative action.

Materiel: The DIB remains heavily dependent on a network of foreign sources for material required to support weapons systems and national security infrastructure. The OIB and CIB lack sufficient visibility to identify and mitigate supply chain risk. Despite numerous GAO audits highlighting such risks, critical supply chains now represent one of the US's most significant national security vulnerabilities.¹⁶ As a result, this substandard materiel availability has degraded the OIB's ability to mobilize and achieve its Core requirement effectively.¹⁷

Organic & Contractor Industrial Base Comparison of Structure – Conduct – Performance Model (Note: Derived from ES S-C-P)

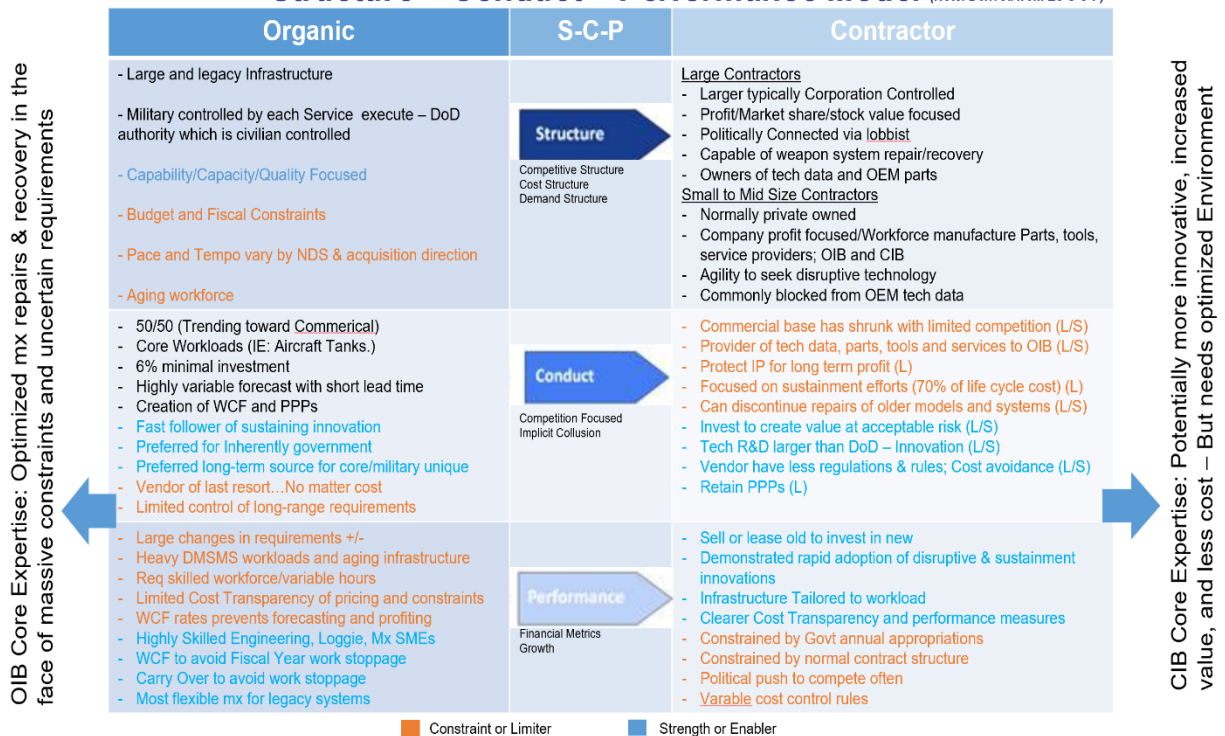


Table 3: DIB S-C-P Comparison Analysis

Table 3 summarizes the evaluation of OIB and CIB firms through the S-C-P model and identifies relevant constraints and enablers for each. Reverse engineering the OIB of the future requires incrementally making changes to root cause issues in structure and conduct to influence and address desired performance in the market.

Chapter 2: Reverse-Engineering the OIB of the Future

With the *Global Trends 2040* report, the National Intelligence Council identified “Competitive Coexistence” as a potential future environment and described “China’s challenge to the US and Western-led international system,” potentially resulting in a more tense geopolitical environment.¹⁸ The DoD’s FY20 Industrial Capabilities Annual Report to Congress expanded on this growing contestation, describing China as a “dual-threat,” challenging the US economically and militarily with profound implications to US supply chains, export controls, technology transfer, and future technology and security capabilities,¹⁹ including expanding its nuclear posture and growing more nefarious in space.²⁰ The challenge to US leaders and policymakers becomes balancing cost and risk, ensuring capacity, and optimizing industrial might faster than the competition.²¹

A future conflict with a near-peer competitor will include contests in all domains and rely heavily on continuous innovation to develop and maintain asymmetric advantages. The military environment in 2040 will include advanced technologies such as robotics, AI, swarm systems, and data analytics at the speed of relevance. These innovations will stress the capabilities of MRO service providers. Continuous innovation in design, production, and sustainment programs remains vital to mission success and achieving and maintaining US military advantage and dominance on the battlefield.

If the US Government (USG) intends to “modernize our military capabilities”²² as proposed in the 2021 INSSG, the OIB must invest and modernize in-kind to sustain and provide MRO services to those capabilities at an acceptable cost. Assuming DoD resourcing will remain essentially unchanged, the CIB and OIB will need to work in harmony, each investing in and refining their comparative advantages to maximize readiness and output and minimize the cost of the DIB *writ large*.

Future Vision, Mission, and Attributes: With the future scenario identified, it is possible to design the mission (Table 4), vision (Table 5), and attributes (Table 6) required for the DIB. The MRO services DIB can achieve this mission and vision by being agile, quick, innovative, competitive, modern, interoperable, collaborative, effective, efficient, distributed, risk-tolerant, resourced and forward projecting. Table 6 further defines these attributes.

Mission for OIB of the Future
The OIB, in partnership with industry and allies, provides maintenance, repair, and overhaul (MRO) and select manufacturing to ensure the readiness and availability of the platforms, capabilities, equipment, and materiel of the Armed Forces in peacetime, surge, and wartime in order to accomplish National Security and National Defense Strategy objectives.

Table 4: Mission for OIB of the Future

Vision for DIB of the Future
The DIB produces, supports, and maintains the weapons capabilities used by the DoD to win wars and achieve national security objectives

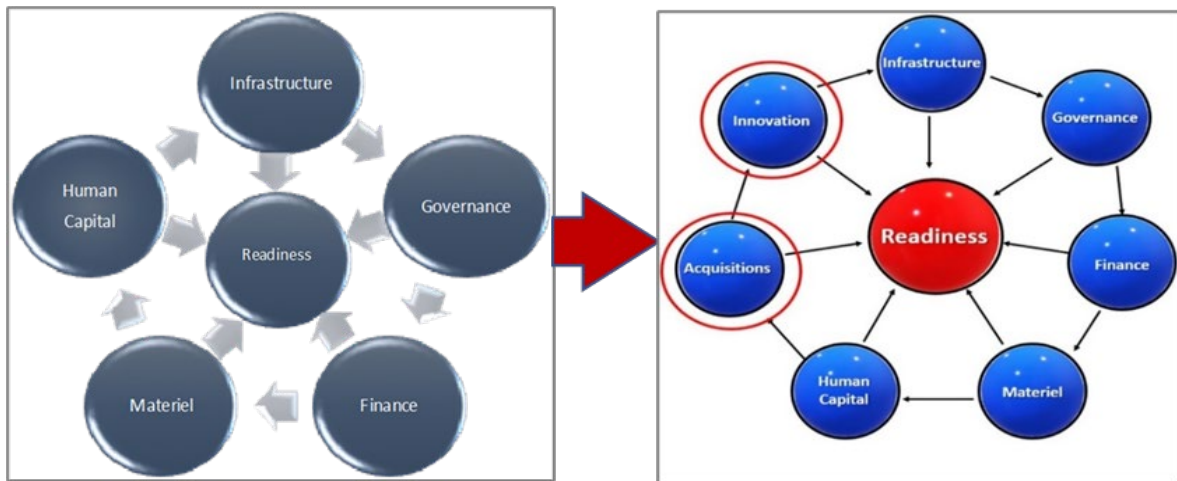
Table 5: Vision for DIB of the Future

Attribute	Description
Agile and Quick	<ul style="list-style-type: none"> - moves quickly, easily, smartly - Able to adapt, operate, produce at speed of relevance - Keeps pace with warfighter capabilities - speed and agility in resource allocation process
Innovative	<ul style="list-style-type: none"> - continuously creating new ideas, new processes, new products - Improving total force readiness - Disruptive and sustaining - Products and processes
Competitive	<ul style="list-style-type: none"> - compete to be cheaper, better, faster - Delivering higher quality capabilities - Innovative and creative solutions to generate and sustain warfighter
Modern	<ul style="list-style-type: none"> - relevant to present and future - modern industrial processes, procedures, and equipment - Modern workforce skills, expectations, culture
Interoperable	<ul style="list-style-type: none"> - Domestically between services and CIB, OEMs - Internationally with allies and partners - Reduces silos and increases information sharing and tech data - Increases efficiency
Collaborative	<ul style="list-style-type: none"> - working together with industry throughout acquisitions process - Horizontal collaboration from development and prototype - Technical data rights transfers

Attribute	Description
Effective	<ul style="list-style-type: none"> - Producing the desired results at desired time - Readiness and capability availability to meet national security objectives
Efficient	<ul style="list-style-type: none"> - OIB achieves maximum productivity with minimum wasted resources - Product and process improvement to reduce cost
Distributed	<ul style="list-style-type: none"> - Delivering MRO services at point of need - Dispersed to increase international interoperability - Breaks service silos - Reduce potential enemy targeting of facilities
Risk Tolerant	<ul style="list-style-type: none"> - Acknowledging of risk, but not frozen by risk - Expending resources on potentially failed projects - Required to innovate, modernize, increase agility - Includes increased tolerance of fiscal risk
Resourced	<ul style="list-style-type: none"> - OIB remains funded, manned, and prioritized to meet mission anytime, anywhere - Includes modernized facilities, equipment, and workforce - Requires secure, reliable supply chain
Forward Projecting	<ul style="list-style-type: none"> - Keeps anticipatory eye to future - Data- and metrics-informed base to project warfighter needs - Quickly comprehends and produces warfighter capabilities

Table 6: Attributes of the Future OIB

Assessing and Evaluating Readiness in the OIB of the Future: To evaluate OIB readiness and performance in meeting the vision, mission, and attributes of the future, OIB leaders and stakeholders need stable, accurate, and precise metrics. To assess the future OIB, the OIB REM needs two additional enablers - “acquisitions” and “innovation” (Figure 4). The addition of these



two elements draws attention to their impact on OIB readiness and provides a path for assessing policy and standardizing metrics. Actions associated with these enablers impact the entire life cycle of a capability. The OIB of the future must consistently and continuously integrate with the acquisitions process. Innovation and associated technology and TDP will fundamentally change

the role of depots in the OIB of the future. New doctrine governing these technologies will require joint development. Disruptive and sustaining innovations will permeate the complete life cycle of a capability and impact MRO services, facilities, equipment, and workforce.

Evaluating the OIB of the Future: The GAO reported that the depots currently do not consistently measure their readiness via established, accurate, and consistent metrics.²³ This behavior leads to inaccurate capacity reporting, misleading depot readiness reporting, and fails to provide leaders and stakeholders with an accurate picture of OIB readiness, capacity, and effectiveness. The OIB must

collect and report standardized performance metrics comparing planned, baseline work, and executed

Material Availability Metric	
$Am = \frac{T_{fmc} + T_{pmc}}{T_{fmc} + T_{pmc} + T_{ncmc} + T_{nmcr} + T_{nmcms} + T_{nmcd}}$	
<ul style="list-style-type: none"> • T represents time in days • Fully Mission Capable (FMC), the platform can complete all missions. • Partially Mission Capable (PMC), the platform can complete some but not all assigned missions. • Not mission capable due to planned depot-level maintenance (NMCD). • Not mission capable due to planned organization-level maintenance (NMCM). • Not mission capable due to inoperable system - essential for all missions & must be repaired (NMCR). • Not mission capable due to awaiting the arrival of repair parts (NMCS). 	

work. The result will be improved accurate performance assessments for leaders and stakeholders.

The Material Availability (Table 7) is one example of a metric that will “measure the total inventory of a system operationally capable (ready for tasking) of performing an assigned mission at a given time, based on material condition.”²⁴ Improved metrics will maintain transparency with all applicable stakeholders, spur process innovation, and improve production at reduced costs, improving efficiency.

In addition to performance metrics, the OIB needs to add a value creation metric utilizing net present value (NPV). NPV utilization enables longer-term financial and business strategies, allowing OIB leaders and stakeholders to safely invest in innovative and future-focused products and equipment. An “invest to save” mentality comes with risks and opportunity costs that significantly depart from the current DoD mindset and culture.

Chapter 3: Alternative Models and Future Scenarios

This chapter speaks to alternative models and future scenarios relative to forecasted conditions and capability requirements in the year 2040. In this light, this chapter speaks to alternative MRO services models and associated analysis.

Great Power Competitors: Russia and China's economic systems and powerful state-owned enterprises (SOE) exist alongside tightly controlled capitalistic sectors. As a result, state-directed economic stimuli drive both nations' defense industrial complexes. The following assessments come from open-source, unclassified literature and lectures due to the opacity surrounding both nations' MRO services ecosystems.

Russia: The Russian defense-industrial complex is unhealthy. It is an oligopolistic market with significant government involvement and several state-run firms and consolidated product types. It lacks adequate infrastructure and materiel capacity to support equipment maintenance and sustained operations. Human capital challenges plague the Russian defense-industrial complex as an uninvested and untrained professional workforce permeates operational and sustainment programs. In addition, governance policies from Moscow are widely acknowledged as propaganda that lacks sufficient resourcing.

China: China's principal DIB is controlled by 10 dominant SOEs, forming an oligopoly, each often owning subsidiaries to exploit limited market opportunities directed by the Chinese Communist Party (CCP) initiatives. Under the CCP's direction, SOEs continue to invest heavily in research and technological advancement while reaping record profits by equipping the PLA (People's Liberation Army) and increasing foreign sales.²⁵ In response to CCP policy, the Chinese DIB prioritizes emerging technologies, domestic production for supply chain resiliency, and political and economic interdependencies via the Belt and Road Initiative (BRI). The CCP's "Made

in China 2025" policy also aims to reduce reliance on foreign supply chains. Its Military-Civilian Fusion (MCF) initiative attempts to invigorate the DIB by codifying the pursuit of dual-use technologies in innovation and is already yielding results in high-tech sectors such as artificial intelligence, autonomous vehicles, and hypersonic missiles.²⁶

Partners and Allies: Despite military, industrial, and political differences between the US, United Kingdom (UK), and Canada, the successful privatization of the UK's weapons sustainment support and Canada's organic, government-owned military ammunition production capability provides the US government with case studies for OIB privatization.

United Kingdom: The UK's Ministry of Defence (MOD) almost wholly eliminated OIB-provided MRO services and transitioned its support organization, Defense Equipment and Support (DE&S), from a GOGO structure to an arm's length body (ALB) structure.²⁷ As an ALB, DE&S is a government-owned entity that operates as a commercial business.²⁸ DE&S has outsourced most of its MRO, supply, and logistics functions to the commercial industry through outcomes-based, long-term contracts.²⁹ Should the US transition to an ALB structure for the OIB, a phased implementation of the DE&S model will allow the DoD time to gain stakeholder support while demonstrating the progress and effectiveness of a privatization framework in the US OIB.

Canada: Canada privatized its organic ammunition plants and produced public and private sector benefits within acceptable risk thresholds.³⁰ These businesses are thriving, their workforce is growing, and the government's price for ammunition has decreased.³¹ Canada's decision to open the ammunition market to private industry allowed stakeholders to optimize comparative advantage. The ammunition industry focused on production, and military leadership focused on operational effectiveness.³² Like Canada, the USG could leverage commercial expertise and

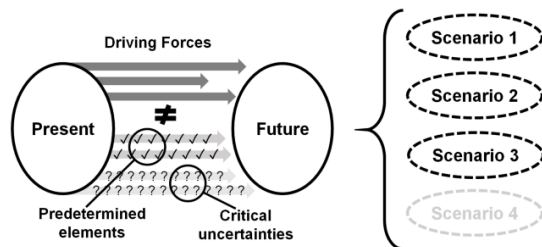
competition in its business processes and incentivize commercial innovation and efficiency by expanding the use of outcomes-based performance-based logistics (PBL) contracts.

Department of Homeland Security (DHS) - United States Coast Guard: The United States Coast Guard (USCG) aligns under the DHS, resulting in budget processes and priorities standing apart from the DoD. The USCG receives MRO services from internal and external sources to maintain perpetual operational demands and maximize availability at an optimum price for American taxpayers. Unlike the DoD, the USCG is not beholden to Title 10 USC 2466 (50-50). Instead, the USCG operates according to Title 14 USC 952, requiring maintenance managers to use business case analyses (BCA) to make efficient MRO resource decisions. A component of the Coast Guard’s Mission Support Business Model (CGMSBM), BCAs empower leaders to make data-informed business decisions. Guided by economic and military considerations rather than regulatory obligations, leaders can quickly adapt to changing market, political and military conditions.

Strategy and Bookend Development - Optimize the Status Quo or Privatize the OIB:

Carefully considered application of a modified two-axis exploration tool enabled the development of two plausible scenarios for the OIB of 2040 (Figure 5).³³ Scenario one, *Optimize Status Quo*,

considers how to refine the OIB within the constraints of existing legislation. Additionally, this scenario seeks to optimize the decision space presently available to the DoD. Scenario two, *Privatize*, focuses on increasing the commercial sectors’ involvement in the DIB and the impacts on the OIB of the future. This scenario leverages the opportunity to change constraints applied by stakeholders external to the DoD.³⁴



Optimize Status Quo of the OIB: The *optimize* bookend maintains the OIB and CIB as co-suppliers of MRO services within the constraints of existing legislation. This scenario slightly enhances elements of the current OIB by focusing on increased efficiencies during peacetime and production during a state of surge in support of contingency operations. The most notable changes between the current OIB and the optimized OIB are allowing 12 months of carryover, expansion of PPPs (and thus minor infrastructure upgrades at select locations), and the addition of a reserve workforce. This option would encourage Congress and senior policymakers to consider the OIB a business and allow it to operate under traditional business rules and economics, such as relevant pricing and the laws of supply and demand.

Benefits: In this bookend option, the government continues serving as the insurance policy for national security. It enables the OIB to perform as a business and promotes competition in the MRO services market. Modifications to the DWCF allow for the carryover of funds, impacting the depots' rates, the workforce, and the workload. The expansion of PPPs facilitates improved industry collaboration and facility modernization, and the addition of a reserve workforce efficiently expands capacity during surge.

Risks: *Optimize* relies heavily on the Office of the Secretary of Defense (OSD) and Joint Staff-level integration and interoperability, requiring the services to separate from their silos to align efforts and gain efficiencies. Increased usage of PPPs would benefit the CIB. However, the increased reliance on PPPs may impact readiness if vendors cannot deliver on workloads. Treating the OIB like a business and relinquishing control is a challenging concept for many OIB stakeholders. Mitigation of these risks requires a culture shift, deliberate communication, and intelligent policy entrepreneurship.

Privatize OIB: The *privatized* scenario consolidates advanced military equipment's creation, development, manufacturing, supply, and MRO services under the CIB, completely doing away with the state-owned OIB. To the maximum practical extent,³⁵ it relies on the inherent advantages of competition and private ownership of capital, allowing the commercial industry to compete for and execute every component of the DIB except inherently governmental activities, as defined by the Federal Activities Inventory Reform (FAIR) Act of 1998.³⁶

Benefits: The OIB privatization option has five primary benefits and meets many of the attributes that describe the OIB of the future. This approach allows firms to apply traditional economic and business practices to leverage USG subsidies to build a competitive advantage. Additionally, this approach minimizes or circumvents federal procurement regulations and civil service and hiring processes for employees. Furthermore, it provides an opportunity for increased production capacity due to the dual-use nature of the facilities. Finally, it removes DoD from running a business that is better suited for the commercial industry.

Risks: Risks associated with this option include an increase in costs to the government, market conditions susceptibility, insufficient capability and capacity due to incorrect analyses, commercial firm market exits (small to midsize contractors), and national security concerns.

The extreme future scenarios of *optimize the status quo* and the far opposite extreme of *privatizing* serve as the final filter for describing the OIB of the future. As with the alternate models, both bookends present implementation options and pitfalls to avoid when designing the future OIB. *Optimize* allows the government to retain ownership but fails to take advantage of commercial benefits such as agility, innovation, competition, improved efficiency and effectiveness, risk tolerance, and self-resourcing. In contrast, while the *privatized* option addresses the attributes of the future more adequately, it does so with a higher degree and magnitude of risk.

Neither scenario fully meets the vision, mission, and attributes of the reimagined OIB of the future at an acceptable level of risk. However, a hybrid model draws on the strengths of both options while mitigating the risks.

Chapter 4: Hybridize

The MRO service market of the future must consider generating warfighter capability through both organic and commercial means to support INSSG objectives. By reimagining the future MRO service market, competition in the market, and performance evaluation, it is possible to envision a high-performing market environment. Considering the future strategic environment, the DoD will need to integrate big data technologies to provide greater transparency and visibility within DoD accounting, business operations, and supply chains.

Structure: As a concept, the future MRO service market structure is less rigid than present conditions. In this future concept, the DoD has more autonomy and flexibility in making MRO service decisions and can address the barriers to MRO service market entry. Additionally, in this concept, Title 10 USC 2466 has been adjusted to provide greater flexibility and can enable increased private industry opportunities. Core determinations are accurately and continuously assessed in this future vision, ensuring a lean and focused OIB. Innovative PPP opportunities receive guidance from sound BCAs, financed through USG subsidies and third parties, and awarded as properly incentivized PBLs to help adjust firm behavior and performance within the market. Additionally, in this scenario, TDP rights are negotiated early in the acquisition process, allowing for greater access during peacetime, and DPA amendments allowing for full TDP access during mobilizations ensure a rapid surge capability.

Conduct: MRO services providers will compete in all phases of the life cycle in the future. Firms will compete and seek to horizontally diversify their work and win openly competed for

MRO services contracts from competitors based on more accessible TDP from the USG. Firms will compete by developing innovative competitive advantages. Firms and providers establish global MRO footprints and relationships with allies to support a more distributed MRO services capability. These firms will identify and invest in technologies and capabilities that can rapidly deploy to forward locations and operate from anywhere globally via networked MRO services capabilities.

Performance: In the future MRO services market, performance will receive measurement through a host of metrics. On-time and on-budget delivery will be integral to market performance metrics. Reduction in Total Ownership Costs (R-TOC) initiatives and life-cycle cost (LCC) management data will measure value creation for DoD. MRO services vendors will receive incentives to control and reduce costs while efficiently maintaining performance.

The National Defense Manufacturing and MRO Reserve (NDMR) will employ a ready reserve of skilled and certified workers to support future surge efforts. The ability to surge quickly will receive testing through DIB exercises that determine gaps and weaknesses in the surge capability.

Infrastructure modernization and utilization metrics function as an additional performance indicator. Facilities that cannot modernize to reduce costs, improve efficiencies, and maintain safety standards may receive divestment from the DIB instead of better value creation opportunities. Pilot programs such as Contractor Owned Shared Operations (COSO) enjoy collaborative utilization to foster innovation hubs, market clusters, and technology centers by offering reduced capital requirements to perspective mission partners and commercial stakeholders (Appendix E).

Risks: This strategy relies on healthy market competition within the MRO services market. The DoD should commission a study to determine if the projected workload is sufficient to lure new MRO services vendors into the market. The DoD study should contemplate the historical behavior defense primes - especially regarding the tendency toward oligopolistic behavior in the industry.

Another risk is the human capital composition and capacity to support future MRO services. New technologies and practices will require new skillsets to execute MRO services on future weapons. Properly incentivized training and education programs are needed today to generate the workforce skills and training necessary to support and sustain tomorrow's competitive MRO service industry. The USG can mitigate this risk by investing in and cultivating these skillsets by establishing the NDMR, subsidizing training and education programs, and increasing the desirability of these jobs in the future.

Chapter 5: Recommendations

The following recommendations highlight issues and potential solutions to bring about the OIB of the future in an unconstrained environment. In advance of the following recommendations, the DoD should commission formal studies to determine the viability, risks, and the corresponding financial and budgetary impacts.

Strategic Initiatives Requiring Further Study: While the following recommendations arguably require significant cultural shifts and bring potential legislative challenges, the authors concur that the affected underlying issues require comprehensive intervention for the OIB to achieve broad modernization.

Recommendation 1: Commission a Joint Sustainment Entity: The OIB represent over 21 unique military commands, each with its network of regulations, waivers, and exemptions, with

depot cultures aligned with their parent branch of service, and depot commanders often have limited understanding of the intricacies of OIB operations and relevant financial frameworks. To maximize the integration, synchronization, and adaptability of the OIB as an enterprise, DoD should commission an independent (non-military) study to explore removing the depots from the direct control of the individual services and instead manage them via a new agency or singular command structure. These authors believe a unified agency, unaligned with a parent military service, would yield a more robust corporate structure across the OIB, ensure synergies across facilities, realize efficiencies of operation by enabling workload distribution across technical sectors, and improve services provided.

Recommendation 2: Reevaluate 10 USC § 2466 (“50-50”): Assessment of alternative industrial base models reveals that the future OIB may not benefit from the continuation of the 50-50 construct. This arbitrary ratio may not yield the optimal effectiveness or efficiency. Nor does this ratio assure the capability of the DoD-owned portion of the MRO services market to surge. Consequently, the DoD should commission research into MRO services capability readiness. Commensurate with Recommendation #11 (below) describing a National Security Industrial Vision, analysis of results will ultimately inform ownership of Core logistics capabilities and drive data-informed decisions.

Recommendation 3: Implement a CIP Rate Match Program: DoD should investigate establishment of a depot capital investment rate matching program. This proposed investigation aims to achieve investments over the mandatory 6% floor stipulated by 10 USC §2476. By incentivizing increased facility-level investments into OIB modernization through a rate match program, and maintaining OSD transparency into the modernization planning, the DoD can create a sustainable capital reinvestment cycle.

Recommendation 4: Establish a Joint LOG-COP with AI-enabled Risk Assessment:

Future warfare will likely leave Command and Control nodes vulnerable and disrupt communications. The DoD should direct the Services to mesh the multitude of Logistics Common Operating Pictures (LOG-COPs) into a standard Joint Force LOG-COP dashboard, leveraging AI, machine learning, and advanced data analytics to inform leaders of readiness posture associated OIB capabilities. This program should endeavor to include common operating pictures of supply levels, in-transit assets, infrastructure assessments, supply lines of communication, etc.

Recommendation 5: Create a National Defense Manufacturing Reserve (NDMR): DoD should endorse the implementation of a reserve-component-inspired model for the OIB workforce to provide surge capacity, incorporate the future of work with flexible work options, and retain trained, skilled OIB artisans. An enabled NDMR would reduce the dependence on contracted support, circumventing the budget and political process and possibly driving down rates at the depots.

Recommendation 6: Revise Multiyear Funding Thresholds: The DoD should petition for Congressional legislation converting O&M funding from a single-year appropriation to multi-year funding to increase flexibility in obligating dollars during the year of execution resolutions and to also increase the reprogramming thresholds from \$15M to a higher level to provide more flexibility to the program offices to execute depot requirements.

Pilot Implementation: The OIB receives direction from various legislated constraints. This recommendation relies on an adjustment to a portion of these constraints. Partnership between the DoD and Congress will be crucial to success.

Recommendation 7: Realign Depots by Technology Sectors: DoD should pilot the restructuring of depots as technology-based/innovation communities of excellence, whereby

technological assessments aid in establishing new Core categories for Depot Source of Repair (DSOR) recommendations, also enabling greater flexibility with 50-50 decisions based on modernized capabilities. Concurrent with this recommendation, DoD should establish a new joint-level Program Office, identify and declare Core technology development sectors, and direct the services to pool resources to establish these new offices. By specializing in specific technologies and innovation ‘space,’ commercial and academic resources can be drawn more geographically, mitigating the human capital ‘deserts’ that plague numerous depots. DoD should empower Program Element Offices to pool sustaining engineering and R&D funds to address OIB needs across platforms.

Recommendation 8: Pursue Contract Owned Shared Operations (COSO): The DoD should evaluate the benefits of leasing facilities from commercial partners rather than directly owning infrastructure. With this solution, unused infrastructure could be used by a qualified commercial owner or leased by other qualified commercial partners. This arrangement, in turn, and over time, may enable the benefits of market clustering and lower facility ownership costs for the DoD.

Recommendation 9: Revamp the WCF Profit Model: Removing the “break-even” requirement for depots will allow them to project future challenges and endeavor profitability comparable to corresponding commercial MRO services providers. Modifications to the WCF that allow depots to pursue profit for employee incentivization, recapitalization, and process improvements will be leveraged to incentivize innovation and R-TOC over system life cycles.

Recommendation 10: Institute Large-Scale Additive Manufacturing with Certification Process: The OIB must increase responsiveness and be more capable of enabling spot repairs both virtually and physically. DoD should identify specific workloads to prioritize investment in

maturing technologies and industry opportunities in additive manufacturing and establish engineering authority acceptance procedures coordinated through respective Program Offices.

Low Risk / High Impact: Lastly, the authors assessed that several recommendations are firmly within the DoD or Secretary's purview to enact unilaterally. This proposal applies minimal risks to current OIB functions and budgetary norms while also providing opportunities for improvement and modernization.

Recommendation 11: Publish a National Security Industrial Vision: The DoD should publish and employ a unifying "National Security Industrial Vision" (NSIV) strategy for the DIB writ large. This should be published on a quadrennial basis and clearly align with both the National Defense and the National Security strategies, and fully leverage 10 USC. 2464's mandate of ensuring the Government's ability to meet the services' needs during crisis rapidly. The NSIV publication must provide a standard definition of OIB 'readiness' and more clearly specify which capabilities are actually Core. Additionally, new standardized definitions and scaling of both 'surge' and 'mobilization' must enable a common framework for Program Managers to measure acceptable risk criteria. Currently, the services determine their own Core logistics capabilities; a forward-leaning unifying vision would enable identifying and using a joint service, horizontal, and futuristic approach to identify areas of redundancy and opportunities for economies of scale.

Recommendation 12: Establish and Collect New Performance Metrics: The DoD must direct the OIB enterprise to develop standardized performance metrics comparing planned, baseline work, and executed work to provide accurate and transparent performance assessments of depots for leaders and stakeholders. Additionally, the OIB must add a value creation metric utilizing 'net present value' (NPV) to enable depots to make longer-term financial and business

strategies and enable leaders and stakeholders to invest in innovative and future-focused products and equipment.

Recommendation 13: Clarify Depot Surge Policy & Establish Data Repository: DoD should immediately develop a surge plan policy linking to J-5 war plans and capturing a full suite of sustainment and production factors in real-time. In addition, the resources required to surge should be collected into a single repository to provide a common operating picture and to evaluate the DoD's ability to surge continually.

Recommendation 14: Expand PPPs to Recapitalize Infrastructure: DoD should actively leverage existing legislation further to expand the use of Public-Private-Partnerships (PPPs), developing "cost-sharing sustainment agreements" to recapitalize infrastructure economically. Expanding such PPPs allows for revitalizing atrophying infrastructure at the 'speed of need' with no short-term government capital investment and increasing interoperability with industry.

Recommendation 15: Pursue Access to Technical Data and Intellectual Property (IP) Rights: DoD should provide standardized guidance to Program Offices for expectations regarding preferred data rights relationships, based on the nature of the product and sustainment model established. A common framework will ensure commercial vendors of the DoD intent and identify their IP as valued government assets. Additionally, DoD must formally establish an IP cadre within the Under Secretary of Defense, expand this cadre into each service, and leverage the expertise into program office negotiations.

Recommendation 16: Expand S.T.E.M. Internships in MRO Services Industry: Despite the implementation of education partnerships, the pool of S.T.E.M. and technical school graduates falls critically short of the demand for skilled labor within the OIB. The depots should expand

internship offerings with local high schools and partnerships with vocational-technical schools, actively including those outside their traditional geographic recruitment areas.

Conclusion

No single recommendation or solution will resolve the inherent problems within the current Defense MRO Services DIB model. The issues plaguing the OIB and the MRO service market are varied and complex. They range across all five readiness enablers, impact both OIB and CIB stakeholders, and represent decades of cultural and industrial practices that have led to the current state. Addressing these OIB issues through reactionary measures does not address the root causes of the problems. Instead, the US government must leverage lessons from various MRO services models utilized by competitors, allies, depots, and industry partners to tailor a more desirable MRO services environment.

Building a market ecosystem that prioritizes readiness in meeting warfighter demands, capacity to surge quickly, ability to control costs, capability to innovate and modernize rapidly, and the ability to train and retain the future's skilled workforce is foundational MRO services market reform. Removing barriers to MRO services market entry and breaking oligopolistic dominance of the market through TDP ownership will increase competition, innovation, and performance in the market. Integrating partners and allies into the MRO services strategy and increasing utilization of distributed, networked, and agile MRO facilities will improve supportability to the warfighter and MRO services interoperability across the globe. Removing DoD constraints in contracting and MRO workload distribution provides the DoD with greater autonomy and flexibility to determine the composition of MRO services support, effectively re-compete contracts over the life cycle, and reduce MRO services LCC. Without a redesign of the MRO services market structure and performance priorities that drive changes to firm behavior in

the MRO services DIB, the US will be unable to implement effective and long-lasting change within the Defense MRO services industry. By pursuing the proposed recommendations within this document, the DoD can identify a holistic strategy to adjust the Defense MRO services market and prepare for the threat of near-peer future war mobilization.

APPENDICES

Appendix A: Ukrainian Implications

Following President Vladimir Putin's authorization of "special military operations" on 22 February 2022, Russia launched a comprehensive invasion of Ukraine, marking a significant escalation of ongoing Russo-Ukrainian tension. The campaign was preceded by a prolonged Russian military buildup and numerous demands for security measures and legal prohibitions against Ukraine joining NATO. The US has boosted its existing and projected security assistance efforts to Ukraine in response to the eastern European crisis. To provide security assistance to safeguard Ukrainian sovereignty, deter Russia, and preserve regional security. The US should consider the following options to utilize the OIB to assist Ukraine.

Available Options

1. The DoD can deploy OIB technicians who have experience working on weapon systems to provide MRO services and training to Ukrainian support teams. Being close to the fight in a NATO safe zone will assist in reducing battle damage to weapon systems that require sustainment or depot-level repairs.
2. The US should posture to disrupt Russian defense export capabilities. Russia exports most of its weapons to China, Egypt, India, Vietnam, and Algeria. Leveraging the OIB and CIB to inject US-made defense exports to once-Russian customers would bolster the US DIB and allow more separation between global competitors.
3. The OIB should take advantage of its manufacturing capabilities by fabricating munitions and materiel and domestic arsenals and depots to aid Ukraine in the repair of their equipment.
4. A USCG Technical Assistance Field Team should be implemented in EUCOM to support US partners and allies in the Post-Soviet States, similar to the SOUTHCOM team that provides

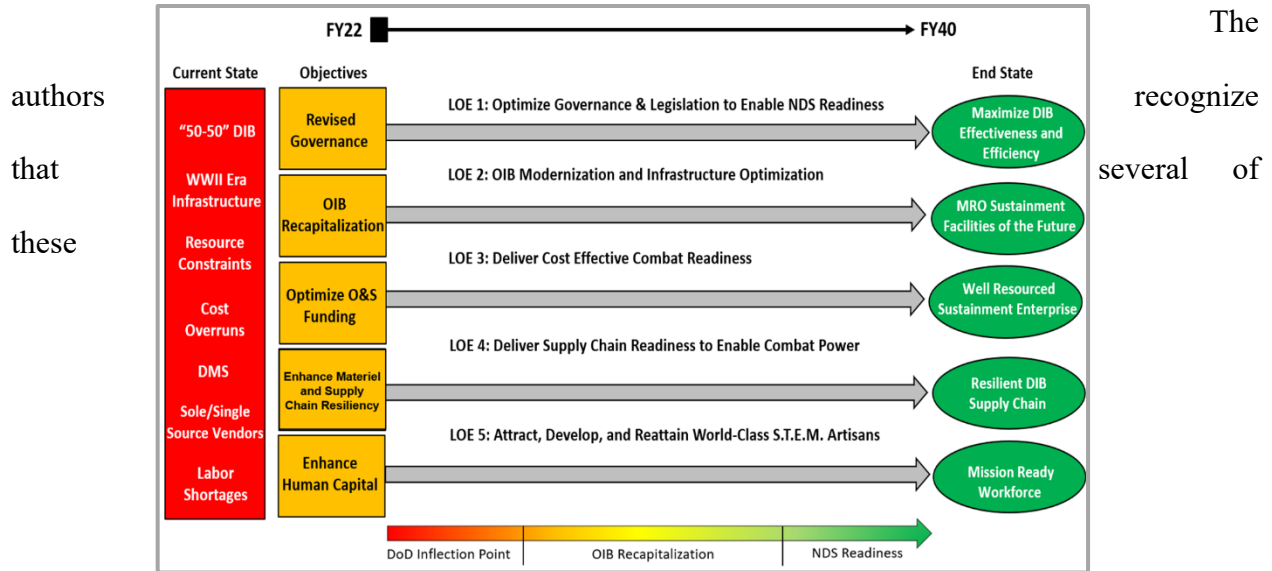
maintenance and training to Caribbean Basin partner nations. Configuration and bi-level maintenance can immediately help Ukraine's navy. By maintaining strict configuration management, more weapons systems can be delivered to the Ukrainian Armed Forces without further training. Total asset visibility will allow Ukraine to communicate its assistance requirements immediately.

5. Congress should focus on providing MRO and OEM services to support its expedited arm sales to Ukraine. To incentivize industry Congress could provide subsidies to interested and capable firms to manufacture arms or support arms sales to Ukraine - which would receive the arms at a discounted cost. The firms selected should have existing capabilities and services that will be the most effective and have the ability for rapid utilization by the Ukrainian Armed Forces. The arrangement removes the burden of US procurement law and other agency rules allowing parties to negotiate the terms of sale with greater freedom and flexibility. Simultaneously, Ukraine receives low-cost, immediate support.
6. USAF program offices should establish contracts via foreign military services and generate commercial partners to lease, repair, and establish supplies and services for Ukrainian commercial airlines. Ukraine commercial airlines use Boeing 737 and CFM56 engines. Delta and United offer services, materials, and repairs required to reinstate Ukraine Airlines. Reopening commercial airlines will provide valuable air transport during any slowdown in the fighting.

Appendix B: Recommendations

The preceding assessment and academic deconstruction of the OIB, and its MRO services market specifically, resulted in a variety of recommendations for further consideration, each with the intent to modernize and reimagine the OIB of 2040 to achieve the key attributes.

Recommendations have been grouped herein by the corresponding critical modernization objectives (highlighted in the leftmost column) as briefed to senior DoD and OSD staff, with principal Readiness Enablers, and Key Attributes of the ‘OIB of the Future’, both also denoted.



authors that these recommendations require significant cultural shifts within traditional command or financial systems. Some are therefore identified as needing further exploration or detailed study to comport with implied legislative changes. Lastly, others have been identified to be within the current purview of DoD or OSD itself, thus providing low-risk and low-cost changes that can still have immediate impact on OIB operations.

Where consensus within the recommendations could not be reached, a synopsis of dissenting views is noted by table indication in red.

R E V I S E G O V E R N A N C E	Enablers	Key Attributes	Primary Concern
	Governance Infrastructure Finance	Interoperable Collaborative Resourced	DoD needs to improve how the Core law, (10 U.S.C. §2464) is implemented and executed
	Publish a National Security Industrial Vision: The DoD should formalize a unified strategy for the DIB write large, align it with the NDS and NSS, and provide common definitions of OIB readiness, and Core capabilities.		
	Assessment: Low Risk / Immediate Impact		

The DoD should publish and employ a unifying “National Security Industrial Vision” (NSIV) strategy for the DIB writ large This should be published on quadrennial basis and clearly align with both the National Defense and the National Security strategies, and fully leverage 10 USC. 2464’s mandate of ensuring the Government’s ability to rapidly meet the services’ needs during crisis. The NSIV publication must provide a common definition of OIB ‘readiness’ and more clearly specify which capabilities are actually Core.

Additionally, new standardized definitions and scaling of both ‘surge’ and ‘mobilization’ must be included to provide a common framework for Program Managers to clearly measure acceptable risk criteria (supply chain risk, sole sources, etc.) associated with the Government’s level of access to technical and data rights of various platforms, and to identify the minimal level of OIB capability and core competency that can be permitted.

Currently, the services determine their own Core logistics capabilities; a forward-leaning unifying vision would enable identifying and using a joint service, horizontal, and futuristic approach to identify areas of redundancy and opportunities for economies of scale.

R E V I S E G O V E R N A N C E	Enablers	Key Attributes	Primary Concern
	Governance Infrastructure Finance	Agile Competitive Resourced	The current 50-50 construct may not enable the most effective, capable, or cost-effective for the OIB.
	Reevaluate 10 U.S. Code § 2466 (“50-50”): The DoD should commission a study to identify the capabilities and risks of mission readiness of the DIB in totality, determine capacity parameters, and develop clear, standardized metrics for capacity and capability based on risk factors.		
	Assessment: Recommended for further study. Note: <i>See below for concerns regarding implementation strategy and sequence.</i>		

The authors recognize that future OIB may not necessarily be best enabled within the current 50-50 construct; a ratio fixed by legislation may not be cost effective, nor a realistic assurance of the capability or capacity to surge.

It is therefore recommended that DoD commission a study to identify the capabilities and risks of mission readiness of the DIB in totality, and to determine maximum estimated capacity presently existing for a surge stemming from large-scale conflict against a near-peer adversary.

Commensurate with recommendation of implementation of a National Security Industrial Vision, analysis of results will ultimately inform ownership of proper Core logistics capabilities, and drive decisions that are more data informed, providing insight into when and where suitable platform-based ratios can be established.

Risk metrics assessed must include (*at minimum*):

- (1) number of independent suppliers for a particular MRO service;
- (2) number of small and medium sized businesses available for a particular MRO service;
- (3) supply chain risk rating based on foreign ownership, control, influence (FOCI) for capable vendors;
- (4) financial risk: cost comparison between OIB and CIB (“*is the CIB indeed more expensive than the OIB?*”); and

- (5) human capital risk: availability and cost of skilled personnel to perform a specific function

From there, a comparative assessment of the deltas between each can aid in identifying where in the DIB has risk of not achieving capacity or capability. This will more readily inform proper ore logistics capability, and drive decisions that are data informed, providing insight into when and where suitable platform-based ratios can be established.

Note: A specified 'proper ratio' of the future OIB remains subject to debate; no consensus could be reached by the authors. Some advocated for a fully unconstrained system, whereby program leaders are empowered to make decisions based on clearly identified risks and supportable data on capacity and capability. Others supported an experimental "pilot program" of deliberate and more methodical transition, proposing an incremental increase of CIB involvement (perhaps 2-percent annually over a 5-year forecast) to drive down overall costs while still maintaining the minimum organic response to surge.

Still others felt that – given 10 USC § 2466's inherent links to 10 USC § 2464 (referring to Core capability itself) - any experimentation with adjustments would be premature without completion of the preceding comparative DIB assessment, and that the law already provides provisions for flexibility to enable more private sector involvement (Section 334 of the NDAA for FY 2003). Additionally, a waiver clause exists, allowing the Services to go above the 50% commercial funding threshold for specific national security reasons.

R E V I S E G O V E R N A N C E	Enablers	Key Attributes	Primary Concern
	Governance Infrastructure Innovation	Interoperable Efficient Resourced	The OIB lacks enterprise-level orchestration and integration of operations, military leadership proficiency, and standardized performance metrics
	Commission a Joint Sustainment Entity: Remove the depots from the direct control of the individual services, and instead manage them via a new agency or singular command structure to yield stronger corporate structure overall, ensure synergies across facilities, realize efficiencies of operation and economies of scale by enabling workload distribution across technical sectors, and generate improvement of services provided.		
	Assessment: Recommended for further study. Note: <i>See below for concerns regarding implementation strategy and structure.</i>		

While the OIB is often defined as functioning enterprise within DoD, the authors assess that its current structure is more aptly described as a confederacy of 21 unique military commands working for their individual service, each performing similar functions and generally follow the same laws and regulations.

The depots are an integral part to the service they presently support, and often display the different cultures of their parent service, while following a network of regulations, waivers, and exemptions. Workforces are comprised almost solely of civilian personnel; military personnel rarely serve at the depot until they are in command as an O-6. As such, depot commanders often have limited understanding of the intricacies of operations, finance (including WCF nuances), and personnel matters. A unified agency would yield stronger corporate structure overall, ensure synergies across facilities, realize efficiencies of operation by enabling workload distribution across technical sectors, and generate improvement of services provided.

To maximize the integration, synchronization, and adaptability of the OIB as an enterprise, further exploration should be conducted to remove the depots from the direct control of the individual services, and instead manage them via a new agency (similar in structure to the UK’s DE&S) or singular command structure*.

A Planning cell will engage with the services to identify future work to keep the depots fully employed and serve as a touch point between the depots and DLA to ensure that parts on hand

prior to work starting thus minimizing schedule delays. An Industrial operations cell will oversee the operations at the depots, standardize and track metrics to help improve performance, and share best practices across the depot sites.

As a result, unused spaces can be more effectively re-capitalized to address new and/or surge capacity needs across multiple facilities, as well as through establishment of future technology-based/innovation communities of excellence (regardless of platform ‘owner’). Depot performance metrics can be more readily standardized (and uniformly applied and enforced), allowing for enhanced in-transit visibility, leveraged data analytics to inform readiness assessments, and produce new metrics and key performance indicators. Workloads could ultimately be competed between OIB facilities, allowing further analysis of 50-50 to be assessed and managed from a singular office rather than solely via the Program Office. Six percent (6%) funding could be pooled across multiple facilities and thus more effectively reinvested by prioritization across the DoD enterprise. Uniform Leaders would be allowed expanded opportunities for Joint Command, providing a clear pathway for professional MRO/Logistician career fields and effective leadership development.

**Note: While this proposal received considerable support by the student authors, many expressed concern that if such a Joint Agency were framed as an independent Combatant Command (using the framework of SOCOM as an example), it would require a change to the roles of Service Components themselves (i.e. the requirement to “organize, train, and equip), ultimately yielding lack of fidelity on future responsibilities, as well as require extensive reassignment of the Uniformed Services themselves. Further discussion determined that standing it up as a distinct agency may be more suitable.*

R E V I S I O N A N C E	Enablers	Key Attributes	Primary Concern
	Infrastructure Innovation Governance	Agile Competitive Resourced	GAO has reported that the depots currently do not consistently measure their readiness via established, accurate, and consistent metrics.
	Establish and Collect New Performance Metrics: The OIB must standardize performance metrics to provide accurate and transparent performance assessments of depots for leaders and stakeholders, and utilize a value creation metric to enable longer-term financial and business strategies		
	Assessment: Low Risk / Immediate Impact		

The DoD must direct the OIB enterprise to develop standardized performance metrics comparing planned, baseline work, and executed work to provide accurate and transparent performance assessments of depots for leaders and stakeholders. Additionally, the OIB must add a value creation metric utilizing ‘net present value’ (NPV) to enable depots to make longer-term financial and business strategies, and enable leaders and stakeholders to safely invest in innovative and future-focused products and equipment.

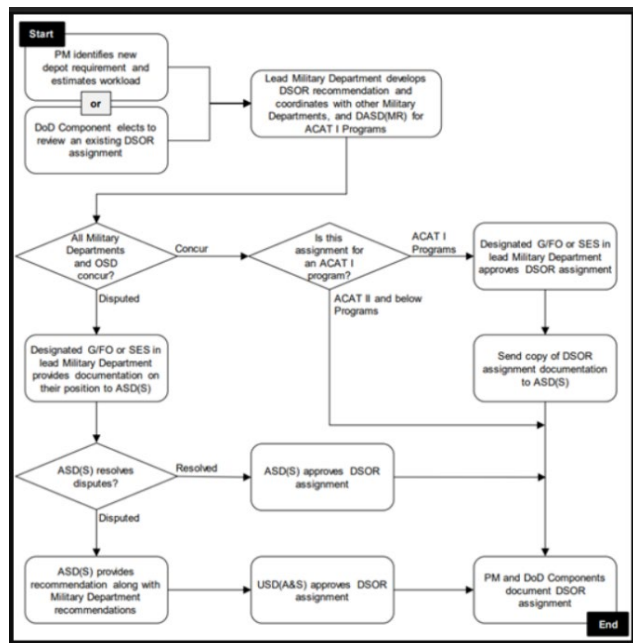
R E V I S E G O V E R N A N C E	Enablers	Key Attributes	Primary Concern
	Governance Infrastructure Materiel	Effective Risk-Tolerant Resourced	Plans and resources, and therefore accurate assessments, required for surge remain siloed within the services and respective depots
	Clarify Depot Surge Policy & Establish Data Repository: DoD should develop a surge plan policy linking war plans, capturing repair parts and other production factors into a single repository to provide a common operating picture and substantiate funding requirements.		
	Assessment: Low Risk / Immediate Impact		

DoD should develop a surge plan policy modeled from the U.S. Air Force Materiel Command Surge Contingency Plan 70 that links war plans and captures repair parts, carcasses, and other production factors. In addition, the resources required to surge should be collected into a single repository to provide a common operating picture and to evaluate the DoD's ability to surge. This quantitative data will also help substantiate funding requirements and address Congressional inquiries.

R E V I S E G O V E R N A N C E	Enablers	Key Attributes	Primary Concern
	Infrastructure Innovation Acquisitions	Innovative Effective Efficient	DoD innovation strategies and programs remain siloed by parent service and/or redundant, failing to leverage common standards and economies of scale.
	Realign Depots by Technology Sectors: Align depots by technology-based/innovation communities of excellence, Innovation centers can aid in establishing new Core categories, enable greater flexibility with 50-50 decisions.		
	Assessment: Pilot Implementation		

Depots should be re-structured as technology-based/innovation communities of excellence, regardless of legacy service orientation or ‘owner’ of prevalent platforms serviced. These innovation centers can aid in establishing new Core categories for DSOR recommendations, also enabling greater flexibility with 50-50 decisions based on modern capabilities.

Additionally, a new joint-level Program Office is required, integrating with the traditional program office concept. To implement, OSD will need to declare Core technology



development sectors and require the service to pool resources to establish these new horizontal program offices. By specializing in specific technologies and innovation ‘space’, commercial and academic resources can be drawn more geographically, mitigating the human capital ‘deserts’ that plague many current depot locales.

With technology sectors defined and horizontal Core teams established, Program Element Offices can pool sustaining engineering and R&D funds to address common OIB needs across a host of platforms. As an example, the AI Core team can establish the OIB infrastructure requirements and

operations for all forecasted AI-enabled programs. Funding can be provided with a sustaining engineering and R&D tax. It is recommended that these additional funds will be on top of the 6%, and directly targeted for the new capability. This framework will require new governance and leadership to promote a matrix Core team construct and resourcing requirements.

R E V I S E G O V E R N A N C E	Enablers	Key Attributes	Primary Concern
	Acquisitions Materiel Innovation	Modern Interoperable Forward- Projecting	Insufficient access to technical data during national emergencies
	Update DPA Authorizations: The Defense Production Act should be modified to allow POTUS to direct companies to provide limited licensing of tech data to depots during times of national emergency to enhance the depot's ability to sustain critical weapons systems.		
	Assessment: Recommended for further study		

The Defense Production Act should be modified to allow POTUS to direct companies to provide limited licensing of tech data to depots during times of national emergency to enhance the depot's ability to sustain critical weapons systems.

O I B R E C A P I T A L I Z A T I O N	Enablers	Key Attributes	Primary Concern
	Finance Governance Materiel	Agile Efficient Resourced	Multi-year workload demand signal to depots
	Modify Carryover Allowance: Permit depots to have up to twelve (12) months or more of carryover to assist in business operations management, aid in long lead times and navigate disrupted supply chains. It would also insulate depots from the effects of a habitual continuing resolutions, provide job security for the OIB workforce, and stabilize Core capability training.		
	Assessment: Recommended for further study		

Permit depots to have up to twelve (12) months or more of carryover.

Providing a workload demand signal to the OIB depots for multiple years at a time, like how acquisition contracts are structured, would assist in management of depot business operations, aiding in navigating long lead times and disrupted supply chains. This would put depot MRO services on closer footing to industry competitors on overall costs. It would also insulate depots from the effects of a habitual continuing resolutions, provide job security for the OIB workforce, and stabilize Core capability training.

O I B R E C A P I T A L I Z A T I O N	Enablers	Key Attributes	Primary Concern
	Infrastructure Finance	Modern Collaborative Efficient	The aging OIB ecosystem has yielded several locations with unused space and infrastructure, creating unnecessary and costly site O&M costs.
	Pursue Contract Owned Shared Operations (COSO): The OIB should open opportunities to divest Government ownership and instead lease capability (space and infrastructure) from commercial partners, maximizing sharing of space and surge capabilities.		
	Assessment: Pilot Implementation		

The OIB should lease capability from commercial partners rather than owning the infrastructure. With this solution, unused infrastructure could be used by the qualified commercial owner or leased by other qualified commercial partners. COSO also fosters conditions for market clustering which enables the exchange of ideas, talent, and capability, providing enhanced conditions for improved human capital development and skilled labor retention within the local area.

O I B R E C A P I T A L I Z A T I O N	Enablers	Key Attributes	Primary Concern
	Infrastructure Finance	Agile Collaborative Efficient	DoD is not taking full advantage of existing and authorized PPP programs to recapitalize the OIB infrastructure.
	Expand PPPs to Recapitalize Infrastructure: DoD should leverage existing legislation to further expand the use of Public-Private-Partnerships (PPPs), specifically developing “cost-sharing sustainment agreements” to economically revitalize atrophying infrastructure and increase interoperability with industry.		
	Assessment: Low Risk / Immediate Impact		

DoD should leverage existing legislation to further expand the use of Public-Private-Partnerships (PPPs), specifically developing “cost-sharing sustainment agreements” to economically recapitalize infrastructure. Expanding PPPs presents an opportunity to revitalize atrophying infrastructure at the speed of need with no short-term government capital investment and increase interoperability with industry.

O I B R E C A P I T A L I Z A T I O N	Enablers	Key Attributes	Primary Concern
	Infrastructure Innovation Finance	Agile Collaborative Distributed	The new OIB ecosystem will require new, agile, built-to-suit worksites to perform MRO services.
	Implement OIB Facility Leasing: Long-term lease construction contracts can incentivize industry to construct and manage buildings while the government leases the facilities for 15-20 years, providing surge space without long-term property and infrastructure costs as systems are divested.		
	Assessment: Low Risk / Immediate Impact		

Following a basic lease construction model already in use by the General Services Administration for civilian government infrastructure, long-term contracts can serve to incentivize industry to construct and manage buildings while the government leases the facilities for 15-20 years. The contracts should be written to include purchase options and/or lease extension options in 5-year (minimum) increments.

Such stability in site utility will likely garner local political and industry support while reducing additional costs to DoD, and while industry may or may not have an interest in the MRO services market specifically - their incentive in rent fees as guaranteed income still allow the Government to achieve operational and surge space without long-term property and basic infrastructure costs as systems are divested.

O I B R E C A P I T A L I Z A T I O N	Enablers	Key Attributes	Primary Concern
	Governance Infrastructure Finance	Modern Efficient Resourced	Services and the depots are not adequately incentivized to exceed the mandatory 6% reinvestment as stipulated by 10 U.S.C. §2476.
	Implement a CIP Rate Match Program: Establish a depot capital investment rate matching program for investments over the mandatory floor of 6%, to create a sustainable capital reinvestment cycle that is well informed and smartly executed in the future.		
	Assessment: Recommended for further study and financial impact		

Establish a depot capital investment rate matching program for investments over the mandatory floor of 6% as stipulated by 10 U.S.C. §2476. By incentivizing increased investments into OIB modernization through a rate match program, and maintaining OSD transparency into the modernization planning, the DoD can create a sustainable capital reinvestment cycle that is well informed and smartly executed in the future.

O I B R E C A P I T A L I Z A T I O N	Enablers	Key Attributes	Primary Concern
	Infrastructure Innovation Materiel	Agile Interoperable Distributed	OIB of the future that is agile, distributed, and interoperable with allies and partners
	Expand the Use of ACE Mobile Depots: DoD should expand its investment in construction of deployable and scalable mobile depot trailers/shipping containers, outfitted with depot MRO capabilities that can be forward deployed and redeployed across any theater, thus leveraging existing U.S. or allied infrastructure.		
	Assessment: Low Risk / Immediate Impact		

DoD should expand its investment in construction of deployable and scalable mobile depot trailers/shipping containers, outfitted with depot MRO capabilities that can be forward deployed and redeployed across any theater, thus leveraging existing U.S. or allied infrastructure.

O P T I M I Z E O & S F U N D I N G	Enablers	Key Attributes	Primary Concern
	Governance Infrastructure Finance	Innovative Risk Tolerant Resourced	Sustainment budgets are underfunded and the OIB is under-resourced. The services use sustainment portfolios as areas to fund other priorities and risks.
	Establish an O&S Resourcing Floor (DPG/NDAA): The depots should leverage historical data and obligation rates to set an Operations and Sustainment (O&S) resourcing floor to ensure the OIB is properly resourced with stable and predictable funding.		
	Assessment: Recommended for further study and financial impact Note: <i>See below for concerns regarding implementation strategy and sequence.</i>		

Sustainment budgets are underfunded and the OIB is under-resourced. The services use the \$18B sustainment portfolios as areas to take risks. In other words, the services deliberately fund O&S accounts between 80-87% of requirements vs the maximum executable to free up O&M to fund other competing readiness priorities. That said, funding sustainment is a critical enabler to readiness.

The depots should leverage historical data and obligation rates to set an Operations and Sustainment (O&S) resourcing floor to ensure the OIB is properly resourced with stable and predictable funding. Congress should mandate this in the NDAA and OSD should direct guidance to the services in the DPG. Setting a floor retains trade space to balance risk and index over time while setting a standardized funding level to enable stable and predictable workload planning for the executive agent.

Note: Dissenting views to this proposal expressed concern of potential impacts and behaviors such a 'floor' may unintentionally create among the services, pointing to a need for additional oversight to ensure the lifecycle costs are effectively reduced, and reducing flexibility by the services to prioritize requirements.

O P T I M I Z E & S F U N D I N G	Enablers	Key Attributes	Primary Concern
	Finance Governance Infrastructure	Efficient Risk Tolerant Resourced	Flexibility for funding obligation during year of execution, during CRs, and for program offices to execute known unknown requirements
	Revise Multiyear Funding Thresholds: DoD should lobby for Congress to convert 3400 O&M funding from a 1-year appropriation to multiyear funding and increase the reprogramming thresholds above \$15M		
	Assessment: Recommended for further study		

DoD should lobby for Congress to:

- a) convert 3400 O&M funding from a 1-year appropriation to multiyear funding, similar to MILCON, to increase flexibility in obligating dollars during the year of execution and overcome the recurring challenges of continuing resolutions, and
- b) increase the reprogramming thresholds from \$15M to a higher level to provide more flexibility to the program offices to execute depot requirements during the FY to react to emerging known unknown requirements

O P T I M I Z E O & S F U N D I N G	Enablers	Key Attributes	Primary Concern
	Infrastructure Finance Innovation	Competitive Efficient Resourced	Depots have little incentive to improve processes or operate more efficiently and must invest profit based on needs.
	Revamp the WCF Profit Model: Remove the “break-even” requirement for depots. Allow depots to project future challenges and make a profit comparable to private firms in the MRO service market to increase recapitalization, employee incentives, and process improvements.		
	Assessment: Pilot Implementation		

Remove the “break-even” requirement for depots. Allow depots to project future challenges and make a profit comparable to private firms in the MRO service market. Profit motivates businesses to innovate and create value. Depots have very little incentive to improve processes or operate more efficiently, and must invest profits in facilities, workforce, etc. based on needs. Modifications to the WCF that allow depots to pursue profit for the purpose of employee incentivization, recapitalization, and process improvements will be leveraged to incentivize innovation and R-TOC over system life cycles.

E N H A N C E M A T E R I E L & S U P P L Y C H A I N R E S I L I E N C Y	Enablers	Key Attributes	Primary Concern
	Infrastructure Innovation Materiel	Innovative Efficient Resourced	The OIB must increase responsiveness to be more capable of initiating spot fixes both virtually and physically.
	Institute Large-Scale Additive Manufacturing with Certification Process: Identify specific sites and workloads to prioritize investment in maturing technologies and industry opportunities such as 3D printing, advanced titanium welding, and cold-spray repair, and coordinate engineering authority acceptance through respective Program Offices.		
Assessment: Pilot Implementation			

In order for the serviced to sustain operational capabilities in future peer-to-peer engagements, the OIB must increase responsiveness, be tied closely with the warfighter systems, and be more capable of initiating spot fixes both virtually and physically. OIB must identify specific sites and workloads to prioritize investment in maturing technologies and industry opportunities such as 3D printing, advanced titanium welding, and cold-spray repair. These innovations require sustained government investment, commercial partnerships, and engineering authority acceptance coordinated through respective Program Offices.

E N H A N C E M A T E R I E L & S U P P L Y C H A I N R E S I L I E N C Y	Enablers	Key Attributes	Primary Concern
	Infrastructure Innovation Materiel	Agile Interoperable Efficient	The joint force must set new data standards, and partner with academic, innovation firms, and industry to develop a truly joint LOG COP dashboard
	Establish a Joint LOG-COP with AI enabled Risk Assessment: Enjoin the multitude of LOG-COPs into a DoD common dashboard that leverages AI and machine learning, and advanced data analytics will inform Combatant Commanders and enable common operating pictures of supply levels, in-transit assets, infrastructure assessments, supply lines of communication.		
Assessment: Pilot Implementation			

Enjoining the multitude of Logistics Common Operating Pictures (LOG-COPs) into a DoD common dashboard that leverages AI, machine learning, and advanced data analytics is imperative to inform Combatant Commanders of their readiness posture and associated OIB capabilities. The Joint LOG COP will enable inclusion of common operating pictures of supply levels, in-transit assets, infrastructure assessments, supply lines of communication, etc. The joint force must set new data standards, and partner with academic, innovation firms, and industry to develop a truly joint LOG COP dashboard.

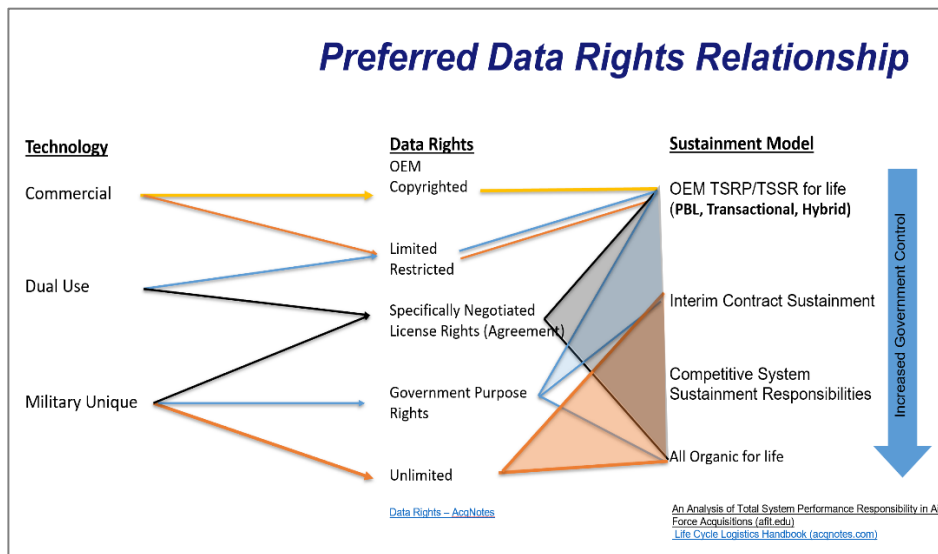
The future NDS fight will leverage A2AD and System Destruction warfare to attack C2 nodes and disrupt communications. Having data and readiness assessments at lightning speed is vital. This joint LOG COP presents that single common operating picture to inform CCs across all services.

E N H A N C E M A T E R I E L & S U P P L Y C H A I N R E S I L I E N C Y	Enablers	Key Attributes	Primary Concern
	Acquisitions Innovation Materiel	Modern Collaborative Resourced	DoD lacks provision for preferred data rights relationships from the CIB.
	Pursue Coordinated Access to Technical Data and Intellectual Property (IP) Rights: DoD must provide common expectations for preferred data rights relationships based on the nature of the product and sustainment model and identify commercial IP as valued government assets. A team of IP experts should be embedded across the DoD enterprise to leverage IP and legal expertise.		
Assessment: Low Risk / Immediate Impact			

DoD must provide common expectations for preferred data rights relationships based on the nature of the product and sustainment model (see below). A common framework will ensure commercial vendors of the DoD intent and identify their IP as valued government assets.

Additionally, while existing DoD Instruction 5010.44 establishes an IP cadre within the Under Secretary of Defense,

expand into each and bring of the into office



DoD must this cadre service the might enterprise program

negotiations. A team of DoD IP experts should be leveraged to mentor program offices. and train selected service cadre to become IP experts and integrate the process within DoDI 50000.

	Enablers	Key Attributes	Primary Concern

E N H A N C E H U M A N C A P I T A L	Human Capital Innovation	Innovative Effective Resourced	The OIB suffers from skillset gaps and a labor shortage.
	Create a National Defense Manufacturing Reserve (NDMR): Adoption of a reserve-component-inspired model for the OIB workforce would provide surge capacity, incorporate the future of work with flexible work options, and retain trained, skilled OIB artisans.		
	Assessment: Recommended for further study and financial impact.		

A new approach to managing OIB human capital, adoption of a reserve-component-inspired model for the OIB workforce would provide surge capacity, incorporate the future of work with flexible work options, and retain trained, skilled OIB artisans. The NDMR addresses both identified OIB workforce gaps: the gap in employment (more positions available than workers to fill them) and the gap in skillset (between skills needed and skills possessed by job seeker).

An NDMR will reduce the dependence on contracted support, circumventing the budget and political process, and possibly driving down rates at the depots.

E N H A N C E H U M A N C A P I T A L	Enablers	Key Attributes	Primary Concern
	Human Capital Innovation	Innovative Collaborative Resourced	The number of people with the skills to fill technical roles in the depots continues to decrease.
	Expand S.T.E.M. Internships in MRO Industry: OIB depots should expand internships with the local high schools to attract students to learn how to perform the skills necessary to repair assets. Depots should also expand partnerships with vocational technical schools to offer trade schools scholarships with contingency payback requirements.		
	Assessment: Low Risk / Immediate Impact		

The number of people with the skills to fill technical roles in the depots continues to decrease. Despite implementation of education partnerships, and depending on the trade or occupational field, the pool of S.T.E.M. and technical school graduates continues to fall short of the growing demand for skilled labor. The depots should expand internships with the local high schools to attract students to learn how to perform the skills necessary to repair assets.

Local OIB depots must also expand partnerships with vocational technical schools even outside of their traditional geographic areas, to offer trade schools scholarships with contingency payback requirements.

E N H A N C E H U M A N C A P I T A L	Enablers	Key Attributes	Primary Concern
	Human Capital Innovation	Competitive Effective Resourced	Hiring authority limitation for transitioning enlisted military maintainers for mid-level federal employment positions immediately after retirement.
	<p>Lift the 180-day Hiring Restrictions: The Services should work with the Office of Personnel Management to link the DoD’s Transition Assistance Program (TAP) to the depot Human Resource Teams to backfill their artisan positions.</p> <p>Assessment: Pilot Implementation</p> <p>Note: <i>See below for concerns regarding implementation strategy.</i></p>		

The 180-day waiver requirement is a limitation in hiring transitioning enlisted military maintainers for mid-level Federal Employment positions immediately after retiring. Improving the transition from the military to the civilian workforce offers an opportunity for the depots to take advantage of trained and certified soon-to-be civilians to fill key Wage Grade positions. The Office of Personnel Management and the Services should work together to link the DoD’s Transition Assistance Program (TAP) to the depot Human Resource Teams to backfill their Artisan positions.

The authors acknowledge there are already a myriad of hiring flexibilities and preferences afforded to military veterans, and that the existing rules were ostensibly developed to prevent military officers in positions of influence from creating senior GS positions for themselves upon retirement. Concurring opinions offer that a waiver be temporarily authorized until new hiring legislation can be developed to ensure that future rules cover only transitions for positions that already exist in the organizational structure.

E N H A N C E H U M A N C A P I T A L	Enablers	Key Attributes	Primary Concern
	Human Capital Innovation	Interoperable Effective Resourced	The Services do not proficiently develop and groom OIB leaders and equip them with the necessary skills to run a depot complex.
	Establish OIB Senior Leader Development Track: DoD should enact deliberate developmental milestones, training, and job placement to provide breadth and depth to develop OIB leaders of the future who understand the sustainment enterprise writ large vs their functional career track.		
	Assessment: Low Risk / Immediate Impact		

Group Report Guidelines for Models

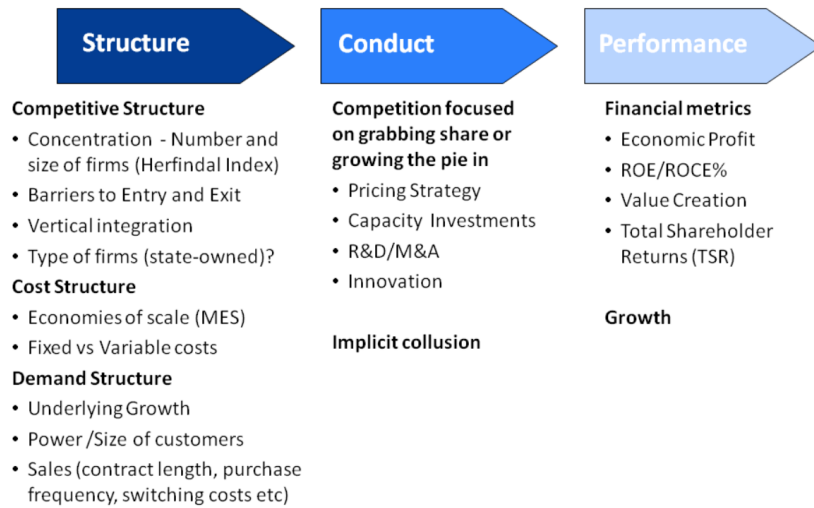
Required: Structure-Conduct-Performance

*Required: Porter's Five Forces (**OR** Porter's Diamond **OR** Lines of Effort only with permission of IS Lead Instructor)*

Structure-Conduct-Performance

The Structure-Conduct-Performance Model traces industry profitability to its root structural causes

STRUCTURE-CONDUCT-PERFORMANCE (SCP) MODEL

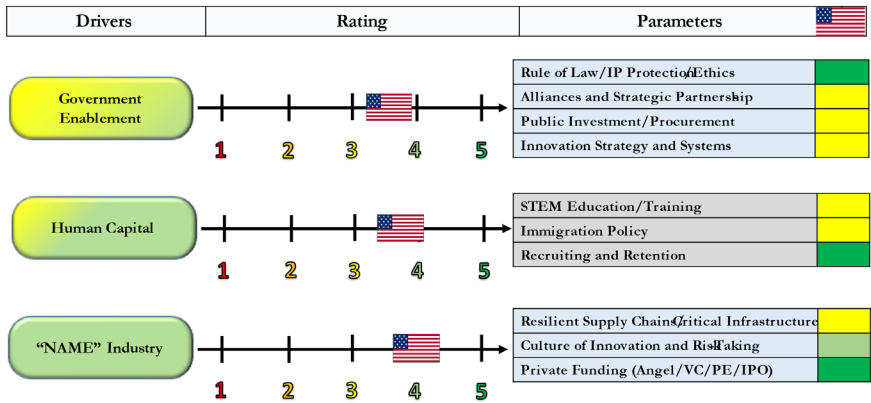


Porter's Five Forces Model



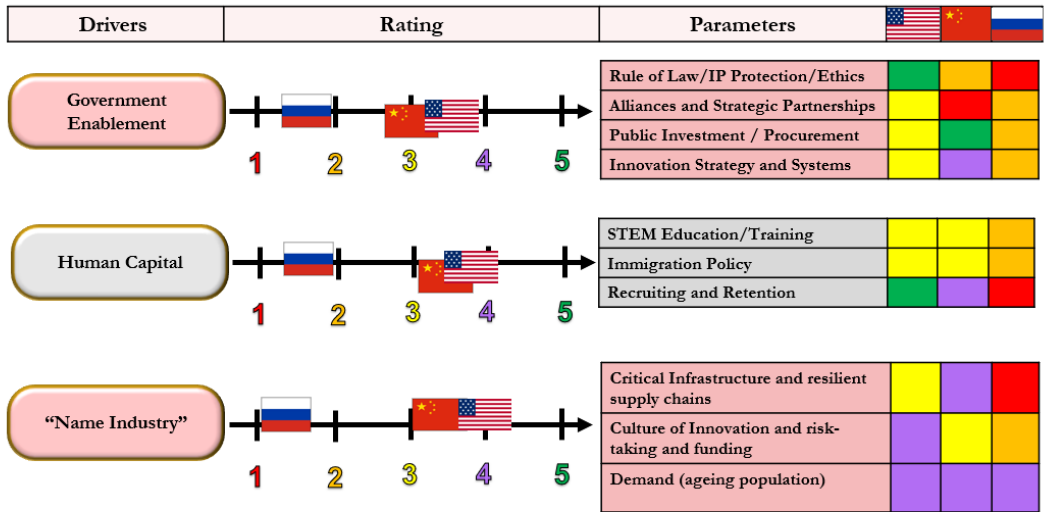
Lines of Effort example, U.S. slide.

Lines of Effort: US



Example, all countries on one slide:

Lines of Effort: China, Russia, and U.S.



Note: the D side included.

Lines of Effort can be followed by slide(s) that address the drivers, for example, for government enablement

Addition to IS Seminar Group Papers - Appendix A

Crain, Nicole V CIV US ES/FAC

Wed 3/16/2022 11:28 PM

To: **ES All Students**

Cc: **ES All Faculty**

Dear IS Students,

I hope you are enjoying the opportunities to learn about your industry. It's clear that there have been valuable experiences in class and during field studies already, with more to come in the weeks ahead.

NDU-P has approved an addition to the IS curriculum, and during the NSIB department meeting faculty asked me to send it out. It is motivated by Russia's unprovoked and unjustified invasion of Ukraine, and **the question that must be answered in Appendix A of each seminar's group paper is as follows: Given that U.S. policy is to support Ukraine in this war instigated by Russia, what options are available within the context of each Industry Study to do so? Include recommendations to support broader U.S. policy.**

Each seminar's Appendix A content should be substance over form - no fluff! Facts, hyperlinks to sources, active voice, actionable and defensible ideas are what is being requested. The preferred time period is a two year horizon, and your recommendations may be influenced and informed by your understanding of various risk calculi including:

- a. Russia and President Putin,
- b. China,
- c. NATO and EU States, and,
- d. The Post-Soviet States (including Ukraine, Belarus, Georgia, Armenia, and/or other states that have influence or impact on a-c above).

If necessary, please ask your IS faculty for further clarification.

This IS assignment is distinct from similarly motivated additions to the IA, SAR, and NRE courses. If you have questions about those assignments, please contact the appropriate instructor.

Best wishes for a smooth path to the end of IA and SAR, and onwards to IS DV briefs, NRE, and graduation, which is closer than it may seem.

V/r,
Nicole

Dr. Nicole Crain
Chair, National Security Industrial Base (NSIB) Department
Professor of Economics
National Defense University Eisenhower School
Ft. McNair, Washington, D.C. 20319

Appendix E: Industry Study(IS) Individual Paper Executive Summaries

A Dynamic OIB Solution – Contractor Owned Shared Operations (COSO) Infrastructure

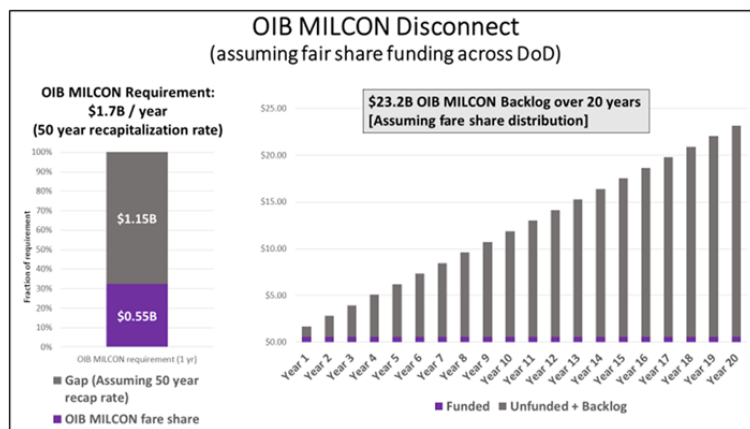
Col Paul Frantz, USAF

The physical infrastructure belonging to the Department of Defense's Organic Industrial Base (OIB) has long suffered from insufficient investment and inattentive process management. Several inspections, reports, and studies have highlighted this ongoing and expanding problem. However, none of these critiques have offered an actionable, cost-effective solution to the OIB's worsening infrastructure problem. This paper proposes a wholly new and cost-effective solution: Contractor Owned Shared Operations (COSO) infrastructure. The COSO infrastructure concept may save the government more than one billion dollars per year in deferred infrastructure upkeep costs. Additionally, COSO has the potential to increase the overall surge capability of the defense industrial base as a whole. Most importantly, transitioning the DoD to COSO will improve overall DoD readiness.

Key findings:

- MILCON funding is insufficient for the entire DoD – only 1/3rd of requirement is funded
- OIB MILCON requirement is \$1.7B per year
- OIB Fair share MILCON funding is \$550M per year
- OIB never receives fair share of MILCON funding
- OIB will save big on infrastructure costs if a transition is made to COSO
- OIB may

benefits across enablers by COSO



receive additional key readiness transitioning to

USAF Depot Modernization and Infrastructure Optimization – OIB of the Future

Introduction and Thesis: If great power competition leads to conflict, the U.S.' OIB must be well postured to mobilize and sustain the warfighter through MRO services and serve as the Nation's insurance policy for readiness. Given the strategic challenges ahead, *the USAF must leverage the interwar period to accelerate change and recapitalize depot infrastructure to enhance OIB readiness in support of a future high-end NDS fight with a peer adversary.*

Key Findings:

- OIB infrastructure is chronically underfunded.
- OIB facilities are relics of the past; crumbling WWII era depots...outdated for today's mission and incapable of meeting the needs of the future force.
- Suboptimal facility configurations create inefficient repair processes.
- OIB facilities face a high risk of damage from extreme weather and environmental effects and have yet to be upgraded to clean and energy-efficient sources.
- While the AF satisfied compliance with U.S. code (FY05-21), the legislated 6% capital investments were not adequate to reform depot infrastructure and transition from a legacy WWII framework to an MRO sustainment facility of the future to satisfy NDS demands.

Recommendations: To modernize and optimize depot infrastructure and ensure an agile and distributed OIB, this paper offers four recommendations: 1) expand public-private partnership opportunities to recapitalize depot infrastructure, 2) operationalize Agile Combat Employment mobile depots, (3) develop a revised approach to capital investments and (4) lobby Congress for an Omnibus reprogramming action to resource MRO sustainment facilities of the future.

The Core Law is Core to the Organic Industrial Base

Introduction and Thesis –

The Organic Industrial Base (OIB) provides materiel readiness for existing weapon systems and a surge capability that supports contingency and reconstitution efforts for the United States (U.S.) national security as per 10 United States Code (U.S.C.) §2464, core logistics capabilities. The problem is that the Services are not using this law to support readiness or surge. The core law, 10 U.S.C. §2464, should stand as is. The Department of Defense (DoD) needs to improve how the law is implemented and executed and employ a “National Security Industrial Vision” strategy to ensure the OIB’s readiness and ability to surge is intact to support the Military National Defense and the National Security strategies.

Key Findings –

There is a lack of oversight by the Office of the Secretary of Defense and an ability to measure the OIB's readiness to surge, which impedes leadership’s ability to know the status of DoD's ability to surge. The resources required to surge should be collected into a single repository to provide a common operating picture and to evaluate the DoD’s ability to surge. The U.S.’s capability to surge sets the U.S. apart from other countries. Other countries like the United Kingdom, which contracted out most of their MRO work, cannot pivot and surge. They must work through their contracts which takes time to respond. Not being able to surge is a risk the U.S. is unwilling to take. Per the core law, Congress has expressed the desire for the U.S. forces to be able to react and surge to support contingency operations at a moment’s notice. Core requirements are not based on an economic decision; it is a capability decision. Providing readiness and the ability to surge are the two foundational reasons for an OIB.

Today the U.S. Army reviews its entire tactical inventory to determine its core logistics capabilities. The result of this review is unaffordable, so the core workload is not used to support the budget. Therefore, a better approach to core logistics capabilities is needed to identify what the Services determine essential to maintain versus contracting. Future requirements need to be included to ensure the depots are aware and prepared to receive new capabilities.

Policy, Strategy, and Execution –

The Office of the Assistant Secretary of Defense for Sustainment will lead as the governing authority to develop a National Security Industrial Vision and strategy to ensure core logistics capabilities are defined and executable.

A surge policy is needed, and a data repository to identify and assess DoD’s ability to surge is required so leaders are informed and able to make decisions quickly. This quantitative data will also help substantiate funding requirements and address Congressional inquiries.

The Coast Guard Mission Support Business Model: The Hard Nucleus for Military Readiness

To maintain perpetual operational demands, the US Coast Guard's (USCG) sustainment processes have evolved to maximize operational availability at an optimum price for American taxpayers. Many of the processes used by the Coast Guard are the same as those in DoD, however there are differences that should be explored and understood to foster best practices and further improve joint force readiness.

Key findings – Straddling the line between a military service and a law enforcement agency, the USCG serves alongside DoD across the globe executing peacetime, wartime, and surge missions. Unlike DoD, the USCG is not beholden to 10 USC 2466 which requires that DoD expend no less than 50 percent of its maintenance funds at organic industrial facilities. The USCG is guided by 14 USC 952 which states: “the assignment of Coast Guard vessel conversion, alteration, and repair projects shall be based on economic and military consideration.”ⁱ This statute provides USCG maintenance managers freedom to best utilize their resources to efficiently maintain assets informed by business case analyses.

Readiness Enablers - The USCG has evolved its mission support model to better structure the organization to compete in the MRO. Coast Guard Mission Support Doctrine highlights that “four cornerstones form the foundation of Mission Support Business Model (CGMSBM): configuration management, product line management, total asset visibility, and bi-level support”ⁱⁱ.

- Product Line Managements assigns the responsibility and authority for an asset's sustainment to one officer. This empowers that individual to optimize MRO decisions to maximize asset availability at the lowest possible cost.
- Total Asset Visibility drives the efficiency and effectiveness of the product line in supporting the fleet by informing data driven decisions and increasing transparency.
- Configuration management identifies and documents what systems and components are installed on platforms throughout the fleet
- MSBM divides maintenance into two levels, organizational which is completed by the organic unit and depot maintenance that is completed using resources off the ship.

Policy, Strategy, and Execution – Shared lessons learned from DoD and USCG include

- Like the navy, the Coast will benefit by demonstrating the value to Congress of a West Coast CG Yard to support west coast cutters.
- The navy should develop a recurring maintenance process similar to the USCG RDAP and determine if it could be implemented on navy ships to reduce the maintenance delays.
- Empower DoD leaders to make business informed decisions by eliminating the 50/50 rule and expanding the appropriations of multi-year sustainment funds.

Executive Summary: “Incentivization of the Future OIB-N”

Effective sustained modernization of the Naval Organic Industrial Base (OIB-N) requires a perpetual cycle of capital investments. Incentivization of capital investments will improve infrastructure modernization financing in the future. An OSD sponsored capital investment rate matching program and sharing costs savings from sustaining innovations with the OIB-N are two ways the Navy can incentivize modernization.

Naval shipyards today are outdated with equipment and facilities beyond their expected useful service life. This obsolete infrastructure has led to increased delays in maintenance availabilities, lost operational days, and increased costs to the U.S. Navy. Current modernization estimates from the Shipyard Infrastructure Modernization Program (SIOP) are \$21 billion over 20 years.

Securing long term investment financing amidst competing near term requirements is a major hurdle to OIB-N modernization. Incentivization offers new ways of financing modernization. OSD can annually utilize withheld tax funding from the DOD topline budget to match any investments of up to 3% made over the minimum capital reinvestment threshold of 6% as stipulated by Title 10 U.S.C section 2476. This incentivizes the services to increase investments for modernization and doubles the rate of financing in perpetuity. Additionally, the Navy should incentivize sustaining innovations resulting in R-TOC. Any R-TOC resulting from the innovation in the current 2-year budget cycle should be placed into a capital investment account at the OIB-N facility and used to seed additional innovative ideas. Financing the OIB-N in this way would result in positive impacts to the infrastructure of the OIB-N and incentivize perpetual workforce innovation. Through transparent R-TOC accounting and business cases, the Navy can demonstrate the value these investments return to the DOD.

Working Capital Fund Options for Improvement

The global demand for forward-deployed forces will increase in a competitive coexistence environment. In response, DWCF agencies will require more flexibility to operate as a business and create value to meet future demands, including expanding MRO capabilities to OCONUS locations.

The DWCF enables the OIB to operate like a business but lacks incentives for innovation. DWCF agencies establishes fixed rates based on the net operating results from the previous year and the goal of breaking even over the accumulated operating results. Carryover insulates the depots from the effects of continuing resolutions, provides job security, and reduces the risk to the supply chain. Six percent capital investment does not enable the OIB to conduct substantive modernizations for competition against the defense primes.

Recommendations / Way Ahead Indicate potential areas for further study and analysis.

1. Maintain DWCF as the means for financing depots' operations. DWCF meets the need of congress and the DoD by enabling the depots to operate as a business and support the readiness goals of the military departments.
2. Allow depots to make a profit comparable to private firms in the MRO market. Profit motivates businesses to innovate to create value. Depots have very little incentive to improve processes or operate more efficiently. The goal is to allow depots to plan and augment work schedules and processes to create value and meet the Army's maintenance deadlines.
3. Allow up to 12 months of carryover for depots. Carryover provides predictability and shields depots from budgetary constraints such as continuing resolution. In addition, the military departments benefit from carryover because the military departments pay for services in advance (cheaper price), and the depots can set conditions to minimize maintenance downtime.

“The Efficiency Trap – USAF Material Readiness”

Introduction & Thesis: Recognizing the future OIB readiness is a wicked problem, USAF can adjust the ecosystems to pivot away from stovepipe organizations, focus on expanded readiness effectiveness, and avoid the past efficiency traps. By examining the USAF material ecosystems, this paper uncovers gaps in today’s collaboration, opportunities for 2035, and the structure needed to innovate and sustain readiness in the USAF & DoD.

Approach: This paper defines material readiness as a function of availability, discusses OIB’s three readiness levers, utilizes a Wicked problem-solving method, and explores the USAF readiness ecosystem to forecast challenges & mitigations. Primary enablers focus on governance, finance, and human capital.

Key Points:

1. The existing readiness ecosystem lacks corporate awareness, industrial experts, and system adaptability. Enablers (*Governance/Finance*): A reporting tool can be built within the Monthly Acquisition Reporting (MAR) application and be funded with a slight tax on various funding streams.
1. OIB must invest in maturing technologies and new domains of infrastructure or miss opportunities to increase responsiveness. Enablers (*Human Capital/Governance*): 1) Creation of manufactory and industry core teams with innovative technology sector industry roles defined between OIB, PO, and CIB. 2) DoD needs a new process to pick horizontal technology core sectors, spread the word campaign, and new guidance.
1. OIB requires expanded investment to capitalize on enhanced sustainment techniques. Enablers (*Governance/Finance*): DoD must create horizontal technology sector teams. Program Element Offices pool sustaining engineering, R&D funds, and resources to address future OIB requirements across a host of platforms.
1. OIB must invest more in maturing technologies or miss opportunities to increase warfighter responsiveness. Enablers (*Governance/Finance/Capital*): OIB must be tied closely with the warfighter's evolving doctrine and more capable of on sight fixes virtually and physically. A horizontal core team can include a warfighter presence to establish support doctrine and new maintenance concepts to maximize the OIB’s three readiness levers.
1. Sustainment leadership must have an overarching framework to make iterative changes and bring national power into play. DIME model is recommended with the following way ahead.
 - a. Diplomatic - On-shoring legacy repair & manufacture with Allied capabilities.
 - a. Informational - Promote US manufactory prowess, & IP protection, and provide preferred data rights framework with service-level IP fighter teams.
 - a. Military – Enhanced methods to forecast horizontal core requirements, more stress testing for gaps, and war planning needs to publish strategies at a bi-annual pace.
 - a. Economic – Develop a heat map to identify current & future material deficiencies. Armed with these assessments, the DPA ecosystem can better justify Congressional assistance.

Organic Industrial Base of the future - U.S. Navy – Materiel

This work objectives to provide a structure-conduct-performance and operations of U.S Navy programs as well as identify the improves of these OIB operations. Thus, the materiel-related readiness facilitator was chosen to determine “The OIB of the Future” (2030-2035) to contribute to the military readiness. So, we will propose some policy recommendations by comparing with Brazilian Navy and others based in U.S Navy only.

As a part of key findings, both Navy must focus in possible joint plans, including short, mid, long-term actions using technologies like Additive Manufacturing (AM) and robotics. The Navy Commanders must exchange experiences, promote educational courses, official visits and lessons learned in the revision of policies concerned to materiel systems and challenges for their OIB. Prioritize the mutual support and development of strategic materiel companies, by using the cost reduction and incentives with technological transfer and dual technology as well as the joint production of items, systems and services with higher added value.

The last main findings, now about U.S Navy only, are to provide some computational approaches for AM naval and engineering applications and develop large-scale AM processes for naval materials of interest; increase development and integration of AM systems; develop the ability to qualify and certify AM parts; provide and maintain the intra and inter-service projects of mutual interest in a rational way and avoid the duplicity of development and greater costs for the government as a whole; improve the depot-level ship maintenance backlog and the financial reporting on ship deferred maintenance; make a short, mid and long-term plans to revitalize and modernize the Navy Depots; use critical and strategic thinking to plan the budget process to be sent to the Congress minimizing the competitions for resources; modernize the requirements systems to establish an Adaptive Requirements Framework and review the NDS in order to deliver differentiated capabilities faster and improve the Navy materiel conditions in the near future.

Finally, we can conclude that there are some simple recommendations that can be done in order to improve the Navy OIB, related to materiel that can be executed in a short, mid and long-term plans to increase the readiness of the naval, air-naval and marine corps assets of the U.S Navy.

Human Capital Requirements for the US Navy's Shipyard of the Future

The United States Navy is facing an acute labor shortage. As the U.S. focuses on China, it will rely on the Navy to defend the Nation's interests and meet its obligations worldwide. The U.S faces a highly complex security environment for the future and needs adequate shipbuilding repair facilities and a skilled workforce to keep its ships operational. U.S lawmakers and leaders must prioritize Navy shipyard modernization and staffing to meet mission readiness and protect our national interests. The root cause of the workforce deficit problem is multifactorial. Inflation has surged, companies report lost opportunities, and supply chains across economic sectors are severely affected. A partial solution to the labor shortage is:

1. The USN needs to use Private Public Partnerships as learned in the OIB field studies.
2. Relax immigration policies. More people are expected to migrate in the next 20 years the U.S. must fixits hiring issues to allow foreign workers to immigrate and work for the OIB.
3. Provide work incentives for specific segments of the population. In this case, skilled shipbuilders stay or return to the workforce to train the next workers.
4. Increase exposure to the military and shipbuilding, like the Air Force Depot is doing with grade-school students. Invest in STEM education and recruitment.

Human Capital Requirements for the Depot of the Future

Introduction & Thesis: – The Organic Industrial Base (OIB) of the Department of Defense (DoD) includes 17 primary facilities that perform depot-level maintenance on major weapon systems.ⁱ Each depot struggles with a similar workforce-related challenges: aging Artisans and the inability to recruit young talent. The required skills include machinists, mechanics, sheet metal specialist, engineers (aerospace mechanical and software), welders, manufacturing/production workers, IT/cyber specialists; aircraft and weapon systems maintainers.ⁱⁱ The OIB leaders of today must find ways to source a skilled workforce to support the advancements in technology that are required not only today, but to support the modernized depots of the future.

Key findings:

1. Depot Artisans are aging quicker than their replacements are joining the workforce.
2. Emphasis on workforce recruitment, training, and professional development varies across the Services.
3. The 180-day waiver requirement is a limitation in hiring transitioning enlisted military maintainers for Federal Employment positions immediately after retiring.

Readiness Enablers:

As part of the OIB Human Capital Strategy, determine the depot of the future framework to help shift the workforce skills toward the training necessary to meet future requirements. Include key Wage Grade employees in shaping and recalibrating the future workforce. Components and Functional Communities should assess the depot civilian positions and identify mission critical occupations. Lastly, determine the surge baseline to establish the depot's true workforce requirements.

Policy, Strategy, and Execution:

1. Determine the depot of the future framework to help shift the workforce skills toward the training necessary to meet future depot requirements.
2. Include key Wage Grade employees in shaping and recalibrating the future workforce.
3. Components and Functional Communities should assess the depot civilian positions and identify mission critical occupations.
4. Determine the surge baseline to establish the depot's true workforce requirements.

The 180-day waiver policy needs to include additional exceptions. Link the Services' TAP programs to the Service Personnel/Human Resource teams to develop a pool of potential hires for select DoD depot vacancies.

National Defense Manufacturing Reserve: A Human Capital Solution for the OIB of the Future

Thesis and Introduction - The Defense Industrial Base (DIB) writ large, but specifically the Organic Industrial Base (OIB), will not be able to meet the weapons maintenance, repair, and overhaul (MRO) and manufacturing needs of the DoD and the nation without a significant overhaul of OIB human capital management.

Key findings –

- Human Capital, Infrastructure, Governance, and Finance overhauls needed in order to advance the current OIB to the future OIB. This overhaul process should also include a reevaluation of the term ‘readiness’ and provide updated metrics for evaluating readiness.
- China continues to compete and challenge the US militarily and economically. As the US’s near-peer competition, a fight with China will look much different than the GWOT. Manufacturing and MRO surge will require more advanced equipment, machinery, tools, techniques, and procedures. This requires an in-kind advancement of workforce skills.
- OIB has two workforce gaps: a gap in employment (more positions available than workers to fill them) and a gap in skillset (gap between skills needed and skills possessed by job seeker).
- Current OIB workforce recruitment efforts have stagnated. Efforts primarily consist of encouraging more STEM across the education spectrum (primary and secondary school level, technical and community colleges, four-year colleges) and increasing the number of and improving access to apprenticeship programs, internships, and community based partnership programs.
- National Defense Manufacturing Reserve (NDMR) is a new approach to managing OIB human capital - a reserve-component-inspired model for the OIB. Provides surge capacity, incorporates the future of work with flexible work options, and retains trained, skilled OIB artisans. The NDMR addresses both of the OIB workforce gaps. It reduced the dependence on contracted support, circumventing the budget and political process, and possibly driving down rates at the depots.

Strategy - The Department of Defense establishes the National Defense Manufacturing Reserve in order The NDMR serves as the Department’s MRO and sustainment insurance policy by providing the skilled, trained, human capital resources necessary to meet the MRO needs of the Department, especially during times of National Security crises.

Further research efforts: Is DoD the right department? Inclusion of immigrants into NDMR (with naturalization option for honorable service)? What other training and opportunities should members receive as part of membership? How long is the commitment? What benefits are included (and associated costs)?

China's Military MRO Capabilities

Over the past decade, the People's Republic of China (PRC) has pursued modern military capable of match its significant economic might, in pursuit of becoming a strategic challenger to US hegemony. But this rapid military investment and force restructuring - from development of cutting-edge military assets to the adoption of joint force capabilities – belies a coming spike in equipment sustainment and repair costs of the PLA's most modern materiel. PRC's economy and defense industrial base are likely ill-prepared to address the shortfalls, likely leaving PLA readiness compromised.

Despite few open-source materials available to describe the PLA's operations and maintenance procedures and costs in sufficient detail, an assessment of the PRC's largely state-owned defense industrial base, and analysis of recent CCP programs, economic, and demographic trends, concludes that challenges await the PLA's ability to sustain their materiel.

- A combination of cooling economic growth, combined with rising debt and souring of acceptance of China's BRI projects and practices, will degrade both available funds for PLA initiatives as well as strategic opportunities for geographic dispersion of future DIB infrastructure.
- As its economy has begun to shift, so too have the demographics of the PRC's 900 million workers. Skilled laborers that produced the first wave of modern military assets a generation ago now near retirement, and three decades of the CCP's 'one-child' policy has left insufficient labor and inadequate talent prepared to fill the void. The decreasing labor pool combined with age-related spending will start to comprise significant portions of the PRC's GDP over the next 20 years.
- The PRCs only recently shifted to continual and rapid adoption of new platforms, historically minimizing the need to provide robust support to systems before their retirement. But a by-product of the rapid modernization and embrace of exquisite weapon systems is a looming labor-intensive - and financially burdensome - MRO infrastructure, which the DIB will need to essentially conjure from scratch. At the same time, scholars have noted that the PLA remains largely untested in high intensity and combat operations and that rapid decision-making, particularly as the PLA adopts more joint concepts, is an acknowledged shortfall of the PLA officer corps.

China's Model and the US Defense Industrial Base

This paper seeks to compare the strategy initiatives between the United States and China, in order to identify advantages and limitations in the approach of each country. In the current era of great power competition between the United States (US) and China, both countries seek to use their advantages to gain international influence. These advantages lie in their population, economy, military, natural resources, and governance. Past research in this area has analyzed China's strategy overtime but has not captured the effect of the generosity of the American educational system, which has allowed China to prepare professionals in all fields. This paper seeks to add to the body of knowledge on the subject by exploring China's demographic advantage in relation to its current strategy. Additionally, this paper will address China's interest in the South China Seas. The analysis completed in this paper revealed that China's long-term strategy has given China an advantage over the United States, additionally, the United States has inherent limitations that prevent it from adopting China's approach to re-gain the advantage. Therefore, the United States must seek out new ways to secure US advantage.

China made a successful comeback to achieve great power status by executing to a long-term strategic plan, leveraging a massive amount of human capital, controlling rare earth manufacturing expertise, and employing a system of governance with almost non-existent national restrictions. While the United States can improve its DIB through implementation of lessons learned, it will not be able to utilize the same advantages as China, and will instead need to discover its own advantages.

The analysis of China's comeback suggests that its comprehensive, long-term strategy has significantly and positively impacted its development as a great power. Considering lessons learned from China can help the United States to strengthen national innovation and the US DIB. The following recommendations are made towards those ends:

1. Prevent Intellectual Property Protections violations, the United States should consider going to international organizations and promoting joint, drastic, and immediate actions to condemn and prevent this type of violation.
2. Ensure Human Capital Development, the US must establish actions to motivate the integration of its human capital by promoting laws that incentivize the education system (High schools, Colleges, Universities) to prepare qualified personnel in the necessary quantities to satisfy the demand of the DIB.
3. Empower International Organizations: the United States must implement strategies that specifically, avoid buying Chinese products in the international market, and implement sanctions to those who acquire them. However, this type of action must be promoted and complied with to guarantee fair innovative competition.

The Russian Defense Industrial Base: A Case of Propaganda and Diminishing Returns

Introduction: As the U.S. continues to navigate the increased geopolitical tensions with Russia and the world watches the unprovoked war in Ukraine, an inquiry into Russian military capacity is of increased interest. The Russia defense industrial complex leverages its capability through authoritarian government influence and economic stimulus. Through national-level armament and sustainment programs, including maintenance, repair and overhaul (MRO), Russia hopes to modernize and expand defense capacity to meet national security objectives. The purpose of this paper is to explore Russian defense industry readiness through the lens of Organic Industrial Base (OIB) enablers to gain insights into the depth and breadth of a nuclear-capable competitor of the U.S.

Key Findings/ Readiness Enabler Assessment:

This paper aimed to explore Russian defense readiness through the lens of the OIB enablers. Through an initial assessment of open-source documents concerning Russian MRO and sustainment capacity, it is determined the Russian industrial complex is unhealthy.

All five OIB enablers highlight systemic problems across the Russian defense industry, such as:

- a. Lack of *infrastructure* capable of maintaining its equipment with limited dependency on other countries
- b. No national-level *materiel* capacity
- c. Overdependency on a *fiscally volatile* market; coupled with increased debt and loss of opportunities due to globally imposed sanctions
- d. Uninvested and untrained professional military and civilian *workforce*
- e. Lack of resourced and attainable *governance* policies grounded truth and not offered as propaganda.

The OIB enabler assessment appropriately mirrors the Russian military actions in Ukraine. The Russian defense industrial base health is on life-support and disabling Russia from leading in the global power competition in its current state. The Russian military element national power will continue to fail if the defense base remains in its current state with the resources given to it by the Russian authoritarian government.

Executive Summary: The Matryoshka Effect: Russia's Hollow MRO Framework

Russia can not perform Maintenance, Repair, and Overhaul (MRO) services, replace weapons, or repair equipment at the tactical level. The Russian defense industry has failed to harden the readiness enablers with governance mismanagement, infrastructure failures, materiel shortages, mismatched human capital, and defense budget issues. Lastly, the sanctions imposed on Russia as the result of their invasion of Ukraine have exposed that their National Security Policy and Defense Plan are more characteristic of propaganda than what is happening.

Russia's industrial base is still much like that of the USSR and reminiscent of the Cold War-era mentality of manufacturing weapon systems to be simple, rugged, and easy to replicate with the practice of cannibalization to replace parts forward. The idea is to make weapons systems simple so that low-skilled operators can swap out parts from damaged or destroyed equipment. Make weapon systems rugged enough to sustain the fight and not need to be replaced or repaired. Lastly, if it needs to be replaced, it can be easily done since weapon systems are easy to manufacture.

Unfortunately, the Russian government does not prioritize the production of weapon systems for the use of the Russian defense industry, but rather for export. Since weapon systems are primarily for export, the technology and modernization are minimal. Parts are not stocked in Russia since the weapon systems are going to other countries as exports and there is no sustainment package for the lifecycle of the systems. The firms that make the major weapon systems for Aerospace, Navy, and land are either state-owned or joint-stock with a majority stake owned by the state. The state rewards a system of quick production for export and disincentivizes any system of making repair parts.

The infrastructure of the defense industry dates to WWII, and the concept of modernization is to patch things up to a state of operability but not spend resources on facilities, or systems of improvement. The conscripts in the Russian army are only active for twelve months and are not supposed to be sent forward into the fight, which leaves them with support roles. The support roles can be supported with conscripts since it takes many months to years to train to do depot-level MRO. On the front lines, the weapon systems that are being destroyed or damaged are not being repaired with cannibalization or replacement because the soldiers on the front line do not have support personnel to perform the tasks and the firms have stopped producing weapons systems because of parts shortages.

The Russian defense spending has been cut over the years and focus placed on personnel, but not enough Russian citizens are joining the contract force, so conscription continues. Since the defense budget goes to the defense industry that supports the state, there is no incentive to make a profit, and firms often default on loans. With the war in Ukraine, Russia has come under pressure from sanctions imposed by the US and its allies. The sanctions have cut off much of the parts and resources needed by Russia to produce their weapon systems and conduct MRO services. Since Russia's MRO services depend solely on state-owned and Joint-stock firms that are affected by the sanctions and from countries that are also affected by sanctions or refuse to do business with Russia, they are unable to perform MRO services, replace weapons, or repair equipment at the tactical level. Their inability to support the warfighter and defense industry is one of the reasons they are losing the war in Ukraine.

**“The United Kingdom OIB Model – An Option to Consider” by Ms. Danielle Fortune,
GSA**

Introduction & Thesis

The United Kingdom's (U.K.) Ministry of Defence (MoD) was once in a similar position as the United States Department of Defense (DOD) regarding its Organic Industrial Base (OIB). The OIB is how each state maintains its military readiness with regard to equipment, weapons systems, and military preparedness. Both organizations suffered from delayed acquisitions, high costs for sustainment, cost overruns, delivery delays, budget cuts, service focus capability alignments, and supply chain issues. Over the past ten years, the U.K. government has adopted significant reforms to address these issues. It now has a model for OIB sustainment that is efficient but not wholly transferable to the not the United States (U.S.).

Key Findings

A review of the U.K. MRO highlights apparent similarities between the challenges they faced and those of the U.S. The U.K. has shifted its strategies to significant outsourcing to meet its military readiness needs. They examined and revamped processes to shift into their current state of privatized MRO service. They achieved significant savings and shifted program management responsibilities to the contractual partner by utilizing performance contracts that make the vendor responsible for delivery.

The MOD awarded a contract to a single vendor in a business partner relationship for logistics and services. This arrangement removes government oversight and creates a new relationship with the private sector that is not hampered by program management oversight. In 2015, the MOD signed the 13-year Logistic Commodities & Services Transformation contract with a team headed by Leidos.

In contrast, a review of the U.S. profile highlights the need to acknowledge the risks associated with a global superpower diluting authority through private contractors. There would be a significant risk for U.S. OIB in that approach. However, the U.K. also employed other strategies that lend themselves to consideration in the U.S. There is an opportunity and applicability for DOD to consider a centralized procurement agency dedicated to the acquisition and sustainment of military equipment and logistics like that of the MoD's DE&S. In addition, DOD should consider moving away from specific platform procurement and sustainment to complex weapons capabilities. Lastly, Public-Private Partnerships (PPPs) with industry to invest in OIB infrastructure, the buildings, and installations necessary for the support, deployment, and operation of a nation's military sustainment efforts, are critical.

Trust in Commercial Industry: The United Kingdom's Readiness Solution

Thesis Statement

The United States (U.S.) should consider pursuing a MRO services model similar to that of the United Kingdom (U.K.), which would include transition to an arm's length body (ALB) structure for the organic industrial base (OIB) and mandating the use of long-term, outcomes-based performance-based logistics contracts for MRO support.

Key Findings

The U.K. Ministry of Defence (MOD) and the U.S. Department of Defense (DOD) share a common problem: the readiness or availability of their military weapon systems for the various missions they are required to support. The DOD's and MOD's MRO support organizations are structured very differently, and they provide MRO services differently as well. The DOD provides MRO services using a "traditional" mixture of OIB and CIB support. The MOD has almost wholly eliminated MRO services provided by their OIB and has transitioned its support organization, Defense Equipment and Support (DE&S), from a government-owned, government-operated (GOGO) structure to an arm's length body (ALB) structure. As an ALB, DE&S remains a government-owned entity, but it now operates much like a commercial company. DE&S has also outsourced the majority of its MRO, supply, and logistics functions to the commercial industry through outcomes-based, long-term, performance-based logistics (PBL) contracts. The DOD should leverage the U.K.'s experience with the transition and consider a phased implementation of the DE&S model to allow time to develop stakeholder support while demonstrating progress and effectiveness of the model in a U.S. setting.

Appendix F: Acronym List

Acronym	Definition
Ao	Operational Availability
AI	artificial intelligence
PBL	performance based logistics
CITE	Centers of Industrial and Technical Excellence
POM	program objective memorandum
DCMA	Defense Contract Management Agency
LCMC	life cycle management command
DLA	Defense Logistics Agency
DLH	direct labor hour
DSOR	depot source of repair
ACAT	acquisition category
Am	Material Availability
AR	Army Regulation
O&M	Operations and Maintenance
ASD	Assistant Secretary of Defense
LCSP	life cycle sustainment plan
C2	command and control
CBM+	Condition Based Maintenance (Plus Predictive and Prognostic)
CDRL	Contract Data Requirements List
CFR	Code of Federal Regulations
CIB	Commercial Industrial Base
CJCS	Chairman, Joint Chief of Staff
CJCSI	Chairman, Joint Chief of Staff Instruction
CLIN	Contract Line Item Number
CM	Configuration Manager

CNSSI	Committee on National Security Systems Instruction
CNSSP	Committee on National Security Systems Policy
CONUS	continental United States
COP	Common Operating Picture
COTS	Commercial off-the-Shelf
DA	Department of the Army
DAS	Defense Acquisition System
DFAR	Department of Defense Federal Acquisition Regulation
DFARS	Defense Federal Acquisition Regulation Supplement
DHS	Department of Homeland Security
DIB	Defense Industrial Base
DID	Data Item Description
DMSMS	Diminishing Manufacturing Sources and Material Shortages
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDD	Department of Defense Directive
DODI	Department of Defense Instruction
DoDI	Department of Defense Instruction
DoE	Department of Energy
DPA	Defense Production Act
DPM	Direct Procurement Method
DPS	Defense Planning Strategy
DRRS	Defense Readiness Report System
DWCF	Defense Working Capital Fund
ECP	Engineering Change Proposal
EO	Executive Order
FAR	Federal Acquisition Regulation

FISMA	Federal Information Security Management Act
FMS	Foreign Military Sales
GAO	Government Accountability Office
GFE	Government Furnished Equipment
GOCO	Government Operated Contractor Owned
GOGO	Government Operated Government Owned
GOTS	Government Off-the-Shelf
GPL	GNU General Public License
GSA	General Services Administration
IAVA	Information Assurance Vulnerability Alert
ICD	Intelligence Community Directive
IP	Intellectual Property
ITAR	International Traffic and Arms Regulations
JCIDS	Joint Capabilities Integration and Development System
JCS	Joint Chiefs of Staff
KO	Contracting Officer - sometimes seen as CO
MAR	Monthly Acquisition Reporting
MIBP	Manufacturing and Industrial Base Policy
MRO	maintenance repair and overhaul
NDAA	National Defense Authorization Act
NDI	Non-Developmental Item(s)
NIAC	National Infrastructure Advisory Council
NICC	National Infrastructure Coordinating Center(s)
NIP	National Intelligence Program
NNSA	National Nuclear Security Administration
NSA	National Security Agency
O&M	Operation and Maintenance (funding appropriation)

O&S	Operations and Sustainment (life cycle phase)
OASD(S)	Office of the Assistant Secretary of Defense for Sustainment
OEM	Original Equipment Manufacture
OIB	Organic Industrial Base
OSD	Office of the Secretary of Defense
P2P	Performance to Promise
P.L.	Public Law
PEO	Program Executive Office
PfM	Portfolio Management / Portfolio Manager
PM	Program/Project/Product Manager
PMO	Program Management Office
PPP	Public Private Partnerships
PSM	Product Support Manager
TLCM	Total Life Cycle Management
USN	United States Navy
USMC	United States Marine Corp
USCG	United States Coast Guard
USAF	United States Air Force
PPSS	Post-production Software Support
R&D	Research and Development
RAM	Reliability Availability Maintenance
RFP	Request for Proposal
ROI	Return on Investment
SME	Subject Matter Expert
SOP	Standard Operating Procedure
TLC	Total Lifecycle Cost
UFR	unfunded requirement

US	United States
USC	United States Code
WRE	War Readiness Engine

Appendix G: Glossary of Terms

Term	Definition
Acquisition	The conceptualization, initiation, design, development, testing, contracting, production, deployment, Logistics Support (LS), modification, and disposal of weapons and other systems, supplies, or services (including construction) to satisfy DoD needs, intended for use in, or in support of, military missions.
Capability	The combination of skilled personnel, facilities and equipment, processes, and technology needed to perform a particular category of work (e.g., composite repair), and that are necessary to maintain and repair the weapon systems and other military equipment needed to fulfill strategic and contingency plans.
Capacity	The amount of work that can be performed within a certain period of time, generally expressed in DLHs per year. The DoD has an approved methodology for measuring public sector depot maintenance capacity in DoD 4151.18-H.
Centers of Industrial and Technical Excellence	Each depot-level activity or military arsenal facility of the Military Departments and the Defense Agencies where the recognized core competencies reside as designated by the Secretary of the Military Department concerned, or the Secretary of Defense in the case of a Defense Agency.
Command and control	The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. (JP 1)

Commercial-off-the-Shelf (COTS)	<p>1) A software and/or hardware product that is commercially ready-made and available for sale, lease, or license to the general public.</p> <p>2) Software that is readily available from the commercial vendors.</p> <p>3) Any item, other than real property, that is of a type customarily used by the general public for nongovernmental purposes, and that has been sold, leased, or licensed to the general public; is sold, leased, or licensed in substantial quantities in the commercial marketplace; and is offered to the Government, without modification, in the same form in which it is sold, leased, or licensed in the commercial marketplace.</p>
Copyright	Copyright is a form of protection grounded in the U.S. Constitution and granted by law for original works of authorship fixed in a tangible medium of expression. Copyright covers both published and unpublished works.
Core logistics capabilities	The depot maintenance capability (including personnel, equipment, and facilities) maintained by the DoD at government-owned, government-operated facilities as the ready and controlled source of technical competence and resources necessary to ensure effective and timely response to a mobilization, national defense contingency situations, and other emergency requirements. Depot maintenance for the designated weapon systems and other military equipment is the primary workload assigned to DoD depots to support core depot maintenance capabilities.
Core sustaining workload	Depot-level maintenance and repair work necessary to ensure technical competence in peacetime while preserving the surge capacity and reconstitution capabilities necessary to support fully the strategic and contingency also includes all aspects of software maintenance; the installation of parts or components for modifications; and technical assistance to intermediate maintenance organizations, operational units, and other activities.
Cyber	The interrelationship between hardware (the internet), software, (the web) and people (users, programmers, etc.) to achieve a virtual and physical objective.

Cybersecurity	<p>1) Prevention of damage to, protection of, and restoration of computers, electronic communications systems, electronic communications services, wire communication, and electronic communication, including information contained therein, to ensure</p> <p>2) “cybersecurity is the collection of tools, policies, security concepts, security safeguards, guidelines, risk management approaches, actions, training, best practices, assurance and technologies that can be used to protect the cyber environment and organization and user’s assets. [these are used] to ensure the attainment and maintenance of the security properties of the organization and user’s assets against relevant security risks in the cyber environment”</p>
Cybersecurity Information Sharing Act of 2015 (CISA 2015)	A Senate bill that outlines a greater relationship between the public and private via information sharing.
Data	The representation of facts, concepts, or instructions in a formalized manner which is suitable for communication, interpretation, or processing by humans or by automatic means. Any representations such as characters or analog quantities to which meaning is, or might be, assigned.
Data element	A basic information unit template built on standard semantics and structures that in turn governs the distinct values of one or more columns of data within a row of data within a database table or a field within a file.
Data management	The process of creating a basis for posting, sorting, identifying and organizing the vast quantities of data available to DoD.
Data Governance	A set of processes that ensures that data assets are formally managed throughout the enterprise. A data governance model establishes authority and management and decision making parameters related to the data produced or managed by the enterprise.

Data Rights	<p>Data Rights is a shorthand way to refer to the Government's license rights in two major categories of valuable intellectual property:</p> <ol style="list-style-type: none"> 1. Technical Data includes any recorded information of a scientific or technical nature (e.g., product design or maintenance data, computer databases, and computer software documentation). 2. Computer Software includes executable code, source code, code listings, design details, processes, flow charts, and related material. <p>Only under very unique circumstances does the Government acquire title to or ownership of technical data or computer software developed under DoD contracts – even if the Government funded 100% of the development. Instead, the Government acquires a license to use, release, or disclose that technical data or computer software to persons who are not Government employees. Therefore, the DoD often negotiates over license rights and not ownership of technical data or computer software to be delivered under a contract. Data Rights for technical data and computer software fall into eight categories: Unlimited Rights, Government Purpose License Rights, Limited Rights, Restricted Rights, Specifically Negotiated License Rights, Small Business Innovative Research (SBIR) Data Rights, Commercial Technical Data License Rights, and Commercial Computer Software Licenses.</p>
Database	A collection of interrelated data, often with controlled redundancy, organized according to a schema to serve one or more applications.
Department of Commerce (DOC)	U.S Government Department that sets regulations for trade, and oversees imported and exported goods, among other roles.
Department of Defense (DoD)	The U.S Department that oversees the military, and foreign focused national security missions.
Department of Energy (DoE)	The U.S. Department that oversees U.S energy needs and energy producing technologies.
Department of Homeland Security (DHS)	The U.S. Department charged with protecting critical infrastructure, and the domestic realm.
Depot labor hour	A common metric for measuring depot maintenance capability, workload, or capacity, representing 1 hour of direct work (e.g., touch labor or other directly attributed effort).

Depot maintenance	The processes of materiel maintenance or repair involving the overhaul, upgrading, rebuilding, testing, inspection, and reclamation (as necessary) of weapons systems, equipment end items, parts, components, assemblies, and subassemblies. Depot maintenance
Government purpose license rights	Rights to use, duplicate, or disclose technical data (TD) for government purposes only, and to have or permit others to do so for government purposes only. Government purposes include competitive procurement but do not include the right to permit others to use for commercial purposes.
Intellectual Property (IP)	Information, products, or services that are protected by law as intangible property, including data (e.g., technical data and computer software), technical know-how, inventions, creative works of expression, trade names.
International Traffic in Arms Regulations (ITAR)	Trade regulation which controls the export and import of defense-related articles and services on the United States Munitions List.
Life cycle sustainment plan	The detailed product support plan, including sustainment metrics, risks, costs, and analyses used to deliver the performance-based best value strategy covering the Integrated Product Support (IPS) elements. This is also referred to as a product support strategy.
Limited Rights (Category of Data Rights)	Rights to use, duplicate, or disclose Technical Data (TD) in whole or in part, by or for the government, with the express written permission of the party furnishing the data to be released or disclosed outside the government.
Maintenance	Action necessary to retain or restore an item to a specified condition.
Materiel	Equipment, apparatus, and supplies used by an organization or institution.
Materiel availability	One of the components of the Sustainment Key Performance Parameter (KPP), defined as the percentage of the total inventory of a system operationally capable, based on materiel condition, of performing an assigned mission. This can be expressed mathematically as the number of operationally available end items/total population.
Non-Developmental Items (NDI)	Any previously developed item of supply used exclusively for government purposes by a federal agency, a State or local government, or a foreign government with which the United States has a mutual defense cooperation agreement.

Operations & Maintenance	Appropriations which fund expenses such as maintenance services, civilian salaries, travel, minor construction projects, operating military forces, training and education, depot maintenance, working capital funds, and base operations support. O&M follows the Department's Annual Funding budget policy. O&M appropriations are available for obligation purposes for one year.
Operations & Support Phase	The fifth phase of the Major Capability Acquisition process. The purpose of the O&S phase is to execute the Product Support Strategy (PSS), satisfy materiel readiness and operational support performance requirements including personnel training, and sustain the system over its life cycle, including disposal. This phase has two major efforts: Sustainment and Disposal. The MDA-approved PSS is the basis for the activities conducted during this phase. The PM will deploy the support package and monitor its performance according to the PSS. At the end of its useful life, a system will be demilitarized and disposed of in accordance with all legal and regulatory requirements and policy relating to safety (including explosives safety), security, and the environment, in accordance with the PSS. Disposal planning will include consideration of retirement, disposition, and reclamation.
Patent	"A patent for an invention is the grant of a property right to the inventor, issued by the United States Patent and Trademark Office. Generally, the term of a new patent is 20 years from the date on which the application for the patent was filed in the United States or, in special cases, from the date an earlier related application was filed" "What is granted is not the right to make, use, offer for sale, sell or import, but the right to exclude others from making, using, offering for sale, selling or importing the invention."
Portfolio Management	The centralized management of one or more portfolios to achieve strategic objectives.
Portfolio Manager	The person or group assigned by the performing organization to establish, balance, monitor, and control portfolio components in order to achieve strategic business objectives.
Post-production Software Support (PPSS)	Post Production Software Support (PPSS) is a key software support concept that includes the activities necessary to ensure that Systems Engineering and sustainment principles, processes and practices are applied to software. While the title indicates a focus on deployed software, the nature of software support is that critical activities occur throughout the acquisition process, in terms of planning, development of a support capability, and the effective deployment and maintenance of software resources.
Private sector	Infrastructure operated by commercial firm

Procedure	<p>Procedures describe the process: who does what, when they do it, and under what criteria. They can be text based or outlined in a process map. Represent implementation of Policy.</p> <ul style="list-style-type: none"> • A series of steps taken to accomplish an end goal. • Procedures define "how" to protect resources and are the mechanisms to enforce policy. • Procedures provide a quick reference in times of crisis. • Procedures help eliminate the problem of a single point of failure. • Also known as a SOP (Standard Operating Procedure)
Program	A group of related projects, subprograms, and program activities that are managed in a coordinated way to obtain benefits not available from managing them individually. See also portfolio and project.
Program objective memorandum	The final product of the programming process within DoD, a Component's POM displays the resource allocation decisions of the military department in response to, and in accordance with the Defense Planning Guidance (DPG). The POM shows programmed needs 5 years hence (e.g., in FY 2016, POM 2018–2022 will be submitted).
Project	A temporary endeavor undertaken to create a unique product, service, or result. See also portfolio and program.
Proof of Concept (POC)	proof-of-concept testing is performed at the conceptual project stage to verify initial assumptions relative to system and process performance.
Proof of Value (POV)	The combination of Proof Of Concept and the communication of the expected business value of a solution.
Proprietary	Proprietary hardware and software are owned and controlled by a single organization or individual.
Public Private Partnerships	Under Title 10 USC § 2474, a PPP for depot-level maintenance is a cooperative arrangement between an organic depot-level maintenance activity and one or more private sector entities to perform DoD or Defense-related work and/or to utilize DoD depot facilities and equipment.
Public sector	Infrastructure owned and operated by the Federal Government

Readiness	The ability of the Military Services to fight and meet the demands of the national military strategy. Readiness is the synthesis of two distinct, but interrelated, levels joint readiness and unit readiness defined as the ability to provide capabilities required by the Combatant Commanders to execute their assigned missions; derived from the ability of each unit to deliver the outputs for which it was designed.
Reconstitution	1. Actions taken to rapidly restore functionality to an acceptable level for a particular mission, operation, or contingency after severe degradation. (JP 3-14) 2. Those actions, including regeneration and reorganization, commanders plan and implement to restore units to a desired level of combat effectiveness commensurate with mission requirements and available resources. (JP 3-02) 3. In maritime pre-positioning force operations, the methodical approach to restore the maritime pre-positioned equipment and supplies aboard the maritime pre-positioning ships squadron to full mission-capable status. (JP 3-02)
Research and Development (R&D)	Research and development of new technologies or capabilities.
Restricted Rights (Category of Data Rights)	Developed exclusively at private expense.
Return on Investment (ROI)	The earning power of assets measured as the ratio of the net income (profit less depreciation) to the average capital employed (or equity capital) in a company or project.
Rights	For Government Rights concerning software see DFARS Section 227.7203-5 (http://www.acq.osd.mil/dpap/dars/dfars/html/current/227_72.htm#227.7203-5)
Small Business Innovative Research (SBIR) Data Rights (Category of Data Rights)	All technical data or computer software generated under a SBIR contract. Government users cannot release or disclose outside the Government except to Government support contractors.

Software maintenance	Includes actions that change the software baseline (adaptive, corrective, perfective, and preventative) as well as modification or upgrade that add capability or functionality. Encompasses requirements development, architecture and design, coding, and integration and test activities. Software maintenance and software sustainment are considered synonymous.
Surge	The act of expanding an existing depot maintenance repair capability to meet increased requirements by adjusting shifts or by adding skilled personnel, equipment, spares, and repair parts. The expanded capability will increase the flow of repaired or manufactured materiel to the using activity or to serviceable inventory storage
Technical Data	One of the 12 Integrated Product Support (IPS) Elements. Represents recorded information of a scientific or technical nature, regardless of form or character (such as equipment technical manuals and engineering drawings), engineering data, specifications, standards, and Data Item Descriptions (DID). Technical data addresses data rights and data delivery as well as use of any proprietary data as part of this element. A data management system established within the Integrated Data Environment (IDE) can allow every activity involved with the program to cost-effectively create, store, access, manipulate, and exchange digital data. It includes, at minimum, the data management needs of the System Engineering process, modeling and simulation activities, test and evaluation strategy, support strategy, and other periodic reporting requirements. It also includes as-maintained bills of material and system configuration by individual system identification code or "tail number."
Technical data rights	The right for the government to acquire TD. If the government has funded or will fund a part of or the entire development of the item, component or process, then the government is entitled to unlimited rights in the TD. However, if the above is developed by a contractor or subcontractor exclusively at private expense, the government is entitled to limited rights. Such data must be unpublished and identified as limited rights data.
Unlimited Rights (Category of Data Rights)	Rights to use, modify, reproduce, display, release, or disclose technical data (TD) in whole or in part, in any manner, and for any purpose whatsoever, and to have or authorize others to do so.

<p>Unlimited Rights (Category of Data Rights)</p>	<p>Developed exclusively at Government expense, and certain types of data (e.g., Form, Fit, and Function data [FFF]; Operation, Maintenance, Installation, and Training [OMIT]). These rights involve the right to use, modify, reproduce, display, release, or disclose technical data in whole or in part, in any manner, and for any purpose whatsoever, and to have or authorize others to do so.</p>
<p>Validation</p>	<p>1) confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled. (Validation demonstrates that the system can be used by the users for their specific tasks.) 2) Confirmation that the product or service, as provided (or as it will be provided), will fulfill its intended use. In other words, validation ensures that —you built the right thing.</p>
<p>Vendor Lock In</p>	<p>Being tied to the future products of a vendor due to the previous investment made in that vendor's proprietary hardware or software.</p>
<p>Vendor Neutral</p>	<p>A product or specification that is not proprietary and controlled by one vendor</p>

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Notes

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