

**Army Modeling and Simulation**

# **Strategy**

**21 July 2008**

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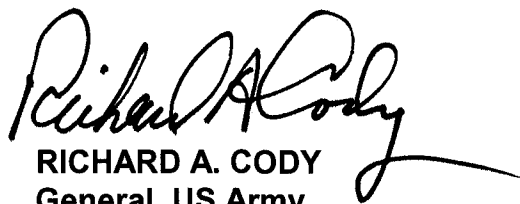
## Foreword

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Over the past quarter century, models and simulations have become ubiquitous and indispensable to the U.S. Army as vital enablers of the Generating and the Operating Forces. The same can be said for the Department of Defense (DOD) and Joint Forces. This significant role played by modeling and simulation (M&S) is largely transparent to end-users, whether operational commanders or other senior leaders. The emergence of a military M&S enterprise and our increasing reliance on M&S to execute diverse Title 10 responsibilities was fueled, in large part, by the rapid increase in the performance-to-price of processors, servers, graphics engines and networks (although M&S software development has remained comparatively expensive). As this enterprise grew, the Army and DOD responded with systems to manage the multiple domains of M&S investment and usage. These various management systems oriented chiefly on governance of simulations of record from the point of view of the user domains.

Throughout the 1990's, following the end of the Cold War, the U.S. Army began transforming itself in response to the changes taking place in the world-wide security environment. As changes to the Army and the operating environment gained traction, much of our M&S functionality could not keep up, making much of our M&S less relevant to their intended usage over time, particularly in analytical models. Concurrently, DOD launched large and costly programs to develop new simulations. These monolithic simulation programs had the unintended consequence of diverting resources from developing new functionality into existing, relevant M&S capabilities. In the aftermath of 9/11, this functionality gap widened at an accelerated pace, and the relatively high cost of M&S research, improvement, and software development became significant barriers to closing this growing gap. In practice, our management systems did not achieve good stewardship of M&S capabilities, regardless of the particular simulation or its intended use.

We have an opportunity to apply what we have learned over the past two decades to a new enterprise. The new way will promote a balance between strong oversight of M&S from a corporate point of view, and sound stewardship of M&S support to capability development. The gaps in our M&S capabilities will be strongly linked to gaps in the capabilities of current and future forces in order to better identify M&S requirements and guide M&S investments to achieve the greatest possible return for our Army. This new way will better ensure that our M&S are relevant and suitable to their purposes and meet Army-wide needs with the most affordable and effective M&S enterprise.

  
**RICHARD A. CODY**  
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Vice Chief of Staff

## **Shaping the Way Ahead**

The new Army M&S strategy is developed to address these issues and complement published Army Strategic Planning Guidance (ASPG) 2006-2023. The ASPG states, “as the Army’s institutional strategy, (ASPG) represents the Army senior leadership’s vision of how the Army will fulfill its mission to provide necessary forces and capabilities to the Combatant Commanders in support of the National Security and Defense Strategies. It also communicates the Army’s priorities for employing available resources.” As the Army executes the process of re-examining and challenging basic institutional assumptions, organizational structures, policies, and procedures to better serve the Nation, M&S will play an increasingly important role in decision-making processes, doctrine and capabilities development in the emerging network-enabled environment. Both Army and Joint Capstone Concepts provide the strategic context that will drive future M&S efforts in development of both materiel and institutional capabilities required to realize full spectrum dominance. Expectation of an increasingly resource constrained future requires that the Army leverage M&S more than ever to minimize cost and do more with fewer resources to make informed, fact-based decisions and provide more relevant and ready forces and capabilities to the Army and Joint Team.

## **The Current Environment**

A preponderance of our M&S were developed to represent a Cold War adversary and do not adequately reflect the current operational environment or evolving Generating Force processes. These are our most urgent Army M&S capability gaps to be addressed. Fundamental aspects of the current fight and capabilities development processes are not well represented in Army M&S include rapidly developing networks (as well as replicating potential network vulnerabilities), Battle Command systems, irregular warfare, counter-insurgency operations, dynamics of human behavior, social networks, non-lethal technologies, research and development, systems engineering methodologies, Generating Force, weapons effects and war-fighter survivability and other future enabling capabilities. These are now critical components of planning, developing, fielding and conducting successful current operations and will be increasingly vital to success in the commander-centric, network-enabled environment of the future. Additional critical gaps are our ability to replicate from the systems perspective, our ability to generate and project power from Continental United States (CONUS) (under Army Force Generation (ARFORGEN)) as well as our forces stationing and inclusion of medical care in the scenarios. Many of our current representational concerns can be traced to a lack of integrating standards (such as Geospatial) and a lack of basic, reliable, generally accepted data (to include both classified and unclassified data sets) and process descriptions. These gaps adversely impact our ability to provide M&S support to critical decision-making, concept development, operational assessment, and training and degrade the spectrum of M&S support to the Operating and Generating Forces.

## Pushing M&S to the Tactical Edge

The Deputy Chief of Staff - 3/5/7 has developed an overarching M&S strategy that articulates an aggressive Army vision to achieve tactical level M&S use: *By 2016, Leaders at all levels, from the Generating and Operating Forces down to platoon level will routinely employ models and simulations that support decision-making, course of action development, mission planning, rehearsal, and operations.*

### Strategic Objectives

The overarching intent of this strategy is to provide clear unity of effort and purpose in the development and use of models and simulations across Operating and Generating Force functions, and the institutional enterprise with focus on leveraging the power of M&S at the tactical edge as a critical combat multiplier. The following strategic objectives are vital to the M&S enterprise achievement of Army intent:

- Address M&S Capability Gaps. Identify and prioritize M&S functional gaps tied to the capability gaps in the Army's Operating Force (current and future), Generating Force, and institutional processes and aggressively fill them in coordination with the Army Staff (ARSTAF) capability area principals.
- Support The M&S Enterprise. Provide support to M&S organizations, users and developers:
  - Systems Approach. Develop and expand a collaborative set of processes building on the example of current practices in the Cross-Command Collaborative Environment (3CE) across multiple communities in the Operating and Generating Forces to gain unity of purpose, integrating standards (Geospatial, parametric data, etc.), shared capabilities and efficiencies and apply corrective actions based on recursive feedback into the process.
  - Qualified M&S Work Force. Coordinate among civilian and military career managers to meet the Army's needs for professional M&S personnel and ensure that the Army can meet its needs for M&S expertise to support all aspects of Army M&S.
- Dedicated Data Program. Create and manage a robust data collection process, a robust data mining process, and develop an accessible data repository to enable more responsive, credible modeling (especially for current operating and generating environments), based on operations, training, experiments and testing.
- Full Joint and International Engagement. Strengthen coordination and integration with the Office of the Secretary of Defense (OSD), the Joint Staff, the Services, and international partners to achieve indisputable authority in representation of Army systems and processes in joint M&S, credibly represents the Joint operating

force and better leverages DOD investments while exchanging capabilities and building international partnerships.

### **Operational Concept**

Central operating concepts of M&S strategy enable strategic objectives through more effective governance and integration of effort, improved stewardship of M&S requirements and more holistic management of the M&S. These concepts are directed at addressing Army priorities by leveraging what the M&S enterprise does well while maximizing resources in a constrained environment:

- Army user domains – Advance Concepts and Requirements (ACR), Research Development and Acquisition (RDA), and Training Exercises and Military Operations (TEMO) – will continue to be responsible for and manage their respective M&S programs, federations and federates.
- Army governance of M&S will be guided by an M&S Campaign Plan and advised by an M&S General Officer Steering Committee (GOSC) and a Council of Colonels (CoC) represented by user domain managers, communities of interest, ARSTAF proponents of capability areas, and other members TBD. HQDA oversight will be accomplished through M&S Directorate, DCS, G-3/5/7 execution of General Order #3 and Army Regulation (AR) 5-11 responsibilities.
- M&S capability gaps not identified in the Army’s formal requirements development process will be routinely assessed by Capability Area Teams (CATs) on behalf of respective ARSTAF principals, for M&S GOSC coordination and G-3 prioritization.
- A new centrally-managed, robust program of operational and generating data collection, reduction, analysis, algorithmic and cross-domain standardization, as a component of the Army Data Program, will become a vital enabler of modeling capabilities.
- Army M&S that serve Generating Force processes, Operating Force capabilities, as well as institutional Army processes will be more fully accounted for.
- Procedures and M&S enterprise-wide collaborative efforts will maximize commonality, reuse and interoperability across the M&S users and developers.
- M&S enterprise processes to address M&S gaps will be strongly aligned with Army and DOD programming and budgeting processes.

Effective M&S support to Army priorities requires enterprise-wide focus on compelling M&S functionality and workforce gaps with a unified, cooperative, and collaborative approach in both Governance and an expanded systems approach building on 3CE methodologies.

## Collaborative Implementation

Implementation of this strategy is intended as a cooperative effort between all stakeholders in the M&S enterprise to include: the warfighting COCOMs, Army Service Component Commands, Direct Reporting Units, Field Operating Agencies and proponents; the acquisition, analysis, experimentation, testing, planning and operations, and training M&S communities, and other Business Mission Areas; the Joint staff, OSD, Services, Agencies, Executive Branch, Congressional Caucus, and international partners. Army implementation and achievement of the vision will largely be accomplished through the continued decentralized execution of M&S enterprise missions. Enterprise mission execution will be guided by an Army M&S Campaign Plan to be developed cooperatively by the M&S CoC, approved by the M&S GOSC, and will reflect the Army strategic objectives for M&S. It is understood that many organizations play vital leading roles in execution of the Army M&S mission, and this strategic plan is not intended to articulate those roles and responsibilities or infringe upon them. Roles and responsibilities remain as prescribed by AR 5-11 dated 1 February 2005 until revised in accordance with the evolving concept. This strategy intends to achieve a shared understanding of Army M&S intent, regardless of roles and responsibilities, unless otherwise specified.

This strategy is further developed along two major lines of operations (LOO), one across M&S operations and the other across development of the workforce. Figure 1 depicts the lines of operation, tasks and objectives of M&S effort.

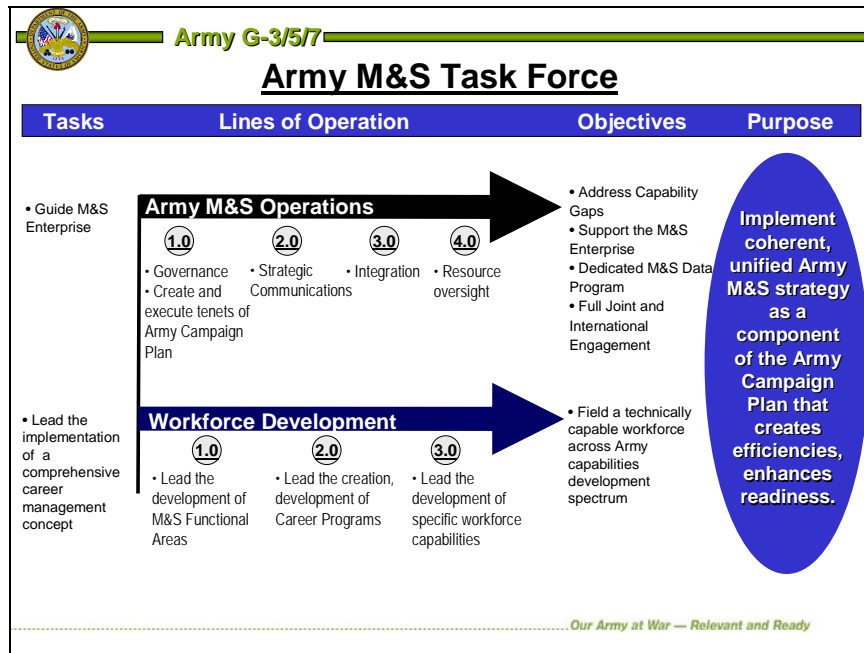


Figure 1. M&S Strategic Lines of Operation

Army Commands, Supporting Component Commands, Direct Reporting Units, Field Operating Agencies and proponents will continue to leverage the Army's formal

requirements development and integration processes to identify, validate and prioritize M&S requirements. Additionally, the M&S enterprise will leverage a new process of expert review by M&S Capability Area Teams (CATs), each closely aligned with an Army capability area and its respective ARSTAF proponent who act as the capability area lead. Each CAT will continually assess its respective capability area, identify M&S gaps in both the Operating and Generating Force, and forward them through its ARSTAF capability area lead for validation, requirements determination and integration, and resourcing. Figure 2 identifies the initial CAT organization.

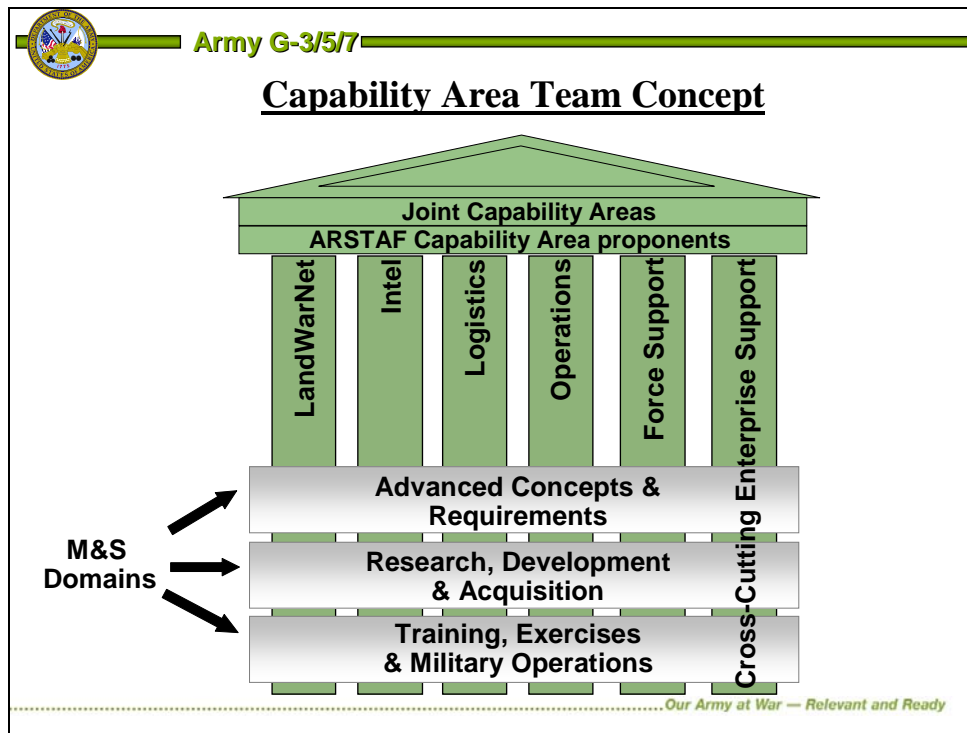


Figure 2. Capability Area Team Concept

The CAT will respond to and focus its efforts in accordance with the direction of its ARSTAF proponent. Additionally, CAT efforts will focus on fulfilling M&S requirements that are not already governed under Army domain leaders, program managers or the M&S CoC. M&S requirements identified and developed by CATs will be forwarded for action by the ARSTAF capability area lead to the Army's process that considers unfunded requirements for validation and resourcing. Those not resourced through the Army's formal deliberation process will be further considered for funding through the Director, M&S in the DCS, G-3. The CAT process replaces the Functional Area Collaborative Team (FACT). The following describe the Capability Areas and scope to be addressed by the respective CATs:

- LandWarNet – This capability area encompasses the functions associated with the Joint Capability Areas (JCA) of Command and Control, Battle Command, and NetCentric Operations. Scope: Describes a vision of how Command and Control (C2)/Battle Command will be executed in support of the Joint Force Commander,



and an information and decision superiority-based concept describing how the Army will operate as a component of a joint force in a fully networked environment 10 to 20 years in the future. This CAT will be co-led by the DCS, CIO/G-6 and the DCS, G-3/5/7.

- Intelligence – This capability area encompasses the components of the JCA Battlespace Awareness. Scope: Considers the Intelligence, Surveillance, Reconnaissance (ISR) and Operational Environment (OE) aspects of future Joint Force Battlespace Awareness capabilities to support the full Range Of Military Operations as envisioned circa 2017. This CAT will be led by the DCS, G-2.
- Operations – This capability area encompasses the components of the JCAs Force Application, Force Protection, and the Force Preparation component of Force Support (Training, Exercises, Education, Doctrine, Lessons Learned, Concepts, and Experimentation). Scope: Capabilities required to effectively apply force throughout the spectrum of conflict in the 2015 timeframe, described by the operational themes in FM 3.0 including Major Combat Operations, Irregular Warfare and Net Centric Operations; and execution of protection operations must be integrated with the overarching Joint Force operations construct, in which the ability to monitor, understand, decide and execute will be the cornerstone of success. This CAT will be led by the DCS, G-3/5/7.
- Logistics – This capability area encompasses the components of the JCA Logistics. Scope: Logistics architectures across the Army Business Enterprise, deployment, Strategic mobility and Engineer support, and logistic situational understanding and decision support in 2015. This CAT will be led by the DCS, G-4.
- Force Support - his capability area encompasses the components of the JCA Force Support less the Force Preparation component. Scope: Examines a set of integrated policies, processes, and tools to establish, develop, maintain and manage a mission ready Total Force, including Force Health Protection, and provide, operate, and maintain capable installation assets across the total force to ensure needed capabilities are available to support National security. This CAT will be co-led by the DCS, G-1 and Deputy, Assistant Chief of Staff for Installation Management (DACSIM).
- Cross-Cutting Enterprise Support – This capability area encompasses the components of the JCA Corporate Management & Support. Scope: Provide strategic level, enterprise-wide leadership, direction, coordination, and support to the M&S users and developers. This CAT will be led by the DCS, G-3/5/7.

Improved unity of M&S effort also requires more comprehensive, holistic management of the M&S workforce in accordance with the Army's Forces Development model. Army human resource policy is to develop multi-functional officers through increased cross-training. Likewise, the Deputy Under-Secretary of the Army (DUSA)

has stated the need for co-alignment and co-intent for multifunctional civilian development. The M&S enterprise will develop a plan across functional areas and career programs to support Army intent and integrate M&S enterprise culture and expertise.

### **HQDA Areas of M&S Emphasis**

Under this strategy, the M&S Directorate, Deputy Chief of Staff (DCS), G-3 will be the ARSTAF focal point for M&S. The M&S Directorate mission will be to develop enabling policy and provide a cross-command collaborative environment, building on the 3CE methodology, by which to integrate effort to organize and equip the Army with M&S capabilities, and train and supply qualified M&S professionals to Army. However, M&S Directorate efforts will be tightly synchronized with M&S GOSC guidance that represents the M&S enterprise at large. The M&S Directorate will advise the G-3 on the prioritization for correction of M&S functional gaps identified through the CATs process; will monitor and advocate M&S investment across the Army and advise the G-3 on M&S investment, uncertainty, risk and mitigation. Achievement of M&S intent to integrate and unify effort requires collaborative CoC and HQDA development and institutionalization of necessary metrics and feedback mechanisms across the enterprise that inform leadership on how the M&S enterprise is performing and the benefit leaders get for their investment. To this end, the M&S Directorate will lead development of enterprise-wide Return on Investment (ROI) metrics to assess and monitor M&S affordability and cost effectiveness. Additionally the M&S Directorate will serve as the authoritative M&S interface to DOD, the Joint staff, and international fora.

### **Task Organization and Governance**

Army M&S will continue to employ a three-domain structure (Advanced Concepts & Requirements (ACR), Training, Exercises and Military Operations (TEMO) and Research, Development and Acquisition (RDA)) by which to manage effort. These domains depicted at Figure 3 were developed to encompass the Army's M&S enabled functions and continue to do so adequately. Moreover, as the figure shows, they readily embrace and map to the six communities of M&S users called out in DOD's new M&S management structure. The M&S CoC will develop a way to effectively interface with DOD. Likewise, M&S mission execution will be guided by a governance structure and processes as defined in an M&S Campaign Plan to be developed cooperatively under the M&S CoC. M&S CoC and GOSC purview will be defined in a formal Charter for VCSA approval. Army M&S must share common capabilities and serve multiple purposes, regardless of communities or domains. In order to achieve future "end-to-end" capabilities such as Future Combat Systems and Net Centric capabilities, the M&S enterprise must leverage M&S across domains, communities and all communities of interest including Army Mission Areas such as Human Resources, Intelligence, Communications, Reconstruction and Stabilization, and Logistics that have Army-wide impact. Army M&S governance processes will reflect all Army interests, including Mission Area leaders, and the composition of forums and initiatives will reflect this intent.

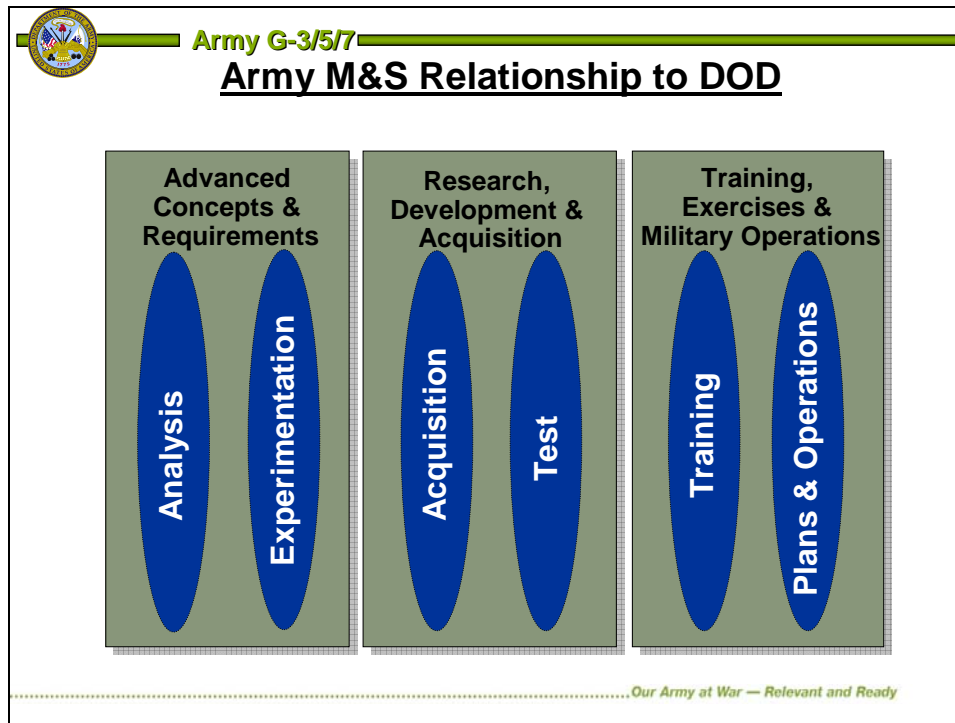


Figure 3. Army M&S Relationship to DOD

### **M&S Workforce Development**

Army M&S strategic intent is that stakeholder proponents will develop a cooperative management approach to workforce development in accordance with Officer Professional Management System (OPMS) policy approved by the Chief of Staff of the Army and developing civilian workforce guidance from the Deputy Under Secretary of the Army. This strategy serves as a framework by which to address workforce development issues. Each stakeholder proponent workforce specialty including Functional Area (FA) 49, FA 57, Career Program 36, FA 50, and civilian job series 1515 will remain under the operational control/direction of their current proponent; however, each proponent will participate in functional developmental working groups, collaboration activities, and executive developmental reviews. Workforce development will be a cooperative effort amongst stakeholder workforce proponents.

### **Summary**

Today's Army is served by a dynamic and invaluable M&S enterprise, the result of years of concerted efforts by many; however, we can improve our M&S support to Soldiers who deserve our best. This strategy acknowledges the impact of change taking place in the world around us in the operating and generating environment and in the advance of technologies to which the M&S enterprise must react. If M&S is to be the critical enabler we envision, the enterprise must embrace a more disciplined and collaborative approach to ensure that our M&S are relevant, suitable and meet Army-

wide needs in the most affordable and effective manner. The M&S enterprise must be postured to enable the Army to meet the challenges of a future of persistent conflict and ever evolving threats. The keys to success are Senior Leader buy-in, user driven activities, and Army-wide advocacy of this new approach to guide mission execution and stewardship of M&S requirements and to ensure HQDA can focus appropriate resources on priority M&S needs to benefit Warfighting capabilities. The next steps are to develop an implementing Campaign Plan and to revise AR 5-11. Development of the Campaign Plan will be guided and approved by the M&S CoC and written by the M&S Directorate.