

## **An Inflection Point for Defense Modeling and Simulation (M&S) Management – Redefining Roles and Responsibilities across the Department’s M&S Enterprise**

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### **ABSTRACT**

The evolution of Defense Modeling and Simulation (M&S) Management spans over thirty years, including the establishment of the Defense Modeling and Simulation Office (DMSO) to serve as the US Department of Defense (DoD) focal point to promote effective and efficient use of modeling and simulation. While historically having broad responsibilities covering multiple communities enabled by M&S plus international technical collaboration, recent Office of the Secretary of Defense (OSD) reorganizations have narrowed that scope to support acquisition-centric activities and digital engineering initiatives.

Concurrently, the emergence of generative AI and other technology breakthroughs have heralded a new era of digital transformation. Thus, there is a need to reexamine governing and collaborative best practices to allow stakeholders and decision makers to redefine roles and responsibilities to best manage and modernize M&S capabilities to sustain a Global Force in a Digital World.

This paper provides insights on the evolution of Defense M&S Management and assesses the more recent capabilities and methodologies of both M&S functional communities and Service-specific management offices. The paper documents the key phases of Defense M&S Management, from an emerging technology (1991-2005), to a focus on collaboration and transformation (2006-2014), to high level coordination and engagement (2015 and beyond).

The paper then investigates the Defense Science Board recommendations from their report on Gaming, Experimentation, Modeling & Simulation (GEMS); state of technology impacts, and areas of need from the current M&S organizations and key stakeholders of M&S capabilities. Discussion topics include governance and collaboration best practices, and comparison of roles and responsibilities across the department, to include the applicable issuances and resourcing.

Finally, the paper challenges the community to consider what Defense M&S enterprise management functions are needed in the fast-moving digital transformation.

### **ABOUT THE AUTHORS**

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## **INTRODUCTION**

The evolution of Defense M&S Management spans over thirty years, starting with the establishment of the Defense Modeling and Simulation Office (DMSO) to serve as the DoD focal point to promote effective and efficient use of modeling and simulation. While historically having broad responsibilities covering multiple communities enabled by M&S plus international technical collaboration, recent DoD reorganizations have streamlined the scope to support acquisition-centric activities and digital engineering initiatives. At the same time, there have been significant recent technology innovations that impact how we achieve mission. Thus, there is a need to reexamine governing and collaborative best practices to allow stakeholders and decision makers to redefine roles and responsibilities to best manage and modernize M&S capabilities to sustain a Global Force in a Digital World.

Given the recent changes and challenges across the defense M&S community, there remains a need to restructure the DoD M&S governance directly under a senior leader with appropriate authorities and resources for guiding the DoD M&S enterprise. Today, however, the capabilities of Defense M&S Management are at an inflection point – where the challenges are as significant as the potential for technological success. There is a more immediate need for M&S practitioners, stakeholders, and leaders to address and assess the current management roles and responsibilities across both the functional communities enabled by M&S, as well as the Service M&S Management Offices.

This paper provides insights on the evolution of Defense M&S Management and considers recent capabilities and methodologies of both M&S functional communities and Service-specific management offices. To facilitate proper Defense M&S management, today’s inflection point demands proactive planning and implementation of overarching initiatives and activities. The development of strategic connections will be paramount, as well as the communications implementation plan to best advocate and promote the goals and objectives of those strategic connections.

It is important to include analysis of the recent Defense Science Board recommendations from their report on Gaming, Experimentation, Modeling & Simulation (GEMS), the current state of technology impacts, and requirements from Defense M&S organizations and key stakeholders of M&S capabilities.

The paper examines existing management functions and provides insights and considerations on strategy development, policy formulation and workforce development as it affects the Defense M&S enterprise.

## **BACKGROUND --- SYNOPSIS OF HISTORY**

In 1990, Congress started an initiative to create an OSD office to coordinate simulation policy, establish interoperability standards and establish guidance for wargaming, simulation and training. This organization was funded at \$15M for a Joint Wargaming Simulation Management Office.

House Report 102-966 recommended “... an authorization of \$10.0 million in procurement and \$60.0 million in research and development “for the newly-established Defense Modeling and Simulation Office (DMSO). The conferees expected that “... the Defense Department will budget the funds required to continue operations of the DMSO in future budget submissions.” These funds were used for Department-wide efforts, such as High Level

Architecture (HLA), Synthetic Environment Data Representation and Interchange Specification (SEDRIS), and initiatives focused on the three pillars of simulation in the 1990's: Training, Acquisition, and Analysis.

By 2004, HLA was a widely-accepted standard, and simulation was recognized as an enabler throughout the Department. However, the budget for the DMSO office had been reduced to \$40-50M, and the number of military slots in the office was also reduced. Concurrently, the impact of the governance bodies had lessened. In response, the Principal Deputy to the Deputy Director, Research & Engineering (DDR&E) formed a Tiger Team with Senior Executive Service (SES) representatives from Training and Readiness, OSD (P&R), Acquisition, DDR&E, and Analysis, OSD CAPE. The Tiger Team agreed that the foundational documents were still valid, but the communities engaged in the use of M&S had expanded. The resulting Steering Committee, integrated product team (IPT), and working groups reflected the nature of simulation use in the Department and engaged at the 2 and 3-star GO/FO/SES level. The Military Services likewise made adjustments to their governance structures. The OSD office remained chartered in R&E as the focal point for M&S within the Department. Funding was managed to enhance and assist initiatives that crossed community boundaries and were beneficial to the broader enterprise efforts. Of note, in 2007, Congress declared Modeling and Simulation to be a National Critical Technology, a significant acknowledgement of the importance to the country and the effect that M&S has had on Defense.

Unfortunately, funding continued to decline, and by 2018, the Defense M&S budget was limited to \$3M to support collaboration and coordination. Outreach efforts continued to the National and International communities through NATO, NDIA, NTSA, and country-led collaboration activities in the UK, Korea, and Singapore. Finally, in 2021, the modeling and simulation office was merged with the office responsible for engineering tools and environments to create a smaller organization responsible for Digital Engineering, Modeling & Simulation (DEM&S). With limited resources, came the announcement of sunset of the M&S Catalog, and changes to M&S governance, to include the planned sunset of the DoD Directive on Modeling and Simulation Management (DoDD 5000.59).

## POLICY AND GUIDANCE

In 1991, the DoD Directive, 5000.59, the DoD M&S Management Plan was released. It satisfied the recommendations from DoD IG audits, Defense Science Board reports, the DoD Simulation Policy Study and Congressional direction that collectively identified the need for increased management oversight of the Department's M&S activities. This document designated the USD(A) for "strengthening the [uses] of modeling and simulation in joint education and training, research and development, test and evaluation, and operations and cost analysis." It also established the DoD Executive Council on Modeling and Simulation (EXCIMS) to "advise and support the USD(A) in the execution of this responsibility." Furthermore, the DEPSECDEF tasked the USD(A) to establish a Defense Modeling and Simulation Office to "serve as executive secretariat for the EXCIMS and to provide a fulltime focal point for information concerning DoD M&S activities [and to assist in the development of] M&S policy initiatives and guidance to promote cooperation among DoD Components...." This directive remains in effect with an expected sunset in the near future.

The EXCIMS Principals collaborated to write the 1995 M&S Master Plan. In 2004, the Tiger Team agreed that the M&S Master Plan still embodied the direction for DoD M&S. This enduring guidance is valid today, in spite of the leaps in technology. The overarching tenets of the plan implement policies in the DoDD 5000.59, provides justification for resources, and fosters M&S integration using common standards, processes and methods. One example of the foresight of these leaders can be found in paragraph C2.2.2:

*"Advanced M&S may integrate a mix of computer simulations, actual warfighting systems, and weapon system simulators. The entities may be distributed geographically and connected through a high-speed network. Warriors at all levels will use M&S to challenge their military skills at tactical, operational, or strategic levels of war through the use of synthetic environments representing every potential opponent in any region of the world, with realistic interactions. Acquisition personnel may use the same synthetic environments for research, development, and test and evaluation activities. M&S will increasingly be used to improve efficiency and effectiveness in engineering development and system design, manufacturing, and logistical support functions. Acquisition personnel will also use synthetic environments to support the acquisition decision-making process."*

These two documents are the basis of the Military Service policies and regulations, NATO and other international guidance, and OSD and Joint Staff guidance.

## **LEADERSHIP AND MANAGEMENT**

In 1992, the EXCIMS was formed and led by a Principal Staff Assistant (political appointee), with members at the three-star level from OSD, Joint Staff, Intel community, and the Military Services. The EXCIMS was supported by an M&S working group led by the Defense M&S Office (DMSO) Director. Additionally, there were three subcommittees, each led by a Senior Executive: Training, Acquisition, and Analysis. The subcommittees continued through 2004 and were responsible for much of the development work on common architectures and frameworks in use today, throughout Defense government, academia and industry.

In 2004, a Defense M&S Tiger Team, led by the Principal Deputy in DDR&E, examined Departmental needs and solutions. The Tiger Team was comprised of Senior Executives in Training, Acquisition, and Analysis, with inputs sought from other Senior Executives in the Services, OSD and the Joint Staff. At the conclusion, there was a decision to reform the leadership into a two-star level leadership team, the Modeling and Simulation Steering Committee. The Steering Committee would be assisted by a working group led by two GS-15s, from the Analysis and Training Communities. The Acquisition community leadership would be the Principal Deputy of DDR&E, who would Chair the M&S Steering Committee. The new supporting organization would take on a major role of enabling integration and became the Defense M&S Coordination Office. Both the Steering Committee and the M&S IPT expanded their membership to include communities enabled by M&S. Membership in the Steering Community required a GO/FO/SES level body in their community that focused on M&S and included Intelligence, Planning, Experimentation, and Testing as well as the three legacy members of Analysis, Acquisition, and Training.

This invigorated M&S Steering Committee spent six months to conduct strategic planning sessions that resulted in Department M&S Mission, Vision and Goals. They endorsed the 1995 M&S Master Plan as still being relevant and valid, as well as confirming the relevance of the DoDD 5000.59 as enduring guidance. In 2012, another strategic planning build reinforced the importance of the M&S goals and reaffirmed the importance of the DoDD 5009.59 and the 1995 M&S Master Plan. Budgets had been cut, and during this period, resources were designated towards initiatives that were common and cross-cutting. Some of these are related in the section below.

Currently, the Services and Defense communities maintain working groups focused on M&S. The DEM&S office under OSD (R&E) maintains authority under the existing policies; however, more recently there have been limited Defense-level M&S leadership meetings. It is unclear who has two or three-star level M&S leadership advocacy in the senior levels of OSD.

## **IMPACTS OF CENTRALIZED ORGANIZATION**

In the more than 30 years since the DoDD 5000.59 was released, much has been accomplished using centralized leadership across the Department. The original EXCIMS leadership broke ground for M&S applications through identifying and supporting capabilities that have strong cross-Department, and international, application. Following through with the initial efforts, the M&S Steering Committee defined goals that focused on reuse, interoperability, and standards.

This is clear from the M&S Master Plan, even as technology advances, we still need to ensure our focus remains on interoperability, reuse, and common data, models and architectures. With early senior-level direction, resources were focused on urgent needs and common good. Three examples of capabilities that were developed during the course of the past thirty years, with direct involvement of the enterprise-focused organization are High-level architecture (HLA), Synthetic Environment Data Representation and Interchange Specification (SEDRIS), and the Integrated Threat Analysis Simulation Environment (ITASE). All were built with common use, interoperability, and standardization as key components and each one has an enduring function. HLA quickly became a useful standard for federating distributed simulations. SEDRIS has evolved into more than M&S applications of environmental data (sedris.org). ITASE is a critical component of threat simulations.

One of the most compelling examples of the need and utility of a focal point for M&S is the ability of M&S Steering Committee members, and others in DoD, to quickly respond to a four-star acquisition summit in 2018. The issue was that organizations within the DoD rely on simulations and simulators that were built for a different purpose other than the current requirements by a different organization. When that organization needed to be responsive in a mission

rehearsal exercise, the technology fixes involved in reconfiguring and translating to integrate and share data was burdensome. Following the January summit discussions, Ms. Ellen Lord, then Under Secretary of Defense (AT&L), established a Simulator Interoperability Senior Steering Group (SSG) to address the M&S concerns. Because the Defense Modeling and Simulation Coordination Office (DMSCO) was the focal point for M&S in the Department, the Director, DMSCO established a supporting structure and working group to respond to the SSG. After several months of working group meetings and research, the SSG working group presented their findings to the SSG. In October, 2018, USD (R&E) signed a memorandum to implement short-term actions in several areas, and to continue to investigate and develop long-term objectives and strategies to address interoperability issues.

If there is not a centralized organization to address the needs of the Department, it would be extremely difficult to organize the right team to efficiently address urgent concerns such as simulator interoperability.

The questions explored in this paper are multi-faceted. How will OSD engage with the Services and Agencies on M&S? Will the OSD office of DEM&S remain the focal point for guidance, policy, and governance for DoD M&S? If so, who are the Senior Leader advocates? Will other offices in the US Department of Defense take on more governance leadership?

### ORGANIZATIONAL STAKEHOLDER SNAPSHOT

Over the past five years, there have been several events and activities that have influenced the Defense M&S enterprise, including publication of strategic documents, collaborative venues, and organizational changes. In 2018, OUSD(R&E) and the Director, Engineering Tools and Environment (ETE) published the Digital Engineering Strategy. Concurrently, the Defense Department was under-going a significant reorganization in 2018 that split the former Office of the Undersecretary of Defense (OUSD) for Acquisition, Logistics, and Technology (AT&L) into the OUSD Acquisition & Sustainment (A&S) and OUSD Research & Engineering (R&E). Equally impactful to Engineering and M&S professionals, there was a follow-on organizational merging of ETE and MSCO/Modeling and Simulation Enterprise (MSE) to form the Digital Engineering, Modeling & Simulation (DEM&S) office. (Figure 1)

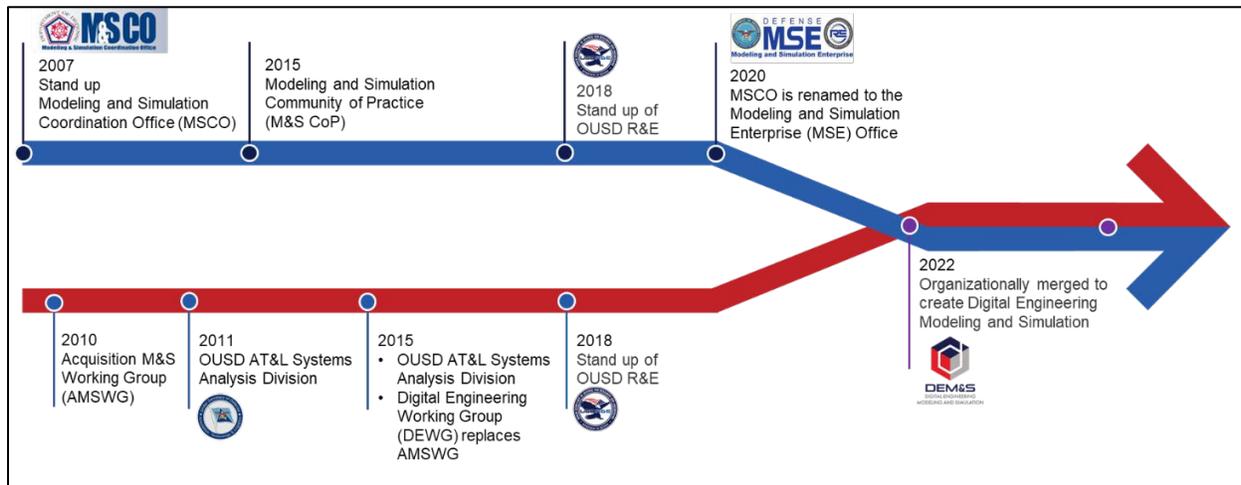


Figure 1. DEM&S Organizational Journey

The Director, DEM&S envisions a future where digital becomes the normal, with data and information flow across disciplines and ecosystems throughout the acquisition lifecycle. Additionally, powerful modeling, simulation and visualization tools are used, with AI use to elevate experts and gain insights. Ultimately, decisions are data driven and made with confidence earlier. With this vision, the department will outpace rapidly changing threats and technological advancements, and deliver advanced capabilities more quickly and affordably with improved sustainability to the warfighter. Initial priorities for the new DEM&S office include overseeing DoD-wide strategy, policy, and coordination to improve communication, lower risk, and optimize designs; highlighting current areas of research and programs of effort that aid to advance the practice of and culture around digital engineering across the DoD; and ensuring a data-centric, open systems architecture, and model-based systems engineering approach to the

design and development of complex warfighting systems. The driving force behind the DEM&S vision and priorities is the 2018 Digital Engineering Strategy. (Figure 2)

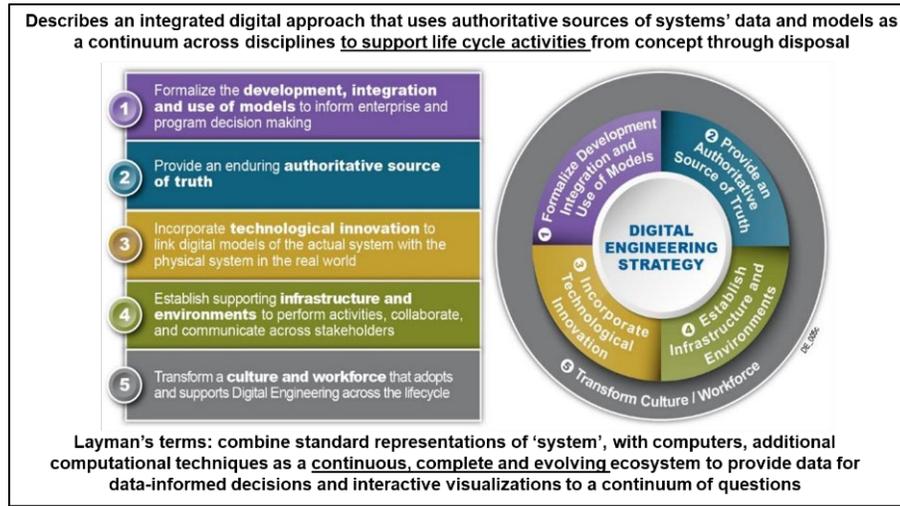


Figure 2. DoD Digital Engineering Strategy: Goals & Objectives

### Defense Training Community M&S Advocacy

Under the leadership of the Office of the Under Secretary of Defense for Personnel and Readiness (OUSD P&R), the department launched the Joint Operational Training Infrastructure (JOTI) Strategy, with the intent of fielding by 2030 a realistic, DoD-wide training capability providing realistic, high-end, interoperable, multidomain training against a peer adversary in a contested environment. Additionally, P&R is creating a three-star level military training executive steering group, focused on designing and critically solving joint, tactical training challenges.

Under the leadership of the Joint Staff -J7, the Joint Live Virtual Constructive (JLVC) capability is a federation of 34 Service and Agency tools, integrated by OSD and Joint Staff governance and policy, through Joint Staff-developed tools, to provide a joint environment for Service and Combatant Command events. A modernized JLVC Federation enable by M&S capabilities is necessary to improve the quality of training. Ultimately, this modernized JLVC Federation will deliver improved readiness by providing Joint context through the development of a secure and integrated Joint Live, Virtual, Constructive training environment.

JLVC Modernization was directed by OSD through an FY22 program decision memorandum, and the JLVC Modernization End State will be a reliable, realistic, relevant, repeatable, and recordable training environment to train Joint warfighters to successfully execute various Operations plans (OPLANS) by 2027. Lines of Effort include (1) Messaging & Synchronization, (2) Standardization, (3) Modernization, and (4) Increased Capability.

### Defense Test And Evaluation (T&E) Community Integrated Continuum

Under the leadership of Developmental Test, Evaluation and Assessments (DTE&A) the T&E community has proposed a new approach that moves T&E from a serial set of activities to a framework across the Systems Engineering (SE) and Mission Engineering (ME) functions that focus on a continuum of activities termed Test and Evaluation as a Continuum (TEaC). Executing TEaC will integrate SE, ME and T&E into parallel, collaborative and combined efforts through a dynamic, connected new model-based SE "V" environment. Thus, DoD can transition to a "model-test-validate-design-test" process providing early and continual information on expected mission capability. Especially relevant to the Defense M&S community are two of TEaC enablers, the Live Virtual Constructive (LVC) test environment, and the Model Based Environment. (Collins, 2023) (Figure 3)

The LVC test environment includes:

- Increased use of M&S and other constructive approaches, spanning the spectrum of threats and operational environments essential to obtaining a comprehensive understanding of systems’ performance.
- Implementing a model validation level (MVL) metric using simulation results and corresponding referent data to understand model trustworthiness.
- Continued evolution of test ranges and facilities to incorporate combined LVC capabilities – this evolution will entail a “shared” infrastructure within the Digital Engineering environment.

The Model Based Environment includes:

- A digital backbone and model-based approaches to manage the continuum of T&E activities.
- Integrated T&E activities with ME and SE activities conducted in parallel.
- “Digital Threads” displaying progress in modeling system performance beginning early in ME through the potential development of high-fidelity “digital twins.”

The T&E as a Continuum builds off the DoD 2018 Digital Engineering Strategy and DOT&E 2022 Strategy Implementation Plan making T&E an integral part of the Systems Engineering and Mission Engineering processes.

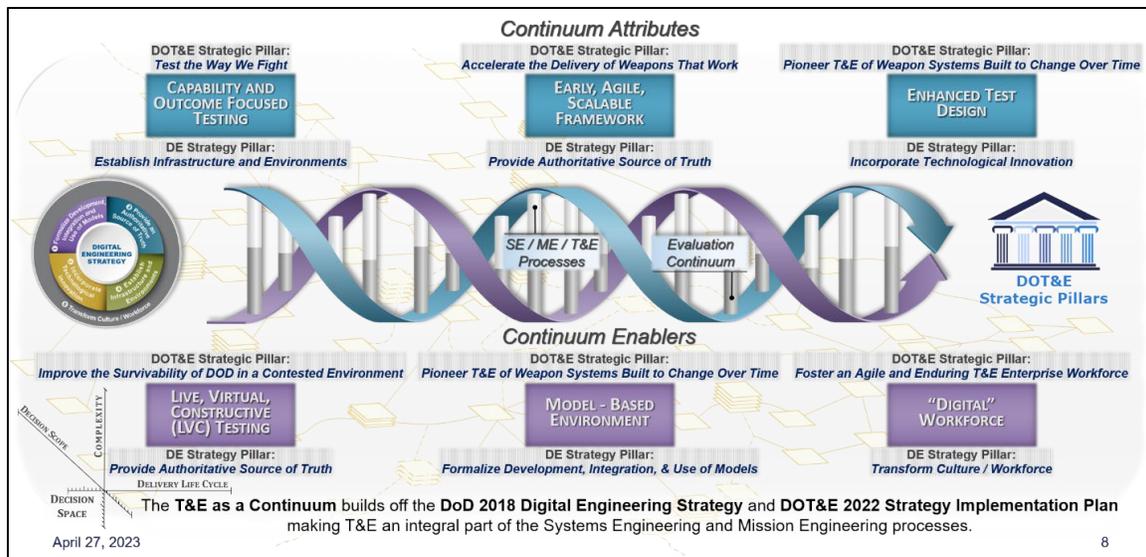


Figure 3. T&E as a Continuum: Attributes and Enablers

## PERSPECTIVES FROM THE SERVICES

### Army

The Army Modeling & Simulation Office (AMSO) provides the focal point over six M&S communities of practice: Acquisition, Analysis, Intelligence, Experimentation, Test & Evaluation, and Training. Under the leadership of AMSO, the 2023 Army M&S Forum focused on Army enterprise requirements, utilizing three lines of effort: Joint Interoperability, Modernization, and Multi-Domain Operations. The results of the Army M&S forum included potential gaps to be analyzed, validated and prioritized by senior leader committees. Furthermore, the Army M&S forum highlighted the importance of the use and availability of authoritative data; the lack of Army M&S governance structure; the use of numerous model and terrain standards; the lack of common scenarios across M&S communities; and the lack of awareness of tools across the M&S enterprise.

### Navy

The Navy Modeling and Simulation Office (NMSO) provides the focal point for M&S across the Department of the Navy. NMSO seeks to foster, facilitate, coordinate, collaborate and align M&S across the Navy with comprehensive

M&S and VV&A plans, policies and standards. Strategic objectives include (1) improve M&S interoperability and reuse; (2) provide authoritative representations and behaviors; (3) incorporate subject matter experts throughout M&S development and use; and enable discovery and minimize duplication. Ultimately, the NMSO mission and objectives will provide robust and credible capability to create synthetic environments that accurately represent platforms and systems, predict outcomes, and provide inputs to naval decision makers and Fleet users in support of numerous areas including acquisition, operations, and training.

### **Air Force**

The office of the Chief Modeling and Simulation Officer (CMSO) provides the focal point for M&S across the Department of the Air Force (DAF). At the 2023 DAF M&S Summit, the CMSO highlighted the DAF M&S Vision: Marshal collective modeling & simulation capabilities that are compatible and complimentary, and that affordably enable core Department of the Air Force competencies underpinning advanced employment of power in the air, space, and cyber domains. Furthermore, the CMSO provided strategic goals, to include: distinguish the M&S enterprise; revise and institutionalize M&S policy; establish a DAF M&S investment process; shape strategic DAF M&S investments; create incentives and communication avenues for stakeholders; and collect and curate a library of models and simulation elements. Ultimately, the DAF M&S Mission is to advance warfighting readiness by increasing collective, affordable, interoperable modeling & simulation-enabled capabilities vital to air, space, and cyber power.

### **Space Force**

The office of the Chief Technology and Innovation Officer (CTIO) provides the focal point for M&S across Department of the Space Force. At the 2023 DAF M&S Summit, the CTIO highlighted the goal to provide decision superiority and advantage through asymmetric effects delivered by providing the right digital infrastructure and innovative tools to craft a lethal warfighting force, while building partnerships, and taking care of our #1 resource, our people. Furthermore, M&S is a key enabler in the digital services ecosystem to empower analytic excellence facilitating decision advantage. Additionally, the CTIO highlighted their task to deliver a USSF Digital Modeling Strategy – a strategy to align, synchronize, and champion digital transformation efforts; advance the focus areas of operations, training, requirements generation, force design, acquisitions, and testing.

### **Marine Corps**

The Marine Corps Modeling and Simulation Management Office (MCMSMO) provides the focal point for M&S across the U.S. Marine Corps. Recent efforts to improve governance and coordinating the diverse M&S communities across the Marine Corps included MCMSMO proposed policy initiatives in five broad lines of effort that address common challenges: (1) Develop and implement M&S policy; (2) Establish and maintain enterprise technical frameworks; (3) Improve the use of M&S across the Service; (4) Shape the M&S workforce; and (5) Synchronize M&S research. The framework proposed demonstrates how a centralized office can provide value with specific deliverables that support multiple M&S stakeholders. (Telford, 2019)

## **DISCUSSION**

While OSD was executing organizational changes (2020-2022), the Defense Science Board (DSB) published their report on Gaming, Experimentation and Modeling & Simulation (GEMS).

There were several insights from the DSB GEMS Report that should influence M&S stakeholders. Described as “GEMS State-of-Play and Future Possibilities”, the report emphasized that DoD has pockets of GEMS excellence, but lacks necessary integration, resources, and talent to reap full benefits from GEMS. More specifically, digital engineering, synthetic environments to offset limits on open-air testing, multi-domain gaming and concept development, etc. are happening in DoD *but in an ad hoc fashion*. Furthermore, legacy issues persist, including lack of interoperability between models, mismatch between DMSCO charter and resources/authorities, differing security and network constraints, service-driven vs joint approaches, and limited interest in M&S products.

The DSB report addressed specific issues for senior leadership and M&S stakeholders. Most notably, there are complex choices confronting DoD (and the USG) that require analytically-informed options, but today’s

environment lacks both the demand signals needed to drive investment and the toolkit needed to deliver such products.

At this inflection point in Defense M&S Management, all of us must ask ourselves – how do we advocate for the most important M&S issues to enable:

- faster prototyping, development, testing, and upgrading of systems
- personalized/multi-domain training
- cost savings and reduced risk
- analytically-informed options for decision-makers

Where the DSB report addressed Modeling & Simulation Governance, the key insights included:

- M&S is ubiquitous throughout the military and often provides the best/only way to address issues in planning, acquisition, and training; and now in the standards and common asset libraries for digital engineering.
- Management structures for joint ventures presents issues that have minimized the effectiveness of the DoD's M&S governance capability
  - The DoD and Service M&S enterprises are conglomerates of smaller, constituency-based enterprises with separate authorities, funding lines, and priorities all supported in law, making governance challenging
  - Resources supporting M&S often originate at these local levels, making enterprise coordination and leadership difficult. This is demonstrated in the lack of interoperability of C4ISR systems, among others
- There is no agreed-upon corporate vision communicated and sustained long enough to effect change
- M&S Governance is relegated to a level from which it cannot exercise needed influence and/or control

There were two recommendation to address M&S Governance. First, to facilitate the adoption of GEMS interoperability and reusability

- USD(R&E) should convene a joint Senior Executive committee of individuals who can commit on behalf of the Services to the adoption of standards, achieving the selection of the first ten standards for capabilities with the most leverage within 18 months
- USD(A&S) should enforce the use of those standards, for Service and joint GEMS
- USD(R&E) should finance a jumpstart population of a library of reference models and gaming assets to be created and maintained by DTIC (see Recommendation 6.1)
- USD(R&E) with Under Secretary of Defense for Personnel and Readiness (USD(P&R)) should establish workforce policies, including GEMS specialty codes for uniformed officers, as well as provide oversight for GEMS workforce hiring, retention, and skill development

And ultimately to ensure lasting success, the DSB recommended the restructuring of DoD M&S Governance directly under a senior leader with appropriate authorities and resources for guiding the DoD M&S enterprise. This is a key finding that must be addressed to make progress in the Digital Transformation, including M&S.

## **INSIGHTS & CONSIDERATIONS**

There is a need to reexamine governing and collaborative best practices to allow stakeholders and decision makers to redefine roles and responsibilities to best manage and modernize M&S capabilities to sustain a Global Force in a Digital World.

Given the impacts of the past five years, including the merging of OSD M&S responsibility from MSCO into DEM&S, the anticipated retiring the DoD Directive 5000.59, and the sunset of the M&S Catalog, how will the Department implement the DSB recommendation? Where is the best office for the DoD M&S governance to reside with senior leader advocacy?

If the DEM&S office in OSD (R&E) continues to focus on Acquisition and Engineering functions, and not rebuild the Defense governance for M&S, (and they are not currently funded to do so), who in the Department can take on

the internal and external coordination and provide senior advocacy for the future? While the EXCIMS was active at the 3 and 4-star equivalent level, they also had responsibility for a budget that allowed impacts to be observed across the Services and OSD. The current DEM&S office, and their SETA support staff, have neither the background nor the resources to affect the level of stewardship that existed for the past 30 years.

Both the training and testing communities have robust M&S governance in place for their functional responsibilities. Would either of those organizations accept a role as Department leadership for the M&S enterprise? Certainly, the Intelligence community has the tools and technologies, though the classification level would eliminate some of the relevant capabilities from reaching the broader Department efforts. The analysis community likewise has a wealth of tools and technologies that are responsive to the theater and campaign level analysis they support. There is also a critical need to resource international technical collaboration where critical gaps occur across the M&S functional communities.

The recommendation by the Defense Science Board for GEMS governance provides the target; however, as the debates on roles, responsibilities, and resources continue, the M&S practitioners, stakeholders, and leaders, must be in alignment with the DE practitioners, stakeholders, and leaders.

Given the vision among the OSD functional communities, the Services must align their strategies. Leveraging the foundation of the OSD functional communities, the Services must innovate and share their best practices. During the collaboration driven by the OSD functional communities, the Services must engage and advocate for addressing the most critical M&S capability gaps.

**Defense Science Board – Gaming, Experimentation, Modeling & Simulation (GEMS), January 2021.**

Governance Recommendations:

Recommendation 7.2. ***Restructure the DoD M&S governance directly under a senior leader with appropriate authorities and resources for guiding the DoD M&S enterprise.***

Based on this paper’s Organizational Stakeholder Snapshot, each of the Service M&S management offices and leaders provide a vital focal point to foster, facilitate, coordinate, collaborate and align M&S issues across the Service stakeholders and support Service leadership and decisions. Additionally, the Service M&S management offices and leaders must address the joint implications that are particularly relevant in the Training and Testing functional communities. Similar to Defense M&S trends, the Service M&S management offices are limited by resource constraints and enabled by “coalition(s) of the willing.” Finally, based on this paper’s Organizational Stakeholder Snapshot, there is a need for further investigation, to include additional functional communities enabled by M&S – the Analysis community, the Experimentation community, and the Intelligence community to name a few.

To facilitate proper Defense M&S management, today’s inflection point demands proactive planning and implementation of strategic initiatives and activities. The development of strategic connections will be paramount, as well as the strategic communications plan to best advocate and promote the goals and objectives of those strategic connections.

If M&S stakeholders across the Defense and Service M&S enterprises are convinced and committed to the impacts of the Department’s digital transformation, there is a critical need to leverage the best practices and methodologies of successful programs and initiatives – regardless of the “stove-pipe” circumstances, and regardless of the governance shortfalls during this M&S enterprise inflection point. The Defense functional communities enabled by M&S are demonstrating purposeful efforts to include OUSD-P&R’s Joint Operational Training Infrastructure and the Joint Staff’s Joint Live Virtual Constructive (JLVC) capability. Additionally, DTEA’s Testing and Evaluation as a Continuum (TEaaC) leverages the critical enablers of the Live Virtual Constructive (LVC) test environment, and the Model Based Environment. To enhance M&S capabilities, our stakeholders must choose when and where to connect with the best organizations that demonstrate the best practices and methodologies. It is time to assess and try Defense governance options. Below are three possible courses that would be a feasible mechanism if there is Senior Leader engagement:

1. Advocate for OUSD-R&E leadership that best aligns with Defense Digital Engineering objectives, and committed connections with the Defense Test & Evaluation organizations, specifically, Defense Test, Evaluation & Assessment (DTEA), Office of the Defense Operational Test & Evaluation (DOT&E) and Test Resource Management Center (TRMC).

2. Advocate for OUSD-R&E leadership that best aligns with Defense Test & Evaluation objectives, and committed connections with the Defense Training organizations, specifically OUSD, Personnel & Readiness (P&R).
3. Advocate for OUSD-P&R leadership that best aligns with Defense Training objectives, and committed to connections with Defense Digital Engineering organizations, specifically OUSD-R&E's Digital Engineering, Modeling & Simulation office (DEM&S).

This may be the time to reestablish an executive-level council that, at a minimum, includes the leadership of Defense Training, Testing and Engineering communities, with membership from the Services and additional functional communities enabled by M&S.

At the enterprise level, modeling and simulation technology is more than a powerful and effective option to the engineering community. The use of modeling and simulation technology must be considered as a necessary and cost-effective enabling system or service to augment the capabilities of the set of processes defined by the ISO/IEC/IEEE 15288 standard. (Tolk, 2023) It is time to undertake a difficult, but fundamentally necessary, effort across Service and functional Communities enabled by M&S to redefine the challenges in a meaningful, measurable and lasting way.

## **SUMMARY**

Modern modeling and simulation technology is a critical part of the Defense Department's digital transformation, and a significant capability of all functional communities enabled by M&S. Ultimately, M&S stakeholders must align, advocate and advance the M&S community to sustain a Global Force in a Digital World.

There were several insights from the DSB GEMS Report that should influence M&S stakeholders. Described as "GEMS State-of-Play and Future Possibilities", the report emphasized that DoD has pockets of GEMS excellence, but lacks necessary integration, resources, and talent to reap full benefits from GEMS. To ensure lasting success, the DSB recommended the restructuring of DoD M&S Governance directly under a senior leader with appropriate authorities and resources for guiding the DoD M&S enterprise.

The M&S communities must consider what Defense M&S enterprise management functions are needed in the fast-moving digital transformation. For Defense M&S management, today's inflection point demands proactive planning and implementation of strategic initiatives and activities. The development of strategic connections will be paramount, as well as the strategic communications plan to best advocate and promote the goals and objectives of those strategic connections. An OSD Senior Leader must step forward to advocate for advancing the practice of reuse and interoperability across the Department and to fight for resources. There are several OSD organizations with equities that could assume this role. This paper has offered three possible alternatives, each of which requires significant leadership collaboration across the DoD.

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