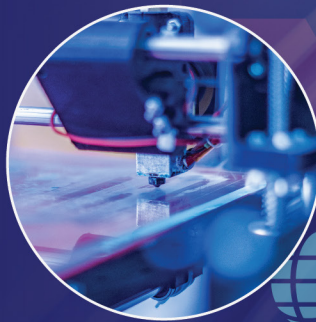
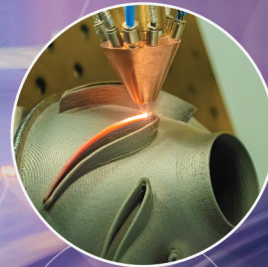




DLA Additive Manufacturing Implementation Plan for DoDI 5000.93 Use of Additive Manufacturing in DoD



01 June 2022

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1. Purpose

Integrate AM in the Supply Chain

As the Nation's Combat Logistics Support Agency and valued partner, the Defense Logistics Agency (DLA) is innovative, adaptable, agile, and accountable, focused on the Warfighter Always. It is imperative for DLA to make smart, disciplined investments in innovative tailored logistics solutions to increase and sustain weapons system and warfighting readiness – including our Nation's strategic deterrent– to meet today's requirements and prepare for the future fight. One of the innovative and adaptable technologies being explored within the Department of Defense (DoD) is Additive Manufacturing (AM).

The DLA AM Implementation Plan (AMIP) responds to DoDI 5000.93, *Use of Additive Manufacturing in the DoD*, requirements directed to DLA.

2. Background

AM, also known as three-dimensional (3D) printing, maximizes the benefits of the convergence of technology and digitalization. To consider AM as a viable option, the supply chain needs a consistent digital thread. A digital thread is a method "to convey the data flows between engineering, manufacturing, business processes, and across supply chains."¹ AM is a technology capable of enabling innovation and modernization of defense systems, supporting readiness, and enhancing Warfighter readiness.

Various AM processes and related non-thermal techniques, such as cold spray, allow for repair and production of a diverse set of materials relevant to DoD requirements. AM is used to create polymer, metal, ceramic, composite parts, and/or electronic elements (*e.g.*, sensors, antennae) from ground to air systems. It is also being deployed in newer applications such as: biological material (*e.g.*, Food and Drug Administration (FDA) approved tissues, organs) energetics, electronics, concrete, and other building materials.²

3. Logistics Efficiencies

The goal of any DLA plan is to support the Warfighter in achieving their designated missions. The use of AM can provide another strategic option in the DLA supply chain to improve Warfighter readiness. The ability to integrate AM solutions into the DoD supply chain are commensurate with the modernization of our data management systems and the adaptability of our business to process digital manufacturing requirements throughout the enterprise. The benefits of AM efforts also rely on the success of ongoing efforts in the enterprise that:

- Coordinate with the Military Services (MILSVCs) on 3D model exchange capabilities
- Enhance DLA's data management systems to enable AM procurement
- Integrate AM requirements into the appropriate supply-chain processes

¹ T. Hedberg, J. Lubell, L. Fischer, L. Maggiano and A. B. Feeney, "Testing the digital thread in support of model-based manufacturing and inspection," *Journal of Computing and Information Science in Engineering*, p. 16(2), 2016. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4904719/>

² *Department of Defense Additive Manufacturing Strategy*, Joint Defense Manufacturing Council, Office of the Deputy Director for Strategic Technology Protection and Exploitation, Office of the Under Secretary of Defense for Research and Engineering, January 2021. <https://www.cto.mil/wp-content/uploads/2021/01/dod-additive-manufacturing-strategy.pdf>

- Accelerate the acceptability of AM parts by developing and implementing agile policies and procedures with Office of the Secretary of Defense (OSD) and the MILSVCs
- Improve collaboration on the exchange of product data between the MILSVCs, DLA, and industry
- Develop and implement training to prepare the workforce for digital manufacturing processes

The foundation of any effort across the DoD is sharing lessons learned and working in collaborative efforts across the DoD enterprise. The Joint AM Working Group (JAMWG) and Joint Defense Manufacturing Council (JDMC) are the two main forums that provide the biggest opportunity for cross-organizational collaboration.

4. Imperatives

The following enterprise imperatives are critically enabling considerations to execute Lines of Effort (LOE) activities and meet the requirements of DoDI 5000.93. These considerations are relevant to all stakeholders: OSD, MILSVCs, and DLA.

1. Enterprise Policies: Each component and agency must be aligned and synchronized with each other to effectively integrate AM across the DoD. Individual policies have limited effectiveness within an individual component.
2. Resources: Dedicated funding, assigned staff, and structured transition of enterprise strategies, such as change management, to execute each component's LOEs and integrate the efforts through OSD decision bodies and/or working groups.
3. Information Technology (IT) Support: IT committed and aligned, with respect to objectives and funding, both internally within their organization and across others to ensure enterprise interoperability.
4. Organic manufacturing: The MILSVCs have been developing design and manufacturing knowledge organically to standardize processes and reduce performance risk for AM. DoD legislative authorities have addressed limitations of current laws and the Federal Acquisition Regulations (FAR) to allow DLA to purchase directly from the MILSVCs organic industrial base. The MILSVCs and DLA would like to submit for consideration that OSD lead legal efforts to expand the use of organic capabilities.
5. Intellectual Property (IP) Policy Management: Ensure common understanding of IP policies to maximize contract arrangements and/or engineering latitude while respecting IP laws.

5. Governance

The DLA AMIP establishes the AM program under the direct authority of the DLA Logistics Operations Director (J3), who will appoint an AM enterprise lead. DLA will organize resources around the LOEs outlined in this plan to implement the actions. The LOE teams will report to the AM enterprise lead and DLA J3.

DLA will include inputs from the JDMC and JAMWG for strategic direction on AM efforts and elevate any concerns to gather consensus and agree on a common way forward. The LOEs in this

plan capture additional areas where oversight, strategic leadership, and potential new DoD policies may be required.

6. DLA Lines of Effort

The intent of the DLA Implementation Plan is to align DLA AM stakeholders' roles and responsibilities to achieve the directed tasks in DoDI 5000.93. Each of the LOEs in this plan reflect enabling activities within the DLA supply chains that are authorized by an internal suite of policies and processes. As OSD, DLA, and MILSVCs explore additional opportunities to expand use of AM, DLA Distribution and DLA Disposition Services may bring forth opportunities not currently defined in the DoDI.

LOE 1: DoD AM Data Framework (JAMMEX)

Develop a common DoD data framework (JAMMEX) to enable secure sharing across DoD.

The OSD Research and Engineering (R&E) Manufacturing Technology (ManTech) program developed an application to facilitate the sharing of AM data; intention of application for MILSVCs units to quickly view, download associated files, and print at the tactical point of need. JAMMEX allows for units with AM capability to leverage other AM printing successes throughout the DoD. This model exchange capability was also intended to share lessons learned throughout the technical and engineering communities. Once the application reached maturity, OSD transferred capability to DLA for management and sustainment.

JAMMEX does not replace standard engineering and systemic capabilities between MILSVCs and DLA. JAMMEX does not replace MILSVCs engineering data repositories where the authoritative data resides.

JAMMEX is a secure web-based system that accesses MILSVCs AM data and makes 3D AM models available without changing or altering the original data source. As part of DLA's integrator role in the DoD, JAMMEX is a Warfighter-centric service capability that enhances the use of AM for readiness at the unit level. In addition, DLA's management of JAMMEX supports OSD development initiatives such as JAMWG.

JAMMEX capabilities include:

- Download of 3D technical data for the successful printing of spare parts to fill supply gaps, such as anti-reflection devices, brackets, and drone parts
- Ease of use by providing a searchable electronic index of AM files
- Secured data usage with role-based access control
- Offline viewing, where users can download and retrieve models and associated data when working in an expeditionary environment where there is little or no connectivity

DLA increases stakeholder participation as demonstrated by partnering with National Institutes of Health (NIH), Food and Drug Administration (FDA), and Veteran's Affairs (VA) to include over thirty (30) AM 3D models that were brought into JAMMEX during 2020 for personal protective equipment in support of COVID-19. JAMMEX was able to quickly provide access of those validated parts to the DoD manufacturing base.

The system currently has hundreds of models and keeps growing. Some of these models support a few weapon systems. An interface was setup with Army's repository system. MILSVCs are committed to participating with JAMMEX, however, the level of participation is not consistent.

Roles and Responsibilities

- Application Manager: DLA J6 (Information Operations)
- JAMMEX Configuration Control Board (CCB): DLA J6 (Information Operations) Current Chair, DLA J3 (Logistics Operations), MILSVCs Representatives, and OSD in an advisory role

Assumptions and Governance

Outlook

DLA can either jointly develop interfaces with the MILSVCs or manually load models into JAMMEX and keep the same level of service. For JAMMEX to maximize access of AM models across the MILSVCs, DLA seeks OSD support/governance to ensure the MILSVCs provide available models. To clarify, the ability to manually upload models is only a temporary solution, as systemic interfaces will transition into a digital thread capability.

Funding Consideration

DLA has fully supported and funded the transition of JAMMEX from a Research and Development (R&D) platform to a fully operational capability for DoD. DLA submits for OSD and MILSVCs consideration that a joint funding arrangement be put in place for long lasting sustainment.

Strategic Direction

CCB provides a framework for operational input that expands the role of JAMMEX. However, there is no agreed upon strategic direction across the stakeholder community for the future of JAMMEX. DLA requires renewed OSD strategic direction and oversight to ensure their intent for JAMMEX benefits are maximized. We recommend the JDMC as a first option as a strategic leadership.

LOE 2: Data Management Modernization (DLA Product Data Modernization)

Establish supply-chain information technology architecture and supporting business systems.

DLA is undergoing several IT modification initiatives, one of those include a redesign of existing product data management capabilities. This initiative, known within DLA as the Technical Data Management Transformation (TDMT), will allow DLA to develop and establish enhanced capabilities within a digital thread environment. Other parallel DLA efforts (*e.g.* Federal Logistics Information System (FLIS) Modernization) and MILSVCs initiatives should strategically drive towards enterprise interoperability, so that authoritative product data can be more jointly and securely accessed and shared for more efficient and agile supply chain support.

Visionary concepts of a digital thread environment require a two-way flow of product data among requirement originators (MILSVCs), DLA, and suppliers. The expected outcome will be a modern, digital platform that transforms DLA's data management process from a transactional exchange of physical data records to management of digital data flows. The goal is to accelerate

the delivery of parts with the most accurate and complete data available without jeopardizing data integrity. This enhances not only standard supply chain operations, but also enables on-demand manufacturing, where the integrity of data exchange is critical.

Expected TDMT capabilities:

- Automates existing manual processes
- Expedites procurement decisions by leveraging both standard and digital product data formats
- Provides life-cycle visibility of product technical data and impacted materials
- Provides single point-of-entry for DLA-managed data and streamlines data flow for DLA operations
- Enhances fraud detection, user authentication, digital rights access, intellectual property, and cyber security measures

New technical data management capabilities will enhance not only the access and sharing of the product data but will enhance other technical processes between MILSVCs and DLA, such as engineering changes, testing, and product acceptance requirements.

Interoperability of modernized data systems between MILSVCs and DLA allows for development and use of new technologies, such as remote inspection and augmented reality, maximizing agility for AM solutions.

Roles and Responsibilities

- TDMT requirement generators: DLA J3 (Logistics Operations), DLA Major Subordinate Commands (MSCs)
- TDMT developer: DLA J6 (Information Operations)
- Stakeholders: MILSVCs and suppliers

Assumptions and Governance

Outlook

DLA is evaluating the TMDT timeline under multiple ongoing modernization initiatives. In the interim, we will explore ways to modify current IT capabilities to improve access to the authoritative product technical data. Our goal is to improve collaboration between DLA and MILSVCs to incorporate AM into the supply chain.

Strategic Direction

DLA TDMT and MILSVCs modernization efforts will align under the DoD's Digital Engineering Enterprise and Manufacturing Digital Enterprise initiatives.

LOE 3: Policies and Processes

To enable the integration of AM into the supply chain, DLA HQ and MSCs will develop policies and processes to supplement existing guidance on requirements generated by the DoDI. In addition, DLA works with MILSVCs in issuance of joint policy and regulation and establishment of joint Performance-Based Agreements (PBA) that ensure integration of efforts and synchronized Warfighter support.

DoDI activities not covered by current DoD guidance, joint regulations, or DLA policies are listed below. DLA recommends continued efforts with MILSVCs and OSD for the activities below where joint agreements are needed (deliverables, policies). In turn, DLA will also establish internal guidance because of those joint policies to ensure DLA meets its specific requirements from its operations in support of AM. DLA will issue appropriate policies, down to standard operating procedures, as the requirements mature. It should be noted that new IT capabilities yet to be determined will be required to automate some of these processes.

The following are the most notable areas that require issuance of new and/or modified policies.

- 1) Provisioning and Cataloging: Current Federal Cataloging Committee (FCC) interim policy allows for engineers to declare that an AM option meets the same form-fit-function as existing National Stock Numbers (NSNs) for traditional manufacturing. This allows a new AM item to be identified with a part number under the existing NSN catalogue record.
 - a. It is recommended that OSD R&E and Acquisition and Sustainment (A&S) facilitate further discussions between engineers, maintainers, and logisticians to address concerns regarding traceability of AM part numbers, as NSN common users may increase the probability of rejection as they would have expected the original subtractive NSN.
 - b. Final DoD permanent policy is yet to-be-determined. An option that needs to be explored is establishment of AM unique NSNs with interchangeability or substitutability (I&S) relationships to traditional NSNs. These additional considerations should be addressed to ensure proper item traceability in supply chain operations.
- 2) AM Collaboration Business Rules: DLA and the MILSVCs will establish agreements/business rules on the identification of DLA-managed items that may become AM candidates. Business rules, however, will need to go beyond the exchange of candidate lists to ensure understanding of who will design the AM alternative and who will become the supplier.
- 3) AM Candidates Risk Categorization for Common Items: DLA requires information on MILSVCs risk categorization for new AM items of supply that are used for multiple services and managed by DLA. DLA and MILSVCs Joint Additive Manufacturing Acceptability (JAMA) project has explored and defined an AM candidate risk categorization framework. This information must be added to the NSN materiel master record in Enterprise Business System (EBS). Currently there is no automated process, therefore any policy or guidance will focus initially on a manual approach, and ultimately, an automated process must be defined across OSD.
- 4) AM Data Sets for Common Items: MILSVCs and DLA must modify current MIL-STD-31000 and other related guidance to capture the agreed-upon data set formats for

common AM items. The input to these new policies will come from DLA, OSD, and MILSVCs JAMA project.

- 5) AM Testing and Qualification for Common Items: MILSVCs and DLA are working on identifying policies that outline testing and qualification processes for common-use AM items. MILSVCs and DLA will identify respective roles and authorities. Current mechanisms such as DoD standardization policies for Qualified Manufacturers Lists (QML) can be explored for qualification criteria. However, a considerable amount of work and decision-making is required for standardizing testing and qualification across the MILSVCs for common-use parts. Additional input to these new policies will come from DLA, OSD, non-government standards, and MILSVCs JAMA project.
- 6) AM Demand Information: MILSVCs, as required by the DoDI, need to systemically provide DLA AM demand information. This new activity will need to be outlined in appropriate agreements between MILSVCs and DLA (for example, enterprise PBAs). With this information, DLA will be able to adjust its demand information in its planning algorithm and contracting actions to ensure the Agency does not over-procure the original subtractive NSNs. While the DoDI specified a systemic exchange of information, the MILSVCs and DLA may need to develop this capability. In the interim, the focus can be on manually exchanging this information.
- 7) AM Part Sourcing Request: DLA contacts MILSVCs Engineering Support Activities (ESAs) per DoD policy whenever an engineering decision is required associated with an active DLA procurement. As part of DLA's effort to expand the use of AM through its acquisition strategies, DLA requires an accelerated response from the ESAs to AM parts-sourcing request. DLA recommends that for these requests, the MILSVCs apply the triage concept they currently use between their AM experts and program offices in determining AM acceptability. These new processes can be outlined in the current DLA and MILSVCs' ESA PBAs. This will avoid premature rejection of engineering requests submitted by DLA for an AM solution.

Roles and Responsibilities

- DoD Policy Makers: OSD R&E, Defense Standardization Program Office (DSPO), OSD A&S, MILSVCs, DLA
- DLA Policy Makers: J1 (Human Resources), J34 (Logistics Operations), J6 (Information Operations), J7 (Acquisition Management), DLA MSCs
- Stakeholders: Warfighters, Engineering, Maintenance, and Logistics Subject Matter Experts (SMEs), Industry Associations

Assumptions and Governance

Outlook

Current policy in support of the use of AM in the DoD are at various levels of development and maturity. A considerable number of policies will initially outline manual processes that will

allow for early assessment of their effectiveness and required systematic capabilities that will standardize and accelerate implementation.

Strategic Direction

There are other emerging technologies that can enhance the use of AM by accelerating some engineering processes. Within the context of long lead times for specific items, AM can offer shorter production lead times. However, current test and qualification/acceptance processes themselves take months. To take full advantage of the agility AM can provide, DLA recommends that OSD, DLA, and MILSVCs explore emerging technologies, such as remote inspection and augmented reality, to accelerate the testing and acceptance cycles. The outcome of these dedicated development efforts continues to feed into new policies and processes. With the support of R&D programs across the DoD, we can evaluate new technologies and reduce risk before incorporating them into operations.

LOE 4: Requirements

DLA performs mission and functions to support OSD, statutory, and MILSVCs requirements.

MILSVCs requirements are communicated to DLA at both strategic and tactical levels. Among the population of requirements that present readiness challenges are hard-to-procure items due to diminishing materials and manufacturer base.

In view of these supply chain challenges, AM capabilities are becoming viable options. DLA's role is to aggregate MILSVCs requirements and identify opportunities to apply the most efficient procurement strategies. DLA plans to focus on 1) working with the MILSVCs to identify opportunities for AM solutions (Class IX spares) and 2) consolidating DoD's requirements for AM raw materials, equipment, and ancillary scanning capabilities (Class IV/Construction and Equipment (C&E)).

1) Working with the MILSVCs to identify opportunities for AM solutions (Class IX spares)

Over the past 4-5 years, the AM technologies have continued to evolve toward maturation, mostly aided by the synergistic development of digital manufacturing. The MILSVCs, OSD, and DLA have participated in these developments through R&D efforts and joint OSD initiatives.

The MILSVCs have increased their knowledge of AM over the past few years and focused on developing organic and expeditionary capabilities for AM. At this time, with the issuance of DoDI 5000.93, we are at a juncture where DLA and the MILSVCs need to scale up AM capabilities by taking advantage of what industry collaborations may offer. However, unless MILSVCs provide DLA requisitions for AM alternatives and agree to procedural steps for mainstreaming AM into the supply chain, DLA is unable to support through the commercial sector. Organic manufacturing will continue to be viewed as the only solution. This perspective simply reinforces a vertical integration of AM within individual MILSVCs, while DLA facilitates the horizontal end-to-end DoD supply chain integration of AM.

The communication of requirements in the execution of the DoDI goes two ways:

- 1) DLA receives item requirements from the MILSVCs in the form of demand signals, technical data, and acquisition methods. MILSVCs submit requisitions systemically for DLA to meet their requirements through engagement of the commercial sector. Unless the MILSVCs provide DLA with the signed, approved processes, and/or approved vendors for AM options to DLA-managed parts, DLA cannot procure those AM products into the supply chain.
- 2) DLA is required by the DoDI to provide information on its ability to integrate AM into the supply chain (Class IX spares and Class IV AM feedstock and equipment), such as number of parts procured, sources used to meet the MILSVCs requirements, and conducting reviews with suppliers to monitor usage performance and effectiveness of supplying AM parts.

Because of this two-way communication, DLA's ability to report in accordance with DoDI is directly dependent on the MILSVCs and DLA's ability to jointly leverage commercial capabilities.

Roles and Responsibilities

- Requirements Generators: MILSVCs
- Requirements Processing: DLA EBS
- Metrics/Reporting: MSCs (whenever AM requirements start flowing to DLA)
- Performance Oversight: J3 (Logistics Operations), J6 (Information Operations), J7 (Acquisition Management)

Assumptions

Outlook

Integrating AM in the DoD supply chain depends on the effectiveness of the two-way requirements process.

Strategic Direction

For DLA to integrate AM into the supply chain, the MILSVCs must regularly provide DLA information on AM production and demand of DLA-managed items. This will allow DLA to adjust its supply planning factors and procurement strategies.

2) Consolidating DoD's requirements for AM raw materials, equipment, and ancillary scanning capabilities (Class IV/Construction & Equipment (C&E))

DLA Troop Support (TS) C&E supply chain is responsible for providing AM raw materials and AM equipment. To date, MILSVCs have been purchasing raw materials and equipment to satisfy their organic and expeditionary needs. This approach has worked to expand knowledge and awareness of AM and to train staff in these processes. DLA interprets the requirements in the DoDI as an opportunity to reach out to the MILSVCs to understand their current and future projection for the use of AM and aggregate those requirements for DoD. DLA can deliver end-to-end supply chain solutions to capture MILSVCs demands, apply procurement solutions,

including the safe handling and distribution of AM raw material, equipment, and ancillary equipment.

Roles and Responsibilities

- Requirement generators: MILSVCs
- Customer outreach: DLA J31 and DLA TS C&E Customer Operations
- Requirement consolidation and analysis: DLA TS C&E Planning

Assumptions and Governance

Outlook

Since the MILSVCs procure AM raw materials and equipment, DLA should receive those approved vendors, and/or specifications to initiate a marketplace analysis and establish a reliable vendor base (see LOE 5).

Strategic Direction

DLA will leverage its customer support and industry collaboration strategies to develop a comprehensive portfolio of AM materials and equipment for DoD.

LOE 5: Industry Collaboration

DLA integrates commercial AM solutions as part of the acquisition process in support of materiel readiness.

1) Working with the MILSVCs to identify opportunities for AM solutions (Class IX spares)

DLA will focus its support of DoDI 5000.93 objectives by engaging the commercial sector to scale up AM solutions for the MILSVCs. DLA can pursue effective procurement on a competitive basis when the Government owns data, or through arrangements with suppliers that allow the Government to use the data without infringing on IP.

DLA envisions the following business opportunities to satisfy AM requirements:

- Captains of Industry (COI)
 - Develop and implement new contractual/licensing agreements with Original Equipment Manufacturers (OEMs) to digitally transfer manufacturing data directly from the vendor to the point of need. This will allow printing with the permission from the OEMs.
- COI strategic contracts/other long-term contracts
 - DLA will leverage strategic relationships with OEM primes and partner with MILSVCs to include their AM capabilities as viable options for supply support.
- OEM engineering and manufacturing services
 - DLA has leveraged specific COI contracts by incorporating new service Contract Line-Item Numbers (CLINs) that allow companies to support MILSVCs AM

organic activities. This innovative use of DLA COI contracts has broadened MILSVCs capabilities by gaining AM knowledge from major industry players.

- Small Business Innovation Program (SBIP)
 - DLA SBIP partners with MILSVCs program offices that experience persistent readiness issues to identify and qualify small businesses with advanced manufacturing solutions for problem parts.
- Broad Agency Announcement strategies
 - DLA Acquisition and Technical organizations can consolidate potential backordered items that are feasible for AM and solicit industry-at-large for their proposed designs. Utilizing current policies, DLA technical representatives coordinate with MILSVCs ESAs to evaluate and determine acceptable solutions.

Roles and Responsibilities

- Acquisition Strategies: DLA J7 (Acquisition Management), DLA Aviation, DLA Land & Maritime (L&M)
- Stakeholders: DLA J3 (Logistics Operations), J6 (Information Operations), MSCs, Technical Community, Suppliers

Assumptions and Governance

Outlook

As AM capabilities mature, industry will have a growing role in sustainment. The nature of contracts will evolve to generate new compensation models for industry, but the digital deliverables must be enabled by a digital IT architecture.

Strategic Direction

DLA will continue to review partnership opportunities that it may establish through its long-term corporate contracts/COIs to bring commercial AM solutions forward for MILSVCs program offices' consideration.

These activities can have positive outcomes if MILSVCs and DLA are aligned to scale up AM commercially.

2) Consolidating DoD's requirements for AM raw materials, equipment, and ancillary scanning capabilities (Class IV/C&E)

Once DLA TS gains comprehensive understanding of customer requirements regarding use of AM feedstock, equipment, and list of vendors already in use, DLA TS can proceed with industry assessment for supportability. Dedicated staff will perform market research to obtain complete knowledge of commercial capabilities to support these commodities. The result will be a thorough understanding of both current and potential new vendors to gain efficiencies.

DLA TS has demonstrated economies of scale with tailored logistics support contracts in other classes of supply and will apply those, and other potential contracting strategies, and processes to support DoD requirements for AM.

Roles and Responsibilities

- Acquisition Strategies: DLA Troop Support C&E
- Stakeholders: DLA J3, DLA J7, MILSVCs, OSD R&E

Assumptions and Governance

Outlook

MILSVCs initial efforts have been focused on R&D, limited production at depot centers of excellence, and expeditionary activities. The DoDI provides DLA and the MILSVCs the opportunity to scale up capabilities that will result in a larger footprint for AM across all aspects of operations.

Strategic Direction

In anticipation of a higher volume of demand for AM material and equipment, DLA is best positioned to provide economies of scale across the DoD for these commodities, as we have seen in other classes of supply.

DLA submits for OSD R&E consideration, specific developmental efforts to explore and determine the potential benefits of connecting individual AM production capabilities into comprehensive networks, such as distributed manufacturing capabilities. These efforts should be inter-departmental to include DLA, introducing the agency's combined strength of strategic acquisitions and IT services portfolio.

LOE 6: Training and Education

Establish organization-specific research and education opportunities for AM

DLA is a supply support agency and plays a specific role on how AM is integrated in the supply chain. DLA is not authorized to have product design, control configuration management responsibilities, nor does DLA manufacture any items. DLA as such receives product or service requirements from MILSVCs that are outlined in contracts to obtain those goods and services from industry. Thus, the training DLA requires is different from the training and education implemented in the MILSVCs.

DLAs workforce development plan will consist of both general education and detailed training for the workforce. The general training will educate the DLA staff on AM as an alternate manufacturing process, and the state of AM technology in the marketplace. Detailed training will reflect new 3D AM product design, testing, and acceptance requirements as conveyed to us by the MILSVCs engineering organizations. Training in DLA will be provided across all processes in the supply chain to include planning, technical, procurement, distribution, and disposition specialists.

DLA AM training approach will consist of leveraging and utilizing:

- General education
- Detailed training
- Workforce Operational Assemblies
 - These assemblies inform employees on new mission, policy, or statutory requirements, and initial training on how to process AM procurements
- Current policy on how to process alternate items of supply
- Internal knowledge with engineering and technical experts on AM
- Defense Acquisition University (DAU) training
- Courses identified in the JAMWG Workforce Development Council
- Local college/university courses

Roles and Responsibilities

- Training Requirement generators: DLA J3 (Logistics Operations), DLA MSCs
- Training developer: DLA J1 (Human Resources/DLA Training Center (DTC))
- Student Body: All DLA staff that support acquisition functions

Assumptions and Governance

Outlook:

MILSVCs will share new AM requirements on DLA-managed items to include design, testing, and acceptance criteria so that DLA can continue to support procurement for these items. DLA detailed training can only take place once these requirements are received, allowing DLA staff to be trained on how to properly conduct acquisition and acceptance on AM parts.

In anticipation of detailed requirements, DLA J3 and DTC have collaborated and created introductory AM training. The course will be completed by end of 4Q FY22.

Strategic Direction

DLA will apply the approach outlined above and will continuously develop and provide detailed training on AM as policy matures between DLA and MILSVCs for integrating AM into the supply chain.

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8. Definitions

Additive Manufacturing (AM) A process of creating an object from 3D model data by joining materials layer by layer. Also known as 3D printing.

AM Data Technical data and other data necessary to design, produce, test, or procure AM items or parts which may include models, engineering design data, associated lists, specifications, standards, performance requirements, quality assurance provisions, software documentations, and packaging details.

Agencies Refers to agencies within the DoD.

Agile The ability to react quickly to changes in market, supply, and demand conditions.

Captains of Industry (COI) Holistic support contracts with built in performance metrics geared to improve readiness for targeted weapon systems at reduced cost to the government.

Class IV Class of supply for construction materials, including installed equipment and all fortification and barrier materials.

Class IX Class of supply for repair parts and components to include kits, assemblies, and subassemblies (repairable and non-repairable) required for maintenance support of all equipment.

Defense Acquisition University (DAU) A corporate university of the DoD offering training to military and Federal civilian staff and Federal contracts on topics such as acquisition, technology, and logistics.

Defense Standardization Program Office (DSPO) Office for Defense Standardization Program that is an integrated standardization program linking DoD acquisition, operational, sustainment, and related military and civil communities.

DLA Enterprise Business System (EBS) DLA's primary information technology solution designed to manage the system processes of Order Fulfillment, Planning, Technical and Quality Assurance, Acquisition and Financial. Identifies areas for key processes improvement, improves analysis, and offers greater agility in tracking operational and fiscal performance.

Engineering Support Activities (ESAs) The Military Service organization assigned responsibility and authority to perform and approve engineering and quality assurance actions necessary to evolve detail design disclosures for systems, subsystems, equipment, and components exhibiting attributes essential for products to meet specific military requirements. In the case of multiple users, there may be more than one ESA.

Industry Includes commercial partners, vendors, and competitors.

Intellectual Property (IP) An intangible property right that allows the owner (or their designee/licensee) to exclude others from making, copying, or using their protected ideas or concepts. The ideas or concepts can include inventions, creative works, identifying marks, and

other types of valuable, commercial information. IP is protected by common, state, or federal laws and may be registered with government authorities.

JAMMEX A secure web-based system that accesses MILSVCs AM data and makes 3D AM models available without changing or altering the original data source.

Joint Connotes activities, operations, organizations, etc., in which elements of two or more military departments participate.

Joint Additive Manufacturing Acceptability (JAMA) Collaborative effort to develop an expedited product acceptance framework to determine appropriate testing options for AM items.

Joint AM Working Group (JAMWG) Collaboration between MILSVCs and Defense Agencies in areas such as research, development, acquisition, production, and sustainment with the goal to realize efficient and effective application of AM across the DoD.

Joint Defense Manufacturing Council (JDMC) A forum for senior leaders across the DoD to collaborate to improve alignment of resources, facilitate information sharing, and shape the manufacturing capabilities of the defense industrial base.

ManTech Program Develop and deliver new capabilities through applied technologies and innovative solutions to enhance Warfighter sustainment.

MILSVCs Military Services (Army, Navy, Air Force, Marine Corps, etc.).

National Stock Number (NSN) The 13-digit number that identifies a stock item consisting of the 4-digit federal supply classification code plus the 9-digit national item identification number and arranged as follows: 9999-00-999-9999. Also called NSN.

Tailored Logistics Support Contracts A pricing contract that vendors offer to buyers on products that are frequently purchased.

Readiness The ability of military forces to fight and meet the demands of assigned missions.

Small Business Innovation Program (SBIP) Consists of the Small Business Innovation Research (SBIR), Small Business Technology Transfer (STTR), and Rapid Innovation Fund (RIF) programs. The objectives are to stimulate technological innovation and increase commercialization of R&D within the DLA managed supply chains improving service to the Warfighter.

Strategy A prudent idea or set of ideas for employing the instruments of national power in a synchronized and integrated fashion to achieve theater, national, and/or multinational objectives.

Subtractive Manufacturing A process involving cutting, hollowing, or taking parts out of a block of something.

Tactical Refers to user-level tasks.

Technical Data Management Transformation (TDMT) Initiative to use technology to provide an end-to-end capability to manage all types of technical data with the objective to provide the

most recent technical data in real time. The technology will ensure protection and security of the technical data at all stages of use, particularly during on-demand manufacturing where the integrity of data exchange is critical.

Warfighter Forward-deployed and training members of the United States Military; DLA's end user/ultimate customer.

9. Appendix: LOE DoDI References

DLA LOE	DoDI 5000.93 Reference
LOE 1: DoD AM Data Framework (JAMMEX)	DoDI paragraphs: 2.1.g, 2.4.c, 2.4.d, 2.5.f, 3.3.g.4, 3.5.a
LOE 2: Data Management Modernization (DLA Product Data Modernization)	DoDI paragraphs: 2.4.e, 2.4f, 2.5e, 2.5g, 3.3.g.1, 3.4.c, 3.4.d, 3.4.e
LOE 3: Policies and Processes	DoDI paragraphs: 2.4.a.1, 2.5.j, 2.5.k, 2.5.n, 2.5.o, 2.5.q, 3.2.a, 3.2.c, 3.2.d, 3.3.b, 3.3.c, 3.3.d, 3.4.a, 3.4.b, 3.5.b, 3.5.c, 3.5.d
LOE 4: Requirements	DoDI paragraphs: 2.4.a.2, 2.4.g, 2.4.h, 2.5.l, 2.5.p, 3.1.b.2, 3.2.b, 3.3.a, 3.3.e, 3.3.g.2, 3.3.g.5, 3.3.g.5, 3.3.g.6, 3.2.g.7, 3.3.h
LOE 5: Industry Collaboration	DoDI paragraphs: 2.5.a, 3.1.a, 3.1.b.1, 3.1.c, 3.1.d, 3.3.a
LOE 6: Training and Education	DoDI paragraphs: 2.5.h, 2.5.i, 3.7.a, 3.7.b, 3.7.c