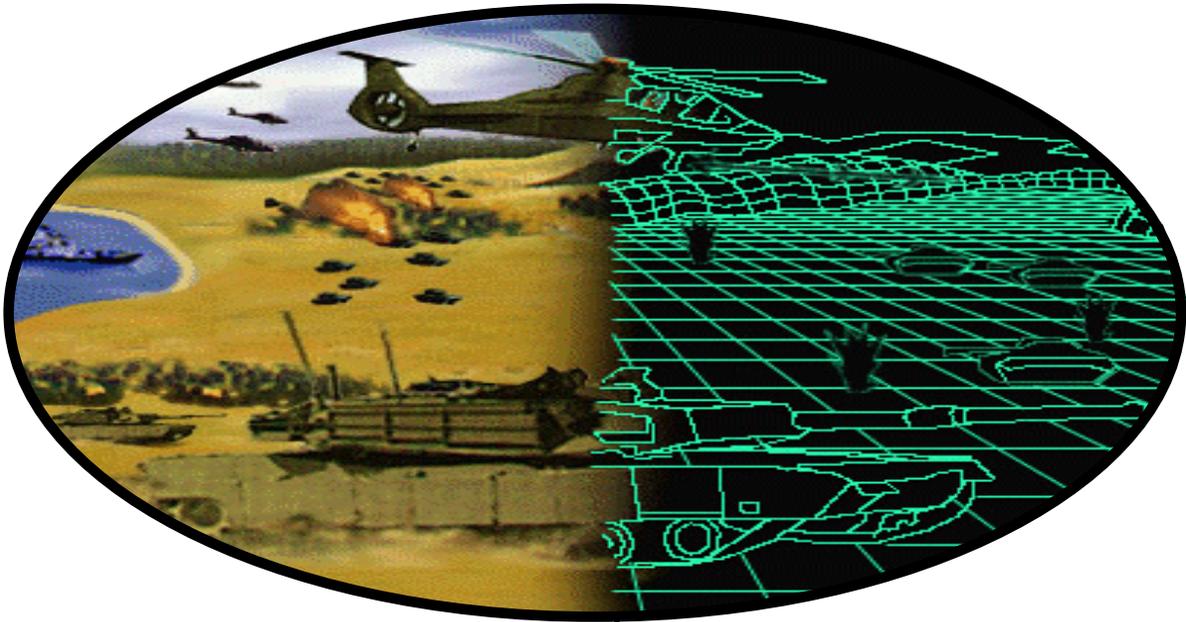


# The Army Model and Simulation Master Plan



Headquarters, Department of the Army  
Office of the Deputy Chief of Staff for Operations and Plans  
and  
Office of the Deputy Under Secretary of the Army (Operations Research)

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The Proponent for this document is the Army Model and Simulation Office, Headquarters, Department of the Army.

Please address all inquiries or suggestions to:

Director, Army Model and Simulation Office  
ATTN: DAMO-ZS  
400 Army Pentagon  
Washington, DC 20310-0450

## FOREWORD

The Army has a long history of using Models and Simulations (M&S) in every facet of Army operations. We train at all levels and across the globe using M&S. Our key decisions consider analytical results derived using M&S. We use M&S to improve the quality of our acquisition process and the products we deliver to our soldiers. In short, M&S are vital tools for accomplishing our mission.



*The Army M&S Master Plan* provides a framework for moving to the future. Our fundamental objective is to provide world-class M&S that meet the needs of the Total Force. By emphasizing efficient development, the Master Plan encourages the development and acceptance of innovative processes such as Simulation Based Acquisition (SBA). Since M&S will play an increasing role in how the Army acquires its capabilities for Army After Next, SBA must be incorporated by all as an integral part of the M&S vision and strategy.

This plan describes the Army's vision for M&S, our management structure and processes, and our M&S strategy. The objectives in the strategy cover the life cycle of our M&S, addressing management tools, requirements, investments, standards and technology, M&S infrastructure, and education. The priorities and overarching guidance provided in this plan will help shape the main efforts of our near-, mid-, and far-term activities.

Our objectives fully support the *Department of Defense Modeling and Simulation Master Plan*. It is only through collegial cooperation with our operational partners in and outside of DoD that we can realize the benefits of our M&S.

Acting on behalf of the Army M&S General Officer Steering Committee (AMS GOSC), we approve this Master Plan. We commend it to all with an interest in the success of our Army. Our M&S will provide the foundation for much of our future. Soldiers are our credentials!

ROBERT M. WALKER  
Army Acquisition Executive  
Co-Chair, AMS GOSC

WILLIAM W. CROUCH  
Vice Chief of Staff of the Army  
Co-Chair, AMS GOSC

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Date

Date

## Executive Summary

The Army uses its Models and Simulations (M&S) as key tools for meeting its Title 10 responsibilities. *The Army Model and Simulation Master Plan* provides direction for all Army organizations involved in the life cycle management of computer-based M&S capabilities by or for organizations of the U.S. Army. The plan describes the Army’s vision for M&S, reviews the Army’s M&S management structures and processes, details the Army’s strategy for achieving the vision, and provides strategic guidance for M&S managers, developers, and users. The Army’s strategic objectives fully support the objectives in the *Department of Defense (DoD) Modeling and Simulation Master Plan*.

The Army’s vision for M&S describes the M&S capabilities the Army will use in the future. The Master Plan contains a summary of the Army’s M&S vision published in *The Army Vision for M&S After Next*. By the year 2010, world-class M&S will meet the needs of the Total Force across the full spectrum of operations. Infusing advanced technology into programs that cross mission areas will create a toolbox of credible, general-purpose and specialized tools. The Operational Force and the Institutional Army will use these tools as an integral part of their activities. Managing modeling and simulation as a core-enabling competency will sustain the effectiveness of Army M&S. The Army will also continue its DoD leadership role in advancing the art and science of using M&S to improve operations.

The Army’s strategy for achieving the vision focuses on one fundamental objective, "**World-class M&S that meet the needs of the Total Force,**" as the essence of the vision. The strategic intent is to depend upon decentralized execution guided by centralized oversight to reach that objective. As a unifying theme, the strategy uses the guiding principle "**Develop Efficiently,**" as exemplified by the process of Simulation Based Acquisition (SBA), for shaping the main effort.

Thus, the Army’s M&S strategy has two aspects: (1) Reach the Fundamental Objective, and (2) as the main effort, Emphasize Efficient Development. To implement this strategy, the Master Plan separates the world of M&S life cycle management into six components. Each component has a corresponding strategic objective. Together, the objectives describe what must be accomplished to reach the fundamental objective. By applying the guiding principle to each component, a Priority Task is chosen. The set of priority tasks forms the main effort. The following table summarizes the details of the strategy.

Components	Strategic Objectives (Summarized)	Priority Tasks
1. Management Tools	Effective Management Tools	Assess Progress
2. Requirements	Sufficient Requirements	Integrate Requirements
3. Investments	Necessary Investments	Reconcile Investments
4. Standards and Technology	Comprehensive Standards	Develop Standards
5. M&S Infrastructure	Efficient M&S Infrastructure	Manage M&S Infrastructure
6. Education	Informed Community	Educate the Force

Finally, the plan provides specific guidance for all organizations: Be efficient today, Focus on the future, and Think and be Joint. Implementing the common vision and supporting strategy will set the stage for future success: *Quality people using world-class M&S that meet the needs of the Total Force across the full spectrum of operations.*

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## Chapter 1. General Information

### A. Purpose

The Army uses its Models and Simulations (M&S) as key tools for meeting its Title 10 responsibilities to organize and sustain highly trained and properly equipped forces for use by the Combatant Commanders-in-Chief (CINCs). *The Army Model and Simulation Master Plan* provides direction for Army organizations and for supporting management and investment plans. The plan describes the Army's vision for M&S, reviews the Army's M&S management structures and processes, details the Army's strategy for achieving the vision, and provides strategic guidance for M&S managers, developers, and users. The plan's strategic objectives support the objectives in the *Department of Defense (DoD) Modeling and Simulation Master Plan*.

### B. Authority

Army Regulation (AR) 5-11, *Management of Army Models and Simulations*, directs the Army Model and Simulation Office (AMSO) to publish *The Army Model and Simulation Master Plan* as a planning guide for the Army M&S community. The plan is updated every odd-numbered fiscal year.

### C. Scope

This plan applies to all Army organizations (Active Army, Army National Guard, and U.S. Army Reserve) involved in the life cycle management of computer-based M&S capabilities by or for organizations of the U.S. Army.

### D. History

The plan supersedes the 1995 version of *The Army M&S Master Plan*. However, it is not a replacement as much as an evolution of the earlier plan in that it incorporates the objectives of that plan and expands its scope to cover the broader set of departmental-level responsibilities outlined in AR 5-11 (10 Jul 97).

### E. Organization

The plan is organized into five chapters and five appendices.

#### 1. Chapter 1

Serves as an introduction to the plan and lists the general responsibilities for developing and executing the strategy for Army M&S.

#### 2. Chapter 2

Summarizes the Army's vision for M&S as approved by the Army Model and Simulation General Officer Steering Committee (AMS GOSC) and published in *The Army Vision for M&S After Next* (available at the AMSO Web site, <http://www.amso.army.mil>).

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### **3. Chapter 3**

Reviews the Headquarters, Department of the Army (HQDA) management concepts, structures, and processes that support the execution of the Army M&S strategy to include the specification of the domains of mission activity in which M&S tools are used and the designation of Domain Managers. The chapter also describes the Standards Development Process managed by AMSO and designates the organizations responsible for appointing the individual Standards Category Coordinators (SCCs).

### **4. Chapter 4**

Provides the details of the Army M&S strategy to achieve the vision. The chapter establishes the fundamental objective, "World-class M&S that meet the needs of the Total Force," as the essence of the vision. It then defines six components of the world of M&S life cycle management. For each component, the chapter sets the corresponding strategic objective and the associated sub-objectives, actions, and metrics.

### **5. Chapter 5**

Provides strategic guidance for all managers, developers, and users of Army M&S. The chapter identifies the Priority Tasks for each component, provides overarching guidance, and provides specific planning guidance based on the priorities of the Army leadership.

### **6. Appendices**

Provide guidelines and general information. Appendix A discusses the development of domain plans. Appendix B provides guidelines regarding the Army Model Improvement Program (AMIP) and the Simulation Technology (SIMTECH) program. Appendix C contains the glossary. Appendix D lists references that provide context for the plan. Appendix E, published separately, is *The Army M&S Investment Plan*.

#### **F. Responsibilities**

The management of M&S in the Army is a shared responsibility. The following responsibilities are drawn from AR 5-11. Figure 1 shows the relationships among several of the positions and organizations in the HQDA M&S management structure discussed below.

##### **1. The Vice Chief of Staff of the Army (VCSA) and the Army Acquisition Executive (AAE)**

Serve as co-chairs of the AMS GOSC.

##### **2. The Assistant Secretary of the Army for Research, Development, and Acquisition [ASA(RDA)]**

Directs Army-wide research, development, and acquisition in support of M&S. Leads Army participation in development of the *Office of the Secretary of Defense (OSD) Technology Area Plan* and the *Technology Area Review for M&S*.

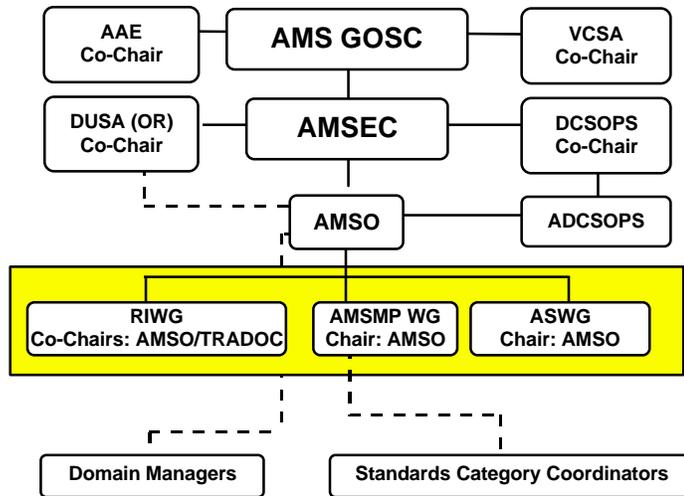


Figure 1. HQDA M&S Management Structure

### 3. The Army M&S General Officer Steering Committee (AMS GOSC)

Meets as required only to resolve major issues of Army M&S management. Provides strategic guidance for the direction of Army M&S. The AMS GOSC approves the vision for Army M&S, *The Army M&S Master Plan*, and *The Army M&S Investment Plan*.

### 4. Deputy Under Secretary of the Army (Operations Research) [DUSA (OR)]

Serves as HQDA proponent for M&S policy and standards. As co-chair of the Army M&S Executive Council (AMSEC), reviews and recommends approval of the Master Plan. Provides HQDA staff guidance for the execution of the Army M&S Management Program (AMSMP) to include policy formulation, programs, plans, goals, architectures, standards, structure, and resources. Acts as the Army proponent for information repositories pertaining to Army M&S.

### 5. Deputy Chief of Staff for Operations and Plans (DCSOPS)

Serves as HQDA proponent for M&S planning, prioritization, and programming. As co-chair of the AMSEC, reviews and recommends approval of the Master Plan. Fully integrates, prioritizes, and oversees M&S requirements (as approved by the Commanding General (CG), Training and Doctrine Command (TRADOC) and applications throughout the Army.

### 6. The Army Model and Simulation Executive Council (AMSEC)

As the principal council which adjudicates issues governing all M&S activities in the Army, the AMSEC makes recommendations regarding the Army position on M&S issues to the co-chairs. The AMSEC has subcommittees to include at a minimum: the Requirements Integration Working Group (RIWG), the AMSMP Working Group (AMSMP WG), and the Advanced Simulation Working Group (ASWG).

### 7. The Director of Information Systems for Command, Control, Communications, and Computers (DISC4)

As the Chief Information Officer for the Army, allows unique policy guidance for M&S within the Army Enterprise Architecture (AEA), if necessary.

**8. Principal HQDA and Secretariat officials, including those listed above, Major Command (MACOM) commanders, directors, and agency heads within the Army**

Serve as M&S proponents for individual M&S applications within their areas of responsibility. Implement and monitor M&S activities for Field Operating Agencies (FOAs), Staff Support Agencies (SSAs), and any other activities under their purview.

**9. Commanding General (CG), TRADOC**

Reviews and approves Army M&S requirements. Has the lead to provide M&S education for the force.

**10. Assistant Deputy Chief of Staff for Operations and Plans (ADCSOPS)**

Oversees the AMSO for the for the DCSOPS.

**11. Director, Army Model and Simulation Office (AMSO)**

Heads the Army central management office for M&S with the mission to provide the vision, strategy, oversight, and management of M&S, across all domains, in support of the AMS GOSC and the AMSEC. Sponsors the development of standards as directed by the DUSA (OR). Serves as the Army's central point of contact for M&S activities with Joint and other DoD organizations. Publishes AR 5-11, *The Army M&S Master Plan*, *The Army M&S Investment Plan*, *The Army M&S Technology Review*, *The Army M&S Standards Report*, and *The AMIP/SIMTECH Program Stewardship Report*.

**12. Domain Managers and Domain Agents**

Manage a domain of mission activity in which M&S tools are used. In accordance with (IAW) AR 5-11, Chapter 3 contains the designation, for each domain, of a Department-level Domain Manager and a MACOM responsible for providing a Domain Agent.

a. Domain Managers coordinate M&S activities and develop and maintain supporting plans for their domains, to include Domain Management Plans and Domain Investment Plans in accordance with the guidelines in Appendix A.

b. Domain Agents assist Domain Managers by gathering requirements and managing the domain review and approval process. Domain Agents are responsible for developing and maintaining investment information for their assigned M&S.

**13. Standards Category Coordinators (SCCs)**

Provide oversight and direction for a designated Standards Category (identified in Chapter 3). Responsibilities include executing the Standards Development Process and supporting the AMIP in accordance with the guidelines in Appendix B.

<END OF CHAPTER>

## Chapter 2. Vision for M&S After Next

### A. Introduction

The second edition of *The Army M&S Master Plan* (1995) presented the Army's plan for embracing the power of Distributed Interactive Simulation (DIS). In the two years since the publication of the plan, significant changes have occurred in the M&S community. The standards for the DoD common technical framework, most notably the High Level Architecture (HLA), began supplanting the DIS standards for interoperability. The leadership of the Army strengthened the management roles of the domains. Changes also occurred in the broader community served by M&S. The publication of *Joint Vision 2010* and *Army Vision 2010* established new concepts and a new lexicon for describing future capabilities. The Army After Next program started to investigate the major factors that will affect the Army in the years 2010-2025. As each of these changes shed more light on the Army's future, they present new challenges for the M&S After Next.

### B. M&S Context for 2010 and Beyond

In what follows, assumptions about the future are grouped into four categories: operational environment, M&S technology, management trends, and resources. These assumptions concentrate on the period between 2010 to 2025, the Army After Next years. These years match the timeframe chosen by senior Army and Joint leadership for envisioning the future. Given the development timelines for major simulation systems, the next Program Objective Memorandum (POM) build for Fiscal Years (FY) 2000-2005 should include activities that begin the development process for M&S to support the Army in the year 2010 and beyond.

#### 1. Operations

The Army must ensure that its M&S stay relevant to the needs of the force. These needs will be driven by *Joint Vision 2010*, *Army Vision 2010*, and the Army After Next program. New operational concepts will require new models for understanding and representing full spectrum dominance throughout the mission space. While technology will drive major changes in operational performance, human and organizational behavior will still dominate the effects of technology on mission success. Future M&S will no longer be able to focus on warfighting; their context will span the full gamut of military operations. Thus future M&S will have to evolve to portray scenarios in the seven mission areas proposed in *Army Vision 2010* with their heavy emphasis on human behavior. The Joint Venture axis of the Army's Force XXI process of change has already begun examining the impact of future operations on the redesign of the Tactical Army leading to Army XXI. Although Joint Venture is the centerpiece of the Force XXI process, the integration of Information Age technologies and the redesign of the Institutional Army are key supporting initiatives.

#### 2. M&S Technology

The information technology, force structure, doctrine, and systems in the Army After Next decades will differ significantly from those employed by the turn-of-the-century Army. The Army will be able to leverage tremendous advances in commercial information technology but must still apply some resources to its unique needs. However, despite all the advances in

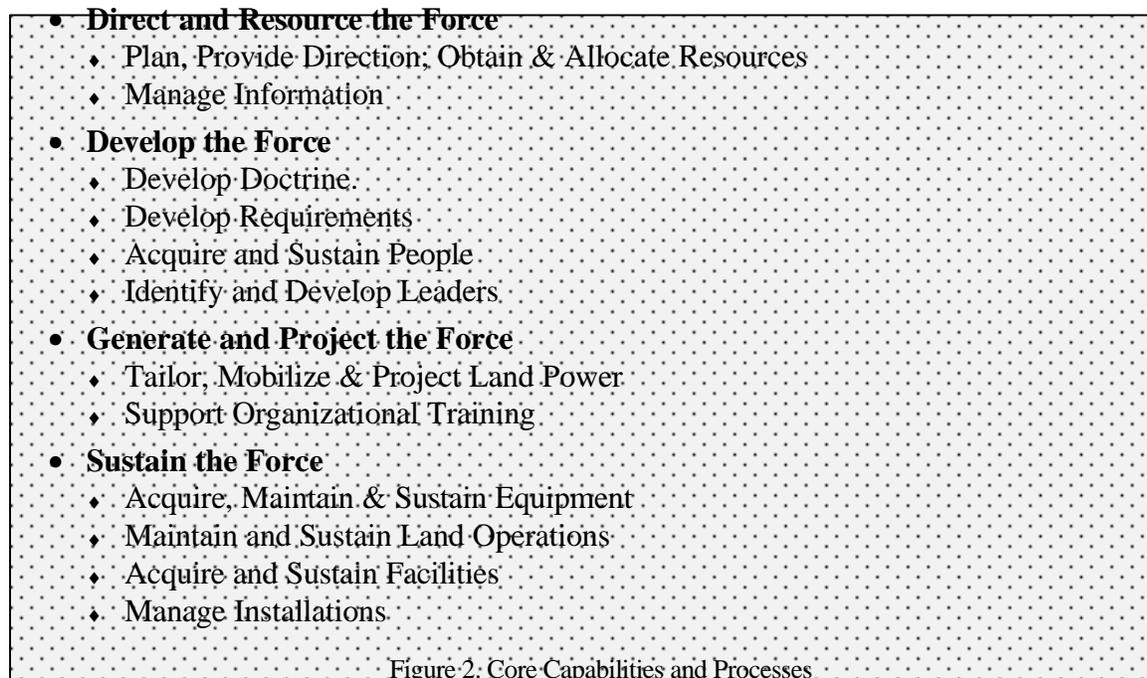
technology, future M&S will still function as limited abstractions of reality; they will not be truth machines.

### 3. Management Trends

Continued improvements in information technology will drive substantial changes in the way commanders lead their units and the Services manage their business. However, the Army will continue to emphasize satisfying the needs of the CINCs with a results-oriented, capabilities-based force, focused on core missions. The fundamental competency that the Army brings to joint operations will not change. As stated in *Army Vision 2010*,

***The Army will continue to provide the ability to conduct prompt and sustained operations on land throughout the entire spectrum of conflict.***

To execute this fundamental competency, the Army will concentrate its management energy and resources on its core capabilities and processes. The major bullets in Figure 2 list the Army's core capabilities as defined in Department of the Army (DA) Pamphlet 100-XX (Draft), *Force XXI Institutional Army Redesign*. The Army achieves each core capability through the execution of its supporting core processes (the sub-bullets in Figure 2). As the Army evolves to a capabilities-based force, people will use M&S to support each of the core processes. At the same time, operational units of the Army will constantly be using M&S for training and mission-related activities focused on effectively performing the Army's fundamental competency. Thus institutionally and operationally, modeling and simulation will continue to be a significant enabler for the force.

- 
- **Direct and Resource the Force**
    - ◆ Plan, Provide Direction; Obtain & Allocate Resources
    - ◆ Manage Information
  - **Develop the Force**
    - ◆ Develop Doctrine
    - ◆ Develop Requirements
    - ◆ Acquire and Sustain People
    - ◆ Identify and Develop Leaders
  - **Generate and Project the Force**
    - ◆ Tailor, Mobilize & Project Land Power
    - ◆ Support Organizational Training
  - **Sustain the Force**
    - ◆ Acquire, Maintain & Sustain Equipment
    - ◆ Maintain and Sustain Land Operations
    - ◆ Acquire and Sustain Facilities
    - ◆ Manage Installations
- Figure 2: Core Capabilities and Processes

## 4. Resources

The ability to meet the requirements generated by *Army Vision 2010* will be constrained by the availability of resources, in particular the availability of funding. The demands for modernization, coupled with budgetary trends, imply that resources will continue to be precious. Thus, resources for M&S will get close scrutiny to ensure they support the core capabilities.

### C. Vision Statement

The Army's vision for M&S in Figure 3 describes the desired set of M&S capabilities and conditions for supporting the future Army.

- **World-Class Models and Simulations** supporting the full spectrum of Army Operations in the 21st Century
- **Tools for the Total Force**
  - ◆ Fully integrated into operational and business decision making processes and systems
  - ◆ Credible. “Synergized Realities” for education, training, analysis, acquisition, and research
  - ◆ Customer-focused sets of interoperable systems of varying fidelity
- **Carefully Managed as a Core-Enabling Competency**
  - ◆ Cultivated Infrastructure energized by quality people
  - ◆ Prioritized Investments
  - ◆ Responsive to Change
- **Army Maintains Leadership** in the use of technology for more effective M&S support
  - ◆ Pre-eminent in art and science of simulating joint operations on land
  - ◆ DoD lead in the representation of leadership and human dynamics for operational command and control

Figure 3. The Army Vision for M&S After Next

### 1. World-Class Models and Simulations

The vision statement begins with a clear declaration of the desired end state. To have the world's best Army, our M&S must provide world-class support across all aspects of Army operations envisioned by *Army Vision 2010* and for the Army After Next. The Army must also remain fully involved in implementing its capabilities for achieving full spectrum dominance in joint community simulations.

### 2. Tools for the Total Force

The Army's M&S will serve as tools for use by the Total Force of Active and Reserve Components. Instead of a single tool, the Army will have a toolbox of general-purpose and special M&S tools that enable users to address missions throughout the operational and business mission areas. Future M&S will be everywhere, integrated into all decision-making processes and systems as exemplified by the importance of embedded training for

Army Training XXI. Much of the border separating M&S from command and control systems will fade away. Albeit a new term, the concept of “Synergized Realities” depicts the full realization of composable, seamlessly-linked simulations, where the capabilities provided by these “synergized realities” will exceed the capabilities of any single simulation environment. Users will no longer have to think about the technology of linking live, virtual, or constructive simulations; they will focus on the assigned mission and then tailor their simulation tools to meet their needs, realizing the synergy from mixing a variety of live, virtual, or constructive environments in a seamless manner. Simulation users will compose valid simulations from interoperable components with the necessary fidelity in the functions critical for their given problem, while remaining within their available resources. As a prime example, the Army must fully embrace Simulation Based Acquisition (SBA). SBA is a process for integrating M&S tools and technology across acquisition functions and throughout program phases. To realize the full potential of M&S to acquisition, program managers must plan for M&S in terms of how it can be applied from beginning to the end of the acquisition life cycle.

### **3. Carefully Managed as a Core-Enabling Competency**

The Army will need a relevant, vibrant modeling and simulation capability to meet its future requirements. *Joint Vision 2010* identifies M&S as a key technology for achieving Dominant Maneuver and Precision Engagement. The Operational Force will depend upon M&S as a crucial enabler in providing the Army's fundamental competency to Joint operations. At the same time, M&S will be just as critical for enabling the efficient execution of the core processes by the Institutional Army. While not a warfighting core competency, modeling and simulation will be a core-enabling competency for the Army. The Army must retain and carefully manage its investments in M&S to preserve infrastructure and quality modeling and simulation professionals. Cultivating the infrastructure implies making sound business decisions tempered by operational requirements to support the needs of the force. Leaders will continue to prioritize their investments to support their missions. At the same time, the Army will continue to prepare for the future, ensuring that its M&S stay responsive to the user's needs.

### **4. Army Maintains Leadership**

The discussion so far has been internal to the Army. The Army also has a role to play in DoD modeling and simulation. The Army will sustain its pre-eminence in the art and science of using M&S for representing landpower in joint operations. At the same time, the Army has a special need for the representation of the human dynamics of military operations. Leadership forms one of the fundamental components of combat power. When it comes to representing leadership and the human dynamics related to operational command and control, the Army cannot depend upon others to have the initiative or expertise to provide the appropriate technology. Out of necessity, the Army will be the DoD lead in this area.

## **D. Guiding Principles**

As an adjunct to the vision statement, the Guiding Principles serve as fundamental and enduring tenets for Army M&S management. They helped in shaping the vision and will

help shape future decisions to implement the strategy. The principles in Figure 4 apply to Army M&S today and should endure throughout the path to the future.

- Support Users Across the Full Spectrum.
- Resource as a Value-Added Commodity.
- Develop Efficiently.
- Sustain as a Core-Enabling Competency.

Figure 4. Guiding Principles

Full spectrum support includes the operational and business spectrums. It also implies that no single model fits every user's needs. The Army will continue to have multiple, although fewer, models. Resourcing these models will depend upon the concept that M&S are merely a means to an end, not the end in themselves. The Army may not be able to afford the "Best Technology"; future M&S investments must seek out value-added "Right Technology." Efficient development provides the impetus for the twin goals of fostering interoperability and promoting reuse based on standards and incentives. Sustaining modeling and simulation as a core enabling competency implies the need to educate the overall force, develop modeling and simulation professionals, cultivate an infrastructure, conduct research, and enable improvement and growth for M&S. One of the keys to future victory will be the ability to adapt, not just produce. To support the Army's ability to adapt in the field and in the staffs, the Army's M&S must be able to adapt as well. The guiding principles serve as a touchstone for adapting the strategy in periods of change to achieve the vision.

## **E. Summary**

*The Army's Vision for M&S After Next* supports the Total Force, incorporating and supporting the needs of the entire M&S community. This vision provides part of the framework within which the Army M&S community can advance as one team toward a common end-state, with flexibility for the users while realizing the benefits of cross-organization policy and infrastructure. The Army After Next will build upon the operational concepts in *Joint Vision 2010* and the technological wonders of the information age. The Army's M&S After Next will provide vital tools for organizing, training, supplying, and equipping forces ready for victory under the direction of the CINCs. Implementing the common vision and supporting strategy will set the stage for the future: Quality people using world-class models and simulations that meet the needs of the Total Force across the full spectrum of operations.

◀END OF CHAPTER▶

## Chapter 3. Management of Army M&S

### A. Introduction

Achieving the Army's vision for M&S will take the cooperative efforts of organizations throughout the Army. This chapter reviews HQDA management of M&S and how the organizations in the Army's M&S management structure interact to support the strategy to achieve the vision.

#### 1. M&S Management Concept

The HQDA management concept described in AR 5-11 is comprised of four key elements: Develop Policy, Establish Standards, Prioritize and Integrate Requirements and Investments, and Direct Research and Technology. Due to the varied nature and wide dispersion of M&S applications throughout the Army, no one authority can exercise control over all aspects of M&S management. What is described in the following paragraphs is a coordinated effort distributed among the several major officials primarily responsible.

#### 2. M&S Management Structure

To execute the elements of M&S management, the Army has adopted a management structure (Figure 1, page 1-3) that supports three interwoven sets of management activities.

- a. At Department-level, the AMS GOSC and the AMSEC provide senior leader oversight and cross-domain coordination. They are supported by the AMSO and the AMSEC Working Groups.
- b. Domain Managers and Agents connect the Department, the MACOMs, and the many organizations within the Army using M&S. Each Domain Manager and Domain Agent is a member of the AMSEC. Each Domain Manager and Domain Agent also provides a member to the AMSEC working groups.
- c. At the organizational level, individual MACOMs and organizations establish their own structures and processes for managing their M&S activities. Designated MACOMs, FOAs, SSAs, and Principal Staff elements of HQDA are also members of the AMSEC.

#### 3. M&S Management Processes

The management of M&S uses and touches many of the HQDA management processes, especially those dealing with the Planning, Programming, Budgeting, and Execution System (PPBES) and system acquisition. However, there are three processes that are tailored specifically to M&S management: the Requirements Integration and Approval (RIA) Process, the M&S Standards Development Process, and the Army M&S Technology Review.

- a. The RIA Process. The RIA process is a tailored version of the requirements approval process established by CG, TRADOC, per AR 71-9 *Materiel Requirements*. Described in TRADOC Pamphlet (TP) 71-9, *Requirements Determination Guide*, the M&S RIA process is managed by the RIWG (discussed in paragraph D of this chapter).

b. The Standards Development Process. The Standards Development Process supports the achievement of the Army's M&S strategy. Standards facilitate the efficient development and application of M&S. The AMSMP WG provides recommendations and guidance for the execution of this process (discussed in paragraph E of this chapter).

c. The Army M&S Technology Review (AMSTR). Led by AMSO, the AMSTR takes a comprehensive look across the realm of M&S and related technologies being developed in Army and other programs. The results of the review are documented in a publication of the same name, *The Army M&S Technology Review*, that describes ongoing efforts and identifies specific objectives for M&S technology. The AMSTR identifies these M&S technology objectives as potential areas to be addressed by the SIMTECH Program and *The Army Science and Technology Master Plan*.

#### 4. M&S Management Tasks

As part of specifying the relationship of the various organizations for the management of M&S, the AMS GOSC approved the relationships for the execution of specific M&S management tasks. Figure 5 shows the relationships for 16 management tasks.

O-Oversight X-Primary Responsibility S-Supporting	State Vision	Devise Strategy	Coordinate Policy	Assess Progress	Coordinate Activities	Review Requirements	Integrate Requirements	Approve Requirements	Prioritize Requirements	Fund M&S Activities	Reconcile Investments	Develop Standards	Manage M&S Infrastructure	Educate the Force	Advocate M&S Activities	Provide Visibility
	<b>AMS GOSC</b>	X	O													
<b>AMSEC</b>	S	X		O	O	O	O	O			O	O	O			
<b>AMSO</b>	S	S	X	X	X	X	X	S	X	X	X	X	X	S	X	X
<b>CG, TRADOC</b>						S	S	X		S			S	X		
<b>Working Groups</b>			S	S	S	S	S		S		S	S	S	S	S	
<b>Domain Managers</b>	S	S	S	S	S	X	S	S	S	S	S	S	S	S	S	S
<b>Domain Agents</b>	S	S	S	S	S	S	S	S	S	S		S	S	S	S	S

Figure 5. Organizational relationships for 16 management tasks

#### B. Domains and Domain Managers

Almost every organization in the Army is involved with M&S. The concept of management by domains of mission activity is key to streamlining the relationship between the many organizations and the Army's requirements approval, planning, and programming processes. Management by domain facilitates the integration of requirements among related programs and the prioritization among programs within a single Program Evaluation Group (PEG).

The Domain Managers play a key role in assisting AMSO in prioritizing M&S investments in each of the six PEGs that the Army uses to build its POM.

### 1. The Domains

The three domains are: Advanced Concepts and Requirements (ACR); Research, Development, and Acquisition (RDA); and Training, Exercises, and Military Operations (TEMO). These domains are organized along functional, not organizational, lines since organizations often use a variety of M&S for different missions. The domains encompass the life cycle of systems and organizations from original concepts, through acquisition or force development, to training and military operations. All Army M&S activities fall under the purview of a single domain or are cross-domain activities. The example simulations and simulators listed in Figure 6 are predominantly used in the given domain but are by no means exclusive to that domain. Individual organizations determine the proper domain(s) for their requirements and programs.

Domain	Domain Activities	Simulations/Simulators
<b>Advanced Concepts and Requirements (ACR)</b>	Force Planning Developing Requirements Warfighting Experiments	Reconfigurable Simulators Constructive Models
<b>Research, Development, and Acquisition (RDA)</b>	Basic/Applied Research Weapons System Development Test and Evaluation	System Prototypes Engineering and Physics Models
<b>Training, Exercises, and Military Operations (TEMO)</b>	Individual and Collective Training Joint and Combined Exercises Mission Rehearsal Operations Planning	System Simulators Training Simulations

Figure 6. The Army's M&S domains with example activities and systems

a. The ACR Domain. The ACR domain supports core processes providing the Institutional Army's core capabilities of Direct and Resource the Force and Develop the Force. The principal focus of the ACR domain is providing strategic direction, concept development, developing requirements, and force planning. ACR domain activities depend upon insights and quantitative data from M&S for analyzing strategic, operational, and tactical operations in war, conflict, and operations other than war. The primary products of these activities are strategies, warfighting concepts, mission needs, doctrine, requirements, executable plans, and affordable programs.

b. The RDA Domain. The RDA domain supports core processes providing the Institutional Army's core capability of Sustain the Force. The principal focus of the RDA domain is supporting research, development, system acquisition, and logistical support, plus advancing the art and science of the Army's M&S across all domains. The four elements of the RDA domain are: Major Systems – Acquisition Category (ACAT) I and ACAT II Programs, Research and Technology Programs, Test and Evaluation Programs, and Non-Major Systems Programs.

c. The TEMO Domain. The TEMO domain supports core processes providing the Institutional Army's core capabilities of Develop the Force, Generate and Project the Force, and Sustain the Force. The principal focus of TEMO is providing M&S capabilities that support the maintenance of a trained and ready force. TEMO domain activities include individual, crew, and collective training events and M&S support to military operations at the tactical and operational levels using a variety of networked and stand-alone live, virtual, and constructive M&S capabilities.

**2. Domain Managers and Agents**

The Domain Managers and MACOMs responsible for Domain Agents are specified in Figure 7. The MACOMs appoint a General Officer (GO) or Senior Executive Service (SES) Domain Agent. The Domain Agents are: ACR – the TRADOC Deputy Chief of Staff for Combat Developments; RDA – the Principal Deputy for Acquisition, Army Materiel Command (AMC); and TEMO – the TRADOC Deputy Chief of Staff for Training. The Domain Managers and Domain Agents may appoint an organization to act on their behalf.

Domain	Domain Manager	Domain Agent MACOM
ACR	Director of Force Development , HQDA (DAMO-FD)	TRADOC
RDA	Director, Assessment and Evaluation (SARD-ZD)	AMC
TEMO	Director of Training, HQDA (DAMO-TR)	TRADOC

Figure 7. Domain Managers and the MACOMs responsible for providing Domain Agents

**3. Domain Manager and Agent Responsibilities**

Domain Managers play a key role in the management of M&S for the Army. They are involved in all 16 management tasks shown in Figure 5. They identify, integrate, and coordinate requirements within and external to the domain and prioritize the investments for the domain. Domain Agents assist the Domain Managers.

**4. Domain Management and Investment Plans**

Each Domain Manager publishes a Domain Management Plan and a Domain Investment Plan. The domain plans provide information to organizations with M&S activities in the domain. They also provide information to HQDA and to the other domains to help integrate and synchronize the total Army effort to achieve the vision.

a. The Domain Management Plan. These plans support *The Army M&S Master Plan*. The purpose of the plan is three-fold: describe the Domain Manager's vision and how it supports the Army vision for M&S, describe the domain's management structure and process, and finally, describe the domain's detailed plan and guidance for achieving the domain vision. Guidance on the format and content for the plan is at Appendix A.

b. The Domain Investment Plan. The investment plan formalizes the domain's investment strategy. It depicts the prioritized programs within the domain and how these programs support the domain objectives and the Army objectives. Domain Managers provide the information in the plan to AMSO to form the basis for *The Army M&S Investment Plan*. Guidance on the format and content for the plan is at Appendix A

### **C. AMSEC Working Groups**

The AMSEC's three permanent working groups address specific areas of M&S activity as described below. The AMSEC or the working groups may charter other working groups.

### **D. The Requirements Integration Working Group (RIWG)**

#### **1. Purpose**

The RIWG oversees management activities dealing with requirements with an emphasis on cross-domain requirements. The RIWG has the following missions:

- a. Provide a forum to discuss current, new, and potential M&S requirements.
- b. Review proposed M&S requirements to facilitate their integration, consolidation, reconciliation, and leveraging across the domains.
- c. Ensure compliance with and identify voids in supporting the HQDA vision and strategic plans.
- d. Develop positions on unresolved integration issues.
- e. Provide integrated cross-domain requirements, significant integration decisions, and positions on unresolved issues to support the Requirements Integration Council (RIC) and the TRADOC Deputy Commanding General's (DCG) requirements approval mission.
- f. Support the M&S policy and guidance set by the AMSEC co-chairs concerning the prioritization and synchronization of M&S investments.
- g. Recommend policy and program guidance to the AMSEC co-chairs concerning the processes for integration, approval, and prioritization of M&S requirements and the development of domain and Army M&S investment plans.

#### **2. Direction and Control**

- a. The RIWG is co-chaired by AMSO and TRADOC (the Director, Simulations Directorate of the Deputy Chief of Staff for Simulations and Analysis (DCSSA)) because it supports the AMSEC and supports the RIC, as part of the RIA process. The charter for the RIWG is signed by the AMSEC co-chairs and the DCG, TRADOC.
- b. Permanent Members. The RIWG consists of representatives at the Colonel or General Schedule (GS)-15 level from each Domain Manager and Domain Agent.
- c. Invited representatives. The co-chairs may invite representatives from other organizations to participate as observers on an as-required basis.

#### **3. The Requirements Integration Council (RIC)**

The RIC is an advisory body to the CG, TRADOC, or his designated representative for approving M&S requirements, currently the DCG, TRADOC. The RIC is chaired by the DCG, TRADOC. Membership consists of GO or SES representatives from the Domain Managers and Domain Agents. The DA ADCSOPS and the DCSSA, TRADOC, serve as Special Advisors to the chair. The RIC focuses on cross-domain requirements issues as framed and presented by the RIWG.

#### 4. The Requirements Integration and Approval (RIA) Process

a. Scope. The Army M&S RIA process applies to all Army M&S requirements. It is through this process that the CG, TRADOC, with support from the RIWG and RIC, executes the TRADOC mission for approving all Army M&S requirements. The details of the process are contained in TP 71-9.

b. Concept. The Army M&S RIA process depicted in Figure 8 addresses all M&S requirements to include those that do not fall under the standard materiel acquisition process and thus do not require a Mission Needs Statement (MNS) and Operational Requirements Document (ORD). The intent of the process is to ensure all M&S requirements have been validated and reviewed for integration with other programs prior to approval, to avoid duplication, and to identify voids in supporting DoD and HQDA M&S visions and strategies. The goal is to minimize the time and dollars spent to meet requirements. The process allows for multiple levels of review with tentative approval for various categories of M&S requirements.

1) M&S Program Requirements. The RIA process begins with user organizations throughout the Army determining their requirements for M&S capabilities. When a user first identifies a requirement, he or she may work with M&S technical experts to translate an operational requirement into an M&S requirement. In some situations, an Integrated Concept Team (ICT) is formed to allow M&S representatives with multiple perspectives to develop and/or review a requirement. All requirements are then submitted via the appropriate domain-specific process to the domain manager. Requirements may fall within one of two categories: Traditional Acquisition or Nontraditional. Cross-domain requirements may occur in either category.

a) Many M&S requirements will be met via a traditional acquisition process covered by DoD Regulation 5000.2-R, *Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information Systems Acquisition Programs*. These requirements will be documented in a MNS and ORD and will be submitted to the RIWG for review as part of the staffing process. They will then continue for approval through the materiel acquisition processes defined in TP 71-9. The DCG, TRADOC, has oversight over those processes.

b) Many M&S requirements do not fall within the scope of DoD Regulation 5000.2-R. These requirements, that are met by nontraditional (non-DoD 5000.2-R) procedures may include requirements for M&S to support Advanced Warfighting Experiments (AWEs); Advanced Technology Demonstrations (ATDs); Special Exercises; or acquisition-related events documented in Simulation Support Plans (SSPs). Information about these requirements is documented in an M&S Requirements Document (MSRD) IAW TP 71-9 and submitted to the RIWG. Following review by the RIWG, these requirements will be submitted to the DCG, TRADOC, for an approval decision.

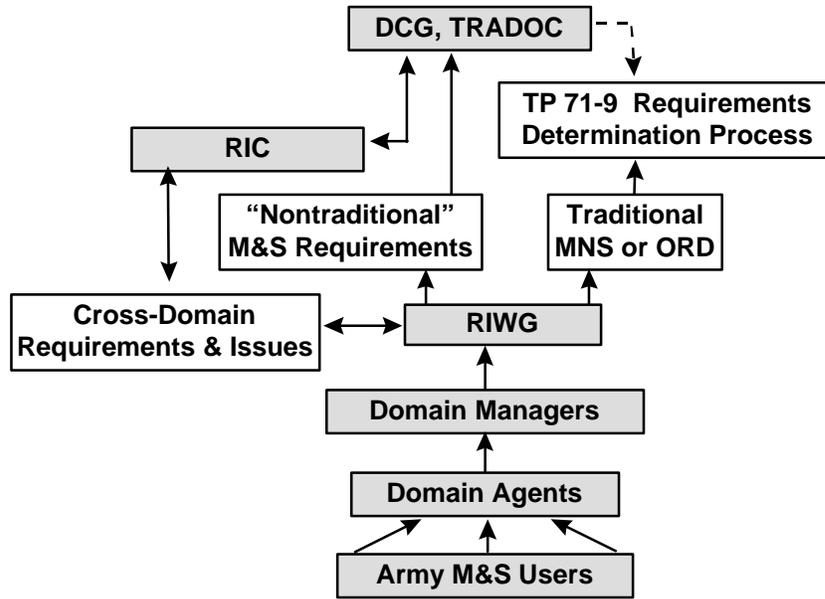


Figure 8. The Requirements Integration and Approval (RIA) process

2) Cross-domain M&S requirements support needs in two or more domains. Cross-domain requirements may be identified in two ways: (1) during the development of requirements as part of a domain's requirements process; or (2) identified initially as a cross-domain requirement and submitted directly to the RIWG. Domain Manager and Domain Agent responsibilities for cross-domain requirements will be performed as designated by the AMSEC. Cross-domain requirements will be documented in an MSRD (or MNS and ORD) that is submitted to the TRADOC RIWG co-chair for entry into the RIA process. Following review by the RIWG, these requirements will be passed through the RIC for coordination prior to submission to the DCG, TRADOC, for an approval decision.

3) M&S Requirements in Non-M&S Programs. Activities outside the M&S community may approve programs with embedded requirements for M&S e.g., Advanced Concepts and Technology (ACT) II programs or Technology Base programs. Proponents for these programs must identify supporting M&S requirements in an MSRD and submit them to the appropriate M&S domain agent for approval consideration in the RIA process.

## 5. OSD and Joint Requirements

The RIWG also considers input from AMSO and the domains regarding the integration of other DoD or Joint M&S requirements. As a follow-on to the RIA process, AMSO may inject Joint and OSD requirements into programs if required as a result of non-Army decision processes.

## 6. Investment Planning

Once a requirement is approved, the Domain Managers ensure it is allocated against a program and included in the domain investment plan. They also assist AMSO in prioritizing the programs for consideration by the PEGs and other resource managers as part of the PPBES process.

## **E. The Army M&S Management Program Working Group (AMSMP WG)**

### **1. Purpose**

The AMSMP WG provides recommendations and guidance for the execution of the AMSMP (defined in AR 5-11). The AMSMP promotes two complementary goals – standardizing how the Army conducts modeling and simulation, and ensuring the Army is abreast of new technologies that may be useful in Army M&S applications. The AMSMP WG has the following missions:

- a. Provide a forum to review and discuss appropriate policy issues prior to forwarding a recommendation to the AMSEC.
- b. Review the definitions of the Standards Categories, provide recommendations and guidance for the Standards Development Process, integrate the efforts of the SCCs into new and existing M&S, and present standards issues to the AMSEC.
- c. Ensure compliance with and identify voids in supporting the HQDA vision and strategic plans.
- d. Provide a conduit to collect and disseminate information on Army M&S activities.
- e. Review project nominations for the AMIP and the SIMTECH Program and recommend prioritization of projects to the AMSEC.
- f. Review and support the development of the AMSTR.

### **2. Direction and Control**

The AMSMP is defined in Chapter 4 of AR 5-11. The AMSMP WG receives direction from the AMSEC. It is chaired by AMSO and membership is composed of representatives from each organization on the AMSEC. The chair may invite representatives from other organizations to participate as observers on an as-required basis.

### **3. M&S Standards**

a. Concept. By facilitating interoperability and reuse, M&S standards provide a basis for efficient development and application of M&S. By developing and promulgating standards, the Army M&S community shares expertise and lessons learned about techniques, procedures, processes, and applications. Standards development builds on the work of many people and organizations, and advances the art and science of M&S in tandem with technological advances.

b. Types of Standards. The term standard is applied in the broadest context to include procedures, practices, processes, techniques, data, and algorithms. Standards for M&S cover a variety of topics and the type and source of relevant standards will vary with each standards category. There are standards for simulations such as HLA. Several types of standards for data apply: meta-data, data structures, raw data, and data storage and transmission. Standards also exist for the process associated with the development and use of M&S. Examples are standards for building simulation object models, federation object models, and conducting Verification, Validation, and Accreditation (VV&A). Standards are

developed within the Army M&S community and are also adopted from other disciplines and organizations.

c. Levels of M&S Standards. There are three levels of standards: Draft Standards, Approved Standards, and Mandatory Standards. The different levels indicate the degree of maturity of the standard and the level of enforcement. The goal is to develop standards that have value-added to the consumer.

1) Draft Standards. Draft standards are the initial level standards. These standards have not completed the review process. They are available to the community for use as best meets their program goals pending further maturation to a higher level.

2) Approved Standards. DUSA (OR)-approved standards are the next higher-level. These standards have been reviewed and demonstrated sufficient maturity and consensus to warrant their recommendation to the DUSA (OR) for approval. The intent is to designate standards that facilitate interoperability, reuse, and efficiency that developers can adopt to reduce their development, VV&A, and operational costs.

3) Mandatory Standards. Mandatory Standards are the highest-level standards and are promulgated by regulation or policy statement. Developers and users of Army M&S systems must follow these standards. While some may raise short-term costs for individual programs, the value in adopting standards is their overall and long-term benefit to the Army.

#### **4. The Standards Categories**

a. Standards categories are approved by the DUSA (OR). The 18 standards categories are shown in Figure 9. The intent is to have sufficient standards categories to cover the realm of technologies and processes important to M&S development and use within the Army. The AMSMP WG may recommend changes concerning the categories to reflect advances in technology and changes in the management of technology within DoD and the Army. Definitions for each category are in Appendix B.

#### **5. Standards Category Coordinators (SCCs)**

Once a standards category is approved, individual MACOMs, FOAs, or SSAs can request to be responsible for the category. The DUSA (OR) approves the designation of the responsible organization (designations are shown in Figure 9). That organization then appoints the SCC from within their organization. The SCCs are normally drawn from a center of technical and/or procedural excellence and have gained the respect of the community for their knowledge, experience, and contributions to Army M&S. Specific SCC responsibilities include executing the Standards Development Process for the category, publishing the SCC Annual Report, and supporting the AMIP. Appendix B contains the identification and contact information for each SCC.

#	Standards Category	Responsible Organization
1	Acquire	TRADOC
2	Architecture	AMC
3	Attrition	AMC
4	Command Decision Modeling	TRADOC
5	Control, Communications, and Computers Systems Representation	TRADOC
6	Cost Representation	Cost and Economic Analysis Center (CEAC)
7	Data	AMC
8	Deployment/ Redeployment	Military Traffic Management Command (MTMC)
9	Dynamic Environment	AMC
10	Functional Description of the Battlespace	TRADOC
11	Logistics	TRADOC
12	Mobilization/Demobilization	Concepts Analysis Agency (CAA)
13	Move	USACE
14	Object Management	AMC
15	Semi-Automated Forces	TRADOC
16	Terrain	US Army Corps of Engineers (USACE)
17	Verification, Validation & Accreditation (VV&A)	TRADOC
18	Visualization	TRADOC

Figure 9. The 18 Standards Categories and their responsible organizations

## 6. Standards Development Process

a. Concept. The Army concept for M&S standards development is to use a process based on consensus. Many M&S technologies evolve at blinding speeds. Some technology niches turn over in a matter of months. Advances and lessons learned take place within a myriad of organizations within the Army, DoD, and throughout the world's commercial and academic sectors. The intent is to capture the intellectual energy and practical achievements of the entire M&S community to ensure that the standards the Army decides to adopt are affordable, relevant, and in keeping with the direction of the state-of-the-art and practice. By keeping the process consensus-based, real M&S experts shape the decisions.

b. The Process. Standards development occurs within the seven-step process depicted in Figure 10 (see Appendix B for a more detailed description of the standards development environment and tools). Beginning at the bottom left of Figure 10, once an SCC is appointed and begins building a team, the process is continuous, with SCCs conscientiously employing a variety of media and techniques to advance toward their defined requirements through the following steps:

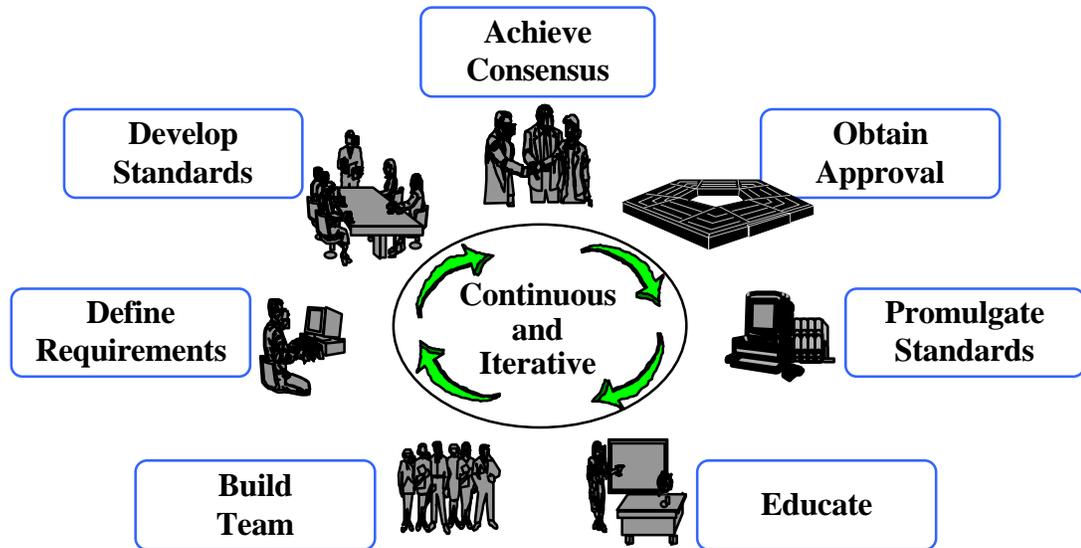


Figure 10. The Standards Development Process

1) **Build Team.** Pulling together experts from within a particular M&S discipline to form a Standards Category Team is the first and most critical step in the Standards Development Process. These experts can come from the Army, DoD, academia, and private industry. The team should provide the SCC with a wide range of expertise and means to keep abreast of developments relevant to the standards category. Team membership is not static. As new issues develop or old ones are resolved, the team membership may change to address current issues. Individuals may join a team at any time; membership is based on the concept of inclusion rather than exclusion. Forums that facilitate the teaming process include: conferences, workshops, publications, and communications that promote the exchange of ideas, techniques, and procedures.

2) **Define Requirements.** The SCC and team define the scope of their category. The definitions for each category are reviewed by the AMSMP WG and then recommended to the DUSA (OR) for approval. Given the definition for the category, the team identifies potential areas for standards development and establishes requirements for each area which are reviewed and validated by AMSO. The team then sets standards priorities for the next five years based on the potential benefit to the Army M&S community, the maturity of the standards area, and the probability of success. Appendix B contains the current definition and requirements for each category.

3) **Develop Standards.** Developing and identifying standards is the crux of the process. Standards may be of many types e.g., procedures, practices, processes, algorithms, or techniques. The wider the involvement of experts across the M&S community, the more likely each category will capture particulars worthy of being standards. Standards are not limited to those specifically developed by the team. They may include “best and current practices” or products that the team feels warrant being considered as standards for Army M&S.

4) Achieve Consensus. Since the process is based on consensus, the SCC and team must achieve consensus within the domains and the community on a proposed standard prior to its being recommended to the DUSA (OR) for approval. In addition to developing and identifying standards, the team members assist the SCC in achieving consensus on the proposed standards. The process for reviewing a standard at each level and eventually proposing it for designation as an Approved or Mandatory Standard is established by AMSO.

5) Obtain Approval. Once a standard has been reviewed and consensus has been achieved, it is submitted to the DUSA (OR) for approval or denial as an Army M&S Standard.

6) Promulgate Standards. The SCC promulgates the use of standards consistent with Army policies through the widest possible and efficient dissemination of information.

7) Educate. Once a standard has been established and promulgated at a certain level, the SCC and team begin educating the M&S community on the availability, applicability, and use of the standard. They assist M&S developers and users as they build and use applications, and educate leaders and decision makers on the benefits of the standard.

## **7. The Standards Category Coordinators Workshop**

The annual SCC Workshop, sponsored by AMSO, serves as a key opportunity for the identification, definition, exploration, and resolution of standards issues. It is important to develop standards in a timely manner to support major simulation acquisition programs and minimize the use of proprietary or contractor-unique approaches. It is equally important to identify and adopt products from major simulation programs for incorporation in future M&S. At the workshop, each category team updates their category Roadmap (covered in Appendix B, Tab 3) and evaluates draft AMIP projects according to their Roadmap. This process involves serious thought and insight into the needs and requirements for current and future Army M&S. New issues and topics requiring attention and discussion are uncovered. The workshop format allows team members from different categories to interact and to determine the best way to cover new issues, as well as to strengthen current topics. At the conclusion of the workshop, the SCCs provide a briefing that highlights their standards development efforts e.g., their Roadmaps, updated definitions and requirements, and draft AMIP project nominations. This allows the attendees an opportunity to comment on the project nominations. Based on feedback from the audience, comprised of the AMSMP WG, other SCCs, and team members, the SCCs will be able to incorporate useful information into their project nominations.

## **8. The Standards Category Coordinator's Annual Report**

An important vehicle for educating the Army and broader M&S community is the SCC's annual report. Each SCC prepares a report, due at the summer AMSMP WG meeting, that provides the status of their standards category in terms of definition, requirements, recent progress, and the Roadmap of prioritized objectives over the POM. Appendix B provides additional guidance for the report. These reports are used by AMSO to build the annual *Army M&S Standards Report*.

## **9. The Army Model Improvement Program (AMIP)**

The AMIP provides funding to organizations to execute projects that support the achievement of standards category objectives. Each fiscal year, SCCs nominate M&S projects furthering objectives within their respective category. The project nominations are included as part of the SCC's annual report. The SCC and their team prioritize multiple nominations to indicate which projects address the most pressing standards requirements within that category. The nominations are integrated and prioritized by the AMSMP WG and submitted through the AMSEC to the DUSA (OR) for approval. Additional guidance is in Appendix B.

## **10. The Simulation Technology (SIMTECH) Program**

a. The SIMTECH Program focuses on accelerating the development of emerging technologies that show promise for improving the art and science of M&S. The program provides funding to organizations seeking to improve their M&S capabilities or to develop technologies that show potential for supporting Army M&S standards development objectives. Specific SIMTECH Program goals are to:

- Improve M&S development and modification techniques.
- Ensure Army M&S more easily and accurately represent complex processes.
- Develop less expensive technologies that maintain or improve Army M&S quality.
- Develop techniques that increase M&S interoperability among and between domains.
- Provide state-of-the-art environments in Army commands and agencies that will attract and retain highly skilled personnel for M&S research and development.

b. Each fiscal year, M&S organizations nominate projects focused on the SIMTECH Program goals. The nominations are integrated and prioritized by the AMSMP WG and submitted through the AMSEC to the DUSA (OR) for approval. Additional guidance is in Appendix B.

## **F. The Advanced Simulation Working Group (ASWG)**

### **1. Purpose**

The ASWG will serve as an independent program oversight group for across-the-Army core simulation programs and their associated requirements or selected advanced simulation programs as designated by the AMSEC. The ASWG functions as an advisory group for the AMSEC on selected advanced simulation programs and issues. The ASWG has the following responsibilities:

- a. Provide a forum to review and discuss issues related to designated advanced simulation programs e.g., programmatics, execution, and interaction with other Services or DoD advanced simulation programs.
- b. Review proposed advanced simulation issues to facilitate their programmatic development across the domains.
- c. Ensure compliance with and identify voids in support of the HQDA M&S vision and strategic plans.

d. Develop and present recommendations to the AMSEC on program guidance and AMSEC issues.

## **2. Direction and Control**

The ASWG is chartered by the AMSEC. Membership is as follows:

a. Primary membership (Lieutenant Colonel/GS-14 and above) will include representatives from the three domains and be designated from the following organizations:

- 1) AMSO, as Chair.
- 2) ACR Domain Manager and Agent.
- 3) RDA Domain Manager and Agent.
- 4) TEMO Domain Manager and Agent.

5) Others, as requested by the ASWG Chair, e.g., Program Directors, Program Managers (PMs), Simulation Combat Developers, TRADOC Cross-Domain Integrator (DCSSA), Functional Managers, and Technical Managers.

b. Representatives e.g., technical experts, advanced simulation representatives, developers, or users of any grade/rank, from other organizations are encouraged to participate at the ASWG meetings.

c. Attendance by contractors requires approval by the ASWG chair.

## **3. Operating Processes**

a. The ASWG is chaired by the Chief, Operations Division, AMSO.

b. The ASWG will meet prior to the AMSEC or at the call of the Chair.

c. Subcommittees will be convened as required to address issues and recommend guidance related to issues. Participation of interested agencies and commands will be encouraged to ensure a wide range of expertise is available in accomplishing goals and objectives. AMSO will provide a member to all subcommittees as required.

d. ASWG program requirements are subject to the Army M&S RIA process.

## **4. Assigned Programs**

The programs assigned to the ASWG will vary per direction of the AMSEC. Current programs include the following:

a. Synthetic Theater of War-Architecture (STOW-A). STOW-A is defined as a suite of hardware and software used to create and support linkages between selected live, virtual, and constructive environments. Its purpose is to provide a seamless synthetic environment that links two or more types of simulations into a single congruent environment using DIS protocols and/or the HLA. STOW-A will support multi-sided, multi-echelon, brigade-level exercises with links to higher echelons. It has potential to support some ACR, RDA, and TEMO efforts in problem identification, experimentation, analysis, resolution, prototyping, mission rehearsal, and training.

b. Computer Generated Forces (CGF). The ASWG oversees the execution of two CGF programs.

1) Modular Semi-Automated Forces (ModSAF). The ModSAF simulation system is based on a modular software structure in which model components have well-defined and documented interfaces allowing run-time reconfiguration of model behavior to develop generalized, and more sophisticated, representations of reactive behaviors and missions. Within STOW-A, ModSAF provides the primary link between constructive and virtual simulations. ModSAF also provides an open architecture that is expected to be the starting point for future extensions of CGF.

2) One Semi-Automated Forces (OneSAF). The OneSAF program is under consideration for development as the Army's next-generation SAF. In accordance with the approved MNS, OneSAF will supplant the myriad of existing SAFs over time as its capabilities mature.

c. The DIS Program. The DIS program is an M&S infrastructure program that supports the sustainment, enhancements, and upgrades to the total DIS environment. It supports the development of DIS standards, protocols, architecture, tools, and integrates other DIS developments. Routine management of the DIS program is performed by a DIS Functional Manager (TRADOC) and a DIS Technical Manager (AMC).

## **G. MACOM-level Management**

Most of the day-to-day M&S activity occurs within MACOMs. Thus individual MACOMs have established their own management structures for organizing their M&S efforts and aligning them to interact with the Domain Managers and Domain Agents.

### **1. TRADOC**

While TRADOC plays a major role for the Army as the approver of Army M&S requirements and as the Army Domain Agent for the ACR and TEMO domains, it also has an active program for the management of M&S. The TRADOC M&S Advisory Board addresses TRADOC M&S issues with the goal of fostering a greater interaction and knowledge base of M&S within TRADOC and ensuring the most efficient use of M&S resources. The TRADOC M&S Advisory Board is chaired by DCG, TRADOC, with membership from the Headquarters TRADOC staff and selected M&S players in the TRADOC community. The DCSSA, TRADOC, is responsible for coordination and integration of M&S requirements for TRADOC and is also responsible for the RIWG, RIC, M&S Advisory Council, and the M&S Advisory Board.

### **2. AMC**

The Army Materiel Command's integral involvement in M&S development, infrastructure, and maintenance crosses all M&S domains. AMC organizations build and use M&S, from detailed first-principal engineering at the Research, Development and Engineering Centers (RDECs) and Laboratories to the development of sophisticated weapons systems simulators as training platforms. The vast extent of M&S involvement lead to the creation of the AMC M&S GOSC, chaired by the AMC Deputy Chief of Staff for RDA, and an AMC M&S Integrated Process Team. The structure was created to provide management oversight for

all M&S activities across the command. Each major subordinate command serves as a stake-holder in the process. Although the Simulation, Training, and Instrumentation Command (STRICOM) is a major subordinate command of AMC, its mission gives it a significant role in the management and acquisition of M&S across the Army.

### **3. Space and Missile Defense Command (SMDC)**

As a major developer and user of M&S, SMDC synchronizes its simulation programs through the efforts of the Simulations Directorate of the Space and Missile Defense Battle Lab.

## **H. Information Support**

Significant amounts of information on Army M&S are available to help users, managers, and developers accomplish their missions. The resources below are in addition to DoD's M&S Operational Support Activity (MSOSA) (1-800-510-6399 or <http://www.msosa.dmsa.mil>) and the Defense Modeling, Simulation, and Tactical Technology Information Analysis Center (DMSTTIAC) (1-407-249-4712 or <http://dmsttiac.iitri.com>).

### **1. AMSO Web Site**

The AMSO Web site, <http://www.amso.army.mil>, provides an entry for anyone interested in Army M&S. The Web site provides: (1) information about AMSO and Army M&S management, (2) access to key M&S documents e.g., *The Army Vision for M&S After Next*, (3) updated information about the Standards Development Process and the Standards Categories, and (4) links to other M&S-related sites. The site also provides information on accessing the SCC reflectors for the latest information on the Standards Categories.

### **2. The Army Node of the DoD M&S Resource Repository (MSRR)**

AMSO hosts the Army node (<http://www.amso.army.mil/armymsrr/>) of the DoD MSRR. Sponsored by the Defense Modeling and Simulation Office (DMSO), the MSRR is a distributed, client-server network of M&S information. Assets include instance databases, meta-data, M&S community directories, models, simulations, algorithms, tools, and documents. All assets on the MSRR are subject to the specific releasability policies of the providing organization. The Army policy for the release of data and the release of M&S is found in AR 5-11. The MSRR consists of a series of World Wide Web (WWW) servers accessible through the Internet or the Defense Information Services Network (DISN). The key MSRR nodes are at the DMSO and the Services.

a. AMSO is the proponent of the official Army repository of activities associated with the development, improvement, VV&A, and configuration management of Army M&S throughout their life cycle.

b. All Army M&S shall be included in this repository. Exceptions to this policy are those M&S that are developed at the engineering level for one-time application.

c. To eliminate unnecessary duplicative activity by M&S proponents, AMSO serves as the Army single point of contact for provision to DoD repositories and bulletin board systems.

<END OF CHAPTER>

## Chapter 4. M&S Strategy and Objectives

### A. Introduction

The Army's M&S strategy focuses on achieving the M&S vision. The strategic objectives form the foundation of the master plan that implements the strategy. The plan is the result of a four-step process. The first step was formulating *The Army's Vision for M&S After Next* (summarized in Chapter 2). The next step was reviewing the management structures and processes available to execute a strategy (Chapter 3). The third step was formulating the strategy, identifying the major components of M&S life cycle management, and defining an associated objective for each component (Chapter 4). As the final step (Chapter 5), a Priority Task was chosen for each component to shape the main effort. This chapter begins with a discussion of the strategy and the identification of the components. Then the individual components are discussed along with their strategic objectives, sub-objectives, actions, and metrics. The chapter closes by mapping the Army's objectives to the objectives in the *DoD Modeling and Simulation Master Plan*.

### B. The M&S Strategy

#### 1. The Fundamental Objective

The vision statement in Chapter 2 establishes the desired setting for future Army M&S in support of the Army After Next. In formulating the strategy, the vision was distilled to a fundamental objective, "**World-class M&S that meet the needs of the Total Force.**" The strategy focuses on the fundamental objective as a surrogate that contains the essence of the vision. Reaching that objective establishes the conditions for achieving the vision.

#### 2. Strategic Intent

The strategic intent is to depend upon decentralized execution, guided by centralized oversight, to reach the fundamental objective. As a unifying theme, the strategy uses the guiding principle "**Develop Efficiently**" for shaping the main effort.

#### 3. Aspects of the M&S Strategy

Thus, the Army's M&S strategy has two aspects: (1) Reach the Fundamental Objective, and (2) as the main effort, Emphasize Efficient Development. To implement this strategy, the Master Plan separates the world of M&S life cycle management into six components. Each component has a corresponding strategic objective that supports reaching the fundamental objective. To shape the main effort, the "Develop Efficiently" guiding principle was used to select a Priority Task from the set of M&S Management Tasks (Figure 5, page 3-2). These tasks are discussed in Chapter 5 since they form part of the Strategic Guidance.

#### 4. M&S Components

The Army's M&S strategy as embodied in this plan separates the world of M&S life cycle management into six components:

- Management Tools
- Requirements
- Investments
- Standards and Technology
- M&S Infrastructure
- Education.

Individually, each component has identifiable processes and products that can be checked and adjusted to ensure the Army stays on the path to the vision. Together, the components and their interrelationships address the spectrum of M&S life cycle management.

a. Functional Relationships. Although the six components are considered individually in this plan, they are interrelated. Figure 11 shows a functional view of the relationships among the components. The management tools surround the other five components, providing leadership, management structures, processes, and policies that unite the Army's activities into a cohesive effort focused on the vision. At the center, standards and technology creates core guidelines and means for developing and using credible M&S. The four remaining components use the products of the other two to identify and produce the M&S that are necessary to meet the needs of an informed and technically competent community. One could also perceive the components as forming a network of activities. The management tools provide the connectivity between the other components, facilitating the transfer of information, resources, and products throughout the Army M&S community and with other communities. It is through the actions of this network that the whole of Army M&S can yield more than the sum of its parts.

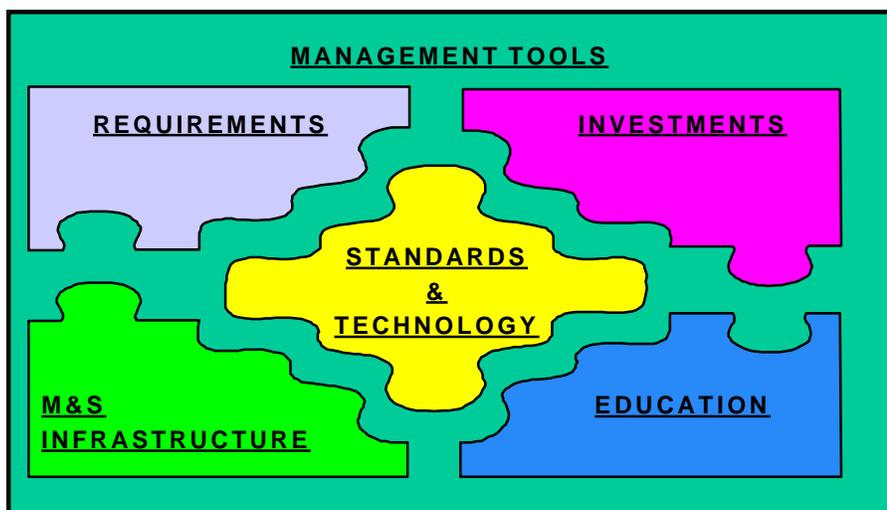


Figure 11. Functional relationships among the components of the Army M&S Strategy

b. Management Relationships. The six components of the strategy also cover the range of M&S life cycle management activities. The left side of Figure 12 shows how the sixteen HQDA M&S management tasks can be mapped into the six components. The right side of Figure 12 shows how the components encompass the four elements of M&S management from AR 5-11 and DoD's M&S objectives, defined in the *DoD Modeling and Simulation Master Plan*. Thus, the six components of the Army M&S strategy provide a holistic view of the Army's management of M&S and a means for linking the Army strategy to the DoD strategy.

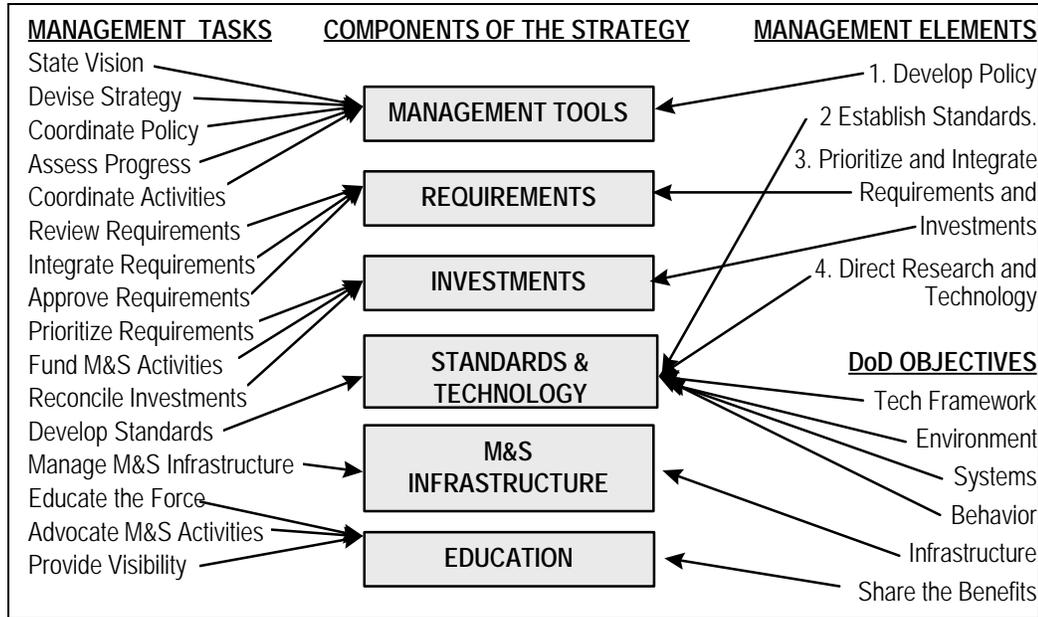


Figure 12. The relationships of the strategic components to M&S management activities

### 5. Strategic Objectives for Each Component

Since each component covers a realm of activity, each has a corresponding strategic objective. Figure 13 summarizes the supporting relationship between the fundamental objective and the strategic objectives. Individually, each strategic objective provides a standard by which one can assess the progress toward the vision in its component. Collectively, they define the set of capabilities and conditions that must exist to achieve the fundamental objective and the Army's vision for M&S.

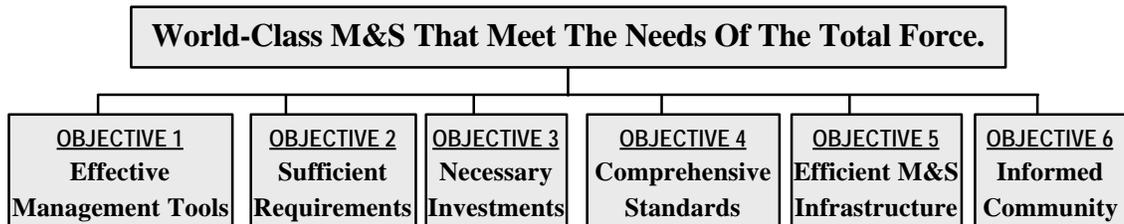


Figure 13. The fundamental objective and the individual strategic objectives (summarized)

## 6. Sub-Objectives, Actions, and Metrics

The strategic objectives tend to be qualitative statements. To provide more precision, each strategic objective has one or more enabling sub-objectives that focus on specific areas of the component. For each sub-objective, at least one action is presented and responsibility is established for executing that action. The identified organization has the lead for that action and, in many cases, will depend upon support from the domains, or the organizations within a domain, to execute the action. Each sub-objective also has one or more metrics that can be used to assess progress. When the responsible organization for an action is one or more domains, that action should be addressed in the domain management or investment plan. A summary of those actions is in Appendix A.

### C. M&S Management Tools

The M&S management tools component covers the development, execution, review, and revision of M&S management structures, processes, and policies that provide leadership, visibility, oversight, and coordination of Army M&S activities. The focus of the component is on strategic-level management to include overarching activities that connect other components and activities that involve organizations external to the Army.

**OBJECTIVE 1: An effective, flexible set of management tools (structures, processes, and policies) that facilitates centralized oversight and decentralized execution to deliver relevant M&S capabilities to the Army.**

#### 1. Discussion

Over the last two years, the Army made significant changes in the structures, processes, and policies used to manage M&S activities. The Army leadership directed these changes to provide a central focus for M&S activities at HQDA and to facilitate cross-domain opportunities. As the Army progresses with its Force XXI initiatives, M&S managers must solidify the role of modeling and simulation as a core-enabling competency that supports the core capabilities of the Army. The Army must also sustain its significant momentum in its interactions with M&S communities outside the Army to include OSD, the Joint Staff, the CINCs, other governmental and nongovernmental organizations, and our allies.

#### 2. Sub-Objective 1-1. An integrated M&S management structure that links senior leaders and organizations throughout the Total Force.

a. Discussion. The Army initiated its 1995 review of M&S management to address concerns over a lack of visibility of M&S investments and the presence of seemingly similar but independent development efforts. Adjusting the membership of the AMSEC, strengthening the domains, and forming the AMSO all contributed to addressing much of the concern. However, the diversity of M&S-supported missions, coupled with the abundance of M&S users, ensures that M&S management remains a complex task. Managers of M&S must continue to review and recommend adjustments to the M&S management structures, processes, and policies to meet the intent of senior leaders and the needs of the domains in light of changes in the Army.

b. Actions:

1) Review (annually) and, as needed, revise the M&S management structure so that it remains relevant, accommodating changes in force structure, roles, and responsibilities (AMSO).

2) Revise processes and use technology to increase management efficiency (AMSO and Domains).

c. Metrics:

1) All organizations have a link to an AMSEC member for representation and communication.

2) All organizations have identified an appropriate domain(s) for each M&S program.

3) Presence of action items in domain plans.

4) Relations with C4I oversight groups.

5) Use of information technology to support management actions.

**3. Sub-Objective 1-2. A coherent set of policies that formalize the “Business Model” for Army M&S.**

a. Discussion. The Army M&S “Business Model” does not currently exist in a formal sense, but is the collective effect of the many Army policies that govern the responsibilities for the life cycle of M&S capabilities. As a business model, the emphasis is on determining what organizations are responsible for providing the products that support different parts of the life cycle for individual M&S systems and the M&S infrastructure, and the relationships among these organizations. The current business model has insufficient incentives for promoting reuse among program managers and for supporting common infrastructure. Building reuseable modules remains unattractive due to the high up-front costs. Consistent cost-sharing mechanisms for cross-domain programs and infrastructure have to be determined.

b. Actions:

1) Formalize the M&S business model to cover the life cycle of M&S capabilities from requirements generation to retirement (AMSO).

2) Develop policies to support the implementation of the business model (AMSO).

3) Coordinate the inclusion of approved policies into applicable Army regulations (AMSO).

4) Review and revise policy to provide incentives and remove barriers for PMs to fully participate in SBA (RDA domain).

c. Metrics:

1) Approved business model.

2) Degree of implementation in regulations and/or policy memos.

3) Degree of PM participation in SBA as measured by use of the MSRR, leveraging of existing models, and development of multi-functional models for reuse.

#### **4. Sub-Objective 1-3. Senior Leadership supports Modeling and Simulation as an Army Core-Enabling Competency.**

a. Discussion. The National Performance Review (NPR) charges government agencies to focus on core missions and competencies. Resourcing for non-core missions and functions will be minimized. In concert with the NPR, the Army has embraced a process for change, adaptation, and redesign called Force XXI. As part of the Force XXI process, the Institutional Army has defined its fundamental competency and has identified core capabilities and processes (Figure 2, page 2-2) that support its fundamental competency. Identifying the relationships between M&S capabilities and the core processes will enable the Army to resource necessary M&S capabilities.

b. Actions:

- 1) Identify relationships between M&S capabilities and the Institutional Army Core Capabilities and Processes (Domains).
- 2) Achieve explicit recognition by senior leaders of the support M&S provide for the Core Capabilities and Processes (AMSO).
- 3) Coordinate M&S as a core-enabling competency with the Institutional Army effort (AMSO).

c. Metrics:

- 1) Established as a core-enabling competency.
- 2) Supported by quantitative figures for instances of cost savings and avoidance, as well as qualitative information on activities that could only be performed via M&S.

#### **5. Sub-Objective 1-4. Army fully involved in Joint and DoD activities.**

a. Discussion. Three factors shape the Army's relationships with Joint and DoD M&S activities: (1) DoD Directive 5000.59: *Modeling and Simulation Management*, (2) the responsibility to support the creation of valid representations of Army forces and capabilities in joint and common use models, and (3) the desire to leverage non-Army M&S activities to provide the most efficient and effective M&S capabilities for the force. The best way to be informed about, to influence, and to benefit from Joint and DoD activities is to be involved. Army M&S managers must establish and sustain a collegial relationship with Joint and DoD managers. The Army is already involved in several joint technology developments and acquisition programs. The Army must be prepared to seize other opportunities that may arise and have value-added to the Army. Finally, the Army must be willing to develop and commit personnel to assume key M&S assignments in DoD and the Joint community. This includes formal long-term assignments as well as temporary commitments to special projects or task forces.

b. Actions:

- 1) Ensure Army M&S management remains linked to OSD and Joint M&S management (AMSO).
- 2) Support Army participation in OSD and Joint activities where beneficial and feasible (Domains).
- 3) Develop plan for preparing and nominating Army personnel for OSD and Joint assignments in critical M&S areas (AMSO).

c. Metrics:

- 1) Membership and attendance on applicable DoD and Joint groups.
- 2) Leadership and participation in joint programs.
- 3) Identification of M&S-related positions on Joint and OSD staff and organizations.
- 4) Number of Army officers nominated and accepted for those positions.
- 5) Presence of Army personnel on short-term OSD and Joint Staff ICTs.

**6. Sub-Objective 1-5. An active system for assessing the value-added of M&S and the progress toward the vision.**

a. Discussion. An important function of management is to provide feedback to the leadership on the value of what is being done and how well it is being done to enable course corrections to be made, if necessary. It is especially important in an era of constrained resources that managers be able to measure and articulate the value of their programs. The end product is improved programs and definable progress toward the vision.

b. Actions:

- 1) Define metrics and gather information on the value-added of M&S (AMSO and Domains).
- 2) Define assessment metrics for determining the status of objectives in *The Army M&S Master Plan* (AMSO).
- 3) Perform an assessment at least biennially after the POM lock on the progress toward the vision (AMSO).

c. Metrics:

- 1) Defined assessment metrics.
- 2) Percent receipt of assessment information.
- 3) Scheduled reviews of management structure.

## D. Requirements

The requirements component covers the process and the results of defining, collecting, integrating, and approving requirements for M&S capabilities to support the force.

**OBJECTIVE 2: An integrated set of approved requirements that describe M&S capabilities sufficient to meet the needs of the force.**

### 1. Discussion

Requirements must be integrated across the Army IAW TP 71-9. All M&S requirements are reviewed IAW domain management processes. Cross-domain M&S and high-interest requirements must go through the RIA process prior to final approval. Requirements should be coordinated with the Army's operational partners e.g., our sister Services, CINCs, DoD, other governmental or nongovernmental organizations, and allies as appropriate, to look for potential cooperative or leveraging opportunities. Requirements must be defined in sufficient detail to support the prioritization and execution of acquisition efforts to meet the requirements.

### 2. Sub-Objective 2-1. Set of requirements that are sufficient to support the full range of mission needs across the operational and business spectrums.

a. Discussion. *Army Vision 2010* and the Force XXI process have described the future operational spectrum and the core processes needed to execute the Title 10 responsibilities for Army XXI (Figure 2, page 2-2). The rapid shifts in force structure, doctrine, and systems leading to Army XXI implies many new requirements for M&S. At the same time, changes in the Army's core processes are driving requirements for new tools to support the decision making process. Unless these requirements are identified, developers will be unable to provide the needed tools to support the force.

#### b. Actions:

1) Identify M&S requirements to support full range of Army XXI needs across the spectrum of future operations to include emerging considerations from the Army After Next effort (Domains).

2) Identify M&S requirements to support full range of Army core processes (Domains).

#### c. Metrics:

1) Number of programs looking beyond 2003 and 2010.

2) Number of programs looking across the operational spectrum at scenarios and requirements for other than conventional major theater wars e.g., Military Operations Other Than War (MOOTW) applications.

3) Number of programs supporting each of the core processes.

4) Number of programs with joint participation in developing requirements.

### **3. Sub-Objective 2-2. Set of approved requirements that are integrated across mission areas to create efficient programs and minimize duplication of effort.**

a. Discussion. Integrating M&S requirements across functional areas creates efficient programs and minimizes duplication of effort. Requirements must support domain strategies for mission accomplishment across their functional areas. As the Army continues to utilize M&S to meet its vision of a total force equipped with the most modern weapons and equipment, it must fully embrace the process of Simulation Based Acquisition (SBA). SBA is a process for integrating M&S tools and technology across acquisition functions and throughout program phases. To realize the full potential of M&S to acquisition, program managers must plan for modeling and simulation in terms of how it can be applied from the beginning to the end of the acquisition life cycle.

b. Actions:

1) Ensure processes for integrating requirements within domains and across domains remain responsive (AMSO and TRADOC).

2) Integrate M&S and Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) requirements to ensure interoperability among M&S and operational C4ISR systems (Domains).

3) Integrate live training and testing requirements (Domains).

4) Identify integrated requirements for embedding simulations in current or emerging systems (Domains).

c. Metrics:

1) Number of programs in investment plan with approved requirements document and recognized by RIWG.

2) Number of program with multiple MACOMs/FOAs/SSAs in requirements process.

3) Process in place to support M&S and C4ISR requirements integration.

4) Process in place to support M&S and testing requirements integration.

5) Process in place to support the integration of requirements for embedding simulations.

#### **E. Investments**

The investments component covers those activities related to the prioritization of resources for M&S activities and the formal allocation of those resources through the PPBES.

**OBJECTIVE 3: Funded programs that efficiently deliver M&S capabilities necessary to meet the most critical needs of the force.**

## 1. Discussion

Requirements managers have the challenge of ensuring they have identified a set of M&S requirements that is sufficient to meet the needs of the force. Investment managers have a different challenge. They must prioritize the set of sufficient requirements to ensure resources are allocated against only those requirements that are necessary to meet the most critical needs of the force. It is unlikely that every approved requirement will be funded, so associated risks must be identified.

### 2. Sub-Objective 3-1. Fully-funded M&S programs that are necessary to meet the most-critical needs of the force.

a. Discussion. Managing M&S investments remains complex because of the often-indirect relationship between M&S programs and their resources. While M&S investments are managed by the three domains they are funded in the six PEGs. Some M&S are funded through individual program elements while others fall under a major program or mission support line. The DoD policy of Cost as an Independent Variable (CAIV) applies to M&S investments as well as major systems. Thus investment managers must prioritize necessary requirements against their funding profile instead of always increasing resource requests to match new requirements. Preference should be given to fully funding programs to deliver necessary capability than partially funding solutions to less critical requirements.

b. Actions:

- 1) Clarify the relationships between approved M&S requirements and investments to improve the visibility of M&S resourcing and risks (AMSO).
- 2) Prioritize investments within domains (Domains) and PEGs (AMSO).
- 3) Increase emphasis on M&S in *The Army Plan* and in the six PEGs (AMSO).

c. Metrics:

- 1) Completion of domain and Army investment plans.
- 2) Relationship of plan and POM results.
- 3) Increases and decreases in M&S accounts due to Program Decision Memorandums and Program Budget Decisions.
- 4) Number of fully funded programs.

### 3. Sub-Objective 3-2. M&S investments that are balanced across the domains and support efficient program leveraging.

a. Discussion. The concept for management by domain groups investments by related functional capabilities. Each of these functional capabilities is important to the overall success of the Army. Thus there is no intent to prioritize among the domains although there is recognition that there should be balance among the domains respective to their needs and to their dependence upon the common infrastructure. The differences between the size of the audience served and technical requirements for the three domains makes it problematic to compare investments on a dollar-for-dollar basis. The emphasis on cross-domain programs creates new challenges for appropriate cost sharing among the domains.

The interdependencies of cross-domain M&S programs can get lost in the PEG prioritization process. Finally, there should be mechanisms to identify investments that appear similar in different domains to the domain managers or program proponents as opportunities for potential leveraging.

b. Actions:

1) Develop mechanisms to enable senior leaders to balance investments across domains (AMSO).

2) Develop mechanism to identify cross-domain linkages to multiple PEGs and to ensure visibility of the related funding profiles (AMSO).

3) Reconcile investments across mission areas to improve efficiency through leveraging (AMSO).

c. Metrics:

1) Programs in each PEG.

2) Number of fully funded programs in each domain.

3) Mechanism to track leveraged programs across PEGs.

4) Number of programs leveraged across PEGs.

5) Number of programs with multiple sources of funding.

## F. Standards and Technology

The Standards and Technology component covers activities related to the development of standards and the review of M&S technology requirements and programs. It is a policy function to develop M&S standards and to promulgate their use once established. Established standards belong to infrastructure.

**OBJECTIVE 4: A comprehensive set of standards that facilitates efficient development and use of M&S capabilities.**

### 1. Discussion

This component of the strategy combines two elements (Develop Standards and Direct Research and Technology) of the Army M&S management concept from AR 5-11 because they form the central technical core governing the development of world-class M&S. Much of the coordination work for the objectives below falls on the shoulders of the SCCs as they execute the Standards Development Process (Chapter 3). However, it is critical that the domains and their member organizations remain active in the Standards Category teams so that the Standards Development Process can capture the full extent of available Army expertise.

## **2. Sub-Objective 4-1. Comprehensive set of DoD-compliant standards for developing Army simulations and supporting data.**

a. Discussion. Although Army M&S are not managed as part of the AEA, they are still computer-based applications for which the Army has established development standards to facilitate software engineering, reuse, quality control, and interoperability. Example standards include the Technical Architecture for Information Management (TAFIM) and the Joint Technical Architecture (JTA)-Army. With the advances in information technology and the requirement for closer integration with C4ISR systems, these standards must evolve to maintain efficient M&S development and support for the force. The Army M&S community fully subscribes to the DoD and Army programs and policies for the development of standard data elements. As M&S continue to evolve, their data standards must evolve to permit reuse and interoperability, especially with C4ISR systems.

b. Actions:

1) Develop standards for the following categories (appropriate SCC):

- Architecture
- Data
- Functional Description of the Battlespace
- Object Management
- Semi-Automated Forces
- Visualization

2) Ensure integration of M&S requirements and architectures into the Defense Information Infrastructure (DII) Common Operating Environment (COE) and JTA-Army developments (SCCs and DISC4).

3) Remain active in forums such as the Architecture Management Group, the Simulation Interoperability Standards Organization, and the Standards Category teams (Domains).

4) Ensure the continuing integration of M&S data elements with the DoD Data Dictionary (SCC).

c. Metrics:

1) Each SCC has identified requirements, objectives, and Roadmap with associated metrics.

2) Incorporation of M&S services and standards into the AEA.

3) Number of approved standards for each SCC.

4) Accessibility of standards and their presence in a repository.

5) Volume of activity on reflectors.

6) Number of programs (Army and Non-Army) using Army M&S standards.

### **3. Sub-Objective 4-2. Comprehensive set of DoD-compliant standards for modeling natural and cultural environments.**

a. Discussion. There are three DoD Executive Agents to develop standards for environmental representations. Thus the Army must work to help the DoD Executive Agents formulate and shape their standards so that they meet Army requirements. This is an important area for ensuring the commonality or at least consistency between M&S standards and C4I system standards. The DMSO project entitled the Synthetic Environment Data Representation and Interchange Specification (SEDRIS) serves as a prime example of a major standards development effort that supports this objective.

b. Actions:

- 1) Develop standards for the following categories (appropriate SCC):
  - Dynamic Environment
  - Terrain
- 2) Remain active in forums such as the Simulation Interoperability Standards Organization and the Standards Category teams (Domains).

c. Metrics:

- 1) Each SCC has identified requirements, objectives, and Roadmap with associated metrics.
- 2) Incorporation of M&S services and standards into AEA.
- 3) Number of approved standards for each SCC.
- 4) Accessibility of standards and presence in a repository.
- 5) Volume of activity on reflectors.
- 6) Number of programs (Army and Non-Army) using Army M&S standards.

### **4. Sub-Objective 4-3. Comprehensive set of standards for modeling Army operations and physical phenomenology.**

a. Discussion. The modeling of Army operations and physical phenomenology is concerned with the creation of standard models or abstractions e.g., algorithms, structures, or taxonomy, of Army forces and their capabilities. These standards can describe several aspects of units: their physical characteristics, how they accomplish their missions, how they interact with other organizations and their environment, and how they function as part of a joint force. These standards should be system-independent abstractions of varying fidelity that support multiple simulation developments. They must be documented to support validation and to accommodate the evolution of the standards to represent the Army as it transitions to Army XXI.

b. Actions:

1) Develop standards for the following standards categories (appropriate SCC):

- Deployment/Redeployment
- Mobilization/Demobilization
- Logistics
- Acquire
- Attrition
- Move
- Control, Communications, and Computer Systems Representations

2) Remain active in forums such as the Simulation Interoperability Standards Organization and the Standards Category teams (Domains).

c. Metrics:

1) Each SCC has identified requirements, objectives, and Roadmap with associated metrics.

2) Incorporation of M&S services and standards into AEA.

3) Number of approved standards for each SCC.

4) Accessibility of standards and presence in a repository.

5) Volume of activity on reflectors.

6) Number of programs (Army and Non-Army) using Army M&S standards.

**5. Sub-Objective 4-4. Comprehensive set of standards for modeling cognitive processes.**

a. Discussion. Standards for modeling cognitive processes or the effects of cognitive processes on Army operations will make two major contributions to Army modeling and simulation. The first contribution is in the area of better models. Army operations are continuing to move away from stylized scenarios with a well-known, "by-the-book" threat into scenarios that emphasize information operations and the capabilities of people and organizations. Having reasonable models of the dynamics of human behavior under conditions of uncertainty will enable more credible representations of information operations yielding more robust analysis. As important, as digitization expands throughout the force, requirements are growing for simulation systems to provide more detail about simulated forces yet require fewer operators. Standards for cognitive process that enable the development of realistic semi-automated forces will be crucial for conserving resources.

b. Actions:

1) Develop standards for the Command Decision Modeling Standards Category (SCC).

2) Remain active in forums such as the Simulation Interoperability Standards Organization and the Standards Category teams (Domains).

c. Metrics:

1) Each SCC has identified requirements, objectives, and Roadmap with associated metrics.

2) Incorporation of M&S services and standards into AEA.

3) Number of approved standards for each SCC.

4) Accessibility of standards and presence in a repository.

5) Volume of activity on reflectors.

6) Number of programs (Army and Non-Army) using Army M&S standards.

**6. Sub-Objective 4-5. Comprehensive set of DoD-compliant standards for ensuring the credibility of Army M&S.**

a. Discussion. DoD has invested significant resources in the development of guidelines and methods for assuring the quality and credibility of its M&S. The Army also recognizes that with CAIV for development, there must be some consideration for how much credibility is enough to support the mission. As the technology and the standards processes mature, the procedures for ensuring credibility must be updated to remain relevant.

b. Actions:

1) Develop standards for the following categories (appropriate SCC):

- Cost Representation
- VV&A

2) Evolve VV&A /Verification, Validation, and Certification (VV&C) guidelines to include HLA-compliant federations and consider the concept of CAIV for M&S (AMSMP WG).

3) Remain active in forums such as the Simulation Interoperability Standards Organization and the Standards Category teams (Domains).

c. Metrics:

1) Each SCC has identified requirements, objectives, and Roadmap with associated metrics.

2) Number of approved standards for each SCC.

3) Accessibility of standards/presence in repository.

4) Volume of activity on reflectors.

5) Number of programs (Army/Non-Army) using Army M&S standards.

## **7. Sub-Objective 4-6. Comprehensive set of M&S Technology Requirements and an integrated program for meeting the requirements.**

a. Discussion. The Army's requirements for M&S capabilities exceed the capabilities of current technology. The commercial telecommunications and entertainment industries will create many suitable products. However, the increasing breadth and complexity of Army missions continues to generate new requirements for M&S systems. These requirements cover a broad range of technologies that are being examined in programs across DoD. The Army must ensure that its investments in M&S technologies cover those areas critical to Army applications but which are not being done elsewhere.

b. Actions:

1) Identify M&S research requirements and determine methods for addressing the requirements e.g., commercial industry, OSD, or Army solution (AMSO).

2) Infuse recommendations of the AMSTR into the *Army Science and Technology Master Plan* (AMSO).

c. Metrics:

1) Plan identifying technology requirements and identification of sources for solutions to the requirements such as commercial, DoD, Army and other activities.

2) Percent requirements not being addressed.

### **G. M&S Infrastructure**

M&S Infrastructure is the underlying base or foundation of assets available to support the development and maintenance of M&S; the basic facilities, equipment, installations, and services needed for the development and maintenance of a system; includes personnel performing development or maintenance, communications, networks, architectures, standards, protocols, and information resources repositories. The M&S Infrastructure component does not include the assets established and operated by organizations using M&S in support of their mission.

**Objective 5: World-class M&S with an efficient set of related infrastructure to meet developer and end-user needs.**

#### **1. Discussion**

The above definition for M&S infrastructure follows the DoD definition but has one significant difference. The Army definition of M&S infrastructure distinguishes between assets managed by the M&S management structure, that are in place to support the development and maintenance of M&S, and assets managed by organizations as part of their mission support infrastructure. M&S infrastructure does not include assets such as the training simulation centers, the analysis centers, or the RDECs. M&S infrastructure includes the body of approved standards, but does not include the process of developing standards. M&S infrastructure includes personnel (contractor or government employees) that perform model development or maintenance, but not those with training, analysis, or RDA missions.

The principal challenge for infrastructure is to match assets to requirements in a time of force structure changes, technical revolution, and scarce resources.

## **2. Sub-Objective 5-1. World-Class M&S systems.**

a. Discussion. M&S systems include the simulations and the software support tools required to use the simulations effectively. The Army will probably be unable to afford to develop every simulation or support tool that might be useful. However, the ones that are funded must be world class i.e., must be of such a high quality so as to be among the best of available systems. Quality is a function of meeting the mission needs of the users. Quality factors include being relevant, verified, validated, user-friendly, and reliable. Part of meeting the user needs also includes the ability to integrate with non-M&S applications e.g., training management systems, to support the complete life cycle of the mission being supported by the M&S system. It is expected that future M&S should be able to support an SBA mission thread that crosses domains as advanced concepts become developed systems upon which the forces need to be trained. Finally, while different functional areas may require models of varying fidelity, there are many support tools that could be shared across multiple applications.

### b. Actions:

1) Develop and field HLA-compliant simulations that support domain-unique or multiple applications across mission areas (Domains).

2) Develop M&S support tools that can be reused across multiple applications (Domains).

### c. Metrics:

1) Progress toward HLA compliant simulations.

2) Identified support tools used by multiple organizations or cross-domain.

## **3. Sub-objective 5-2. An efficient set of M&S support facilities with sufficient systems and capabilities to meet user needs.**

a. Discussion. The Army's investment in M&S and mission infrastructure have been driven by current strategies for supporting the development and maintenance of M&S and supporting organizational missions. Advances in information technology and increasing requirements to support geographically separated organizations along with forward presence and deployed forces are driving the development of new strategies. These new strategies will propel changes in infrastructure in terms of facilities, quantity of fielded systems, and supporting personnel and communications. As part of efficient development, the M&S community must migrate away from single-purpose networks to the DII, while ensuring that their requirements influence the DII to adjust to meet their needs. Resource repositories are being established to support reuse within organizations. Integrating these repositories will be essential to achieve the full benefits of reuse across domains.

### b. Actions:

1) Migrate M&S infrastructure to efficient set of facilities based on mission needs (AMSO).

2) Conduct an annual review of the mission, management structure, and products of programs assigned to the ASWG (AMSO).

3) Integrate M&S network requirements with DII (DISC4).

4) Support establishment of integrated system of M&S resource repositories as part of the DoD MSRR (AMSO).

5) Identify M&S infrastructure cost drivers and report to OSD per DoD 5000.59P (AMSO and CEAC).

c. Metrics:

1) Facilities operating near capacity.

2) M&S Network requirements identified and integrated by DISC4.

3) Established integrated databases for requirements and for investments.

4) Robust AMSO Web site: Currency of documents and links to M&S sites.

5) Army repositories registered in the MSRR.

6) Percent items in investment plan with current information in models catalog.

7) Infrastructure cost drivers identified and reported to OSD.

#### **4. Sub-Objective 5-3. An efficient balance of M&S development infrastructure supporting internal and external development.**

a. Discussion. The Army has supported the development and acquisition of M&S capabilities through two main means. The Army has established a core of in-house M&S professionals capable of developing and using M&S capabilities to meet specific needs. The Army also procures significant M&S capabilities through external development managed by formal contracting procedures and supporting infrastructure. Both means are essential to the maintenance of M&S. The in-house capability provides responsive support to facilitate investigations of emerging analytical issues as well as provides a base of expertise and experience useful for providing insights to guide external development. Supporting external development enables the Army to draw upon the substantial abilities of industry and academia to meet its needs efficiently. The challenge is achieving the right balance of internal and external development infrastructure as advances in information technology drive the shift from artistry to engineering in software development.

b. Actions:

1) Assess the organizational requirements for internal and external development infrastructure (Domains).

2) Plan to achieve an efficient balance of development infrastructure (Domains).

c. Metrics:

1) Domains identified strategy for internal versus external development and maintenance.

2) Domains established plan for achieving development balance.

## H. Education

The Education component covers those activities related to the increasing the awareness, knowledge, and understanding of Army M&S policies, programs, applications, resources, and technology.

**OBJECTIVE 6: A broad community of M&S managers, users, and developers with sufficient understanding of Army M&S to make informed decisions about and effective use of Army M&S capabilities.**

### 1. Discussion

Education is an overarching component that covers multiple proponents across the Army as well as external audiences. The goal of education is to ensure that people who make decisions about the investments, uses, and development of Army M&S capabilities have sufficient understanding to make informed decisions. There are three major audiences to be considered: Managers of Army M&S, users, and developers. Each audience has multiple echelons and each echelon within an audience has different information requirements and different opportunities to receive the information. The challenge is to ensure that plans for education cover the full range of audience and information requirements using efficient means for imparting understanding.

### 2. Sub-Objective 6-1. All managers of Army M&S programs have sufficient understanding of Army M&S requirements, programs and capabilities to make informed decisions.

a. Discussion. Many people can be considered M&S managers. In its broadest sense this audience includes anyone that has an interest in how tax dollars are being invested in Army M&S. In a narrower sense it pertains to those people who directly affect the resources allocated to Army M&S and the management of those resources. This group includes the Congress, the OSD and Joint Staffs, senior leaders in the Army, Program Executive Officers (PEOs), and many Army resource managers. Potential presentation topics include the concepts underlying the Army M&S strategy, the Army M&S management structure, and beneficial applications of M&S from each domain. Delivery media could include focused presentations and school curricula, as well as informal access to information via the Internet.

#### b. Actions:

1) Keep the target group informed through focused briefings, presentations at modeling and simulation meetings, and other forums, publications, and other media (AMSO).

2) Plan for including information on the benefits of M&S across the Army and the major Army management processes and structures in school curricula to include non-TRADOC opportunities e.g., the Army War College or the Army Management Staff College (TRADOC and AMSO).

3) Maintain WWW pages that provide current information on organizational M&S plans, programs and capabilities (AMSO, SCCs, and M&S organizations).

4) Provide organizational WWW page Uniform Resource Location information to AMSO (Organizations desiring a link from the Army node of the MSRR to their page).

c. Metrics:

- 1) Completed Educate the Force plan.
- 2) Completion and distribution of educational/informational materials.
- 3) Number of articles published and papers presented on M&S management.
- 4) Favorable reports out of Army and DoD science boards and oversight bodies.

**3. Sub-Objective 6-2. All Users of Army M&S capabilities have sufficient understanding of Army M&S infrastructure to make effective use of the inherent capabilities and to articulate requirements.**

a. Discussion. Users of M&S capabilities covers those personnel who plan, direct, and execute the operation of M&S capabilities to support a given mission. This audience includes personnel in Army units, staffs, and agencies e.g., unit operations officers simulation center managers, analysts, training managers, and acquisition PMs. Information requirements include capabilities and limitations of M&S in general, employment guidelines and techniques, as well as specific information about operating M&S used in their functional area.

b. Actions:

1) Plan for including information on benefits, concepts, techniques, and examples of M&S applications and the major Army management processes and structures in school curricula to include non-TRADOC opportunities e.g., the Defense Acquisition University, and the Force Management School (TRADOC and AMSO).

2) Plan for increasing awareness about DoD information resources such as the follow-on to the MSOSA (AMSO).

3) Identify acquisition education opportunities to provide instruction and guidance to the acquisition community regarding SBA. Provide necessary data and assist schools in developing appropriate SBA course content (RDA Domain).

c. Metrics:

- 1) Number of TRADOC and Non-TRADOC curricula with M&S topics.
- 2) Presentation of M&S management topics at specific non-TRADOC schools.
- 3) Requests for support from Army organizations to the MSOSA.
- 4) Number of semester hours of required and elective SBA instruction in acquisition curriculums.

**4. Sub-Objective 6-3. All personnel involved with the development of Army M&S capabilities have sufficient knowledge of M&S technology, standards, and policies to create and execute efficient and effective M&S programs.**

a. Discussion. The development of M&S capabilities requires a wide range of expertise among a large number of people. There is no single set of information requirements. However, there are a number of Army programs to facilitate the acquisition of qualified personnel and to develop military and civilian personnel to have the necessary skills. Based on their missions, each organization must determine its own needs while remaining cognizant of the career field regulations of the personnel management system. Domains should ensure that the educational requirements are synchronized with the infrastructure requirements for the domain.

b. Actions:

- 1) Identify requirements for M&S-capable personnel by education level (Domains).
- 2) Develop plans to acquire and develop personnel with necessary educational qualifications (Domains).
- 3) Identify and publicize potential educational opportunities for Army M&S personnel (AMSO).

c. Metrics:

- 1) Domains have identified requirements for modeling and simulation professionals.
- 2) Identified sources of M&S education.
- 3) Percent fill of M&S technical positions with qualified people.

**I. Support for DoD M&S Objectives**

The Army strategy fully supports the objectives in the *DoD Modeling and Simulation Master Plan*. As shown in Figure 12 (page 4-3), the components of the Army strategy cover a wider range of activities than the DoD objectives due to the different Title 10 responsibilities for the Army. The DoD objectives emphasize the development of standards. The Army's Standards and Technology component contains sub-objectives that can be mapped to the DoD objectives. Figure 14 shows how the Army's Standards Categories connect DoD objectives to the Army's Standards and Technology sub-objectives and highlights the fact that standards support all three domains.

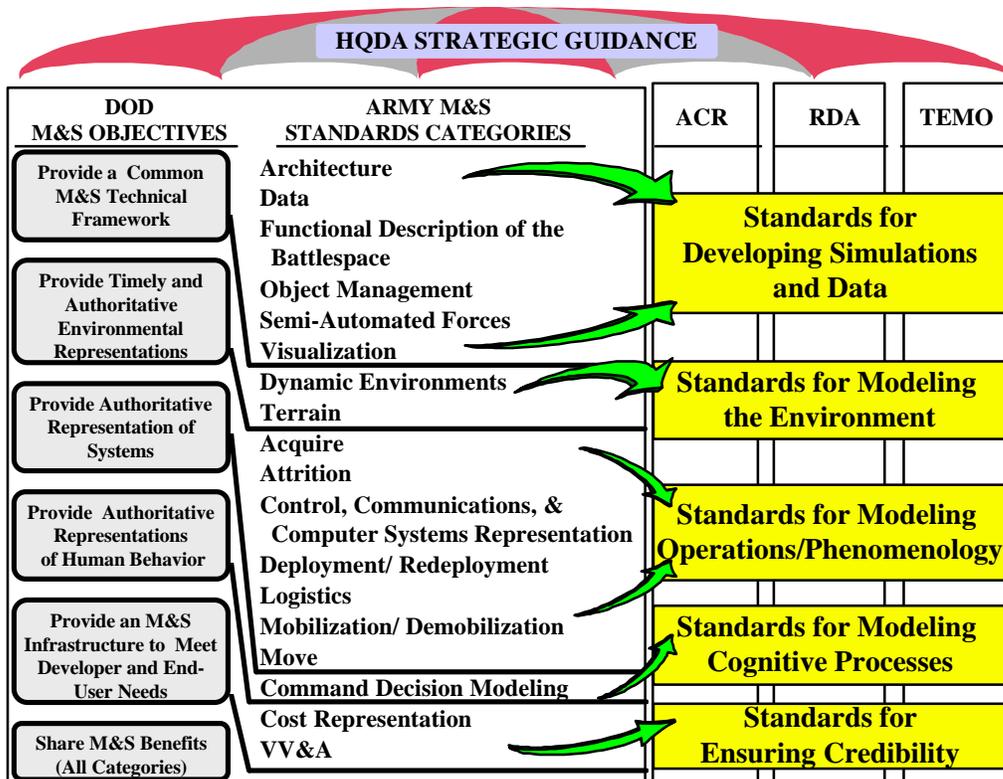


Figure 14. DoD M&S Objectives and Army Standards Categories and Sub-Objectives

<END OF CHAPTER>

## Chapter 5. Strategic Guidance

### A. Introduction

The following guidance applies to all M&S managers, users, and developers in the Army. The Army's M&S strategy in Chapter 4 lays out a series of actions to be achieved and identifies responsibilities at a high level for accomplishing those actions. However, Chapter 4 does not prioritize among the components and the corresponding strategic objectives as those priorities may be different for individual domains. This guidance will help prioritize organizational efforts in support of the strategic objectives to include the development of plans, programs, and investments. The three main sections of this chapter discuss the Priority Tasks, the overarching guidance for Army M&S management, and provide specific guidance for the near, mid, and far term. The Army's M&S are vital tools to help modernize the force and sustain its readiness. The M&S community must ensure that the tools remain relevant as the Army moves to the future.

### B. Priority Tasks

To help organizations prioritize their management efforts, a set of Priority Tasks has been identified that support the main effort of the Army's M&S strategy, "Emphasize Efficient Development." Figure 12 (page 4-3) maps each of the M&S management tasks to one of the six components. For each component, the task that was considered the most important for efficient development was selected as the Priority Task for that component. The Priority Tasks define the Army's main effort in terms of activities that all Army organizations must support. They also provide a convenient checklist for managers to use when examining an M&S activity for its contribution to the main effort.

#### 1. Assess Progress

There are many challenges on the path to the vision and, as the Army evolves, new challenges will appear. Senior leaders depend upon coherent assessments to ensure the organization is overcoming the challenges and is on the correct path. If you do not check, it probably will not get done.

#### 2. Integrate Requirements

Given fixed resources, integrating requirements is the key to ensuring that the greatest number of needs can be met. While integration often calls for compromise, without it, the Army will be unable to achieve the full potential from its M&S.

#### 3. Reconcile Investments

Reconciling investments brings discipline to the process of ensuring that the Army meets its most critical needs for sustaining readiness and modernization.

#### 4. Develop Standards

Developers and users should look to the Army's M&S standards as a value-added means for increasing the interoperability, reuse, and credibility of our M&S while reducing costs.

## **5. Manage M&S Infrastructure**

All organizations should cultivate their infrastructure, pruning what is no longer needed and strengthening what is essential.

## **6. Educate the Force**

The Army's M&S are rapidly becoming an indispensable part of the Army's core processes and capabilities. The Army must have an informed community of managers, users, and developers that understand the benefits, the applications, and the technology.

### **C. Overarching Guidance**

Resourcing for Army M&S mirrors that of the rest of the Army and thus is subject to close scrutiny. The guidance below incorporates and builds on recent Army guidance as expressed in messages from the VCSA to the Army.

#### **1. Be Efficient Today**

The Army M&S community must strive for efficiency on two levels. At the individual program level, managers must ensure that only the minimum amount of resources are used to accomplish their mission. On a larger scale, HQDA, the Domain Managers, and senior leaders must continually look for better ways to deliver relevant products to the force. This includes internal M&S community actions e.g., SBA, as well as crossing the boundaries to other communities.

a. **Eliminate Duplication.** While many missions require tailored M&S applications, developing a unique simulation for every need is no longer efficient. All users must work through the RIA process to ensure that their requirements are integrated.

b. **Leverage Opportunities for Reuse.** All M&S managers, developers, and users must plan for reuse in the broadest sense. The Army's M&S standards provide an essential starting point for all developments. Organizations must also look beyond the Army for opportunities to leverage developments from other Service, Joint, and OSD programs. To properly apply available resources to achieve the vision, all must carefully balance the unique aspects of their requirements with the potential benefits of reuse.

c. **Share Information.** Harnessing the power of information technology will be equally as important for the Institutional Army as it is for the Operational Force. The key to successful integration and leveraging is knowing what else is out there. All organizations must support the Army's efforts to collect and share information on M&S activities.

#### **2. Focus on the Future**

The Force XXI process and the Army After Next effort are all about the future. We must build the M&S systems needed to help us prepare for the future while sustaining our legacy systems at a minimal level.

a. **Prepare for Army After Next.** The Army After Next effort takes a long-term view of the Army in its strategic environment. We need to ensure that we have the M&S tools necessary to examine the issues that shape our future.

b. Pay the Up-front Costs. To fully realize the benefits of modeling and simulation, managers must follow the example of the commercial industry by adjusting their processes and building the infrastructure to support a long-term strategy, not just short-term benefits.

c. Minimize Sustainment of Legacy Systems. The Army has a broad range of programs developing next-generation M&S across the domains. These programs will replace a myriad of legacy systems. While many people would like to fix the warts on our older systems, we can no longer afford to fix every fault and pay the up-front costs for the future. Users and program managers must ensure that systems planned to be replaced receive only life-support sustainment.

### **3. Think and Be Joint**

a. Full Spectrum Operations. The Army operates today in a joint environment. Users and developers must ensure that the requirements for future M&S cover the full spectrum of operations and capture the capabilities of our operational partners. We must also ensure that we are prepared to describe our capabilities to others and support their requests for information.

b. Cooperative Efforts. Several major efforts are developing simulations for Joint and Service use. Keeping in mind our Title 10 obligations, we must support these efforts and be prepared to use their products to maintain our credibility and relevance in the Joint and OSD communities.

## **D. Planning Guidance**

### **1. Near-term (FY 98-99)**

Army M&S are in the midst of a major transition from legacy systems to a next generation of systems.

a. The Army main effort is the development of next-generation M&S systems. The commitment includes prioritizing resources for these new M&S systems while reducing resources for legacy systems to just sustainment level. Legacy systems are defined as those M&S that are planned to be replaced by an ongoing development. The Army will accept risk by not enhancing legacy systems beyond currently programmed requirements.

b. As a supporting effort, actions that are underway to meet OSD policy regarding compliance with the HLA must continue.

### **2. Mid-term (FY 00-05)**

a. The Army's main effort will be achieving the full operational capabilities of the fielded next-generation systems to meet the needs of Army XXI.

b. There are several supporting efforts:

- Completing the transition to HLA-compliance, which should be completed in the beginning of the time period.
- Resourcing and reorganizing infrastructure to support the next-generation systems and Army XXI. All organizations using M&S must review their mission support infrastructure to ensure they are efficiently using the capabilities provided by the M&S infrastructure to meet their missions.

c. Organizations must also consider preparing for the Army After Next years:

- Identify M&S research and development needs for supporting the Army After Next.
- Resource initial acquisition efforts at the latter part of the period.

### **3. Far-Term (2006 and beyond)**

Since this time period is beyond the next POM, the main effort is on identifying requirements rather than investments. Organizations must ensure they remain aware of the long-term plans for the Army so that M&S planning considers the implications of changes in strategies, force structure, doctrine, and systems.

## **E. Conclusion**

The Army's has been realizing the benefits from modeling and simulation for decades. As a key technology for achieving *Army Vision 2010* and the Army After Next, M&S has become an integral part of daily operations across the force for sustaining readiness and modernization. Implementing the common vision and supporting strategy will set the stage for future success: Quality people using world-class M&S that meet the needs of the Total Force across the full spectrum of operations.

◀END OF CHAPTER▶

## Appendix A. Domain Management and Investment Plans

### 1. Domain Management Plan

#### a. Purpose

The purpose of the plan is three-fold: describe the Domain Manager's vision and how it supports the Army Vision for M&S, describe the domain's management structure and processes, and finally, describe the domain manager's detailed plan and guidance for achieving the domain vision.

#### b. Format

As this plan is the domain manager's plan, the format is up to the domain manager. However, the following format contains the general information requirements for the plan. A consolidated list of the domain-specific action items from Chapter 4 of the Master Plan are listed in Tab 1 to this appendix.

- 1) Chapter 1 - General Information. This chapter should cover basic introductory information about the plan.
- 2) Chapter 2 - Domain M&S Vision. This chapter should provide a definition of the scope of the domain and the Domain Manager's vision for the domain. The definition should enable M&S proponents to determine if their activity falls within the purview of the domain manager. The discussion should provide insight into how the domain vision supports the Army's strategic vision for M&S.
- 3) Chapter 3 - Domain Management of M&S. This chapter should describe the domain management concepts, structures, and processes and their interactions with the Army's M&S management as described in Chapter 3 of the Master Plan. The discussion should include how the M&S proponents within the domain interact with the domain's structure and processes.
- 4) Chapter 4 - Domain M&S Objectives. This chapter should provide the details of the domain strategy to achieve the vision. The strategy should detail the domain objectives that, in concert with the Army objectives, define the full set of capabilities and conditions required to achieve the domain vision. The discussion should address the action items delineated for the domains under the Army objectives in Chapter 4 of the Master Plan. It is not necessary for a domain to have a matching objective for every Army objective, in fact the objectives may be quite different. However, each of the domain objectives should support one or more of the Army objectives.

#### c. Timelines and Submission Instructions

Each domain already has or is about to have an approved Domain Management Plan based on the previous version of the Army M&S Master Plan. Updates or new versions of the plan are due to AMSO in time to support the biennial review that will occur after the POM lock in the summer of even-numbered years. Plans should be submitted to AMSO in electronic format (Microsoft Word) and in hard copy with a cover letter from the Domain

Manager. After receipt, AMSO will make the plans accessible through the AMSO home page.

## **2. Domain Investment Plan**

### **a. Purpose**

The investment plan formalizes the domain's investment strategy. It depicts the prioritized programs within the domain and how these programs support the domain objectives and the Army objectives. The plan should contain enough information on the individual programs to support the associated investments during a POM scrub. Domain Managers provide the information in the Domain Investment Plan to AMSO to form the basis for *The Army M&S Investment Plan*.

### **b. Format**

While the format for the plan is up to the domain manager, the programmatic information must follow the format at Tab 2 of this appendix.

### **c. Timelines and Submission Instructions**

Each domain already has an approved Domain Investment Plan. Updates or new versions of the plan are due to AMSO by 31 July every odd-numbered year in time to support the build of *The Army M&S Investment Plan*. Plans should be submitted to AMSO in electronic format (Microsoft Access or Microsoft Excel) and in hard copy with a cover letter from the Domain Manager. After receipt, AMSO will make the plans accessible (without the programmatic) through the AMSO home page.

## Appendix A. Tab 1. Action Items for the Domains

The following table is an extract from Chapter 4 to provide a convenient listing of action items for which one or more domains has the lead.

Sub-objective	Action
1-1	Revise processes and use technology to increase management efficiency (AMSO and Domains).
1-2	Review and revise policy to provide incentives and remove barriers for PMs to fully participate in SBA (RDA domain).
1-3	Identify relationships between M&S capabilities and the Institutional Army Core Capabilities and Processes (Domains).
1-4	Support Army participation in OSD and Joint activities where beneficial and feasible (Domains).
1-5	Define metrics and gather information on the value-added of M&S (AMSO and Domains).
2-1	Identify M&S requirements to support full range of Army XXI needs across the spectrum of future operations to include emerging considerations from the Army After Next (Domains).  Identify M&S requirements to support full range of Army core processes (Domains).
2-2	Integrate M&S and Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) requirements to ensure interoperability among M&S and operational C4ISR systems (Domains).  Integrate live training and testing requirements (Domains).  Identify integrated requirements for embedding simulations in current or emerging systems (Domains).
3-1	Prioritize investments within domains (Domains) and PEGs (AMSO).
4-1	Remain active in forums such as the Architecture Management Group, the Simulation Interoperability Standards Organization, and the Standards Category teams (Domains).
4-2	Remain active in forums such as the Simulation Interoperability Standards Organization and the Standards Category teams (Domains).
4-3	Remain active in forums such as the Simulation Interoperability Standards Organization and the Standards Category teams (Domains).
4-4	Remain active in forums such as the Simulation Interoperability Standards Organization and the Standards Category teams (Domains).

Sub-objective	Action
4-5	Remain active in forums such as the Simulation Interoperability Standards Organization and the Standards Category teams (Domains).
5-1	<p>Develop and field HLA-compliant simulations that support domain-unique or multiple applications across mission areas (Domains).</p> <p>Develop M&amp;S support tools that can be reused across multiple applications (Domains).</p>
5-3	<p>Assess the organizational requirements for internal and external development infrastructure (Domains).</p> <p>Plan to achieve an efficient balance of development infrastructure (Domains).</p>
6-1	<p>Maintain WWW pages that provide current information on organizational M&amp;S plans, programs and capabilities (AMSO, SCCs, and M&amp;S organizations).</p> <p>Provide organizational WWW page Uniform Resource Location information to AMSO. (Organizations desiring a link from the Army node of the MSRR to their page).</p>
6-2	Identify acquisition education opportunities to provide instruction and guidance to the acquisition community regarding SBA. Provide necessary data and assist schools in developing appropriate SBA course content (RDA Domain).
6-3	<p>Identify requirements for M&amp;S-capable personnel by education level (Domains).</p> <p>Develop plans to acquire and develop personnel with necessary educational qualifications (Domains).</p>

**Appendix A. Tab 2. Format for Investment Plan Programmatic Data**

Domain Name												
Investment Plan for Budget Year and POM												
MDEP	PE	PEG	M&S Acronym	Appropriation Type	FY XX	FYXX	FY XX	Total				
Group the M&S by MDEP	Program Element			Enter the type of appropriation e.g., OPA, OMA, OMAR, OMNG, or RDTE	**							

\*\*For each FY, enter:

(D) Costs of development and/or fielding of a new M&S (includes major upgrades of an existing M&S which significantly changes the M&S capability).

(M) Maintenance costs of keeping the current M&S capability and incrementally improving that capability e.g., due to hardware, software, or network changes which necessitate incremental upgrade. Maintenance costs do not include the direct and overhead costs for training e.g., billeting, coordination, scenario development, transportation, facilities, or education. Also, maintenance costs do not include doing studies or analyses that use the M&S, the costs of collecting input data, or the reporting of the findings of a study or analysis.

(F) Funds available for obligation in the current year and/or programmed in the outyears.

(U) Amount of costs not identified as funded.

Example:

MDEP	PE	PEG	M&S Acronym	Appropriation Type	FY XX	FY XX	FY XX	FY XX	FY XX	FY XX	FY XX	Total
XMGH	665801.0000	TT	IMTBASS	RDTE	50 (D/F)	10 (D/F)						60 (D/F)
					10 (D/U)	5 (D/U)						15 (D/U)
				OMA			50 (M/F)	35 (M/F)				85 (M/F)
							10 (M/U)	10 (M/U)				20 (M/U)



## **Appendix B. Army M&S Management - Standards Development, AMIP, and the SIMTECH Program**

### **1. Purpose**

This appendix discusses the M&S Standards Development Process and potential tools and also provides guidance for Standards Category Coordinators (SCCs) and for organizations interested in the SIMTECH program. Tab 1 contains the definition for each Standards Category and a discussion of the future requirements for each category. Tab 2 provides contact information for the current SCCs. Tabs 3, 4, and 5 provide the formats and time lines for SCC Reports, AMIP project nominations, and SIMTECH project nominations respectively. Tab 6 designates the AMSMP WG members that also serve as the points of contact (POCs) for SIMTECH project nominations.

### **2. The Standards Development Process**

Chapter 3 of the Army M&S Master Plan outlines a seven-step process for SCCs' use in developing and presenting M&S standards to the Army M&S community. This section provides additional information and guidance, particularly on how to achieve consensus, establish repositories, and educate users. It also provides an example of how to develop M&S standards. One aspect of a Standards Category is that it support all three M&S domains. They provide an interface between the DoD M&S Objectives and the domains as illustrated in Figure B-1 (repeated from Chapter 4).

#### **a. Standards development**

Standards Development is an iterative process. To be most effective, each standards category will focus its effort on a limited range of standardization objectives. Resource limitations preclude working on all objectives at the same time. Also, completed work or breakthroughs in one M&S area may change the solution approach in other areas. Thus, the task of establishing teaming arrangements and defining standards and services required is continuous and iterative.

- 1) For instance, the teaming arrangements required to complete work on the first priority in a standards category may differ for that required for subsequent priorities. As the standards category focus changes, so will the make-up of teams required to do the work.
- 2) The concept of prioritizing work is the most important aspect of standards development. Each SCC should have a list of standardization requirements, in priority order, that is periodically reviewed by the standards category team. The priority list also will change over time, but its maintenance is critical to keeping work focused.
  - a) Current category requirements are discussed in Tab 2 of this appendix. They are also shown in Appendix B of the *FY 97 Army M&S Standards Report* (January 1997).
  - b) Each SCC should frequently review and revise standardization priorities. The review should consider work accomplished to date and what work must follow to build on completed work.



b) Internet communications. The Internet is a versatile and important SCC tool. Current capabilities are:

- Electronic mail (E-mail). Best used for point-to-point communications and transmission of soft copy documents.
- Mail Reflectors. AMSO will establish mail reflectors for each one of the standards categories as well as a general standards development reflector. Specific information regarding how to subscribe to these reflectors will be on the AMSO home page as soon as the service is available.
- The Internet. Internet forums exist such as the STRICOM Request for Information capability. This forum allows agencies to request an Internet search on M&S issues and topics.

c) Video Teleconferencing (VTC). This media is best used when face-to-face interaction is required. It allows distributed VTC sites to network and conduct a meeting from home stations. Any graphics or documents needed to conduct the meeting should be faxed to participants before the scheduled VTC. At least 30 days advanced scheduling is normally required, as some VTC sites are usually busy. Desktop VTC capability is becoming more widespread and should be used when available.

d) Meetings. This is the most expensive and time consuming forum. It should be used as a last resort and only as a decision making forum. This does not imply that all decisions require a meeting. It does mean that meetings are normally appropriate only when a high level decision maker must be present and/or no other forums can satisfy the communications requirement. Resources are too scarce to use this forum frequently.

2) Tools for the future. This section describes tools that should be adapted to the standards development process. Future standards development will consist of the same basic four components - printed material, Internet communications, VTC meetings and face-to-face meetings. However, the Army will make far greater use of the Internet.

a) Each standards category has established a World Wide Web (WWW) home page. This media will facilitate the work of coordinating standards, posting standards for the community at large, commenting, and sharing data and information, etc..

b) Each SCC should maintain an annotated bibliography, available via the Internet. The bibliography should document articles, books, papers, or any other information that makes a significant contribution or otherwise influences standards development.

c) SCCs should use meetings as decision forums and printed material to publish information of a permanent or semi-permanent nature. Periodic newsletters or bulletins could, for instance, announce adoption of standards, revised SCC team lists, changes to accessing standards category FTP sites, WWW home pages, BBS, E-mail addresses, etc.. Hard copy bulletins or newsletters will, over time, become an informative set of standards category information.

3) Standards Category Directory. The AMSO maintains a listing of SCCs, E-mail addresses, fax and phone numbers, and other pertinent data. The listing is accessible from

the AMSO Web site. The SCC section of the AMSO Web site will also contain information on special topics e.g., feedback from the Architecture Management Group.

### **c. Standards Category Coordinator's Annual Reports**

Tab 3 shows the format and milestones for the SCC annual reports. These reports document the standardization priorities, work to date, and future work needed and planned to support the Standards Development Process and produce standards.

### **d. Standards Development and the AMIP**

The AMIP supports standards development by investing in M&S projects which will lead to standard algorithms, data, procedures, techniques, etc. Projects are selected for funding each year based on their potential contribution. Approval for AMIP projects rests with the DUSA (OR). The time lines for AMIP project nominations is shown in Figure B-2.

### **e. Changes to standards categories**

Recommendations for adding, deleting, or changing category definitions and/or category priorities should be forwarded to the appropriate SCC (Tab 2) with an information copy to AMSO. Recommendations for adding, deleting or combining categories should be forwarded directly to AMSO. The AMSO address is:

Director, Army Model and Simulation Office  
ATTN: DAMO-ZS  
400 Army Pentagon  
Washington DC 20310-0450

AMSO will act as a clearing house for questions or comments pertaining to standards categories. AMSO will answer any questions or refer them to the appropriate SCC.

## **3. The SIMTECH Program**

The SIMTECH program invests in state-of-the-art technologies that show potential for use with Army M&S. The program also seeks to develop technologies that show potential for supporting Army M&S Standards Category objectives. Approval for SIMTECH projects rests with the DUSA (OR). Tab 5 provides the format for SIMTECH project nominations.

## **4. Reports and Time Lines**

Figure B-2 provides a summary of AMSMP reports and time lines. Tabs 3, 4, and 5 provide specific instructions for each report or submission.

<b>Army M&amp;S Management Program</b>			
<b>Item</b>	<b>Who Submits</b>	<b>Time Line</b>	<b>Purpose</b>
SCC's Reports	Standard Category Coordinator	Due at summer AMSMP WG Meeting	Report on standards development status and objectives.
AMIP Project Nominations	Standard Category Coordinator	<ol style="list-style-type: none"> <li>1. Draft proposals presented at the Army M&amp;S Standards Workshop in May.</li> <li>2. Final proposals due two weeks prior to the summer AMSMP WG per project call.</li> </ol>	Nominate projects for AMIP funding.
SIMTECH Project Nominations	AMSMP WG Representative	Final proposals due two weeks prior to the summer AMSMP WG per project call.	Nominate projects for SIMTECH funding.

Figure B- 2. Army M&S Management Program Timelines.



## Appendix B. Tab 1. Standards Category Definitions and Requirements

Categories	Definitions	Requirements
<b>Acquire</b>	Encompasses those algorithms which model the phenomena pertaining to the firsthand collection of battlefield information by an observer/sensor. In general four quantities or processes are addressed in this Standard Category: (1) Signatures of the battlefield environment, including signatures of both the datum of interest and the surrounding environment; (2) Signature transmission/transformation from source to receptor; (3) Discrimination of target/datum of interest from background; and (4) The search process performed in the examination of the battlefield. Applicable to signatures in the acoustic and electromagnetic (ultraviolet, visible, infrared, and radar) spectra with either reflective or emissive sources. Countermeasures to acquisition (signature reduction, reduced signature transmission, or degraded discrimination capability) are also applicable..	<ul style="list-style-type: none"> <li>• Developing target and background signature models to generate data needed for combat simulations and models</li> <li>• Conducting discrimination and search research, and developing standard representations for use in combat models and simulations</li> <li>• Developing standard techniques for implementing environmental and acquisition perception models into combat models and simulations</li> </ul>
<b>Architecture</b>	The structure of components in a program/system, their relationships and principles and guidelines governing their design and evolution over time. Architecture includes the system framework and components that facilitate interoperability of all types of models and simulations, as well as facilitate reuse of M&S components. It encompasses virtual, constructive, and live simulations from ACR, RDA and TEMO domains.	<ul style="list-style-type: none"> <li>• Develop, demonstrate, and promote common components, standards, protocols, interfaces, processes and methodologies</li> <li>• Transition current standardization efforts and all new standards development efforts to be in compliance with the emerging joint technical architecture and specifically the DoD M&amp;S High Level Architecture</li> <li>• Develop an awareness of evolving architectures, including, but not limited to Virtual Reality Machine Language (VRML) and the Dismounted Warrior Network (DWN)</li> </ul>
<b>Attrition</b>	Addresses the algorithms and processes that encompass the selection, prioritization and engagement of targets and the subsequent battle damage assessment and disengagement of combatant forces. Also included within this framework are physical processes that represent the probabilities of hit/kill for both direct and indirect fire weapon systems, effects of countermeasures, tracking and designation of targets, flyout of projectiles (including line-of-sight checks as appropriate), ammunition expenditure, and battle damage assessment.	<ul style="list-style-type: none"> <li>• Establish standard attrition methodologies.</li> <li>• Facilitate use of standard attrition methodologies by the M&amp;S community</li> <li>• Improve known weaknesses</li> <li>• Investigate the adequacy of current methodologies and replace where deficient</li> </ul>
<b>Command Decision Modeling</b>	Algorithms that model or simulate human behavior that results in an action taken, a decision or reaction being made or a plan being formed.	<ul style="list-style-type: none"> <li>• Advance the art of modeling decision making processes for SAFOR, CGF and constructive simulations</li> <li>• Develop a planning process standard</li> <li>• Develop a battle management language standard</li> <li>• Develop a framework for representing command knowledge</li> <li>•</li> </ul>

ARMY MODEL AND SIMULATION MASTER PLAN

APPENDIX B. TAB 1. STANDARDS CATEGORIES DEFINITIONS AND REQUIREMENTS.

Categories	Definitions	Requirements
<b>Control, Communication and Computer (C<sup>3</sup>) Systems Representation</b>	Encompasses the objects, algorithms and techniques necessary to replicate friendly and enemy control, communications and computer (C <sup>3</sup> ) systems and processes.	<ul style="list-style-type: none"> <li>• Define and design objective C<sup>3</sup> systems M&amp;S representations</li> <li>• Coordinate common C<sup>3</sup> systems representations with other categories</li> <li>• Upgrade current M&amp;S capabilities to replicate C<sup>3</sup> systems</li> <li>• Insure design will permit systems interface with other M&amp;S in the constructive and virtual worlds</li> <li>• Insure HLA compliance is part of the development of new M&amp;S communications models</li> <li>• Provide for data interchange of allow communications effects to play in combat models</li> <li>• Develop MOE's to identify key elements and validation tolerances for control, communications, and computer M&amp;S</li> <li>• Insure the models are available to users</li> </ul>
<b>Cost Representation</b>	Includes the data, tools, algorithms and techniques necessary for accurately costing and consistently portraying all aspects of activities portrayed in models and simulations.	<ul style="list-style-type: none"> <li>• Develop methods to cost all elements portrayed in M&amp;S</li> <li>• Standardize techniques for comparing costs of alternatives</li> </ul>
<b>Data</b>	Procedures that increase information sharing effectiveness by establishing standardization of data elements, data base construction, accessibility procedures, data maintenance and control.	<ul style="list-style-type: none"> <li>• Promote Data Standards</li> <li>• Develop infrastructure                             <ul style="list-style-type: none"> <li>⇒ Data modeling tools and training</li> <li>⇒ Standardize data structures</li> </ul> </li> <li>• Automate existing databases</li> <li>• Develop new databases</li> <li>• Expand Education</li> </ul>
<b>Deployment/Redeployment</b>	Includes the objects, algorithms, data and processes needed to accurately portray the relocation of military and civilian forces from the origin to the area of operations, and the preparation for and movement of forces from one area of operations to follow-on designated CONUS or OCONUS bases or areas of operation.	<ul style="list-style-type: none"> <li>• Develop modeling standards that address all deployment domains (ACR, TEMO, RD&amp;A, execution, planning, analysis, training, etc...) and all the joint end-to-end process element</li> <li>• Develop a common object structure for the representation of all aspects of deployment/transportation, including forces (equipment, personnel, and supplies), transportation assets, cargo, and infrastructure</li> <li>• Develop and document deployment related objects, entities, actions, algorithms, processes, etc... at various levels of resolution</li> <li>• Ensure commonality and linkages with mobilization, logistics, and warfight simulations</li> </ul>

ARMY MODEL AND SIMULATION MASTER PLAN

APPENDIX B. TAB 1. STANDARDS CATEGORIES DEFINITIONS AND REQUIREMENTS.

Categories	Definitions	Requirements														
<b>Dynamic Environment</b>	Includes the objects, algorithms, data and techniques required to replicate weather, weather effects, background changes due to environmental effects, effects on acoustic propagation, and transport and diffusion of aerosols as battle by-products in models and simulations.	<ul style="list-style-type: none"> <li>• Provide fundamental environmental data for M&amp;S</li> <li>• Provide consistent data for environmental effects models</li> <li>• Provide standardized database for system performance analysis</li> <li>• Provide set of standard synthetic natural environments</li> </ul>														
<b>Functional Description of the Battlespace</b>	The process that develops simulation and research database configuration and management tools consistent in their representation of Army Battlespace Domain activities and functions, understood by the M&S community, and interoperable at levels allowed by their model environment.	<ul style="list-style-type: none"> <li>• Development of definitions of simulation development methods for Army use</li> <li>• Development of policy and procedures for managing Army repository data, models, and algorithms for the simulation developers and users</li> <li>• Form liaison relationships between major Army simulation programs and other Standard Categories to encourage use, updates, and expansion of object classes; and</li> <li>• Explore methods of gathering, sharing and storing database models, data and algorithms for building new models, conducting new processes and establishing standards for reuse on future development programs</li> </ul>														
<b>Logistics</b>	Objects, algorithms, data and processes which model or simulate the initial provisioning, supply, resupply, stockage,. facilities, maintenance and sparing of the ten classes of supply and CSS services provided to and in the field. Army standardization requirements must address M&S support for CSS functions to and in the field	<p>Develop standards to support M&amp;S for the following Logistics/CSS functions:</p> <table border="0"> <tr> <td>1. Supply - Class III (Bulk)</td> <td>8. Medical</td> </tr> <tr> <td>2. Supply - Class V</td> <td>9. Services</td> </tr> <tr> <td>3. Supply - Class VII</td> <td>10. Supply - Classes II, III (Pkg), IV</td> </tr> <tr> <td>4. Supply - Class IX</td> <td>11. Finance</td> </tr> <tr> <td>5. Personnel</td> <td>12. Stockage</td> </tr> <tr> <td>6. Supply - Class I (and water)</td> <td>13. Supply - Classes VI and X</td> </tr> <tr> <td>7. Maintenance</td> <td>14. Facilities</td> </tr> </table>	1. Supply - Class III (Bulk)	8. Medical	2. Supply - Class V	9. Services	3. Supply - Class VII	10. Supply - Classes II, III (Pkg), IV	4. Supply - Class IX	11. Finance	5. Personnel	12. Stockage	6. Supply - Class I (and water)	13. Supply - Classes VI and X	7. Maintenance	14. Facilities
1. Supply - Class III (Bulk)	8. Medical															
2. Supply - Class V	9. Services															
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4. Supply - Class IX	11. Finance															
5. Personnel	12. Stockage															
6. Supply - Class I (and water)	13. Supply - Classes VI and X															
7. Maintenance	14. Facilities															
<b>Mobilization/ Demobilization</b>	Includes the algorithms, objects and unique modeling techniques needed to accurately portray preparation of forces for military operations and their return, to include: active units, reserve units, active duty individuals, mobilization of Reserve Component (RC) individuals, expansion of CONUS/OCONUS installation support facilities, preparation for overseas movement, and surge and expansion of the industrial base.	<ul style="list-style-type: none"> <li>• Standardize algorithms, objects and techniques for modeling mobilization</li> <li>• Provide linkage of mobilization models and simulations to real time data bases</li> <li>• Create HLA federation with strategic deployment and transportation modeling objects and algorithms.</li> </ul>														
<b>Move</b>	Encompasses the objects, algorithms, data and techniques necessary to replicate activities that influence land force platform and personnel movement (ground, air, and water). It also addresses mobility and countermobility as engineer functions, suppression (as a mobility degrader), formations, and dispersion.	<ul style="list-style-type: none"> <li>• Land force platform and personnel movement</li> <li>• Mobility and countermobility as engineer functions</li> <li>• Suppression effects on movement</li> <li>• Dispersion and formations</li> </ul>														

ARMY MODEL AND SIMULATION MASTER PLAN

APPENDIX B. TAB 1. STANDARDS CATEGORIES DEFINITIONS AND REQUIREMENTS.

Categories	Definitions	Requirements
<b>Object Management</b>	The process that develops abstract object classes that are: (1) consistent in their representation of object attributes/methods; (2) understood by the M&S community; and (3) interoperable at levels allowed by their model environment.	<ul style="list-style-type: none"> <li>• Develop definitions of abstract object classes for Army use</li> <li>• Develop policy and procedures for managing Army objects</li> <li>• Form liaisons between major Army simulation programs</li> <li>• Explore methods for gathering, sharing and storing meta data about objects</li> </ul>
<b>Semi-Automated Forces (SAF)</b>	Software integration which produces realistic entities in synthetic environments which interface appropriately with live, constructive, virtual and simulator entities, but which are generated, controlled and directed by computer routines.	<ul style="list-style-type: none"> <li>• Develop SAF standards that are useful in all M&amp;S domains, applicable to distributed simulations, representative from single entity to corps, and useful in a joint environment</li> <li>• Minimize operator overhead for SAF</li> <li>• Ensure structures and data bases are modular and easily isolated</li> <li>• Provide consistent representations for battle field systems, and unit tactical/doctrinal behaviors in all SAFs</li> <li>• Support the development of the High Level Architecture</li> </ul>
<b>Terrain</b>	Includes the objects, algorithms, data, and techniques required to represent terrain and dynamic terrain processes in modeling and simulation.	<ul style="list-style-type: none"> <li>• Defining digital terrain data content, resolution and accuracy requirements for developmental models and simulations</li> <li>• Developing correlated terrain databases</li> <li>• Developing techniques for rapid terrain database generation</li> <li>• Developing techniques for dynamic terrain features</li> <li>• Developing a consensus based data exchange standard</li> <li>• Developing reuse repositories</li> </ul>
<b>Verification, Validation &amp; Accreditation (VV&amp;A)</b>	Verification is the process of determining if the M&S accurately represent the developer's conceptual description and specifications and meets the needs stated in the requirements document. Validation is the process of determining the extent to which the M&S adequately represents the real-world from the perspective of its intended use. This process ranges from single modules to the entire system. Accreditation is an official determination that the M&S are acceptable for its intended purpose.	<ul style="list-style-type: none"> <li>• Establish and define standard verification, validation, and accreditation processes</li> <li>• Build verification and validation tools and guidelines</li> <li>• Make the above tools available to users</li> <li>• Develop measures of effectiveness to identify key elements and establish validation tolerances</li> </ul>
<b>Visualization</b>	The process that develops hardware, software and procedural standards to provide a seamless vision of the battlespace by incorporating and integrating the environment, entities and their psychologies across virtual, constructive and live simulations. This enables leaders, decision-makers, staffs and soldiers at all levels to attain cognitive awareness of the battlespace.	<ul style="list-style-type: none"> <li>• Determine how Visualization relates to the other standards categories and to C4ISR</li> <li>• Define and articulate attainable, adaptable, and scaleable standards</li> <li>• Implement standards</li> </ul>

**Appendix B. Tab 2. Standards Category Coordinators**

<b>CATEGORY</b>	<b>NAME</b>	<b>ADDRESS</b>	<b>PHONE</b>	<b>E-MAIL</b>
<b>Acquire</b>	Dave Dixon	TRADOC Analysis Center - WSMRATTN: ATRC-WB (Mr. Dixon) White Sands Missile Range, NM 88002-5502	V: (505) 678-4510 DSN: 258-4510 F: (505) 678-5104	dixond@trac.wsmr.army.mil
<b>Architecture</b>	Susan Harkrider	Commander, USASTRICOM ATTN: AMSTI-ET 12350 Research Park Way Orlando, FL 32826-3276	V: (407) 384-3926 DSN: 970-3926 F: (407) 384-3830	harkrids@stricom.army.mil
<b>Attrition</b>	Alan Dinsmore	Director, AMSAA ATTN: AMXSY-CD (Mr. Alan Dinsmore) 392 Hopkins Road Aberdeen Proving Ground, MD 21005 5071	V: (401) 278-2785 DSN: 298-2785 F: (401) 278-6585	adin@arl.mil
<b>Command Decision Modeling</b>	Sean MacKinnon	National Simulation Center ATTN: ATZL-NSC-D Fort Leavenworth, KS 66027-2345	(913) 684-8290 DSN: 552-8290 F (913) 684-8302	mackinns@leav-emh.army.mil
<b>Control, Communications and Computers Systems Representation</b>	Burt Kunkel	Modeling & Simulation Branch Concepts and Architecture Division Directorate of Combat Developments Ft. Gordon Ga. 30905-5090	(706) 791-1977 DSN: 780-1977 F (706) 791-6595	kunkelb@emh1.gordon.army.mil
<b>Cost Representation</b>	Dorothy Bernay	Director, USAA Cost & Economic Analysis Center ATTN: SFFM-CA-PA (Ms. Bernay) Rm 327, Nassif Building 5611 Columbia Pike Falls Church, VA 22041-5050	V: (703) 681-3347 DSN: 761-3347 F: (703) 681-7553	bernad@hqda.army.mil
<b>Data</b>	Jesse Brewer	Director, AMSAA ATTN: AMXSY-AP 392 Hopkins Road Aberdeen Proving Ground, MD 21005-5071	V: (410) 278-2090 DSN: 298-2090 F: (410) 27802043	jbrewer@arl.mil

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APPENDIX B. TAB 2. STANDARDS CATEGORY COORDINATORS.

CATEGORY	NAME	ADDRESS	PHONE	E-MAIL
<b>Deployment/ Redeployment</b>	Melvin Sutton	Director, MTMC, Transportation Engineering Agency ATTN: MTTE-SIT 720 Thimble Shoals Blvd. Suite 130 Newport News, VA 23606	V: (804) 687-0322 DSN: 927-5266 F: (804) 599-1561	suttonm@baileys.emh5.army.mil
<b>Dynamic Environment</b>	Rick Shirkey	Director, US Army Research Laboratory ATTN: AMSRL-BE-S (Dr. Shirkey) White Sands Missile, NM 88002-5501	V: (505) 678-5470 DSN: 258-5470 F: (505) 678-8366	rshirkey@arl.mil
<b>Functional Description of the Battlespace</b>	LTC George Stone	PM-CATT, ATTN: CPM-FAMSIM (LTC Stone) 12350 Research Parkway Orlando, FL 32826-3276	V: (407) 384-3621 DSN: 970-3621 F: (407) 384-3640	stoneg@stricom.army.mil
<b>Logistics</b>	Ron Fischer	USA CASCOM ATTN: ATCL-CAT Fort Lee, VA 23801-6000	V: (804) 734-0322 DSN: 687-0322 F: (804) 734-2588	fischerr@lee-emh2.army.mil
<b>Mobilization</b>	Julie Allison	Director, USA CAA ATTN: CSCA-0S (Ms. Julie Allison) 8120 Woodmont Ave. Bethesda, MD 20814-2797	(301) 295-1588 DSN 295-1588 F (301) 295-5110	allisonj@caa.army.mil
<b>Move</b>	Denise Bullock	Director, USAE Waterways Experiment Station ATTN: CEWES-GM-K (Ms. Denise Bullock) 3909 Halls Ferry Road Vicksburg, MS 39181-6199	V: (601) 634-3372 F: (601) 634-2764	bullocc@ex1.wes.army.mil
<b>Object Management</b>	Brad Bradley	Director, AMSAA ATTN: AMXSU-CD 392 Hopkins Road Aberdeen Proving Grounds, MD 21005-5071	V: (410) 278-4066 DSN: 298-4066 F (410) 278-6585	bbradley@arl.mil
<b>Semi-Automated Forces</b>	Pam Blechinger	TRADOC Analysis Center ATTN: ATRC-FM 255 Sedgewick Ave Fort Leavenworth, KS 66027-2345	V: (913) 684-9237 DSN: 552-9237 F: (913) 684-9232	blechinp@trac.army.mil

ARMY MODEL AND SIMULATION MASTER PLAN

APPENDIX B. TAB 2. STANDARDS CATEGORY COORDINATORS.

<b>CATEGORY</b>	<b>NAME</b>	<b>ADDRESS</b>	<b>PHONE</b>	<b>E-MAIL</b>
<b>Terrain</b>	Don Morgan	US Army Topographic Engineering Center ATTN: CETEC-PD-DR (Mr. Don Morgan) 7701 Telegraph Road Alexandria, VA 22310-3864	V: (703) -428-6784 DSN: 328-6784 F: (703) 428-3176	dmorgan@tec.army.mil
<b>Visualization</b>	MAJ Michael J. Staver	TPIO for Synthetic Environment National Simulation Center 410 Kearny Ave Ft. Leavenworth, KS 66027-1306	V: (913) 684-8231 DSN: 552-8231 F (913) 684-8227	email: staverm@leav-emh1.army.mil
<b>VV&amp;A</b>	Larry Cantwell	TRADOC Analysis Center ATTN: ATRC-FZ 255 Sedgewick Ave. BLDG. 314 Fort Leavenworth, KS 66027-2345	V: (913) 684-6867 DSN: 552-6867 F: (913) 684-9151	cantwell@trac.army.mil
<i>Questions or Issues related to the Standards Process, AMIP, and the SCCs can be directed to the following:</i>				
<b>AMSO Routine POC</b>	MAJ Stephen Johnson	Director, Army Model and Simulation Office ATTN: DAMO-ZS (MAJ Johnson) The Pentagon, Army 400 Washington, DC 20310-0450	V: (703) 601-0012 ext 27 DSN: 329-0012 ext 27 F: (703) 601-0018	johnssg@dcsopsp3.army.mil

## **Appendix B. Tab 3. Standards Category Coordinator Annual Report**

### **1. Purpose**

The SCC annual report provides a status of the Standards Development Process within that category, significant progress during the past year, and standardization priorities for the next year. It serves as a permanent record of the status of standards development within each standards category.

### **2. Submission Instructions**

#### **a. Media**

Reports are required in hard copy and in an electronic copy. The electronic copy must be a Microsoft Word document formatted using the Times New Roman font. Do not submit electronic reports in any other format. Figures and graphics may be embedded in the Microsoft Word document. If they can not be embedded, the electronic copy of all figures and graphics must be forwarded in TIF or GIF format or as Microsoft PowerPoint slides. Do not send figures or graphics electronically in any other format.

#### **b. Due Date**

Reports are due at the summer AMSMP WG meeting each year when the SCCs present their AMIP projects

#### **c. Cover Letter**

Include a transmittal memorandum, signed by the SCC, as the cover document for the report. The memorandum must state that the SCC forwards the SCC report titled (list title) and dated (list date of report).

#### **d. Structure**

The report will address the following areas as a minimum. SCCs may add other information as appropriate.

- 1) Standards category definition. Show any changes, additions, or deletions to the current category definition.
- 2) Standardization requirements. Show the current Army standards development requirements and highlight any changes. Category requirements shown in Tab 1 of this appendix reflect revisions made at the Army M&S Standards Workshop in May 1997. Requirements should be as specific as possible, support the objectives shown in Chapter 4, and be listed in priority order. SCCs may list any number of requirements.
- 3) Accomplishments and assessment. Show specific accomplishments and the M&S objective that each accomplishment supports. As part of this section, discuss the adequacy of Army and DoD investments in technology related to the category. The assessment should also discuss the utility and adequacy of output from DoD initiatives and executive agents as they affect work within the standards category.

4) Priorities for the next year. Show specific standards priorities for the following year and relate them to the objectives in Chapter 4. Discuss the specific standards that will be completed or nearly completed during the year.

5) Roadmaps. Roadmaps are required for each standards category, covering the next five years. The Roadmaps should reflect the key tasks necessary to progress toward standards. Where appropriate, show classes of algorithms, techniques, procedures, functionality, practices, or processes that must be addressed by the standards category team. Each Roadmap should also address VV&A and VV&C as appropriate. A narrative accompanying the Roadmap should discuss the specific supporting processes and organizations that implement the activities and functions depicted in the Roadmap. See figure B-3-1 for an example Roadmap.

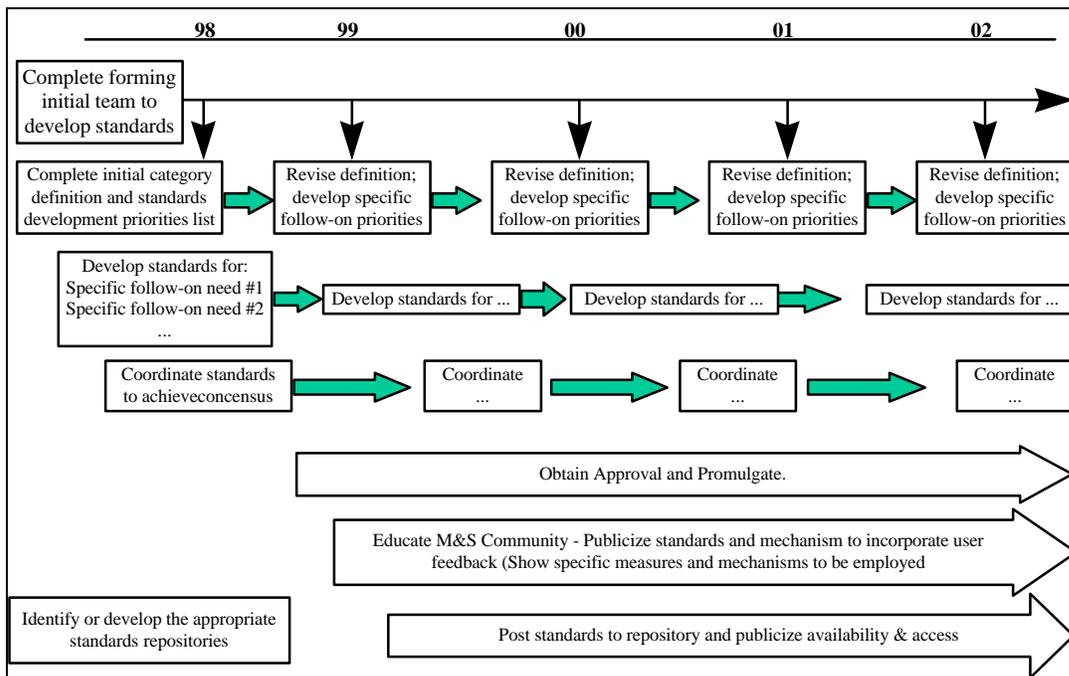


Figure B-3-1. Generic Standards Category Roadmap.

## **Appendix B. Tab 4. AMIP Project Nomination Guidelines**

### **1. Purpose**

Each year the AMIP funds projects that work towards standards development objectives within the standards categories. The SCCs nominate projects for AMIP funding that support the priorities documented in their SCC Annual Report.

### **2. Project Call**

As part of the annual cycle, AMSO issues a "Call for AMIP Project Nominations" to the SCCs no later than the Army M&S Standards Workshop in May. This project call will also be available at the AMSO Web site.

### **3. Submission Instructions**

#### **a. Media and Format**

Nominations are required in both hard and electronic copies. Specific formatting and transmission instructions will be included in the project call.

#### **b. Prioritization**

If an SCC submits multiple nominations, the SCC must prioritize them from 1 to N, with 1 being the highest priority project for their category.

#### **c. Routing**

All AMIP nominations must be routed through the appropriate SCC (Tab 2). AMSO will not accept nominations directly from any agency or organization.

#### **d. Due Date**

Nominations, from the SCCs, are due to AMSO four weeks prior to the summer AMSMP WG meeting. The date will be established in the project call.

#### **e. Cover Letter**

A transmittal memorandum, signed by the SCC, must accompany the hard copy nomination packet. The memorandum must state that the SCC nominates the following projects for AMIP funding and then list the titles of the projects in priority order, from 1 to N. The entire hard copy nomination packet should be sent to:

Director, Army Model and Simulation Office  
ATTN: DAMO-ZS  
400 Army Pentagon  
Washington, DC 20310-0450

**f. Acknowledgment of Receipt**

All nomination receipts must be verbally or electronically acknowledged by the AMSO AMIP POC. Nominations will not be considered submitted until the AMIP POC acknowledges receipt of a readable copy that includes text and graphics.

## **Appendix B. Tab 5. SIMTECH Project Nomination Guidelines**

### **1. Purpose**

Each year the SIMTECH program funds projects that invest in state-of-the-art technology which may be adaptable to Army M&S objectives. It particularly focuses on those technologies that show potential for supporting Army M&S standards development objectives.

### **2. Project Call**

Each year, AMSO will issue a "Call for SIMTECH Project Nominations" to the AMSMP WG. The project call will also be available at the AMSO Web site.

### **3. Submission Instructions**

#### **a. Media and Format**

Nominations are required in both hard and electronic copies. Specific formatting and transmission instructions will be included in the project call.

#### **b. Prioritization**

If an organizations submits multiple nominations, the organization must prioritize them from 1 to N, with 1 being the highest priority project for their category.

#### **c. Routing**

All SIMTECH project nominations must be routed through the organization's AMSMP WG POC (Tab 6). AMSO will not accept nominations directly from any organization not listed in Tab 6.

#### **d. Due Date**

Nominations, from the AMSMP WG members, are due to AMSO four weeks prior to the summer AMSMP WG meeting. The date will be established in the project call.

#### **e. Cover Letter**

A transmittal memorandum, signed by the AMSEC member, must accompany the hard copy nomination packet. The memorandum must state that the organization nominates the following projects for SIMTECH funding and then list the titles of the projects in priority order, from 1 to N. The entire hard copy nomination packet should be sent to:

Director, Army Model and Simulation Office  
ATTN: DAMO-ZS  
400 Army Pentagon  
Washington, DC 20310-0450

#### **f. Acknowledgment of Receipt**

All nomination receipts must be verbally or electronically acknowledged by the AMSO SIMTECH POC. Nominations will not be considered submitted until the SIMTECH POC acknowledges receipt of a readable copy to include text and graphics.

## Appendix B. Tab 6. Army M&S Management Program Working Group Members (SIMTECH Program Points of Contacts)

ORGANIZATION	CONTACT NAME/ADDRESS	PHONE/FAX NUMBERS	EMAIL ADDRESS
<b>AMSO -WG Chair</b>	Director, Army Model and Simulation Office ATTN: DAMO-ZS (Ms. McGlynn) The Pentagon, Army 400 Washington, DC 20310-0450	V: (703) 601-0012/13 ext 26 DSN: 329-0012/13 ext 26 F: (703) 601-0018	mcglyla@dcsopspo3.army.mil
<b>ADO</b>	Army Digitization Office ATTN: DACS-ADO (Ms. Susan Wright) Room 1A869, Pentagon Washington, DC 20301	V: (703) 693-3856 DSN : 223-3856 F: (703) 693-4102	wrights@ado.army.mil
<b>AMC</b>	US Army Materiel Systems Analysis Activity ATTN: AMXSU-SL (Dr. Atzinger) 392 Hopkins Road Aberdeen Proving Ground, MD 21005-5071	V: (410) 298-6576 DSN 298-6576 F: (410) 298-6242 DSN 298-6242	erwin@arl.mil
<b>ARI</b>	Commander US Army Research Institute for the Behavioral and Social Sciences ATTN: PERI-II (Dr. Gillis) 12350 Research Parkway Orlando, FL 32826	V: (407) 384-3985 DSN: 970-3985 F: (703) 617-3268 DSN: 970-3268	gillisp@stricom.army.mil
<b>ARNG</b>	Chief, National Guard Bureau ATTN: NGB-ARO-TS (MAJ Harber) 111 South George Mason Drive Arlington, VA 22204-1382	V: (703) 607-7316 DSN: 327-7316 F: (703) 607-7383/7385 DSN: 327-7383/7385	harberg@arngrc-emh2.army.mil
<b>ASA(RDA)</b>	Assistant Secretary of the Army For Research, Development, and Acquisition ATTN: SARD-DO (Ms. Purdy) Rm 3D468/PNT Washington, DC 20310-0103	V: (703) 614-5920 DSN: 224-5920 F: (703) 693-2385 DSN: 223-2385	purdye@sarda.army.mil

ARMY MODEL AND SIMULATION MASTER PLAN

APPENDIX B. TAB 6. AMSMP WG MEMBERS (SIMTECH PROGRAM POCS)

<b>ORGANIZATION</b>	<b>CONTACT NAME/ADDRESS</b>	<b>PHONE/FAX NUMBERS</b>	<b>EMAIL ADDRESS</b>
<b>AWC</b>	Commandant, US Army War College ATTN: AWC-AW (COL Slattery) Carlisle Barracks Carlisle, PA 17013-5050	DSN: 242-3171 F: 242-3279	slatterp@csl-emh1.army.mil
<b>CAA</b>	Director US Army Concepts Analysis Agency ATTN: CSCA-OS (Mr. Cooper) 8120 Woodmont Avenue Bethesda, MD 20814-2797	V: (301) 295-0529 DSN: 295-0529 F: (301) 295-1834	cooper@caa.army.mil
<b>CEAC</b>	Director US Army Cost and Economic Analysis Center ATTN: SFFM-CA-PA (Mrs. Bernay) 5611 Columbia Pike Falls Church, VA 22041-5050	V: (703) 681-3347 DSN: 761-3347 F: (703) 756-7553	bernad@hqda.army.mil
<b>FORSCOM</b>	Commander US Army Forces Command ATTN: AFOP-PLA (LTC Hughes) Ft McPherson, GA 30330-6000	V: (407) 697-2483 DSN: 367-7635 F: (407) 697-5523	hughese@ftmcphsn-emh1.army.mil
<b>MTMC</b>	Military Traffic Management Command Transportation Engineering Agency(MTMCTEA) ATTN: MTTE-SIM (Mr. Sutton) 720 Thimble Shoals Boulevard, Suite 130 Newport News, VA 23606	V: (757) 599-1638 DSN: 927-5266 F: (757) 599-1564	suttonm@baileys-emh5.army.mil
<b>OCAR</b>	Chief of Army Reserves ATTN: DAAR-PAE (MAJ Glikin) Rm 1D416, The Pentagon Washington, DC 20310-2400 phone: (703) 697-2327/8; DSN prefix 227 fax: (703) 695-3826; DSN prefix 225	V: (703) 697-2327/8 DSN: 227-2327/8 F: (703) 695-3826 DSN 225-3826	glikin@pentagon-ocar1.army.mil

ARMY MODEL AND SIMULATION MASTER PLAN

APPENDIX B, TAB 6. AMSMP WG MEMBERS (SIMTECH PROGRAM POCS).

<b>ORGANIZATION</b>	<b>CONTACT NAME/ADDRESS</b>	<b>PHONE/FAX NUMBERS</b>	<b>EMAIL ADDRESS</b>
<b>ODCSINT</b>	Deputy Chief of Staff for Intelligence ATTN: DAMI-IFT (Ms. Macklin) Rm 2E453/PNT 1000 Army Pentagon Washington, DC 20310-1086	V: (703) 614-8121 DSN: 224-8121 F: (703) 697-2314 DSN: 227-2314	marilyn.macklin@hqda.army.mil
<b>ODCSLOG</b>	Commander US Army Logistics Integration Agency ATTN: LOSA-CD (Mr. Rybacki) 54 M Avenue, Suite 4 New Cumberland, PA 17070-5007	V: (717) 770-6001 DSN: 977-6001 F: (717) 770-6702	rybacmg@hqda.army.mil
<b>ODCSOPS</b>	Deputy Chief of Staff for Operations and Plans ATTN: DAMO-ZD (MAJ Isensee) Rm 3A538, The Pentagon Washington, DC 20310-0400	V: (703) 695-2459 DSN: 225-2459 F: (703) 614-9044 DSN: 224-9044	isensek@dcsopspol.army.mil
<b>ODCSPER</b>	Deputy Chief of Staff for Personnel ATTN: DAPE-MR (Dr. Holz) Rm 2C733, The Pentagon Washington, DC 20310	V: (703) 617-5789 DSN: 227-5789 F: (703) 697-1283 DSN: 227-1283	holzrf@hqda.army.mil
<b>ODISC4</b>	Director, Information Systems For Command, Control, Communications, & Computers ATTN: SAIS-ADO (MAJ Renner) Rm 1C670, The Pentagon Washington, DC 20310	V: (703) 697-3131 DSN: 227-3131 F: (703) 695-5213 DSN: 225-5213	donald.a.renner@pentagon- 1dms2.army.mil
<b>OPTEC</b>	Commander US Army Operational Test and Evaluation Command ATTN: CSTE-MP (Ms. Wilson) 4501 Ford Avenue Alexandria, VA 22302-1458	V: (703) 681-6685 DSN: 761-6685 F: (703) 681-6685	wilsons@optec.army.mil
<b>PA&amp;E</b>	Director of the Army Staff, Program Analysis & Evaluation Directorate ATTN: DACS-DPM (MAJ Muehl) Rm 3C719, The Pentagon Washington, DC 20310	V: (703) 697-0085 DSN: 227-0085 F: (703) 693-2115	muehlt@pentagon-paed.army.mil

ARMY MODEL AND SIMULATION MASTER PLAN

APPENDIX B. TAB 6. AMSMP WG MEMBERS (SIMTECH PROGRAM POCS)

ORGANIZATION	CONTACT NAME/ADDRESS	PHONE/FAX NUMBERS	EMAIL ADDRESS
<b>SMDC</b>	Commander US Army Space and Missile Defense Command ATTN: CSSD-BC-ST (Mr. Street) P.O. BOX 1500 Huntsville, AL 35807	V: (205) 955-3921 DSN: 645-3921 F: (205) 955-1354	streett@smdc.ar my.mil
<b>TRADOC</b>	Commander US Army Training and Doctrine Command ATTN: ATAN-ZD (Mr. Carson/Ms. Angela Winter) Fort Monroe, VA 23651-5000	DSN: 680-5803 F: DSN: 680-4394	carsonk@monroe.army.mil wintera@monroe.army.mil
<b>USACE</b>	Commander, US Army Corps of Engineers Director of Research and Development ATTN: CERD-M (Mr. Lundien) 20 Massachusetts Avenue, NW Washington, DC 20314-1000	V: (202) 761-1847/0752 DSN: 763-1847/0259 F: (202) 761-0907	jerry.lundien@inet.hq.usace.army.mil
<b>USAREUR</b>	Commander-in-Chief US Army Europe and 7 <sup>th</sup> Army ATTN: AEAGC-TS-F (LTC Lee) Unit: 28130 APO AE 09114	V: 011-49-9641-83-2460 DSN : 474 F: 011-49-9641-83-2541	aeagbs10@email.grafenwoehr.army.mil
<b>USARPAC</b>	Commander US Army, Pacific ATTN: APOP-PL (Mr. Deryke) Fort Shafter, HI 96858-5100	V: (808) 438-2498 DSN: 438 F: (808) 438-4940	derykeb@shafter-emh3.army.mil
<i>Questions or Issues related to the AMSMP WG and the SIMTECH Program can be directed to the following</i>			
<b>MS4D Manager</b>	Director, Army Model and Simulation Office ATTN: DAMO-ZS (Mr. Helmersen) The Pentagon, Army 400 Washington, DC 20310-0450	V: (703) 601-0012/13 ext 29 DSN: 329-0012/13 ext 29 F: (703) 601-0018	helmesp@dcsopspo3.army.mil

## Appendix C. Glossary

### 1. Acronyms

AAE	Army Acquisition Executive	CEAC	Cost and Economic Analysis Center
AAN	Army After Next	CG	Commanding General
ACAT	Acquisition Category	CGF	Computer Generated Forces
ACR	Advanced Concepts and Requirements	CINC	Commander-in-Chief
ACT	Advanced Concept and Technology	CINCs	Commanders in Chief
ADCSOPS	Assistant Deputy Chief of Staff for Operations and Plans	COE	Common Operating Environment
ADO	Army Digitization Office	CSA	Chief of Staff, United States Army
ADS	Advanced Distributed Simulation	DA	Department of the Army
AEA	Army Enterprise Architecture	DARPA	Defense Advanced Research Projects Agency
AIS	Automated Information System	DCG	Deputy Commanding General
ALSP	Aggregate Level Simulation Protocol	DCSINT	Deputy Chief of Staff for Intelligence
AMC	U.S. Army Materiel Command	DCSLOG	Deputy Chief of Staff for Logistics
AMIP	Army Model Improvement Program	DCSOPS	Deputy Chief of Staff for Operations and Plans
AMS GOSC	Army Model and Simulation General Officer Steering Committee	DCSPER	Deputy Chief of Staff for Personnel
AMSAA	Army Materiel Systems Analysis Activity	DCSSA	Deputy Chief of Staff for Simulations and Analysis
AMSEC	Army Model and Simulation Executive Council	DII	Defense Information Infrastructure
AMSMP	Army Model and Simulation Management Program	DIS	Distributed Interactive Simulation
AMSMP WG	Army Model and Simulation Management Program Working Group	DISA	Defense Information Systems Agency
AMSO	Army Model and Simulation Office	DISC4	Director of Information Systems for Command, Control, Communications, and Computers
AMSTR	Army Model and Simulation Technology Review	DISN	Defense Integrated Services Network
AR	Army Regulation	DMSO	Defense Modeling and Simulation Office
ARI	U.S. Army Research Institute for Behavioral and Social Sciences	DMSTTIAC	Defense Modeling, Simulation, and Tactical Technology Information and Analysis Center
ASA(RDA)	Assistant Secretary of Army (Research, Development, and Acquisition)	DoD	Department of Defense
ASWG	Advanced Simulation Working Group	DSI	Defense Simulation Internet
ATD	Advanced Technology Demonstration	DTD	Digital Topographic Data
AV 2010	Army Vision 2010	DUSA (OR)	Deputy Under Secretary of the Army (Operations Research)
AWC	Army War College	EUSA	Eighth U.S. Army
AWE	Advanced Warfighting Experiment	FFRDC	Federally Funded Research and Development Center
C4I	Command, Control, Communications, Computers, and Intelligence	FOA	Field Operating Agency
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance	FORSCOM	U.S. Army Forces Command
CAA	Concepts Analysis Agency	FTP	File Transfer Protocol
CAIV	Cost as an Independent Variable	FY	Fiscal Year
		GO	General Officer
		GOSC	General Officer Steering Committee
		GS	General Schedule
		HLA	High Level Architecture
		HQDA	Headquarters, Department of Army
		IAW	In Accordance With
		ICT	Integrated Concept Team
		IV&V	Independent Verification and Validation

JMASS	Joint Modeling and Simulation System	RDEC	Research, Development, and Experimentation Center
JROC	Joint Requirements Oversight Council	RIA	Requirements Integration and Approval
JSIMS	Joint Simulation System	RIC	Requirements Integration Council
JTA	Joint Technical Architecture	RIWG	Requirements Integration Working Group
JWARS	Joint Warfare System	S&T	Science and Technology
M&S	Model(s) and Simulation(s)--Used in singular and plural	SAF	Semi-Automated Force
MACOM	Major Army Command	SBA	Simulation Based Acquisition
MAIS	Major Automated Information System	SCC	Standards Category Coordinator
MAP	Major Defense Acquisition Programs	SEDRIS	Synthetic Environment Data Representation and Interchange Specification
MDEP	Management Decision Package	SES	Senior Executive Service
MNS	Mission Needs Statement	SIMTECH	Simulation Technology
ModSAF	Modular Semi-Automated Forces	SMDC	U.S. Army Space and Missile Defense Command
MOOTW	Military Operations Other Than War	SSA	Staff Support Agency
MSEA	M&S Executive Agent	SSP	Simulation Support Plan
MSOSA	Modeling and Simulation Operational Support Activity	STAMIS	Standard Management Information System
MSRD	Model and Simulation Requirements Document	STOW	Synthetic Theater of War
MSRR	Model and Simulation Resource Repository	STOW-A	Synthetic Theater of War-Architecture
MTMC	Military Traffic Management Command	STRICOM	Simulation, Training, and Instrumentation Command
MTMCTEA	Military Traffic Management Command Transportation Engineering Agency	T&E	Test and Evaluation
NGB	National Guard Bureau	TAFIM	Technical Architecture Framework for Information Management
NIMA	National Imagery and Mapping Agency	TEA	Transportation Engineering Agency
NPR	National Performance Review	TEC	Topographic Engineering Center
OCAR	Office of the Chief, Army Reserve	TEMO	Training, Exercises, and Military Operations
OneSAF	One Semi-Automated Force	TP	TRADOC Pamphlet
OPTEC	U.S. Army Operational Test and Evaluation Command	TRADOC	Training and Doctrine Command
ORD	Operational Requirements Document	USACE	United States Army Corps of Engineers
OSD	Office of the Secretary of Defense	V&V	Verification and Validation
PAED	Army Program Analysis and Evaluation Directorate	VCSA	Vice Chief of Staff of the Army
PDU	Protocol Data Unit	VV&A	Verification, Validation, and Accreditation
PEG	Program Evaluation Group	VV&C	Verification, Validation, and Certification
PEO	Program Executive Officer	WARSIM	Warfighters' Simulation
PM	Program Manager	WG	Working Group
POC	Point of Contact	WWW	World Wide Web
POM	Program Objective Memorandum		
PPBES	Planning, Programming, Budgeting, and Execution System		
PPBS	Planning, Programming, and Budgeting System		
QA	Quality Assurance		
R&D	Research and Development		
RDA	Research, Development, and Acquisition		

## 2. Definitions

The following definitions are drawn from AR 5-11:

Accreditation. The official determination that a model, simulation, or federation of M&S is acceptable for use for a specific purpose.

Advanced Concepts and Requirements (ACR)

Domain. One of the three domains for Army M&S applications. ACR includes experiments with new concepts and advanced technologies to develop requirements in doctrine, training, leader development, organizations, materiel and soldiers which will better prepare the Army for future operations. ACR evaluates the impact of horizontal technology integration through simulation and experimentation using real soldiers in real units.

Computer Generated Forces (CGF). A capability/technology where computer generated forces are a doctrinally correct representation of both friendly and opposing forces. These forces will support simulations by providing opposing forces, supporting forces, and forces needed to permit a smaller number of personnel to represent a much larger force.

Configuration management. The application of technical and administrative direction and surveillance to identify and document the functional and physical characteristics of a M&S, control changes, and record and report change processing and implementation status.

Constructive M&S. M&S that involve real people making inputs into a simulation that carries out those inputs by simulated people operating simulated systems.

Data Standards. A capability that increases information sharing effectiveness by establishing standardization of data elements, data base construction, accessibility procedures, system communication, data maintenance, and control.

Data Verification, Validation, and Certification (VV&C). The process of verifying the internal consistency and correctness of data, validating that it represents real-world entities appropriate for its intended purpose or an expected range of purposes, and certifying it as having a specified level of quality or as being appropriate for a specified use, type of use, or range of uses. The process has two perspectives: producer and user process.

Distributed Interactive Simulation (DIS). A subset of advanced distributed simulation which interfaces through the use of a DIS Protocol Data Unit (PDU).

High Level Architecture (HLA). Major functional elements, interfaces, and design rules, pertaining as feasible to all DoD simulation applications and providing a common framework within which specific system architectures can be defined.

Interoperability. The ability of a set of M&S to provide services to and accept services from other M&S and to use these exchanged services to enable them to operate effectively together.

Live Simulation. A representation of military operations using live forces and instrumented weapon systems interacting on training, test, and exercise ranges which simulate experiences during actual operational conditions.

Model. A model is a physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, or process.

Model Types.

(1) Physical model. A physical representation of the real world object as it relates to symbolic models in the form of simulators.

(2) Mathematical model. A series of mathematical equations or relationships that can be discretely solved. This includes M&S using techniques of numerical approximation to solve complex mathematical functions for which specific values cannot be derived (e.g., integrals).

(3) Procedural model. An expression of dynamic relationships of a situation expressed by mathematical and logical processes. These models are commonly referred to as simulations.

M&S Activity. The development and maintenance of a computer-based M&S capability by or for organizations of the U.S. Army.

M&S Developer. The organization responsible for developing, managing, or overseeing M&S developed by a DoD component, contractor, or Federally Funded Research and Development Center (FFRDC). The developer may be the same agency as the proponent agency.

**M&S Proponent.** The organization responsible for initiating the development and directing control of the reference version of a model or simulation. The proponent will develop and execute a viable strategy for development and maintenance throughout the life cycle of the M&S; and for directing the investment of available resources in same. The M&S proponent serves as the advocate and final authority on their M&S. The proponent will advise the DUSA(OR) on release of the M&S to foreign countries, and will advise the MACOM or Organizational Release Authority for domestic release. Except where responsibilities are specifically designated to an acquisition official by DoD or DA policy e.g. DoD 5000.2 or AR 70-1, the M&S proponent is responsible for, but may delegate execution of: M&S Development; Configuration Management; Preparation and Maintenance of Simulation Object Models (SOMs) as appropriate; all aspects of Verification and Validation; and maintenance of current information in all catalogs and repositories.

**Modeling and Simulation.** The development and use of live, virtual, and constructive models including simulators, stimulators, emulators, and prototypes to investigate, understand, or provide experiential stimulus to either (1) conceptual systems that do not exist or (2) real life systems which cannot accept experimentation or observation because of resource, range, security, or safety limitations.

**Research, Development, and Acquisition (RDA) Domain.** One of the three domains for Army M&S applications. Includes all M&S used for design, development, and acquisition of weapons systems and equipment. M&S in the RDA domain are used for scientific inquiry to discover or revise facts and theories of phenomena, followed by transformation of these discoveries into physical representations. RDA also includes Test and Evaluation (T&E) where M&S are used to augment and possibly reduce the scope of real-world T&E.

**Simulation.** A method for implementing a model(s) over time.

**Simulator**

- (1) A device, computer program, or system that performs simulation.
- (2) For training, a device which duplicates the essential features of a task situation and provides for direct practice.

(3) For Distributed Interactive Simulation (DIS), a physical model or simulation of a weapons system, set of weapon systems, or piece of equipment which represents some major aspects of the equipment's operation.

**Standard.** A rule, principle, or measurement established by authority, custom, or general consent as a representation or example.

**Standards Categories.** The elements of the framework for M&S standardization. The Standards framework contains all the things the Army M&S community seeks to represent algorithmically, devolved into Categories which are assigned to the Army agencies best suited to coordinate development and maintenance of standards in the technical regime represented by that category.

**Stimulator.** (1) A hardware device that injects or radiates signals into the sensor system(s) of operational equipment to imitate the effects of platforms, munitions, and environment that are not physically present. (2) A battlefield entity consisting of hardware and/or software modules which injects signals directly into the sensor systems of an actual battlefield entity to simulate other battlefield entities in the virtual battlefield.

**Synthetic Environments (SE).** Internetted simulations that represent activities at a high level of realism from simulations of theaters of war to factories and manufacturing processes. These environments may be created within a single computer or a vast distributed network connected by local and wide area networks and augmented by super-realistic special effects and accurate behavioral models. They allow visualization of and immersion into the environment being simulated. (Ref. DoD 5000.59-P; CJSI 8510.01)

**Test and Evaluation (T&E).** Test and evaluation includes engineering, developmental, and operational tests.

**Training, Exercises, and Military Operations**

**(TEMO) Domain.** One of the three domains for Army M&S applications. TEMO includes most forms of training at echelons from individual simulation trainers through collective, combined arms, joint, and/or combined exercises. TEMO includes mission rehearsals and evaluations of all phases of war plans. Analysis conducted during the rehearsal or evaluation validates the plan as best as the simulation environment will allow.

Validation. The process of determining the extent to which a M&S is an accurate representation of the real-world from the perspective of the intended use of the M&S. Validation methods include expert consensus, comparison with historical results, comparison with test data, peer review, and independent review.

Verification. The process of determining that a M&S accurately represents the developer's conceptual description and specifications. Verification evaluates the extent to which the M&S has been developed using sound and established software engineering techniques.

Virtual M&S. A synthetic representation of warfighting environments patterned after the simulated organization, operations, and equipment of actual military units.



## Appendix D. References

### Section I. Required Publications

DoD Directive 5000.59, *DoD Modeling and Simulation Management*, 4 January 1994.

DoD Directive 5000.1, *Defense Acquisition*, 1996.

DoD Regulation 5000.2-R, *Mandatory Procedures for Major Defense Acquisition Programs (MDAPS) and Major Automated Information System (MAIS) Acquisition Programs*, March 15, 1996.

DoD 5000.59-P, *Department of Defense Modeling and Simulation Master Plan*, 1995.

Chairman, Joint Chiefs of Staff publication, *Joint Vision 2010*, 1996.

Chief of Staff of the Army publication, *Army Vision 2010*, 1996.

AR 5-11, *Management of Army Models and Simulations*, 1997.

AR 71-9, *Materiel Requirements*, 1997.

DA Pamphlet 5-11, *VV&A of Army Models and Simulation*, 1993.

DA Pamphlet 100-XX (Draft), *Force XXI Institutional Army Redesign*.

HQDA White Paper, *The Army Vision for M&S After Next*, AMSO, 1997.

TRADOC Pamphlet 71-9 (Draft), *Requirements Determination*, 19 March 1997.

### Section II. Related Publications

DoD 5000.59-M (Draft), *Glossary of Modeling and Simulation Terms*

*OSD Technology Area Plan.*

*Technology Area Review for Modeling and Simulation.*

Memorandum, Office of the Assistant Secretary of Army (Research, Development, and Acquisition), Subject: Simulation Support Plans for ACAT I & II Programs, July 31, 1995

*The Army M&S Standards Report*, AMSO, 1997.

*The Army M&S Technology Review* (to be published).

*The AMIP/SIMTECH Program Stewardship Report*, AMSO, 1997.

*The Army Science and Technology Master Plan*, Office of the ASA (RDA), Dec 1996.

*The Army Plan.*

The management plans for each domain.

*Leading Change*, *The National Performance Review*, available at <http://www.army.mil/dpr-page/nrip.htm>



**Appendix E. The Army M&S Investment Plan. (published separately)**

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