

## **Department of the Air Force Digital Product Support Vision**

The Department of the Air Force (DAF) is committed to adopting digital tools and processes to accelerate development and delivery of new capabilities providing a more lethal, agile, and ready force. When discussing “digital” it is common to think Digital Engineering, however, Digital Engineering is too narrow a scope for the changes required for success. The DoD and DAF must strive for a *Digital Enterprise*, not simply digital engineering. The Digital Enterprise must cross all functional boundaries to succeed.

Secretary of the Air Force Frank Kendall issued the Department of the Air Force Operational Imperatives (OIs) identifying the critical operational capabilities and functions the Department of the Air Force must invest in to protect the United States’ ability to deter conflict and project power against pacing challenges. The concept behind the operational imperatives goes beyond thinking about Air Force and Space Force capabilities in terms of platforms (i.e., a type of aircraft or satellite). We must evolve our approach to focus on capabilities and integrated systems-of-systems. We also must invest in *how* we develop and deliver these capabilities, not just in the capabilities themselves. A digital DAF is foundational to delivering these OIs in a relevant timeline.

*“We fight as an integrated whole set of capabilities, not just as platforms. We need to connect our existing platforms, but we also need to move beyond them to a new generation of integrated capabilities.” – Secretary Kendall*

The focus of this document is to define Digital Product Support (DPS) and provide a vision of how it enables and supports the Digital Enterprise. This will require a change of how we define and think about our jobs. We must be willing to expand our scope and tear down functional stovepipes to develop enterprise solutions. We must question all our thoughts on product support and use new digital tools to not only reduce, but where possible, eliminate the logistics tail.

Mr. Andrew Hunter, Assistant Secretary of the Air Force for Acquisition, Technology, and Logistics (SAF/AQ) identified his key focus areas, to include accelerating digital transformation and affordable sustainment. DPS falls squarely into these areas and is critical to the future success of Air Force systems. A fully integrated, digital strategy will improve our ability to develop, deliver, and sustain advanced weapon systems as well as our legacy fleets. DPS will be a force multiplier enabling improved support.

*“Sustain Capabilities Affordably” – Andrew Hunter, SAF/AQ*

The focus on improved sustainment management, enabled by DPS, does not stop at the Air Force. The Deputy’s Management Action Group (DMAG), co-chaired by the Deputy Secretary of Defense and Vice Chairman of the Joint Chiefs of Staff (VCJCS), with Secretaries of the Military Departments, Chiefs of the Military Services, and DoD Principal Staff Assistants, has added a focus on Sustainment. They have established the Sustainment DMAG to look across all services seeking common themes and efforts that can be jointly addressed. Additionally, they are looking at investment opportunities to accelerate efforts.

The exciting news is the implementation of DPS is underway and experiencing early successes. The A-10 program maintains digital data of their aircraft structural health in their product lifecycle management tool. This enabled them to conduct finite element analysis of cracks on a

down-range aircraft, define the repair and maintain fleet availability. The A-10s use of digital tools has reduced their sustainment engineering response time by 60%.

The B-1 has leveraged work conducted by the National Institute for Aviation Research (NIAR) to develop manufacturing quality 3-D computer aided design models to enable increased sourcing for scarce parts. The Rapid Sustainment Office (RSO) work on additive manufacturing enabled the printing of parts in the depot to keep the depot lines flowing.

## **Digital Product Support Defined**

The concept of Digital Product Support is not new and is described in the DoD Product Support Manager's Guidebook<sup>1</sup>:

“Digital product support uses digital engineering methods and digital data and system models to implement the Product Support Strategy, enable data-driven decision-making, and deliver effective and efficient product support outcomes throughout the system lifecycle. This applies to both systems which are “born digital” (e.g., designed using modern digital engineering tools) and digitally engineered modifications to legacy systems. In execution of a digital product support approach, digital engineering and product support activities and teams are tightly integrated and mutually reinforcing in delivering affordable readiness to the warfighter. The twelve Integrated Product Support (IPS) Elements which comprise the Product Support Strategy, can each benefit, in many cases substantially, from utilization of system models, particularly 3-dimensional computer-aided design (3D CAD) models.”

DAU does not provide a standard definition for Digital Product Support, instead they state it is comprised of two key concepts with the following definitions:

1. Digital Engineering (and by extension, digital product support) is defined as “an integrated digital approach that uses authoritative sources of systems’ data and models as a continuum across disciplines to support lifecycle activities from concept through disposal.”
2. Additionally, product support is defined as “the package of support functions required to field and maintain the readiness and operational capability of covered systems, subsystems, and components, including all functions related to covered system readiness.”

Based on this, the recommended definition of Digital Product Support is:

***Digital product support is the systematic application of digital principles and tools, to include system modeling and simulation, to all Integrated Product Support Elements (IPSEs) throughout the lifecycle.***

Insights into how Digital Product Support impacts each of the IPS Elements can be found on the DAU website at below.

[Digital Product Support \(dau.edu\)](http://dau.edu)

## Digital Product Support through the System Lifecycle

Having defined DPS lets discuss what this means to the logistician throughout the system lifecycle.

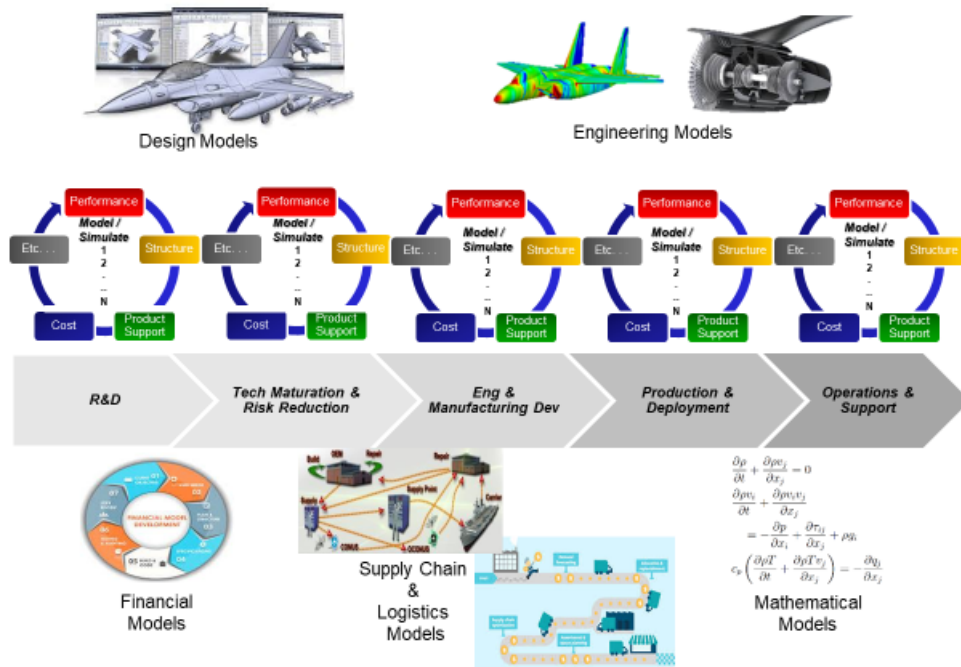


Fig 1: System Lifecycle

DPS begins in research and development. Design models, to include design for maintenance and supportability, and data are stored in a cloud environment for use throughout the lifecycle. These models mature throughout the acquisition process. This will provide increased understanding of the design and the ability to conduct modeling and simulation of countless system configurations maximizing the system capability and supportability. Modeling and simulation will continue throughout the system lifecycle to constantly improve and maximize capability and readiness.

Logisticians must begin influencing design in research and development. They must continually analyze all integrated product support elements to enable more agile, available, and lethal systems. The Air Force Research Laboratory (AFRL) is placing a new emphasis on planning for weapon system lifecycle support by integrating their data and modeling tools with the Air Force enterprise. This will provide a great new resource to understand the decision process in early technology development and enable reduced lifecycle costs with increased system availability.

As the program moves into technology maturation and risk reduction the logistician will be able to evaluate alternatives and conduct supportability analysis activities using modelling and simulation. Imagine running hundreds of simulations of equipment layouts to assess maintainability, evaluating the impact on supportability and readiness based on equipment reliability numbers or the impact to the supply chain based on alternate materials and parts. This

will all be possible effectively implementing DPS. There are tools available for use today to include the Logistics Composite Model Analysis Toolkit (LCOM ATK). LCOM ATK is a software simulation tool used to investigate reliability, availability, maintainability, and supportability (RAMS) capabilities and modernization issues of weapon systems. More on LCOM ATK can be found at: [Logistics Composite Model Analysis Toolkit \(LCOM ATK\) \(dau.edu\)](http://dau.edu).

The data and models developed early in the process will be invaluable once you reach engineering and manufacturing development. Consider the Human Engineering Design Approach for Maintainers and the Maintenance Task Analysis process. Using virtual prototypes early in the design phase will allow subject matter experts to “fly through” the design and provide comments and recommendations before manufacturing begins. Using these same models will allow programs to conduct a portion of the technical manual verification ahead of delivery of the first article. Verified, digital technical data will be in the hands of the maintainer sooner.

Digital models will allow improved training and increased training capability. Virtual systems can exist anywhere obviating the need for a physical representation to train on. As the system matures and changes the virtual model is updated and available to conduct training on the latest configuration.

During production we will now have a “digital twin” of every tail revolutionizing operation and support of our systems. The creation of digital twins will allow enterprise visibility into end item configuration and history. DPS will enable improved lifecycle support moving from managing by averages to managing by tail enabling tailored planning for field and depot maintenance, as well as improved supply planning accuracy. Each aircraft and item can be managed and tracked throughout its lifecycle with instant access to all modifications, part changes as well as operating environments. Data collected in operations will be fed back to the program office for evaluation of trends, root cause analysis, implementation of condition-based maintenance, and analysis of performance. Program office and maintenance personnel will have the ability to proactively plan for evolving problems and be better equipped to respond to urgent needs. All the efforts will be captured and stored to share across the enterprise. The DAF will be empowered to move from reactive to proactive maintenance.

The Digital Enterprise integrates all stakeholders into a seamless, cloud-based enterprise. Data collection begins in research and development and is built upon throughout the lifecycle. This Digital Enterprise approach also enables the use of common models, architectures, and supporting infrastructure and equipment which would tremendously reduce DAF O&S costs.

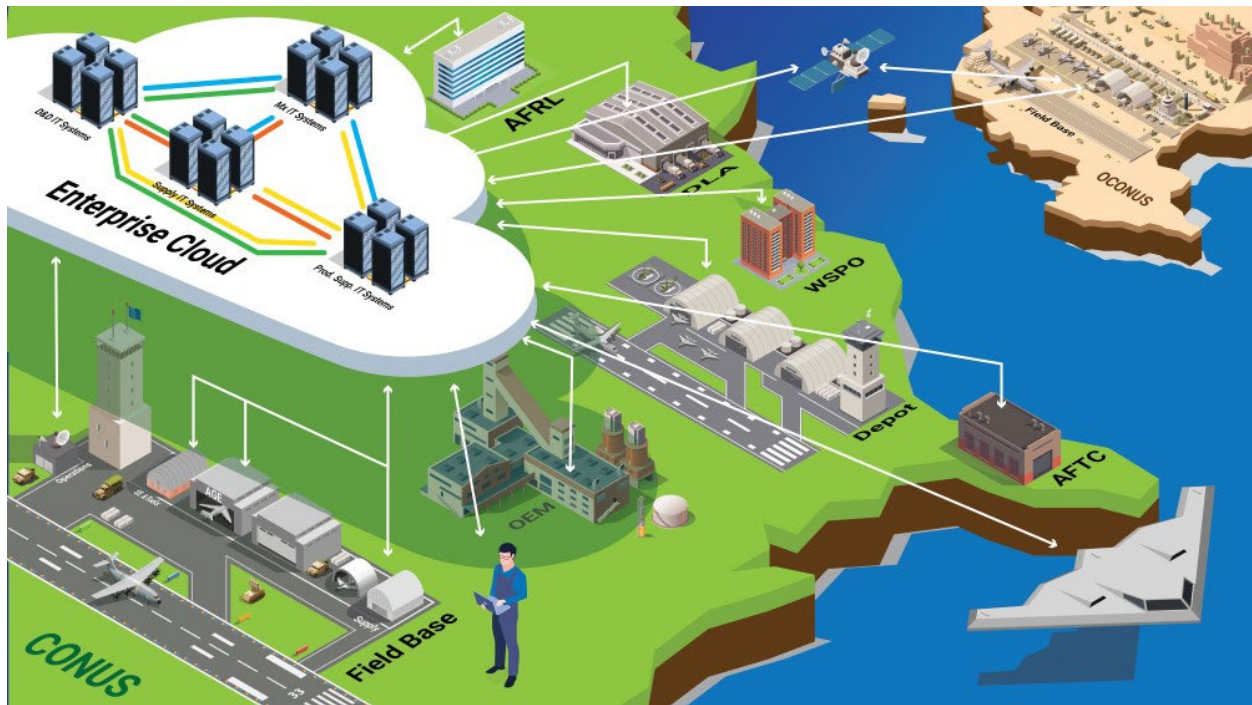


Fig 2 DAF DIGITAL ENTERPRISE OVERVIEW

Air Force Product Lifecycle Management (AF-PLM), the DAF strategic business initiative to standardize data and processes for management of product data across the AF is foundational in providing infrastructure and tools to support the logistician implementing DPS. AF-PLM has begun delivery of initial capabilities and is continuing to expand. AF-PLM is working closely with other Logistics Information Technology (LogIT) initiatives to define and build an integration strategy for standard data.

### What do we need to change in Acquisition?

It is critical that a plan is in place to acquire the needed contractor models and data to ensure product support through the lifecycle. OSD recognized this requirement and added Digital Product Support to the latest Life-Cycle Sustainment Plan Version 3.0 guidance 13 Oct 22<sup>2</sup>. The Air Force Digital Transformation Office (DTO), in partnership with Air Force Lifecycle Management Center, is developing the Acquisition and Sustainment Data Package (ASDP). This will provide the needed acquisition language and tools to define and acquire digital data required to enable the digital enterprise. ASDP updates are maintained on the Air Force Digital Guide at the following link:

<https://usaf.dps.mil/teams/afmcdce/SitePages/ASDP-Contracts-Guidance.aspx>.

The Air Force Lifecycle management Center Acquisition Center of Excellence (ACE) ([Acquisition Center of Excellence \(dps.mil\)](https://dps.mil)) is available to assist programs beginning their digital journey. The ACE Digital Enterprise Launch Team for Acquisition (DELTA) will guide programs in consideration of Digital Acquisition strategies, processes, and tools. Program teams can receive support to critically think through applicability and implementation of Air Force Digital Acquisition policies/guidance/best practices and the applicability to their acquisition programs. It

is critical that as contracts are developed, the data needed for modeling, simulation, and analysis is requested and delivered in digital formats enabling analysis by DAF experts. Since much of the data is used by multiple disciplines the functional teams must work together to request data once, place it under configuration control and make it accessible for use.

In addition, the Air Force must continue to more strongly invest in the deployment of modern digital software tools including Product Lifecycle Management, Computer Aided Design (CAD)/Finite Element Analysis (FEA) tools, and other DPS enabling tools.

### **DPS for Legacy Systems**

We must be judicious in how we apply digital principles to our programs. New starts should be born digital to enable all the benefits identified. However, legacy systems must assess the benefits of converting to a more digital posture. When conducting a modification program, the program should consider how best to implement digital tools, technologies, and processes. What is the expected lifecycle of the system? Are we looking at the pace of technology driving constant change and benefitting from a digital approach? What is the potential cost benefit? Will leveraging digital tools or technologies allow for increased capability that may warrant the investment? There can be benefit to digitizing subsystems that justify the investment. Do not be lulled into an all or nothing mentality.

Moreover, in many cases the application of existing digital tools provides return in terms of both a business case analysis and readiness improvement (e.g. geometric digital twin technologies for resolving DMSMS). Look to apply tools and digitize sustainment where it makes sense from a cost or mission perspective.

### **How do Logisticians need to Change?**

The *DoD Logistics Human Capital Strategy* published by the Office of the Secretary of Defense, Sustainment 21 Jun 2019<sup>3</sup> accurately captured what is needed of our logistics workforce and is extracted below as noted by italics.

*To be successful, logisticians must become increasingly adept at influencing system design and development for supportability by more closely integrating with, leveraging capabilities of, and understanding key aspects of system engineering. This will include:*

- *product support/supportability analysis;*
- *Reliability, Availability and Maintainability (RAM) analysis;*
- *configuration management;*
- *technical data management/logistics product data management;*
- *Product Lifecycle Management (PLM);*
- *Reliability Centered Maintenance (RCM);*
- *model-based engineering; and*
- *software sustainment.*

*Moreover, a more granular understanding of the following are needed to equip the logistics workforce to support missions*

- *supply chain management to include supply chain risk management (SCRM)*
- *sustaining engineering functions, including*
  - *continuous product and process improvement,*
  - *technology insertion,*
  - *open systems architectures,*

- *product deficiency resolution, and*
- *reliability growth and maintainability enhancements.*

*Logisticians have a key role in the DAF's Digital Enterprise. We must transform the community from a "spares, repairs, and warehousing" mentality to an agile, responsive, customer-focused, innovative, risk-taking, outcome-based, results-oriented culture that assesses, benchmarks, partners with, leverages capabilities of, and eventually strives to exceed best-in class private sector organizations within<sup>3</sup>*

- *Supply chain management (e.g., Amazon, FedEx)*
- *Logistics and product support data analytics*
- *Product life cycle management (e.g., CIMdata, Dassault Systems, PTM, SAS, Siemens, Oracle, and Integrated Support Systems)*
- *Supportability analysis (e.g., U.S. Army Materiel Command (AMC) Logistics Data Analysis Center (LDAC))*
- *Prognostics and health management*

## **Training for the Logistics Workforce**

Training of the workforce will be foundational to DPS. Efforts have begun on multiple fronts to include the Defense Acquisition University (DAU), Air Force Institute of Technology (AFIT), DTO, as well as OSD.

DAU offers multiple on-line training opportunities that provide foundational information as well as credentialing for all functional areas. DAU developed Digital Product Support Training Fundamentals Training (LOG 0590). Credentialing is available in Digital Engineering for DoD Consumers as well as Data Analytics for DoD Acquisitions Managers. All logisticians are highly encouraged to complete the Digital Engineering Credential (CENG 001 Digital Engineering for DoD Consumers Credential). This consists of two classes, CLE 084: Models, Simulations, and Digital Engineering as well as CENG 001: MBSE: Model-Based Systems Engineer. Additional courses that are highly encouraged to prepare logisticians for DPS are **CLCL 007** Product Support Analysis Credential and **CLCL 010** Technical Data Management Credential. Finally, be on lookout for additional courses currently in development to include LOG 0440 Supply Chain Resiliency Fundamentals Online Training Course; LOG 0590 Digital Product Support Fundamentals Online Training Course; LOG 0600 Product Support Data Analytics Fundamentals Online Training Course; CLCL 016 Digital Product Support Credential; and CLCL 017 Supply Chain Resiliency Credential.

AFIT provides training in competencies to improve digital literacy. Workshops and webinars complement formal education courses, addressing cutting-edge digital topics such as Model-Based Systems Engineering, Agile Software Development, Dev\*Ops, Cloud Services, and Data Analytics. AFIT's AVOLVE ([Avolve \(dso.mil\)](https://www.dso.mil/avolve)) provides easy to access to view videos on a wide range of digital topics.

The DTO Digital Guide provides a variety of training tools and links ([Air Force Digital Transformation - Home \(dps.mil\)](https://www.af.mil/digital-transformation-home)). This includes awareness training as well as access to other tools such as AFIT's AVOLVE and Digital University. It is great tool to gain a basic understanding of digital and stay abreast of the latest efforts in DAF Digital Transformation.

The Office of the Assistant Secretary of Defense for Sustainment (DASD (Product Support)) issued a September 21, 2022, memorandum entitled "Interim Update to Life Cycle Logistics

Competencies” that outlines both updated and new LCL competencies spanning multiple integrated product support (IPS) elements. These updates focus primarily on emerging focus areas including digital product support, data analytics, artificial intelligence, supply chain resiliency, and facilities & infrastructure.

<https://icatalog.dau.edu/onlinecatalog/Doc/CFcompetencys/LCLCompetencies.pdf>

## **Conclusion**

The evidence is clear that the world changed with the rise of China as a threat to our nation. We must change to face this threat. We must all embrace the new tools and capabilities to improve our systems, challenging old ways of doing business. We must question everything we do and seek new and innovative approaches. We must commit to learning and changing to strengthen our Air Force. We must embrace “born digital”, conduct analysis to determine where/when to implement on legacy programs, and ultimately, we must properly resource the models, people and data.

Digitizing Sustainment will provide the tools and insight needed to better understand our systems and proactively plan to address aging issues such as structural fatigue, DMSMS, and even analysis of workforce skills and location of sustainment needs to maximize availability. It will not be an easy journey and there will be mistakes, but it is a journey we have just begun and must continue in fervor together.

## References

1. PSM Guidebook - [Product-Support-Manager-\(PSM\)-Guidebook.pdf \(dau.edu\)](#)
2. Life-Cycle Sustainment Plan Version 3.0 - [LCSP Outline Version 3.0 13 October 2022 v1.pdf \(dau.edu\)](#)
3. *2019 DoD Logistics Human Capital Strategy*  
[https://www.acq.osd.mil/log/PS/training.html/DoD\\_Logistics\\_Human\\_Capital\\_Strategy.pdf](https://www.acq.osd.mil/log/PS/training.html/DoD_Logistics_Human_Capital_Strategy.pdf)