

# Applying DoW Digital Standards Strategy

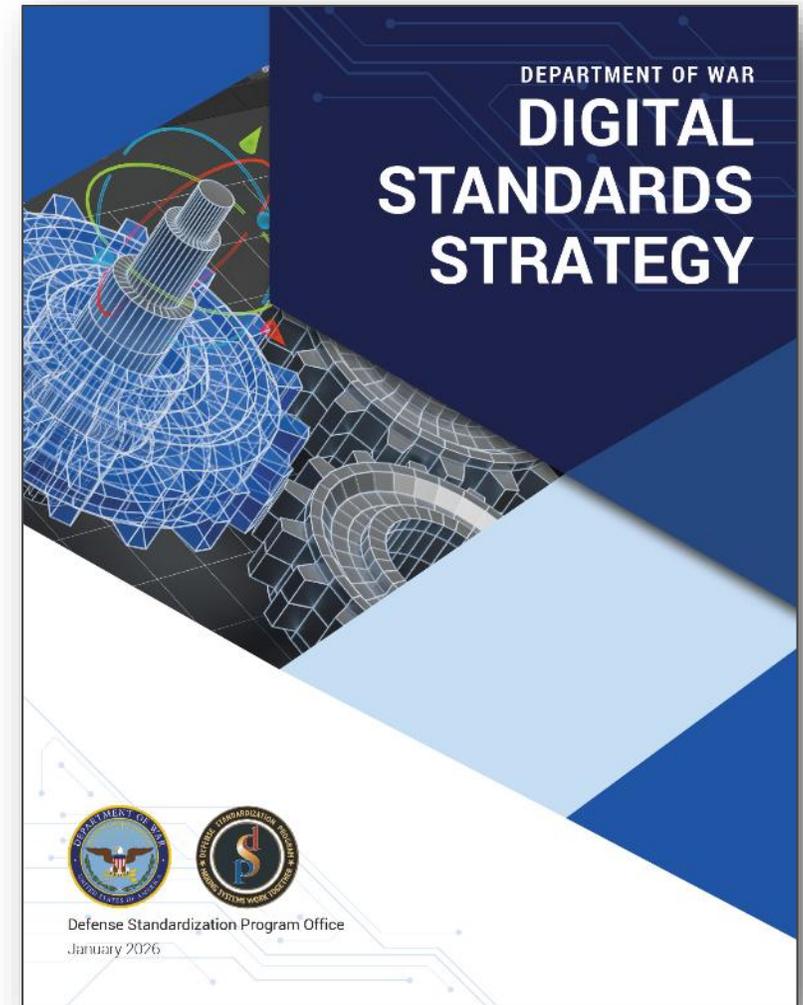
Machine-readable data is required | Human-consumable makes it actionable



# Today's Session Will Include

- ✓ Analysis and key takeaways
- ✓ Applying the strategy to industry
- ✓ Industry examples leading the way
- ✓ How to get started (including demo)

*Note: Q&A throughout. Use the Q&A panel (lower right) to ask your question*



# Analysis of the Strategy

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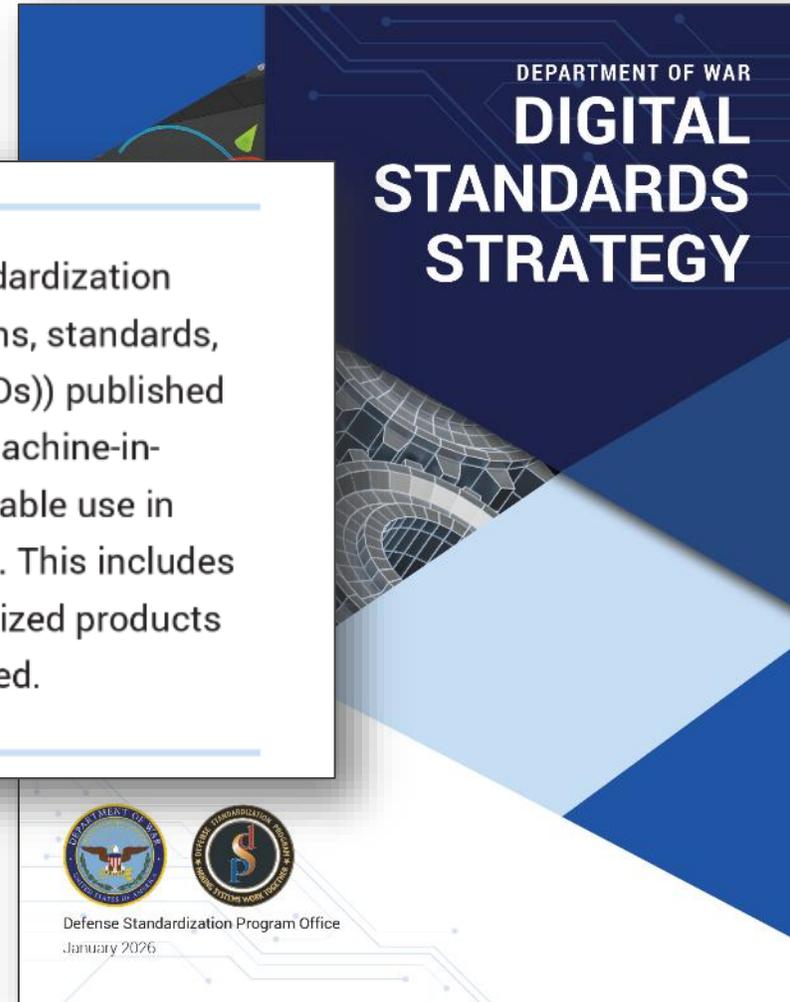
Machine-readable data enhances (human) performance



# Machine-readability is essential

- Eliminate formats that cannot be read or interpreted by machines
- In a 28-page document:
  - Total “machine” references = 45
  - “Machine-readable” = 28
  - “Machine-interpretable” = 14
- Guiding Principle II
  - 15 “machine” mentions in 1.5 pages

**Digital standards** are standardization products (e.g., specifications, standards, Data Item Descriptions (DIDs)) published in machine-readable and machine-interpretable formats that enable use in digital tools and processes. This includes models and other standardized products that are not document-based.



# A Continued Need for Human-Readable

Powered machine-readable artifacts

## CONTINUED NEED FOR HUMAN-READABLE STANDARDS

While this strategy focuses on the shift of defense standardization documents to machine-readable and machine-interpretable formats, these formats do not eliminate the need for human-readable documents. Human-readable documents often can be autogenerated from machine-readable and machine-interpretable formats, meaning that they provide the same exact representation as the digital formats. The following is a sampling of use cases for human-readable documents.

### Use Case #1: Lack of User Access

Some stakeholders may have limited or no access to digital tools; therefore, human-readable documents are the only option to provide access to standards. As the DOW adopts digital approaches to engineering, acquisition, and sustainment processes, ecosystem-wide access to digital tools will be essential.

### Use Case #2: Lack of User Experience

The DOW workforce currently lacks skill in standards development and model-based engineering as well as digital tools, which furthers the case for providing human-readable documents. To support DOW increasing proficiency with digital tools, the government, industry, and academia could emphasize training as part of a continuous learning culture and increase understanding of how and why processes are changing.

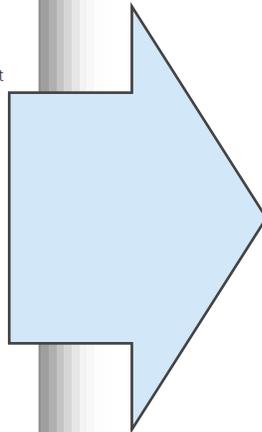
### Use Case #3: The Transition Period of DOW's Digital Transformation

The use of digital engineering, acquisition, and sustainment processes is under way in the DOW, and it is a major shift in perspective and workforce culture. While the use of digital processes and tools provides tremendous positive impact to the DOW in the long term, in the short term, the transition to digital processes can be slow moving and difficult, especially for current and legacy programs that are subject to funding and resource pitfalls. As not all DOW programs are fully "born digital," the need for a form of human-readable documentation will remain.

There is a steep learning curve to use digital tools and processes, which takes time to resolve. Initial development of standards in machine-readable and machine-interpretable formats can be met with iterative error fixes. Having human-readable documents on hand during these transitional periods can be beneficial.

### Use Case #4: Relevancy of Format

Feedback from the users of a standard is an essential decision aid in determining content and formatting requirements. Stakeholder needs must be evaluated and considered at the time of development or revision of a standard, whether developing a new or converting a pre-existing standard to a digital standard, and then implemented based on stakeholder needs and based on Figure 1, the DOW's Implementation of Digital Standards. Some process standards (e.g., best practice guides) are intended to be human-readable and may not be fit for digitalization and machine-readable formats.



- **Connected and portable:** From lack of user access to ecosystem-wide access to digital tools
- **Consumable:** From lack of digital-ready skills to digital proficiency
- **Connected and portable:** Digital transformation transition period
- **New connected product experiences:** Document-based standards need to evolve, and in some cases not carried forward.

# Guiding Principles: Key Takeaways

Digital standards require the same level of rigor that has been applied to MIL-STD, MIL-SPEC for decades

Machine-readable product data drives digital tools and processes. Human-readable product experiences are sourced from machine readable data.

Avoid vendor lock.  
Ensure access.  
Minimize training.  
Expert community-driven standards are key.

## Principle I:

Digital standards adhere to standards management processes.

## Principle II:

Publish digital standards in relevant (i.e., usable) formats.

## Principle III:

Utilize a tool-agnostic approach to digital standards development and use.

*Source: Figure 4 on Page 12 of DoW Digital Standards Strategy*

# Five Lines of Effort to Run This Program

1. Collaboration and coordination is essential for organizational change management
2. “Human-readable to machine-readable” = digitalization that accelerates innovation
3. Machine-interpretable enables model and data portability
4. Establish ecosystem to digitally manage standards
5. Workforce development is central to the digital transition



# Applying the Strategy to Industry

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How to turn the strategy into a competitive advantage



# Market forces have compressed timelines for manufacturers

Innovation speed is now the competitive advantage

**Competition** forces faster cycle times without sacrificing quality to win time-to-market battles

**Demand** from customers forces early customer visibility to speed delivery while avoiding late-stage changes

**Supply chain** dynamics forces efficiency and responsiveness with closed-loop feedback to maintain speed



F-35 Lightning II Jet: Mach 1.6, 1218 mph

# Innovation starts with engineering

But it doesn't end there

**Harness** the full power of product engineering (data and people)

**Empower** everyone with high quality product data

**Accelerate** innovation by connecting people to the digital thread

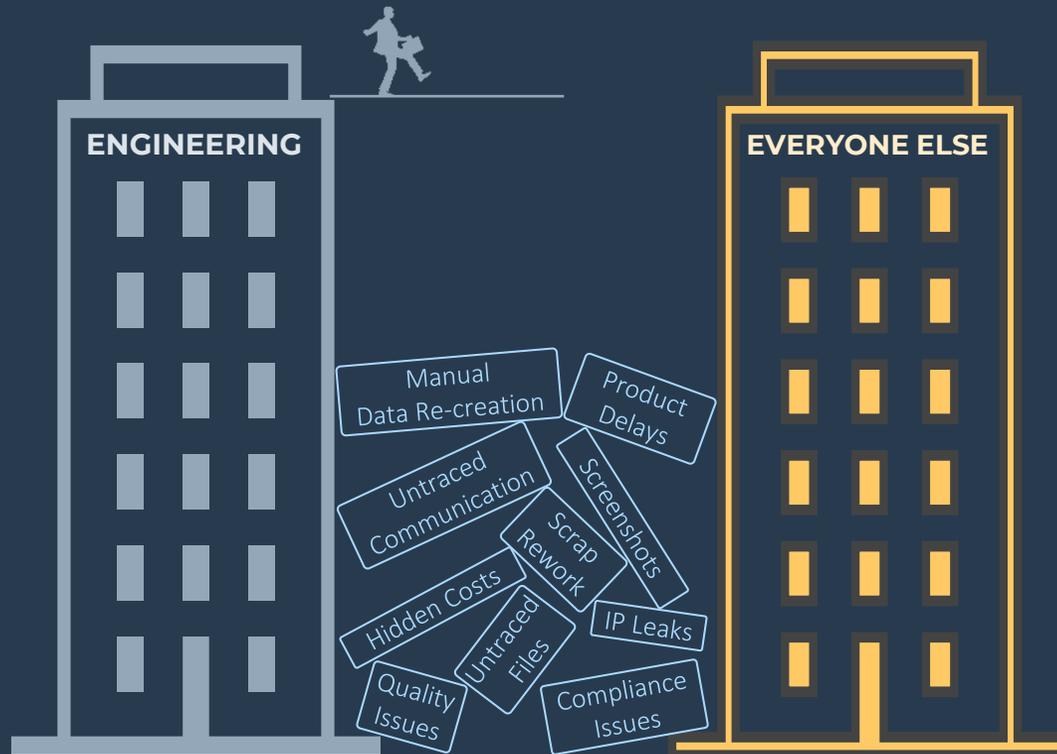


Go faster



# The Model-based Collaboration Gap

Where the digital thread breaks



Digital engineering strategies focus on authoritative models and interoperability but often assume collaboration will take care of itself.

When data isn't actionable, people make it actionable themselves. Without a strong collaboration layer, teams recreate data outside the digital thread.

**The result is inevitable: delays, rework, and risk.**

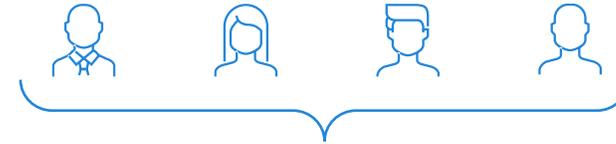
# The Missing Layer in Digital Engineering

Close the gap by making machine readable product data consumable across the enterprise

**Authoritative:** Define and manage data



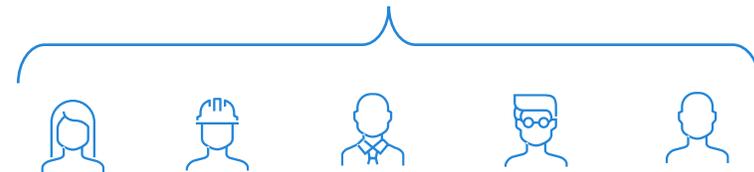
Engineering, Manufacturing, Quality, Procurement, Sustainment



**Consumable:** Access and understand data



**Derivative:** Exchange and visualize data

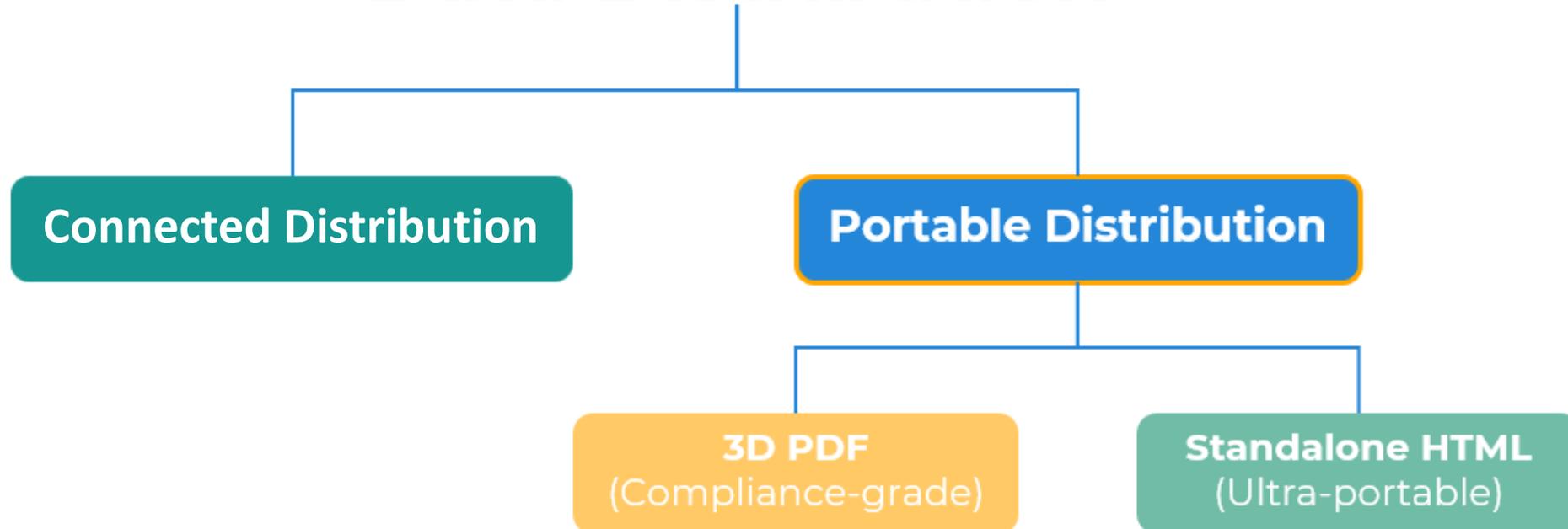


Suppliers, Partners, Customer Stakeholders

Closed-loop feedback, decisions and lifecycle traceability

# Democratize Access to Digital Engineering

## Digital Engineering Data Distribution



# Industry Examples Leading the Way

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Connected Distribution



# DoD 5000.97 Digital Engineering will transform product manufacturing

## Immediate impact (December 2023)

Digital engineering must be addressed in the acquisition strategy... after the date of this issuance.



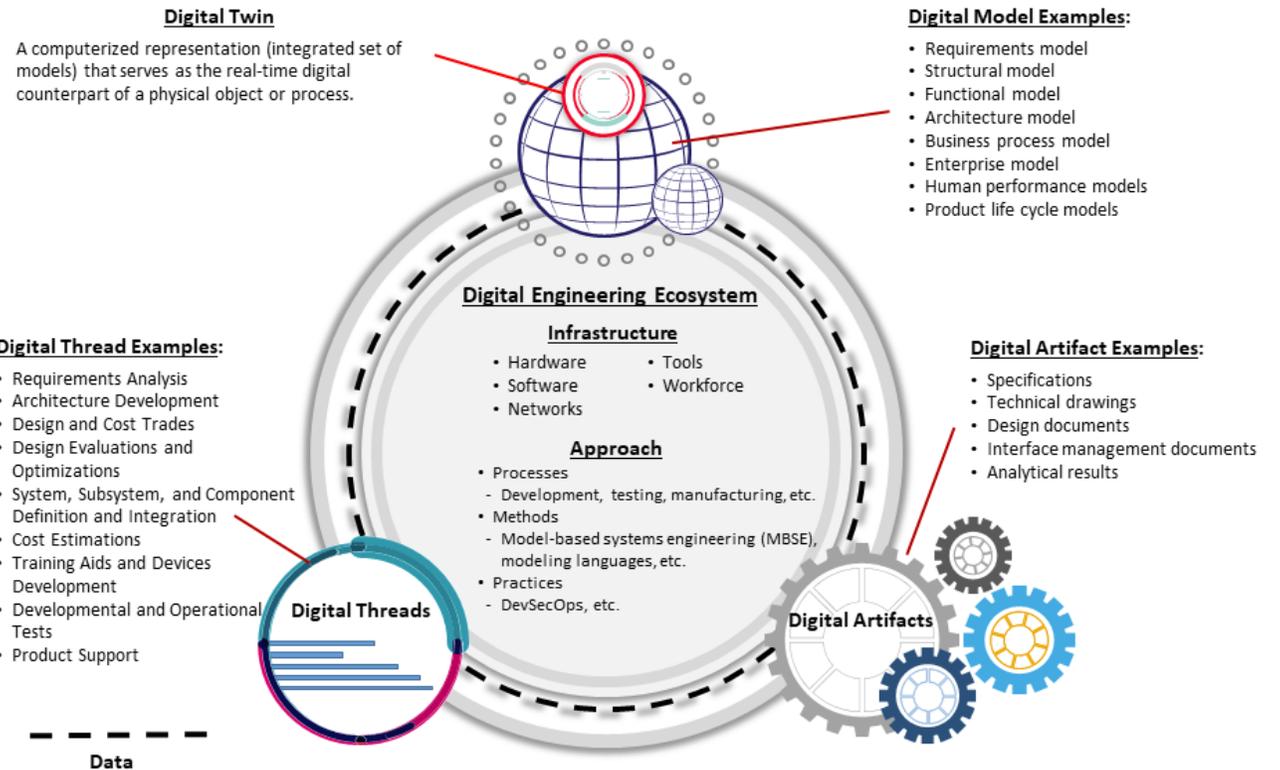
### DoD INSTRUCTION 5000.97 DIGITAL ENGINEERING

**Originating Component:** Office of the Under Secretary of Defense for Research and Engineering  
**Effective:** December 21, 2023  
**Releasability:** Cleared for public release. Available on the Directives Division Website at <https://www.esd.whs.mil/DD/>.  
**Incorporates and Cancels:** Department of Defense Directive 5000.59, "DoD Modeling and Simulation (M&S) Management," August 8, 2007, as amended  
**Approved by:** Heidi Shyu, Under Secretary of Defense for Research and Engineering

**Purpose:** In accordance with the authority in DoD Directive 5137.02, this issuance establishes policy, assigns responsibilities, and provides procedures for implementing and using digital engineering in the development and sustainment of defense systems.

## Broader impact

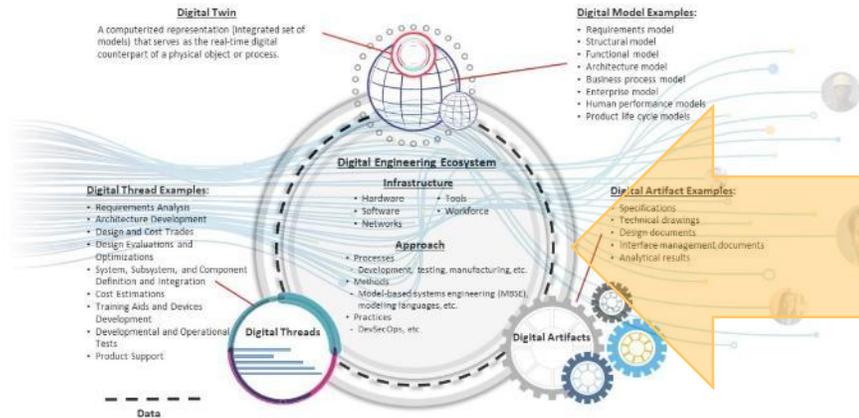
Digital engineering will transform product manufacturing  
DoD 5000.97 Digital Engineering is the blueprint



# Manufacturers need the blueprint AND the manual

## The Manual

*A Guide for Digital Engineering and DoD Instruction 5000.97*



## Broader impact

*Digital engineering will transform product manufacturing  
DoD 5000.97 Digital Engineering is the blueprint*

### Digital Twin

A computerized representation (integrated set of models) that serves as the real-time digital counterpart of a physical object or process.

### Digital Model Examples:

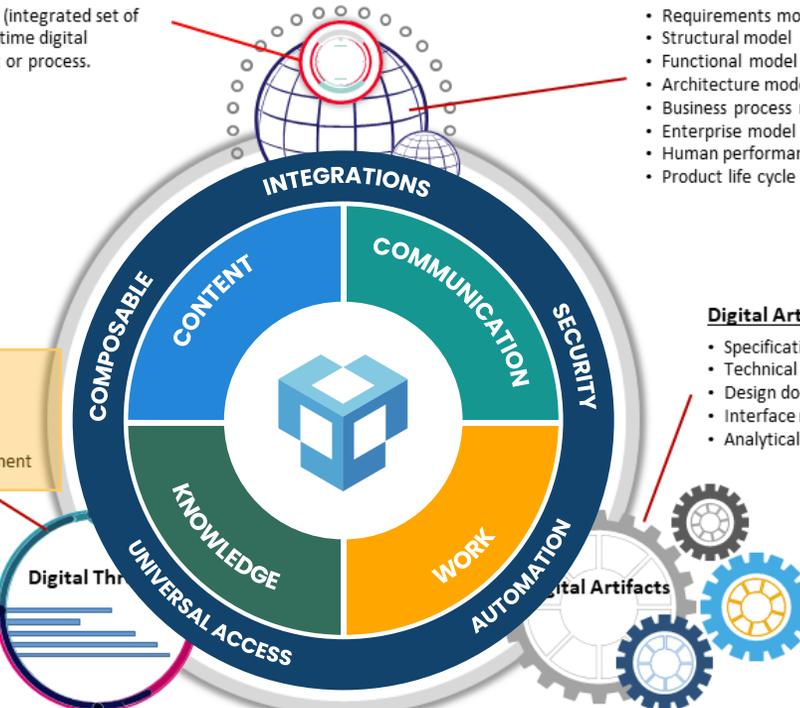
- Requirements model
- Structural model
- Functional model
- Architecture model
- Business process model
- Enterprise model
- Human performance models
- Product life cycle models

### Digital Thread Examples:

- Requirements Analysis
- Architecture Development
- Design and Cost Trades
- Design Evaluations and Optimizations
- System, Subsystem, and Component Definition and Integration
- Cost Estimations
- Training Aids and Devices Development
- Developmental and Operational Tests
- Product Support

### Digital Artifact Examples:

- Specifications
- Technical drawings
- Design documents
- Interface management documents
- Analytical results



# The collaborative digital engineering environment

**Collaborative digital environments** are key to involving all stakeholders.

Contractor-to-government, contractor-to-supplier digital **collaboration** and more.

Customers, regulators, suppliers, and more are **integrated to complete the digital thread**.

A **feedback mechanism** for stakeholders and contributors to the authoritative source of truth.

## Broader impact

*Digital engineering will transform product manufacturing  
DoD 5000.97 is the blueprint*

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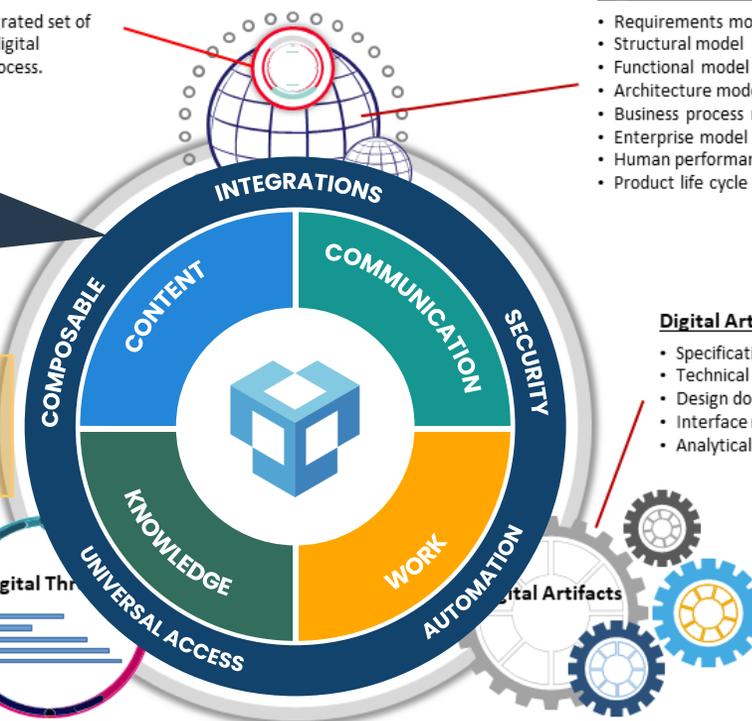
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# Digital Engineering at Lockheed Martin

“Lockheed Martin’s adoption of the Model-Based Enterprise (MBE) represents an organizational approach that **seamlessly connects and consumes product data while eliminating functional and systems silos**. By leveraging data-rich models, MBE realizes an end-to-end digital vision throughout the Design, Buy, Build, and Sustain value chains.”

– Dan Heller, VP of Corporate Engineering

“Our transition to a Model-Based Enterprise **enables real-time data sharing amongst Lockheed Martin and our Supply Chain, enabling us to accelerate design, reduce total cycle time, and improve quality**. A Model-Based Enterprise will accelerate our transformation capabilities, driving our industry competitiveness and improving Supplier collaboration.”

– David Tatro, VP of Operations Transformation

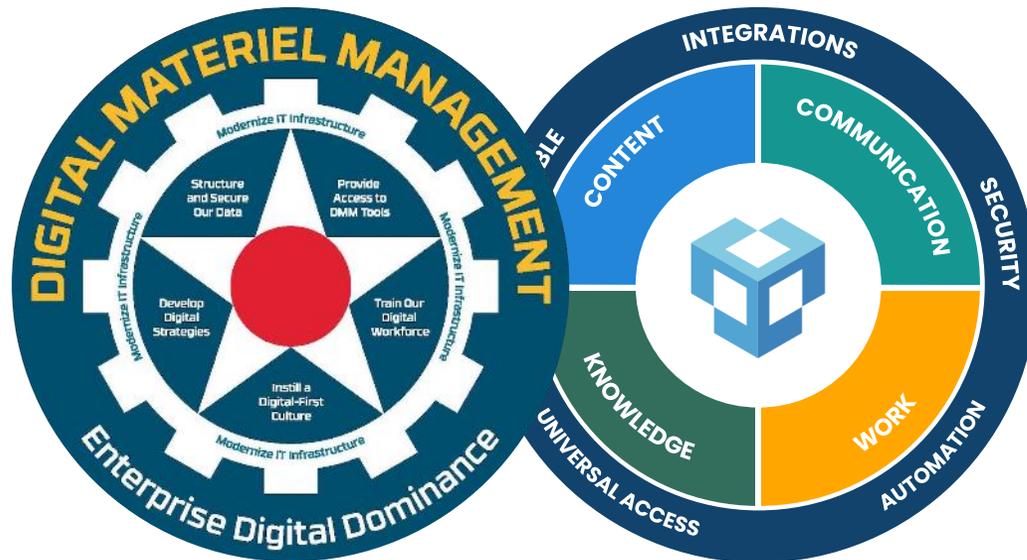


“[Traditional] File transfer tools may not be collaborative enough. Suppliers may need to collaborate directly within PLM systems. **These collaborations can be facilitated** through tools like the External Integration Hub (EIH) or BA/Program specific Integrated Design Environments (IDE) **using tools like Anark.**”

# USAF Driving and Product Innovation Platforms

“Deliver integrated, innovative, and trusted capability throughout the [product] acquisition lifecycle with unprecedented industry and government collaboration.”

*-Air Force Materiel Command, 2023*



- Highlights from the DMM strategy
  - ✓ Models and data are easily and securely shareable across the lifecycle
  - ✓ Providing access to the right digital tools when they need them
  - ✓ Digital first culture and strategies

Bridging the gap: Delivering human-consumable data at scale

# Converging on a Standards-Driven Digital Thread

Persistent IDs (PIDs) are the Rosetta Stone for machine-readable data

- Digital thread requires data exchange and continuity
- Persistent IDs link product definition to manufacturing and quality data
- Standards enable machine-readable interoperability
- Foundation for advanced analytics and AI-driven workflows



10 Year Anniversary  
**3DCIC**  
COLLABORATION & INTEROPERABILITY CONGRESS

8:45 AM  
**Enabling Digital Manufacturing with Persistent IDs: A Standards-Driven Approach**

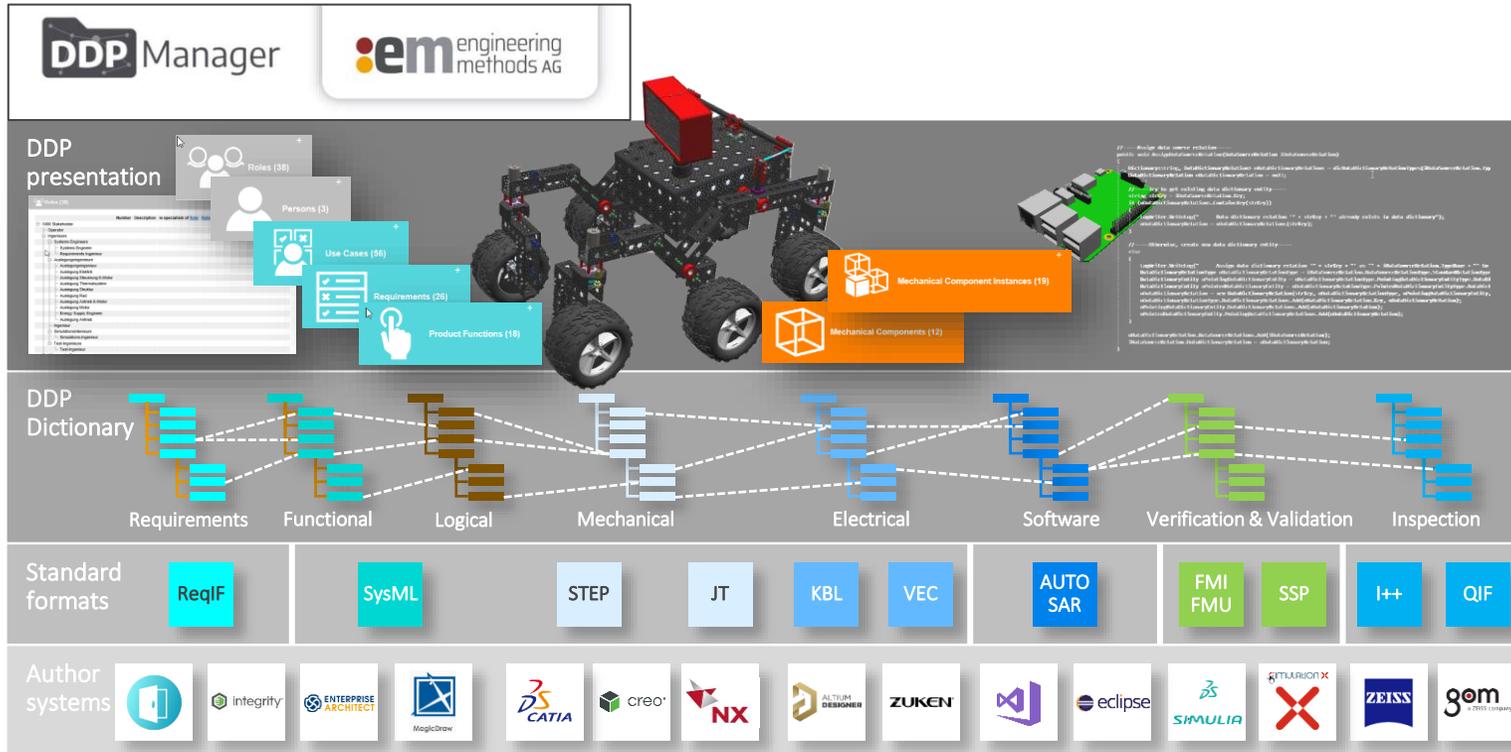
**Stephanie Locks-Hartle**  
Lockheed Martin Corporation

The integration of data across the design-to-sustainment lifecycle remains a significant hurdle in the manufacturing industry. To overcome this challenge, a collaborative effort between Lockheed Martin and Northrop Grumman, and Georgia Tech and Purdue has yielded a standards-based framework that facilitates seamless data exchange. At the core of this framework is the utilization of Persistent IDs (PIDs), which serve as unique digital identifiers for part geometry and product manufacturing information (PMI). By leveraging open standards such as STEP AP242, MTConnect, and QIF, PIDs can establish a digital thread that bridges the gaps between design, manufacturing, inspection, and sustainment ecosystems.

*Bridging the gap: Delivering human-consumable data at scale*

# Digital Data Packages and CASCaRA

Connecting product data across the lifecycle using open standards



## CASCaRA

Facilitate collaboration in the product lifecycle from conception to retirement

Standardized collaboration data model and ontology.

Multi-source product data combined into a common knowledge graph

Enables human-consumable and machine-readable exchange across lifecycle systems

Foundation for advanced analytics and AI-driven workflows

Learn more about [MBSE and Digital Data Packages](#)

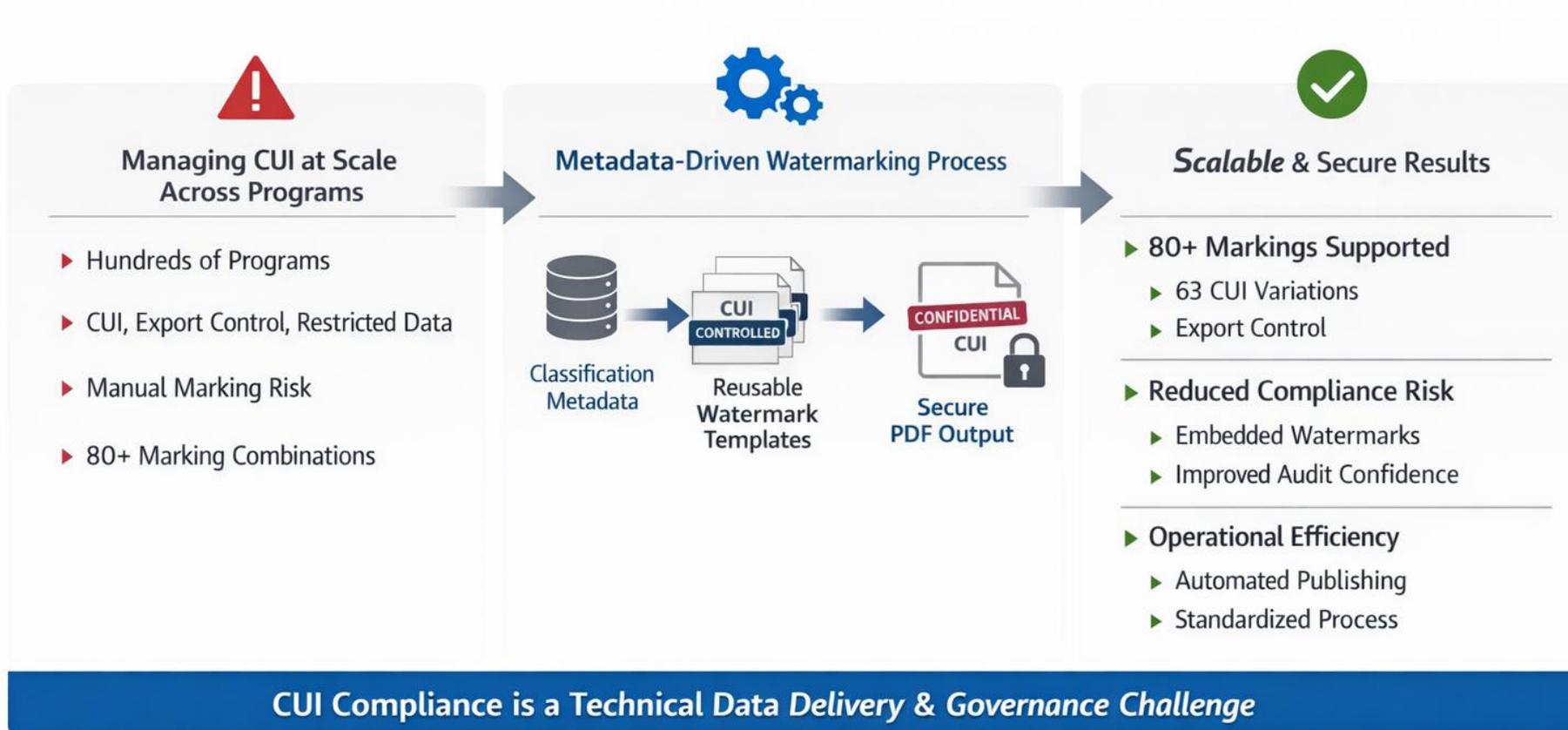
Learn more about [CASCaRA](#)

*Anark's Role: Delivering human-consumable product data experiences*

# CUI Case Study

Security is essential for data distribution

*From Manual Marking Risk to Automated, Metadata-Driven CUI Compliance*



Learn more about [digital engineering data governance & compliance](#)

# How To Get Started

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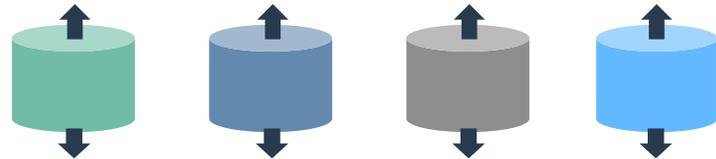
Model-based Collaboration Across the Digital Thread



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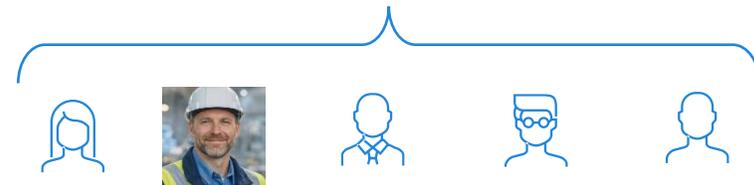
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Engineering, Manufacturing, Quality, Procurement, Sustainment



**Consumable:** Access and understand data



Suppliers, Partners, Customer Stakeholders

Closed-loop feedback, decisions and lifecycle traceability

# Live Demo

The screenshot displays a CAD software interface with a 3D model of a mechanical part. The model is primarily green and cyan, with various features and dimensions. A comment thread is visible on the right side of the interface, discussing a positional tolerance on a bore.

**Model Details:**

- Name: Ion Drive
- Description: NX - MBD Assembly - With Section Views
- Section Views: CONFIGURABLE CUI MARKINGS
- Dimensions: (15.982), 3, 14.173, 90°, 92°
- Feature:  $\varnothing 2.047$  with a positional tolerance of  $\varnothing 0.02$  (M) B | A

**Comment Thread:**

- maria** (1/16/2026, 8:41:45 AM) **High**: The positional tolerance on this bore may be difficult to hold after anodize. Can we confirm if the tolerance is functional or legacy?  
Manufacturability GD&T Strategy
- diana** (1/16/2026, 8:59:21 AM): Confirmed, tolerance is functional due to bearing alignment. However, we can relax MMC by 0.05 without impact. Design is updating PMI.
- maria** (1/16/2026, 9:01:50 AM): Thanks Diana, we'll start the process planning, expecting this tolerance to be updated as you mentioned.
- carl** (1/16/2026, 8:52:30 AM) **Medium**: Datum target is referenced, but I don't see a clear inspection setup defined for this cylindrical tolerance zone. If this needs an inspection plan, we need a better view for the referenced feature. If I turn this around to get a better view of the features, the GD&T is backwards.  
Quality Inspection

**Interface Elements:**

- Top: Ion Drive, Feedback button
- Left: Table of Contents, CAD Tools, Captures, Model V..., Occure, Print, Split Panel, Bill of M., Popup, Info
- Bottom: Section, Measure, Select, Modify, Render, Orientation, SECURE CONNECTED COLLABORATION

# Thank You!

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Anark wants your input and feedback

Connect with us to learn more!

[www.tinyurl.com/MeetAnarkJimMartin](http://www.tinyurl.com/MeetAnarkJimMartin)

