The USAF AFMC shift to Digital Materiel Management

WRT-1086, WRT-1089, WRT-1097.9, WRT-2405
Department of the Air Force

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SYSTEMS
ENGINEERING
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Digital Materiel Management:
Ensure critical processes employ digital methods across the entire lifecycle – from invention to retirement – for both warfighting capabilities as well as installation and mission support capabilities

DIGITAL MATERIEL MANAGEMENT

Enterprise Digital Dominance

Modernize IT Infrastructure

Structure and Secure Our Data

Provide Access to DMM Tools

Develop Digital Strategies

Train Our Digital Workforce

Instill a Digital-First Culture
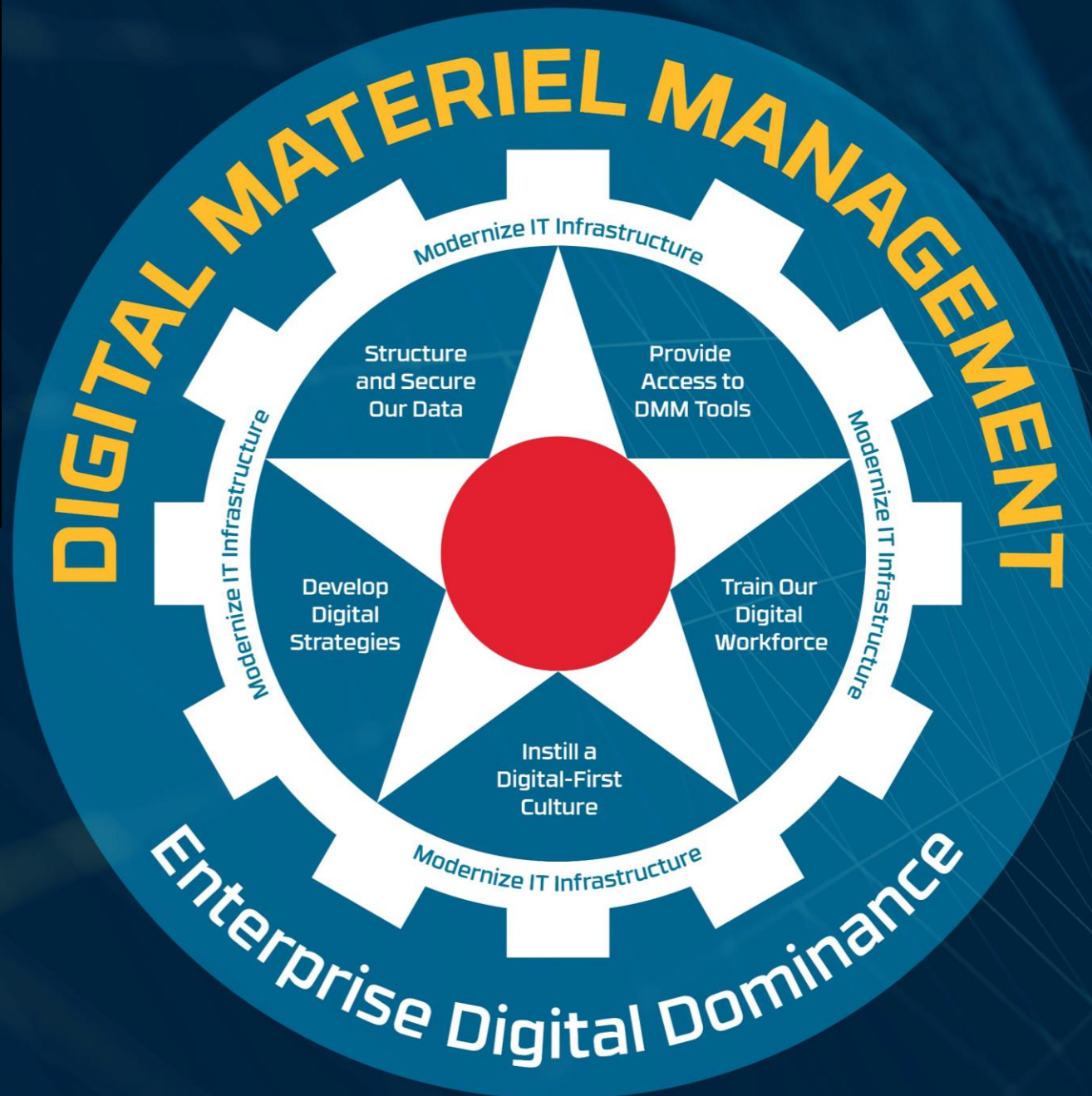
SERC/AIRC DMM Efforts to date

All efforts relate to the Air Force Materiel Command (AFMC) Digital Materiel Management (DMM) Whitepaper – An Accelerated Future State. It is the only codified element of Digital Materiel Management available to date. USAF is evolving to systems thinking-based approaches to enable this AFMC transition

WRT-1086 – completed Sept 2024
- Executive forum for Collaboration – industry and the United States Air Force (USAF) Acquisition Enterprise – on Digital Materiel Management (AFMC Digital Transformation Office / Digital Acceleration Task Force (DTO/DATF)

WRT-2405 – through Sept 2025
- Executive Forum for Collaboration - Industry and the United States Air Force Acquisition Enterprise – on Digital Material Management at Scale (DTO/DATF)

WRT-1089 – through Apr 2025
- Executive Forum for Collaboration – Industry and the United States Air Force (USAF) Acquisition Enterprise – Standards to Structure and Secure Data (DTO/DATF)

WRT-1097.9 – through Feb 2025
- Transformations of Acquisition and Sustainment Disciplines to Enable Digital Acquisition *(WRT-1097.09) (OSD A&S)*

SERC/AIRC DMM Efforts to date

WRT-1086 – Industry Association Consortium (IAC): https://guide.dafdto.com/

- IAC is one consortium in the AFMC Mission Tasking Order (MTO) on Consortia. (Merriam Webster: an agreement, combination, or group (as of companies) formed to undertake an enterprise beyond the resources of any one member) The second consortium, the Digital Acceleration Consortium (DAC) just let 4 contracts to identify Data Item Descriptions (DIDs) for digitalization (generally). Refer to SOSSEC for more information. https://sossecinc.com/sossec-consortium/
  - IAC is most noted for the user stories (publicly available) developed during 3 IAC events and used in 1089, 2405, and 1097. https://guide.dafdto.com/industry-association-consortium-sharing-site/

- During development of the IAC concept, an emphasis of AFMC Center guidance to transition to DMM was added; and is the focus of 2405.
  - Additional elements in DMM evolution (not part of the 1086-2405 transition): DMM IT Integration Model (DIIM); Integrated Digital Environment;
  - AFMC Actualization Strategy, DAF Digital Acquisition Framework; Launchpad; Digital Innovation and Integration COE (DIICE); Digital Building Code; et al

Dept of Air Force

DAF

DIF
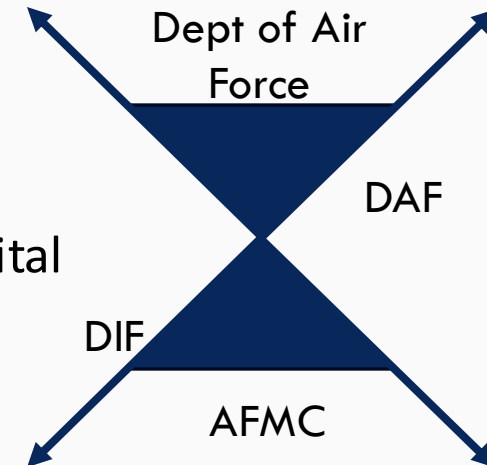
AFMC

SERC/AIRC DMM Efforts to date

WRT-2405 – IAC and DIF:

- DIF Outline, delivered at the end of 1086, will be used as starting point for activities with AFMC Centers.
  - Guide (agile approach) for AFMC centers on WHAT needs to be done; template for center development of HOW
  - Challenge: AFMC centers reorganizing/rescoping/refocusing
  - Basing concept for development in systems theory and implementation science; organizational behavior and culture design, and taxonomy
    - Help answer the questions: What is next? How to determine if an effort is part of DMM? Are we focusing in the right area? Is this the best way to spend resources? Etc.
    - Evolve the centers to independent operation, while considering impacts to other centers.
    - Support to Actualization Strategy and Acquisition Framework development
- Provide general research areas and advise DTO/DATF on future DMM-emphasis areas.
- IAC may transition to government-led function. Latest workshop: Systems Engineering Technical Review (SETR); NDIA SE/ME Conference, Norfolk.
  - Two parts – one on digitalization of current practice; second on evolutionary/revolutionary USAF Acquisition practice.
  - Workshop at AIAA SciTech being planned.

SERC/AIRC DMM Efforts to date

WRT-1097.9 – Acquisition Taxonomy/Ontology:

❖ Develop a common set of terms (taxonomy) between acquisition functional communities.

— Intersection points derived from the DMM Whitepaper

— SySML-ize the AVDM: "Never miss an opportunity to teach"

▪ Review elements in Acquisition Visibility Data Model, and existing efforts for DID development

— Risk is in the basis as the current acquisition process

▪ Will use User story template from IAC, emphasizing the Understandability aspect (from VAULTIS)

▪ Workshop based. DoD Champion – SAF/AQ; First workshop expected Dec 2024

▪ Taxonomy/Ontology development utilizing research in (Blackburn, Hagedorn):

— ART-022: Transforming Systems Engineering Through Model-Based Systems Engineering

— WRT- 1084: Roadmapping A Framework of Computationally Enabled Ontologies for Digital Engineering

SERC/AIRC DMM Efforts to date

WRT-1089 – Structure and Secure Data:

- MTO- based
- Tasks:
  - Develop a technical roadmap
  - Develop an integrative framework for capture and agreement of standard practices and associated data standards for gov't/industry collaboration around data and models
  - Recommend enterprise level requirements for Structure and Secure Data – related to DMM implementation
  - Provide technical scope and deliverables in a DAC funded effort
- Closely tied with MTO on SAP Integrated Digital Environment (IDE) Work (MITRE, Aerospace), and development of the DIIM
- Closely tied with ontology work with USA DEVCOM (Blackburn, Hagedorn)
- Tom McDermott PI; along with Aerospace as leads; with Stevens and GTRI support

Focus on Interoperability of data exchange

Interoperability of **data** is the ability to access and process data from multiple sources **without losing meaning** and then integrate that data for different forms of representation and analysis. Interoperability enables people to find, explore, and understand the structure and content of datasets. Standardized approaches are agreed upon data models.

Interoperability of **models** is more difficult because models transform data into information in ways that are inherently dependent on the modeling tools and domain methodologies. There will never be a single repository of data or a universal modeling language so agreed upon standards must be invoked.

What do we need to ensure interoperability to achieve good outcomes?

- Standards, documented best practices, cultural change, technology/tools

How do those outcomes benefit the various stakeholders including government and industry?

How does interoperability impact (positively or negatively) the mission?

Summary of DMM Ecosystem Needs from User Stories

- Enterprise-Wide, Federated Data Management Platform (DMP) Architecture
  - Enterprise-Wide Data/Models Catalog for Visibility/Discoverability (connected to the DMP)
  - Flexible Data/Model Queries with Full Traceability/Provenance to the Baseline
  - Curated, Configuration-Managed Authoritative Datasets (i.e., historical records, as-built/as-flown)
  - Contractual Standards for Data Rights/Access (including IP)
  - Data Standards to Enable Open APIs and Data Pipelines to Connect Data (i.e., ontologies, schemas, etc.)
  - Automated and Scalable Means for Data Transformation and Aggregation (i.e., tool agnostic, MLS)
  - Common, Customizable UI/UXs / Dashboards (supported by the federated DMP)
- IDE-Enabling Needs (Integrated Development Environment)
  - ➢ Role-based, IdAM/ICAM Controlled Access within and across the Contractor and Gov IDEs
  - ➢ IDE Support to an Enterprise-Wide, Federated DMP

- What are the common/core services allow majority of users and use cases to be provided/achieved?

Secure and Structure Data MTO
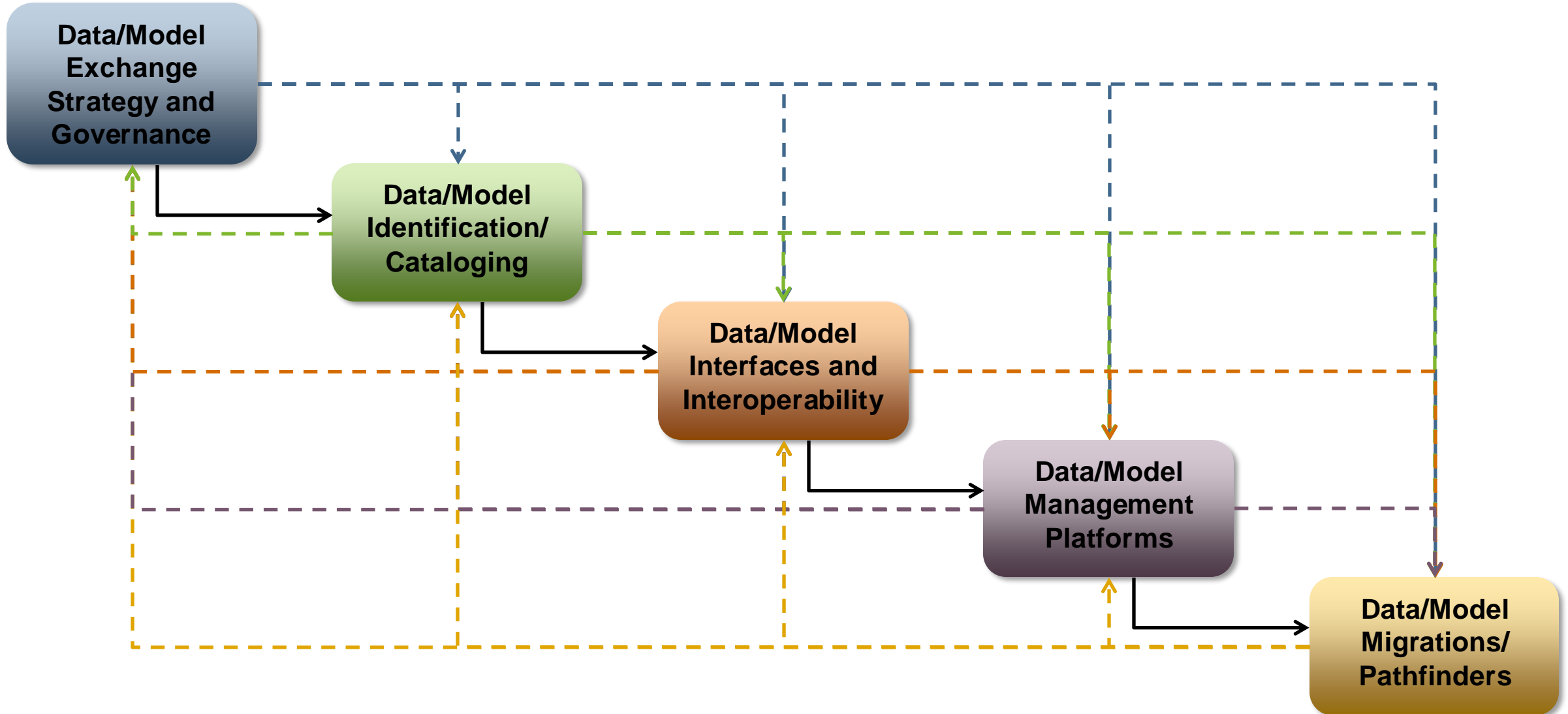
User Stories → Use Cases

User Story 2
As a
Acquisition Professional **(SE & Requirements Decomposition)** **(EN)**
I want to
create a digital thread with fidelity, consistency, and traceability
So that
I can access digital data and models in tech and milestone reviews to improve reviewer understanding and as-built design quality.

Question		Use Case
How do I know what data I have?	V	Data model established to facilitate the movement of the data between industry and gov
How do I get access to it?	A	Data accessed through a federated DMP (e.g., PLM) system (seamless interface b/w ctr/gov IDE)
How do I know that it is relevant to my needs?	U	IP data rights/access contractually defined at start of the program with flexibility to discover/ask for more
How do I connect it to my models?	L	Open APIs and data pipelines to connect data built on data standards (i.e., ontologies, schemas, etc.)
How do I know that it is authoritative?	T	Configuration-based/synchronized (and on-demand in some cases) data access b/w ctr and gov IDEs
How do I easily ingest it into tools?	I	Automated and scalable ingest/egress data transformation between tools (e.g., tool agnostic)
How am I granted access to it?	S	Role-based, IdAM/ICAM controlled access within and across the contractor and government IDEs

DMP = data management platform

DTO

Thank you!

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