AIR FORCE MATERIEL COMMAND

An Accelerated Future State

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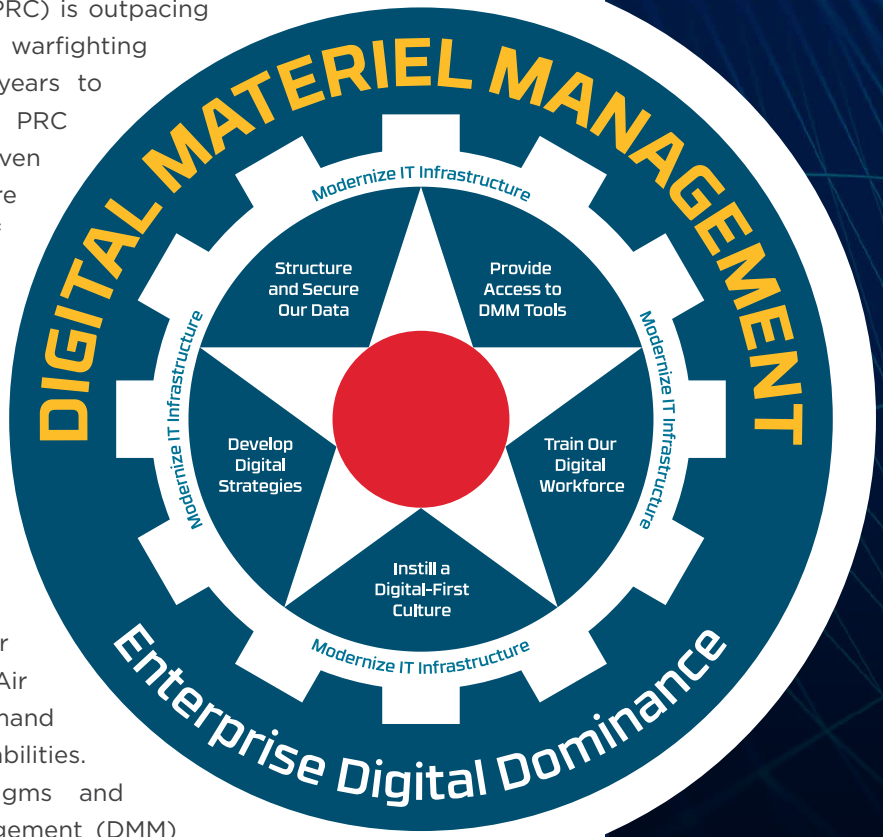
How We Win

Today the People's Republic of China (PRC) is outpacing the United States (U.S.) in fielding warfighting capability. The U.S. averages sixteen years to deliver a major weapons system.[1] The PRC delivers systems in approximately seven years.[2] The difference means nine more years of production; nine more years of modernization; and nine more years of practicing tactics, techniques, and procedures for the PRC. That's nine years of the PRC being in the game before the U.S. even takes the field. This disparity in integrated capability delivery timelines must change—or the U.S. will lose.



There is no time for antiquated serial processes, inadequate teaming, or lifecycle and functional stovepipes. The Air Force relies on Air Force Materiel Command (AFMC) to deliver war-winning capabilities. AFMC must shatter existing paradigms and adopt enterprise Digital Materiel Management (DMM) capabilities to radically accelerate our fielding, sustainment, and modernization. Models must replace documents. Structured data must replace disparate information. Digital collaboration must break down decision stovepipes. Through these practices, AFMC will execute DMM to accelerate integrated capability delivery across the materiel lifecycle and functional disciplines to counter the PRC's pace and win.

Watch a video outlining key initiatives behind the transition to DMM

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Lifecycle DMM

Counter to the U.S.' current trajectory of ever-increasing acquisition timelines,[3] DMM accelerates all phases of the materiel lifecycle from invention to modification. Every phase and AFMC organization plays a role. The common threads uniting the entire materiel ecosystem are models, data, and infrastructure. What those threads mean for each lifecycle phase and the outcomes they generate are critical to aligning the entire capability delivery process.

INVENTION

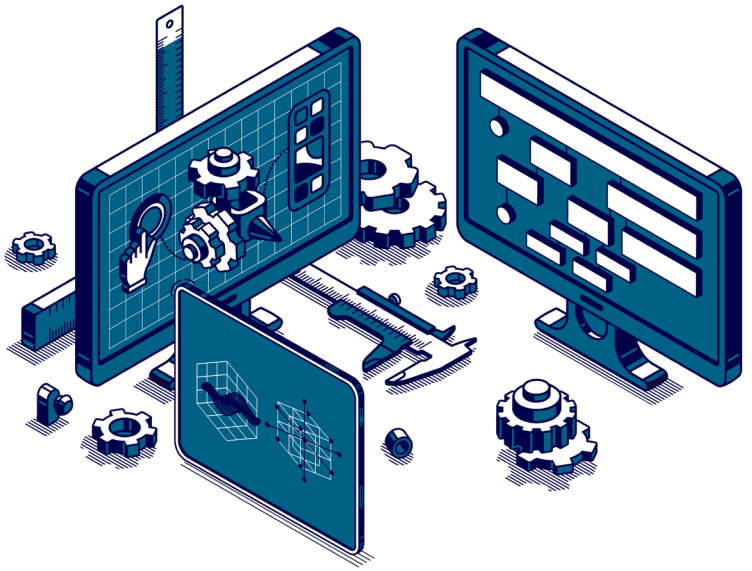
DMM drives invention through data-driven warfighter requirements development (e.g., Architect Framework for Simulation mission analysis), warfighter use case modeling (e.g., Systems Modeling Language-based architecting), and mission engineering (e.g., wargaming simulations to inform capability planning). In this phase, nascent models set a foundation for process and design. Government Reference Architectures (GRAs) begin to take shape. The outcomes range from models suitable for detailed simulation activities (e.g., AFRL's Golden Horde) to data sufficient for real-world prototyping (e.g., AFRL's Skyborg).[4,5]

SYSTEMS ENGINEERING AND REQUIREMENTS DECOMPOSITION

DMM underpins Open Architecture Implementation (e.g., Open Mission Systems [OMS], Universal Armament Interface [UAI], Weapon Open Systems Architecture [WOSA]); architecture modeling to inform design trade space analysis (e.g., Sentinel Pareto front decision space); shared allocation error checking; system definition verification assurance; size, weight, power, and cost (SWaP-C) allocation assurance; and shared Model-Based Systems Engineering (MBSE) modeling frameworks. The maturing and expanding of models, data, and infrastructure developed during this phase enables unparalleled, accelerated, bi-directional government and industry understanding. Outcomes include models and data supporting design trade space analysis (e.g., Sentinel program) or marked reduction in design and qualification time (e.g., Resilient Embedded GPS-INS [R-EGI] program).[6]

PERFORMANCE MODELING AND DESIGN

DMM revolutionizes accelerated and continuous acquisition reviews (e.g., System Functional Review [SFR], Preliminary Design Review [PDR]) via shared, accessible models of the system. Process and design models are not an artifact of development—they are development. No over-the-wall engineering. In this phase, truly collaborative designs are built on shared models, shared data, and common infrastructure that set the stage for all subsequent lifecycle phases. Outcomes include significantly accelerated, continuous design reviews and quick-turn, targeted performance modeling (e.g., C-130J electrical load analysis).

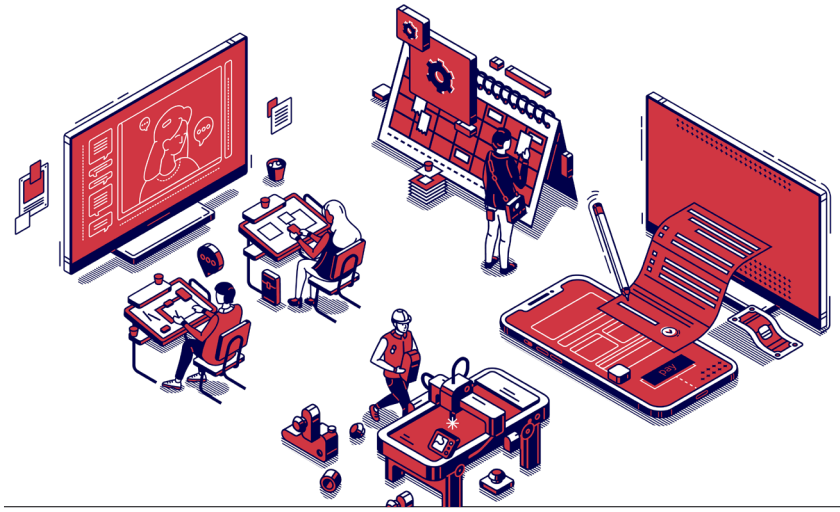


TEST AND PERFORMANCE VERIFICATION

DMM enables a testing regime focused on the validation of models. Leveraging model validation allows for more targeted (e.g., areas of uncertainty or concern from the models) and adaptable testing as models gain refinement and resolution. The increased confidence in the models will accelerate certification timelines (e.g., Airworthiness, Cybersecurity, Nuclear Surety). The models, data, and infrastructure born in previous phases feed virtual environments such as the Joint Simulation Environment (JSE). Outcomes drive assured lifecycle system performance and confidence in manufacturing design.

PRODUCTION

DMM models, data, and infrastructure facilitate model-driven manufacturing and the implementation of Full Scale Determinate Assembly (FSDA) techniques (e.g., Boeing T-7A).[7] Assemblies click together the first time, every time—radically accelerating production timelines. Additionally, DMM enables interchangeable parts across tails and lots, automated part delivery ingestion, and controlled dissemination flow (e.g., Spirit Aerosystems Global Digital Logistics Center).[8] Outcomes are measured in a dramatic improvement to production timelines across all supply chain tiers, with the models, data, and infrastructure capable of re-creating the as-built design at any point in the future.



PRODUCT SUPPORT DATA CATALOGING

DMM is used to investigate reliability, availability, maintainability, and supportability (RAMS) capabilities and modernization options (e.g., Logistics Composite Model Analysis Toolkit [LCOM ATK]); improve lifecycle support moving from managing by averages to managing by the tail; enable tailored planning for field and depot maintenance; and improve supply planning accuracy. Additionally, standardized data and processes for management of product data (e.g., Air Force-Product Lifecycle Management [AF-PLM]) underpin accelerated outcomes in automated and intelligent supply chain management.

SUSTAINMENT

DMM supports data-driven reliability improvements (e.g., preventative maintenance, condition-based maintenance); weapon readiness (e.g., Finite Element Analysis [FEA] enabling real-time assessments for identified weapon system defects, streamlined service life extension practices); and geometric digital twin technologies for resolving Diminishing Manufacturing Sources and Material Shortages (DMSMS). Additionally, DMM extends the service life of weapons systems by truly designing to sustain from the beginning—with the digital backbone to back it up. Outcomes include accelerated Periodic Depot Maintenance Cycles, realistic affordability initiatives, and just-in-time part delivery.

MODIFICATIONS

DMM facilitates rapid weapon system upgrades through open architecture implementation, model-based technical data packages (TDPs), geometric digital twinning, and process modeling artifacts. Gone are the days of 2D drawings and lengthy process reviews. DMM products will produce outcomes that slash modification timelines for every system while assuring intellectual property (IP) protection for the government and industry.

INSTALLATION AND MISSION SUPPORT

DMM leverages existing tri-service standards and criteria for Building Information Modeling (BIM) and Civil Information Modeling (CIM) to bolster installation infrastructure, underpinning the airmen and guardians who establish, operate, and recover our power projection platforms for high-end conflict. Emerging DMM initiatives such as digital twinning and Infrastructure Common Operating Pictures accelerate program delivery, empower proactive design and construction decisions, eliminate design clashes, minimize construction rework, and optimize sustainment of natural and built infrastructure.

Lifecycle DMM accelerates integrated capability delivery by threading models, data, and infrastructure throughout the materiel lifecycle. Those models, data, and infrastructure can serve as authoritative digital sources of truth for all aspects of integrated capability delivery. Harnessing those mechanisms for ubiquitous functional use will break down traditional stovepipes and accelerate functional timelines.

Functional DMM

Counter to current organizational stovepipes limiting AFMC acquisition agility, DMM revolutionizes the ability of each functional to accelerate within and across functional domains. Integrated tools built on models, data, and infrastructure yield radical transparency throughout government and industry teams. That omniscience results in functional teams that can collaborate like never before to accelerate integrated capability delivery.

PROGRAM MANAGEMENT

DMM means better insight for program managers. Product Lifecycle Management (PLM) tools capable of integrating models and data from across the functionals allow program managers to make informed decisions impacting every aspect of a program. A program manager can see the status of all deliverables, the status of all integrated product teams, and the current production status all in one view. This insight allows for better program management and more rapid integrated capability delivery.[9]

CONTRACTING

DMM means agile processing for contracting professionals. Digitally integrated tools facilitate rapid solicitation development, continuous pricing, the inclusion of automated business intelligence analytics, and digital contract deliverables in a shared environment. When integrated with PLM tools, these contracting-specific models and tools provide automatic updates to cross-functional program changes.[10]

ENGINEERING

DMM means real-time technical reviews for engineers. MBSE and digital design and analysis tools hosted on enterprise infrastructure provide real-time access for government and industry partners. As a result, Government engineers can shift from reviewers and critics to truly collaborative design partners.

LOGISTICS

DMM means automated data-driven decision-making for logisticians. Digital product support uses digital methods, 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. Design activities and product support teams are tightly integrated, enabling us to better understand the system of systems and proactively address issues such as structural fatigue, DMSMS, and workforce skills analysis.[11]

FINANCIAL MANAGEMENT

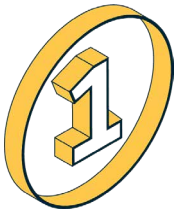
DMM means instant access to current budget, cost, and program execution data for financial managers. System performance models can rapidly reflect cost considerations in design trade-space analysis, allow financial professionals to execute a series of 'what-if' analyses to work towards an optimal solution for the enterprise, and streamline Financial Improvement and Audit Readiness (FIAR) compliance for all lifecycle phases.

TEST AND EVALUATION

DMM means unlimited testing for test professionals. The combination of program models, data, and infrastructure allows experts to develop and provide an authoritative source of truth. The authoritative source of truth validates system performance, informs decision-making, and updates digital models in a continuous evaluation process throughout the lifecycle of a system.[12]

DMM As the Path to Exceeding the PRC's Materiel Pace

DMM is the disruptive enabler we need to accelerate capability delivery through a fully empowered digital workforce equipped to deliver integrated, innovative, and trusted capability across the lifecycle, with unprecedented industry and government collaboration. AFMC will achieve this vision through the execution of six key initiatives:

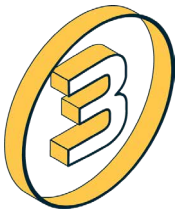


Instill a Digital-First Culture

AFMC will make a cultural shift to collaboration versus review, as DMM capabilities provide real-time interaction between government and industry.

Develop Digital Strategies

AFMC will ensure programs and organizations share a common vision of applying digital-first strategies to their work across all functional disciplines.



Structure and Secure Our Data

AFMC will deploy data standards, formats, and reference architectures for MAJCOM lifecycle use.

Provide Access to DMM Tools

AFMC will use and provide access to PLM tools, system and process modeling tools, design tools, and analytics tools across all functional disciplines.

Train Our Digital Workforce

AFMC will train the workforce to use and understand the power of DMM tools.

Modernize IT Infrastructure

AFMC will upgrade IT infrastructure (characterized by speed, agility, connectivity, and accessibility) to set the foundation for DMM progress across the MAJCOM.

These six initiatives are required to realize DMM. Implementation requires resourcing and dedication to change from the status quo. Execution will yield acceleration.

Conclusion

The U.S. is nine years slower than the PRC in delivering integrated capability. The only thing more difficult to accept than change is losing. We will choose change. DMM holds the power to accelerate the materiel management cycle, solidify seamless cross-lifecycle and cross-functional collaboration, and ensure the most effective decision-making within and beyond AFMC. The time to act boldly is now. We cannot afford to wait. The stakes are too high. Our nation's security depends on our success. Let's get in the game with DMM. Let's win.

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