

DoD Instruction 5000.97 - Digital Engineering: Assessing the Impact on the Department's M&S Enterprise

Daniel Hettema
DEM&S Director
OUSD(R&E)
Alexandria, VA
daniel.l.hettema.civ@mail.mil

Jeffrey Nartatez
Systems Engineer
OUSD(R&E)
Melbourne, FL
jeffrey.p.nartatez.ctr@mail.mil

Keith Henry
Systems Engineer
OUSD(R&E)
Orlando, FL
keith.d.henry.ctr@mail.mil

ABSTRACT

The Department of Defense (DoD) is transforming engineering practices to incorporate digital technology and innovations into an integrated, digital, model-based approach. DoD Instruction (DoDI) 5000.97, Digital Engineering (DE) establishes policy, assigns responsibilities, and provides procedures for implementing and using DE in the development and sustainment of systems. Furthermore, this instruction incorporates and supersedes DoD Directive 5000.59, DoD Modeling & Simulation (M&S) Management, necessitating a reexamination of governing and collaborative best practices to allow stakeholders and decision makers to redefine roles and responsibilities to best manage and modernize M&S capabilities.

This paper provides an overview on DE concepts and capabilities. The paper highlights policy direction to program managers and key elements of the Digital Engineering Framework and the Digital Engineering Ecosystem. Key topics include Digital Models, Digital Twins / Threads, and Digital Artifacts.

Finally, the paper assesses cross-community and service-centric challenges incorporating the tenets of the former DoD Directive on M&S Management. This includes examination of existing management functions and recommendations on strategy development, policy formulation and workforce development as it affects the Defense M&S enterprise.

ABOUT THE AUTHORS

Daniel Hettema is the Director of Digital Engineering, Modeling and Simulation (DEM&S) within the Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)). In this role, he oversees DoD strategy, policy, and coordination for DEM&S topics. He brings experience in model-based systems engineering and digital engineering from both government and industry and has held leadership roles in the International Council on Systems Engineering (INCOSE). He holds a B.S. in Systems Engineering from George Mason University and an M.S. in Space Systems from Johns Hopkins University.

Jeff Nartatez supports (OUSD(R&E)) DEM&S, focusing on DE and M&S strategy implementations and collaborating on policy, guidance, standards, and tools. As a Systems Engineer, he provides 30 years' expertise in technical and strategic consulting as a subject matter expert working with defense contractors and the defense industrial base. He served in various Director and Systems Engineering managerial positions throughout his career where he provided engineering leadership for all core engineering disciplines with an emphasis on Systems Engineering. Jeff holds a B.S. in Electrical Engineering from Pennsylvania State University.

Keith Henry has served in the M&S community for nearly thirty years. He currently provides System Engineering and Technical Assistance (SETA) support as a Systems Engineer for the Director of DEM&S under (OUSD(R&E)). He is an Army FA57 by trade and contributes his valuable expertise to the community as a former member of the Armed Forces, Industry, and as a prior Government Civilian.

DoD Instruction 5000.97 - Digital Engineering: Assessing the Impact on the Department's M&S Enterprise

Daniel Hettema
DEM&S Director
OUSD(R&E)
Alexandria, VA
daniel.l.hettema.civ@mail.mil

Jeffrey Nartatez
Systems Engineer
OUSD(R&E)
Melbourne, FL
jeffrey.p.nartatez.ctr@mail.mil

Keith Henry
Systems Engineer
OUSD(R&E)
Orlando, FL
keith.d.henry.ctr@mail.mil

ASSESSING THE IMPACT ON THE DEPARTMENT'S M&S ENTERPRISE

Introduction

The newly published DoDI 5000.97, Digital Engineering incorporates and cancels the Department of Defense Directive (DoDD) 5000.59, DoD Modeling and Simulation (M&S) Management, dated August 8, 2007. DoDD 5000.59 and DoDD 5134.01, Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)), were the foundational bedrock managing DoD M&S activities and the authoritative documentation, as referenced in multiple DoD instructions. This paper summarizes the history of DE and M&S at the DoD, provides updates on major policies, and explores the impact of this cancellation and how it has transformed the community.

Organizational Background

In 2018, the Office of Secretary of Defense under-went a significant reorganization that divided the former Office of the Undersecretary of Defense for Acquisition, Technology, and Logistics (OUSD(AT&L)) into two offices: OUSD for Acquisition and Sustainment (A&S) and OUSD for Research and Engineering (R&E). The impacts to the M&S community was felt instantly as the policy requirement for Defense Modeling and Simulation Office (DMSO), Para 3.35 (see insert) previously found in DoDD 5124.01 Under Secretary for Defense for Acquisition, Technology, and Logistics (USD(AT&L)) was not transferred to DoDD 5137.02 Under Secretary for Defense for Research and Engineering (USD(R&E)) or DoDD 5135.02 Under Secretary for Defense for Acquisition and Sustainment (USD(A&S)) Figure 1.

In 2018, the Director of Engineering Tools and Environments (ETE) within OUSD(R&E), published the DoD Digital Engineering Strategy. This strategy outlined 5 goals for the Department to adopt DE practices and to deliver warfighter capability faster. The goals are 1) Formalize Development, Integration and Use of Models; 2) Provide an Authoritative Source of Truth; 3) Incorporate Technological Innovation; 4) Establish Infrastructure and Environments; 5) Transform Culture / Workforce.

In 2020, without the policy requirement, and lacking a congressional budgetary line item, the MSCO was rebranded into the Modeling and Simulation Enterprise (MSE). This enabled a scoped focus on DoD enterprise challenges, gaps in standards, policy updates, and congressional reports. MSE began collecting pain points and developing a M&S Strategy to replace the 1995 M&S Master Plan.

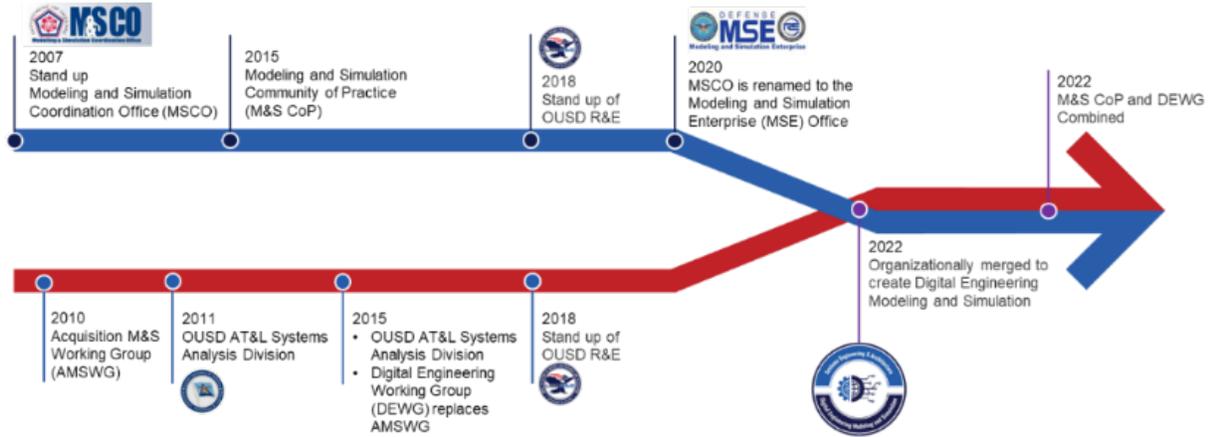
In 2022, a reorganization within R&E combined the MSE and ETE portfolios into a single directorate for Digital Engineering, Modeling & Simulation (DEM&S). The rationale was that a unified directorate could more effectively address the 80% overlap in pain points between the two portfolios, aligned with R&E priorities. Figure 2 illustrates the timeline leading to the creation of the DEM&S directorate.

DoDD 5124.01 OUSD (AT&L)excerpt

3.35 Establish and maintain the DoD management and administrative structure for M&S, in accordance with DoD Directive 5000.59, and sponsor the DoD Executive Council for Modeling and Simulation; develop policies, plans, and programs to coordinate, harmonize, and rationalize DoD M&S, including the DoD Modeling and Simulation Master Plan and Investment Plans; ensure that DoD M&S investments support operational needs and the acquisition process; to include the development of common tools, methodologies, and databases; and the establishment of standards and protocols promoting interoperability, data exchange, open system architecture, and software reusability.

From DoDD 5124.01 Under Secretary for Defense for Acquisition, Technology, and Logistics (USD(AT&L)) - CANCELLED Figure 1

Figure 2- DEM&S Historical Organizational Timeline



For the sake of brevity, the authors have omitted many of the major successes of these organizations and the full historical pedigree of MSCO, dating back to the 1990s Defense Modeling & Simulation Office. This high-level organizational summary is essential for discussing the impact and transition across department-wide strategy, policy, and workforce development.

Note on Terminology

One of the many challenges when portfolios join is disconnected terminology ingrained in the distinct cultures. Like many terms across the DoD, those used to discuss DE or M&S are frequently plagued with inconsistent definitions. Throughout this paper, the following key definitions and sources are referenced. This list is intended to provide the key characteristics of the terms, rather than provide detailed definitions.

Table 1 - Common Terms in Paper

Term	Definition	Reference
Model	A representation of an actual or conceptual system that involves mathematics, logical expressions, or computer simulations that can be used to predict how the system might perform or survive under various conditions or in a range of hostile environments.	DAU Glossary
Simulation	A method for implementing a model. It is the process of conducting experiments with a model for understanding the behavior of the system modeled under selected conditions or of evaluating various strategies for the operation of the system within the limits imposed by developmental or operational criteria.	DAU Glossary
Digital Twin	A virtual replica of a physical entity that is synchronized across time. Digital twins exist to replicate configuration, performance, or history of a system. Two primary sub-categories of digital twin are digital instance and digital prototype.	DAU Glossary
Digital Thread	An extensible and configurable analytical framework that seamlessly expedites the controlled interplay of technical data, software, information, and knowledge in the digital engineering ecosystem, based on the established requirements, architectures, formats, and rules for building digital models. It is used to inform decision makers throughout a system's life cycle by providing the capability to access, integrate, and transform data into actionable information.	DAU Glossary

Digital Artifact	A product or output, in computer (i.e., digital) format, created within or generated from the digital engineering ecosystem. Digital artifacts provide data for alternative views to visualize, communicate, and deliver data, information, and knowledge to stakeholders.	DAU Glossary
Digital Ecosystem	The interconnected infrastructure, environment, and methodology (process, methods, and tools) used to store, access, analyze, and visualize evolving systems' data and models to address the needs of the stakeholders. DEBoK	DEBoK Glossary
Authoritative Source of Truth (ASOT)	An entity such as a person, governing body, or system that applies expert judgment and rules to proclaim a digital artifact is valid and originates from a legitimate source.	DAU Glossary

HIGHLIGHTS OF M&S STRATEGIES AND POLICIES IN THE DEPARTMENT

It is useful to group OSD-level policy into 5 major layers. Each layer has a different objective and lower levels depend on higher order policy for authority.

- 1) **Strategy:** These documents are non-binding but are used to guide and shape follow on policy, guidance, and workforce activities (DoD Science and Technology Strategy or DoD Modernization Strategy).
- 2) **DoD Directives:** These are signed by the Secretary of Defense and primary establish high-level policy (DoDD 5000.59 M&S Management) or assign responsibility (DoDD 5137.02 R&E Charter).
- 3) **DoD Instructions:** Signed by an OSD Component Head, these supplement policy (DoDI 5000.70 Management of M&S Activities) or provide general procedures (DoDI 5000.97 DE).
- 4) **DoD Manuals:** These expand on instructions by adding more detailed procedures that are then signed by OSD Component Heads.
- 5) **Technical Guidance:** These are written by Subject Matter Experts (SMEs) to address specific problems and provide recommendations.

The following sections summarize OSD-level strategies, directives, and instructions related to the organization’s joint focus on DE and M&S. While there are manuals and technical guidance policies related to M&S, they are narrowly scoped to specific applications rather than broad applicability, and therefore, are not discussed in this paper.

Digital Engineering Strategy

The DoD Digital Engineering Strategy outlined a strategic vision and charted a course to integrate DE practices into DoD's acquisition and lifecycle processes. The DE Strategy offers guideposts for improving organizational effectiveness by advancing the document-to-digital engineering continuum. The five goals that make up the strategy are:

- (1) Formalize the development, integration, and use of models to inform enterprise and program decision making.
- (2) Provide an enduring, authoritative source of truth.
- (3) Incorporate technological innovation to improve the engineering practice.
- (4) Establish a supporting infrastructure and environments to perform activities, collaborate, and communicate across stakeholders.
- (5) Transform the culture and workforce to adopt and support digital engineering across the lifecycle.

Within the engineering community, this strategy has served to drive behavior change across the department. Since its release in 2018, programs have instituted “digital first” approaches, with the creation of robust digital threads throughout the acquisition lifecycle. Nonetheless, continuing work is still needed to integrate high fidelity simulation tools used by detailed design and testing engineers into the environment.

Modeling & Simulation Strategy for Engineering

Recognizing the need for new strategic guidance, MSE began developing a replacement to the 1995 M&S Master Plan, in October 2022. Initially scoped to address the totality of M&S at the DoD, the 2022 R&E reorganization forced a rescoping around the engineering application of M&S. The strategic vision for M&S for Engineering is to

empower the enterprise with adaptable, integrated, and re-usable M&S, effectively supporting the full spectrum of the Department’s activities and operations, and the workforce providing those capabilities. The strategy focuses on connecting specialized tools through data, standards, and collaboration capabilities versus systematic unification, all-purpose federation, or direct integration for its own sake. As a result, the M&S Strategy for Engineering is aimed at establishing a foundational ground truth for M&S within engineering, particularly focusing on acquisition processes.

The strategy provides a strategic framework through a series of goals and focus areas to inform and align M&S capabilities across the engineering enterprise. The goals establish the context of that framework and provide a pathway for building M&S capabilities to address enduring challenges like security, reuse, and composability, as outlined below.

- (1) Create a technical framework for joint enterprise-level modeling and simulation.
- (2) Foster M&S community trust with reliable data sources. Reliable data is essential for credibility and trust in the M&S community.
- (3) Enhance acquisition and program management skills using the M&S professional development systems.
- (4) Advocate for integrating enterprise-level M&S services in DoD and the broader M&S community.
- (5) Adapt M&S policies, processes, and infrastructure for agile technology assessment and procurement.

Just like the DE Strategy, the M&S Strategy for Engineering is anticipated to be a key resource for DoD Components in crafting their digital engineering implementation plans.

Similar to the DE Strategy, the M&S Strategy for Engineering is expected to serve as a foundational document to assist and provide senior-level endorsement to DoD Components in the development of their own digital engineering implementation efforts.

OUSD(R&E) will serve as the coordinating function, ensuring progress across the department by closing gaps, eliminating duplication, and facilitating the sharing of best practices. Additionally, OUSD(R&E) will serve as the focal point for the department to share ongoing status on these efforts to our allies, the industrial base, and academia. The M&S Strategy for Engineering is expected to be published before the end of 2024.

DoD Directives & Instructions

In April 2023 analysis done by the authors in conjunction with Navy M&S identified over 700 policies related to M&S. Of those, OSD is responsible for 72 (24 – Directives, 41 – Instructions, 7 – Manuals). The following paragraphs are summaries of key policies and where applicable status updates.

DoDD 3700.01 DoD Command and Control Enabling Capabilities

This directive highlights the use of modeling and simulation to support decision-making processes and to ensure that C2 systems are robust and adaptable. To meet operational requirements M&S should be used during development and evaluation.

Policies Referencing M&S, as of April 2023	
DoD	72
Joint	28
Army	82
Navy	52
Marine Corps	27
Air Force	415
Space Force	33
Total	709

DoDD 5000.01 The Defense Acquisition System

References modeling and simulation as crucial tools for assessing system performance, managing risks, and supporting decision-making throughout the acquisition lifecycle. M&S activities help in predicting outcomes and optimizing the development and deployment of defense systems.

DoDD 5000.59 DoD Modeling and Simulation Management

Canceled by DoDI 5000.97 DE this directive primarily established the DoD M&S Steering Committee (M&S SC) under the provisions identified in DoDI 5105.18 DoD Intergovernmental and Intragovernmental Committee Management Program. However, DoDI 5105.18 states that a committee is to terminate when “(1) The stated objectives have been accomplished, the subject matter or work of the intergovernmental or intragovernmental committee has become obsolete by the passing of time, or their functions are assumed by another entity.” Given that the M&S SC hasn’t met for over 3 years, the lack of inclusion of paragraph 3.35 from the AT&L Charter in the

R&E or A&S Charter, and MSCO no longer being a congressional line item, leads to M&S SC being obsolete and therefore, should be terminated. Thus, making DoDD 5000.59 no longer needed and cancelled by DoDI 5000.97.

DoDD 5137.02 Under Secretary of Defense for Research and Engineering

This directive assigns the Under Secretary of Defense the task of developing governing policy, advancing practices for modeling & simulation, and digital engineering. In addition, the directive aims to ensure that modeling and simulation capabilities are maintained within the DoD for Test and Evaluation (T&E).

DoDI 5000.61 DoD M&S Verification, Validation, and Accreditation (VV&A)

This instruction is currently being updated and is expected to be published before the end of 2024. This update establishes policy, assigns responsibilities, and prescribes procedures for the verification, validation, and accreditation (VV&A) of models, simulations, including distributed simulations, and the associated data. It establishes the basis for credible modeling and simulation (M&S) across the DoD and includes amplifying updates in support of accreditation and risk assessment to include maturity and confidence assessments and uncertainty quantification. Additionally, this policy, in coordination with Operational Test & Evaluation (OT&E) lays the foundation for improving department-wide modeling trust via the application of Verification, Validation and Uncertainty Quantification (VVUQ).

DoDI 5000.70 Management of DoD Modeling and Simulation (M&S) Activities

This instruction is currently under initial review and potential update by OUSD(R&E). This instruction provides implementation instructions for DoDD 5000.59, assigns organizations to M&S SC, and establishes a M&S glossary.

DoDI 5000.85 Major Capability Acquisition

The instruction references how modeling and simulation is an essential tool for evaluating system performance, managing risks, and supporting lifecycle management. It calls out how M&S should be included in assessing design options, predicting operational outcomes, and ensuring the successful acquisition and deployment of major defense systems.

DoDI 5000.88 Engineering of Defense Systems

This instruction highlights the use of modeling and simulation to support system engineering processes, including design, development, and testing.

DoDI 5000.89 Test and Evaluation

This instruction emphasizes the use of modeling and simulation to enhance the T&E process by providing realistic scenarios and predictive analyses. Additionally, it highlights that models and data will be used to digitally represent the system to conduct integrated T&E activities.

DoDI 5000.97 Digital Engineering

On December 23, 2023, DODI 5000.97 Digital Engineering was released. The policy assigns responsibilities and provides procedures for implementing digital engineering in the development and sustainment of defense systems. This includes the utilization of M&S to meet program objectives. Programs initiated after the publication of DoDI 5000.97 will incorporate digital engineering for the capability in development. Programs started before the date of the policy should incorporate digital engineering to the maximum extent possible when it is practical, beneficial, and affordable. Additionally, digital engineering should be addressed in the Acquisition Strategy and in the Systems Engineering Plan.

As stated in the policy: Digital Engineering supports the systems engineering process by moving the primary means of communicating system information from documents to digital models and their underlying data.

The policy describes digital engineering as:

- A critical practice necessary to support acquisition and sustainment
- Expanding on engineering practices to take full advantage of computation, visualization, and collaboration
- Using computer systems for the development, verification, validation, use, curation, configuration management, and maintenance of technically accurate digital models in support of system life-cycle activities
- Moving the primary means of communicating system information from documents to digital models and their underlying data

This instruction further defines the need for the department to continue to apply DevSecOps practices, ensure models are technically accurate, and models and data are shared in alignment of the DoD Data Strategy goals to make data visible, accessible, understandable, linked, trustworthy, interoperable, and secure.

Opportunities for the Joint DE and M&S Community

Under the previous MSCO paradigm the M&S community was constructed around the 7 functional communities: acquisition, engineering, experimentation, planning, analysis, intelligence, and training. This resulted in 21 interfaces between these communities. With a more democratized approach to M&S application, a simplified construct based on the original 3 communities should be adopted: engineering, analysis, training. This reduces the total number of interfaces from 21 to 3. Additionally, this enables practitioners across the department to more rapidly adopt new approaches and technology vs a bureaucracy laden process.

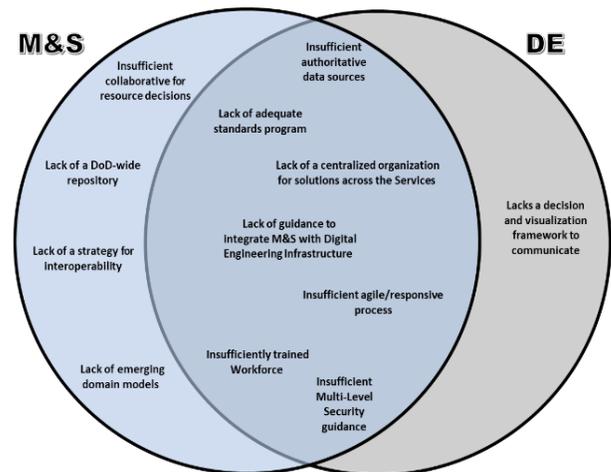
This reduction to the 3 primary communities aligns to the pain point analysis performed by the DEM&S team reviewing the pain points collected by MSE. Analysis has shown that the engineering community generally has the tools necessary to perform their job. These tools exist in silos and models and data aren't freely shared or linked properly. Further analysis shows that this siloed effect is mostly driven by silos in organizations and general lack of trust across the silos. Meanwhile the training community generally has a culture more accepting of sharing but lack the technology to make near real environments that is unobtrusive to the warfighter being trained. This three-community alignment is already taking shape at OSD, with R&E leading engineering, the Office of Cost Assessment and Program Evaluation (CAPE) heading analysis, and Personnel & Readiness (P&R) focusing on training. R&E is ensuring collaboration across these organizations.

Addressing Gaps

Several gaps and shortfalls exist ensuring the Department cannot effectively communicate and operate together across different M&S systems. There is a lack of standardization in tool integration, data exchange, and processes, leading to inefficiencies and redundancies. These will need renewed focus by the Department and accomplished by investing in pathfinding novel solutions to these problems. By removing OSD, organization overhead components are better equipped to invest in these solutions that can then be pulled and made common at the OSD level.

Figure 2- Mutual DE and M&S Pain Points

Within OUSD(R&E) the DEM&S directorate is at the heart of the engineering transformation. To better serve the joint community, the Digital Engineering Modeling and Simulation Community of Practice (DEM&S CoP), was formed by combining the Digital Engineering Working Group (DEWG), and the M&S Community of Practice. The DEM&S CoP was then shifted into a thematic bimonthly meeting format, where the community could come together and shine a spotlight on successful pathfinding efforts or lessons learned.



Addressing the overlapping generalized pain points, shown in Figure 2, prior to combining the communities served as the initial themes for the CoP. To fully address this, continued coordination will be needed as the DoD updates policy, investment in technology, strengthens the workforce, and addresses standards gaps.

Some of the integration challenges across the Department include organizational culture, lack of coordination on foundational standards, interoperability, scalability, performance, security, cybersecurity, realism, accuracy, cost constraints, data management and accessibility, and workforce development. These integration challenges must be addressed as the Department constructs digital twins and digital threads across the enterprise. Utilization of M&S applications is crucial in constructing digital twins and digital threads for the DoD. By creating detailed virtual replicas of physical systems and processes, these technologies enable the DoD to simulate real-world scenarios and

analyze the outcomes in a controlled, virtual environment. This capability is particularly valuable for testing new defense strategies, evaluating system performance under various conditions, and conducting mission rehearsal operations without the risks and costs associated with real-world testing. Furthermore, integrating real-time data feeds into these models allows for continuous updates and optimizations, ensuring that the digital twins evolve in parallel with their physical counterparts. This enhances operational readiness and supports predictive maintenance, training, and decision-making processes, thereby improving defense operations' overall effectiveness and efficiency.

On Going Efforts to Strengthen the Workforce

“If we’re comfortable, we’re probably not changing.”

- Gen Charles Q Brown, Chairman of the Joint Chiefs of Staff

Digital engineering represents a fundamental departure from traditional methods, leveraging digital computing, advanced modeling techniques, analytical prowess, and emerging technologies to facilitate engineering tasks within an intricately interconnected virtual environment. Recognizing the transformative potential of digital engineering, the DoD has undertaken deliberate efforts to reshape its workforce, investing in the necessary infrastructure and skill development initiatives to effectively implement digital practices. Far from being complete, the collaboration across multiple workforce efforts continue to mature requirements and confront training and certification challenges.

A cornerstone of this initiative has been the establishment of partnerships with academic institutions, fostering the creation of consortia that serve as centers of excellence, and disseminating best practices across the Department's research, engineering, and development endeavors. Notable DoD achievements toward transforming the workforce to promote cultural change include:

- The Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)) has integrated digital engineering into the training required by the Department's Engineering and Technical Management (ETM) acquisition workforce. This training targets nearly 63,000 military and civilian personnel, approximately 39% of the acquisition workforce, to effectively use digital engineering technologies.
- OUSD(R&E) maintains the Digital Engineering Body of Knowledge (DEBoK) that provides its knowledge base an access point to resources for program managers, modelers, engineers, and contract specialists.
- The Components have all implemented digital workforce initiatives based on guidance provided in strategic documents. These efforts include a combination of establishing digital transformation offices, Service-level digital engineering strategies, supplemental education, and certification for career accession planning.
- Individual Components are developing tailored training programs in areas such as Model-Based Systems Engineering (MBSE) and modeling languages, catering to diverse workforce needs. When fully implemented these programs will encompass a spectrum of knowledge levels, ranging from basic to advanced, ensuring that personnel possess the requisite skills for their respective roles, with a focus on hands-on learning experiences to reinforce theoretical concepts.

Through these concerted efforts, the DoD is poised to capitalize on digital engineering's transformative potential, fostering innovation, efficiency, and agility across its spectrum of operations.

FUTURE ACTIONS NEEDED

The application of M&S has now become an integral part of Departmental operations and spans across the analysis, engineering, and training arenas. As outlined in this paper there is ample strategy and policy to address the management of M&S within specific communities. The cancellation of DODD 5134.01 AT&L Charter and DODD 5000.59 M&S Management have created an environment in which there is no singular office responsible for enterprise M&S management. The dissolution of the Modeling and Simulation Steering Committee requires the Departments to evolve in the application of M&S across domains that may have historically been practicing M&S in isolation. The Military Departments have embraced digital transformation and the use of M&S to accelerate many of the complex challenges they face by publishing and executing their own policies to initiate the breakdown of organizational barriers to meet transformative requirements and to accelerate the necessity of an integrated Joint battlespace for the peer-near peer fight.

The continuing advancement of M&S capabilities across the Department has resulted in both organizational and cultural changes. A sense of collaboration and knowledge sharing across organizations provides the impetus leading to improved communication that currently impede progress. The Components must continue to lead efforts to

mitigate stovepipes both across and between organizations. This is a Departmental departure to management activities of the past where a codified governance structure provided a construct for some visibility, cross communication, and awareness of M&S activities. The incorporation and cancellation of DODD 5000.59 as stated in DODI 5000.97 has driven the decision making and management of organizational M&S activities down to the practitioner level where it can be most useful. OSD continues to write policy that will reiterate the need to share knowledge across organizational boundaries, develop the M&S workforce, and facilitate the development and adaptation of M&S standards to aid in interoperability. Continued collaboration between OSD and the Components will allow for continued growth and advancement of M&S applications through a decentralized approach that will serve the practitioner to advance warfighting capability to the Joint force for success on the battlefield of tomorrow.

REFERENCES

Austin, L. J. (2022, October 22). 2022 National Defense Strategy of the United States Including the 2022 Nuclear Posture Review and the 2022 Missile Defense Review. District of Columbia, Washington, D.C.: Office of the Secretary of Defense.

DoD Data, Analytics, and Artificial Intelligence Adoption Strategy. (2023, June 27). District of Columbia: Deputy Secretary of Defense.

DoD DE Strategy. (2018, June). Washington, D.C., District of Columbia. Retrieved February 26, 2024, from <https://de-bok.org/asset/1f7e7fb64da4c23439b9ea0878d3d5e9fc0f78d7>

DoD Modeling and Simulation (M&S) Master Plan. (1995, October 01). District of Columbia, Washington, D.C.: Office of the Under Secretary of Defense for Acquisition and Technology.

DODD 5000.59 DoD M&S Mangement. (2018, October). Washington DC, District of Columbia. Retrieved from <https://www.esd.whs.mil/DD/>

DODD 5134.01 Under Secretary of Defense for Acquisition, Technology, and Logistics. (2008, April). Washington DC, District of Columbia. Retrieved from <https://www.esd.whs.mil/DD/>

DODD 5135.02 Under Secretary of Defense for Acquisition and Sustainment (OUSD (A&S)). (2020, July). Washington DC, District of Columbia. Retrieved from <https://www.esd.whs.mil/DD/>

DODD 5137.02 Under Secretary of Defense for Research and Engineering (OUSD (R&E)). (2020, July). Washington DC, District of Columbia. Retrieved from <https://www.esd.whs.mil/DD/>

National Defense Science & Technology Strategy 2023. (2023, May 31). District of Columbia, Washington, D.C.: Department of Defense. Retrieved from <https://www.dtic.mil/>