**Educating the M&S Workforce**

**M&S Body of Knowledge (BOK) & Human Capital Strategy**

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**Original Project Intent**

**What Problem, Requirement, or M&S Shortfall Underlies This Proposal?**

- **The original problem that was to be addressed?**
  - “The M&S workforce is not equipped with adequate education, processes, practices, tools, technology and resources to support the institutionalization of M&S across the DoD’s mission space.” *Common & Cross Cutting Business Plan*

- **Directive Documents**
  - Goal 5 of the DoD M&S strategic vision - To develop people that are well trained and employ existing models, simulation, and data to support departmental objectives.
  - Acquisition M&S Master Plan: M&S Education is called for under Objective 5, Shape the Workforce.
  - M&S SC Common and Cross-Cutting Business Plan identified the following Workforce Development Gaps:
    - A DoD **Human Capital Strategy** for M&S to articulate competencies required.
    - Accepted multi-disciplinary M&S **Body of Knowledge** (BOK).
Purpose of the M&S Workforce Project
To determine whether the current M&S workforce and management structure or a modification of that structure is required to ensure that M&S technology capabilities are effectively integrated throughout DoD.

DoD Functional Communities

Services and Joint Communities

Planning    Training    Acquisition    Testing    Analysis    Experimentation

Army        Marines      Navy         Air Force    Joint Organizations
The DoD Modeling and Simulation (M&S) workforce comprises at a minimum of 10,000 individuals* which includes military, government civilians, and contractors.

Assuming $150K cost per individual this represents an expenditure of $1.5B per year.*

*These numbers are based on previous studies (through surveys and verified during focus group sessions) by the U.S. Army and U.S. Air Force, plus the results from this initiative.
Every profession has a Common Body of Knowledge (BOK) that serves as the framework for educating and testing the competencies of those wishing to enter and succeed in the profession.

M&S BOK is a result of combining several previous initiatives for developing a DoD M&S BOK.

Initial validation of this BOK, each functional area community and individual Service was requested to identify the knowledge/skill levels.

Four areas of M&S usage were examined:
- **Awareness** – information all persons need to know about M&S
- **Application** – information needed to perform M&S functions
- **Management** – information needed to manage M&S programs
- **Executive** – information senior leadership needs to know about M&S
Each functional area community and Service reviewed/validated the consolidated BOK

Each functional and service organization recorded the highest knowledge/skill level needed for each content element.

519 knowledge areas were reviewed

Utilized the Bloom Taxonomy to rate each knowledge/skill level:

1 - Knowledge: Recalls data or information
2 - Comprehension: Able to understand the meaning of data or information
3 - Application: Uses information in new situations; solves problems
4 - Analysis: Breaks down information and identifies components
5 - Synthesis: Uses old ideas to create new ones
6 - Evaluation: Compares and discriminates between ideas
0 - Does not apply

Published as an Appendix in the Human Capital Strategy for the the BOK for four levels of M&S usage (Awareness, Application, Management and Executive)
## Application

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# Project Overview

**M&S BOK & Human Capital Strategy**

## M&S Management

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**Project Overview**

**M&S BOK & Human Capital Strategy**

**Data Collection**

- Conducted a review of materials, reports, other organizational structures, other M&S Workforce studies and published literature
- Survey elements of DoD through a Trend Analysis Survey and Conduct Focus Group Interviews

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**Joint Organizations**

- Army
- Navy
- Air Force
- Marines
- Acquisition
- Training
- Planning
- Testing
- Analysis
- Experimentation

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1) **What is meant by an M&S position?**
2) **What characteristics, competencies, and academic proficiencies are required of key M&S positions by organizations throughout the DoD?**
3) **Having defined the characteristics, competencies, and academic proficiencies required of key M&S positions what analytical data is available to support a DoD M&S Human Capital Strategy?**
   - What are the core M&S requirements for the various functional application areas?
   - What are the core M&S requirements for leaders / managers?
   - What are the core M&S requirements for executives?
4) **What business process would be most effective to identify and track M&S professionals?**
Survey Results

M&S critical for mission success

Org has need of M&S expertise

Org has positions or requirements for specially trained M&S personnel
Data Collection

Focus Group Results

- M&S is critical for mission accomplishment
  - Qualitative Indicators – 92% of comments emphasizes the critical role of M&S

- Future M&S requirements will be critical for an organization’s successful mission accomplishment
  - Qualitative Indicators – 96% of comments view future M&S requirements as critical

- There are positions and/or associated requirements for specially trained M&S personnel in organizations
  - Qualitative Indicators – 94% of comments see the need for specially trained M&S personnel

- Organizations have all of the M&S personnel that are needed
  - Qualitative Indicators – 84% of comments stated additional M&S personnel are needed

Qualitative results reinforce the quantitative survey results
Data Implications

Overview

- Need an appropriate mix of M&S personnel in organizations
  - Officers for Operational Relevance
  - GS Civilians for Long Term Continuity
  - Contractors are critical but should not be responsible for performing inherently government work

- M&S expertise has evolved from professionals in a wide range of job series
  - GS-1515 Operations Research Analysis, GS-301 General Management, GS-2210 Computer Specialist; GS 340 Program Management; GS-854 Computer Engineering; etc.
  - Promotion/advancement based on job series, not M&S

- Contractors
  - Each organization has a tendency to view the role of contractors differently
  - Unique management competencies are required in dealing with contractors
M&S Challenges
Nine developments within the field of M&S that will have an impact on the DoD M&S workforce

- **Technical and complex nature of M&S**
  - M&S tools/applications are technical in nature
  - Requires a mix of technical and application skills

- **Advances in Technology**
  - Increased Capabilities
  - Rate of Obsolescence

- **Need for Digital Systems to Interoperate**
  - C4I to C4I
  - Simulation to Simulation
  - C4I to Simulation

- **Need for Information Traceability with Documentation**
  - Historically Lacking
  - Process vs. Culture Issue

- **Diverse Functionality of M&S Community**
  - Six different Functional Communities
  - Requirements Variations
M&S Challenges

Nine developments within the field of M&S that will have an impact on the DoD M&S workforce

- **Need for re-use of M&S tools/applications**
  - Cost of development
  - Duplication
  - Long-term sustainment costs

- **Ongoing changes to DoD environment and missions**
  - Impact on legacy simulations
  - Changes in Mission Set - Warfare vs. other requirements
  - Net-centric Operations

- **DoD M&S workforce**
  - M&S “workforce” mix of military, government civilian and contractors
  - Most “just happen” into the workforce
  - Inherently government work issue

- **M&S Skill and Competency Gaps**
  - Historically new technologies create gaps - Printing Press example
  - Secondary effects
  - Mix of technical, operational and management level personnel
Joint M&S Workforce Development: Human Capital Strategy

Modeling and Simulation Human Capital Strategic Goals

Strategic Goal 1: Develop M&S Leadership
Develop leaders to ensure the capabilities that M&S bring to the DoD enhance the ability to execute the department’s mission through cooperative and innovative approaches for its investment in and delivery of products, technology, and services.

Objective 1.1 Develop M&S leadership competency framework
Objective 1.2 Assess leadership composition & competencies of current workforce
Objective 1.3 Implement strategies to close competency gaps

Strategic Goal 2: Establish a High-Performing DoD M&S Workforce
Advance M&S to a results–oriented culture that fosters innovation, avoidance of duplication, motivates staff, and sustains a high performing, workforce.

Objective 2.1 Develop and implement strategies to ensure the effectiveness of diversity programs and practices
Objective 2.2 Implement a performance management system that aligns employee performance plans with organizational goals
Objective 2.3 Implement compensation structures that distinguish between levels of performance, recognize contribution and rewards merit
Joint M&S Workforce Development: Human Capital Strategy

Modeling and Simulation Human Capital Strategic Goals

Strategic Goal 3: Institute Recruitment and Retention Practices
Develop effective strategies to recruit and retain a highly skilled and diverse M&S workforce for DoD (including the Services and functional communities) in order to meet the myriad of customer needs and to transform the Department into the Employer of Choice for M&S professionals.

Objective 3.1 Create & implement an M&S workforce recruitment strategy for DoD
Objective 3.2 Implement strategies to retain skilled M&S personnel
Objective 3.3 Become an employer of choice for M&S professionals

Strategic Goal 4: Institutionalize M&S Talent Development/Knowledge Management
Develop, promote, and retain a culture of continuous learning to ensure that the M&S workforce has the knowledge, skills, and abilities to achieve National Security and National Objectives.

Objective 4.1 Develop M&S competency framework
Objective 4.2 Assess competencies of current M&S workforce
Objective 4.3 Implement strategies to close competency gaps
Objective 4.4 Implement Strategies to preserve M&S organizational (institutional) knowledge
Joint M&S Workforce Development: Human Capital Strategy

Modeling and Simulation Human Capital Strategic Goals

**Strategic Goal 5: Evaluate Human Capital Effectiveness**

Ensure that the management of M&S Human Capital is recognized as a critical component of DoD’s mission and that M&S Human Capital strategies, programs, and systems are aligned and measured to effectively achieve DoD goals.

Objective 5.1 Design an M&S organizational structure that allows the right mix of personnel (military, civilian and contractor)

Objective 5.2 Align Human Capital Management strategies with mission, goals, and organizational objectives and integrate into strategic plans, performance plans, and budgets

Objective 5.3 Design an M&S workforce planning framework that aligns with the DoD’s strategic plans

Objective 5.4 Implement an accountability system that monitors & measures the results of M&S human capital management policies, programs & activities
## Joint M&S Workforce Development: Human Capital Strategy

### Alignment of Strategic Goals to M&S Challenges

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## National Defense Strategy
- Secure the United States from direct attack
- Secure Strategic access and retain global freedom of action
- Strengthen alliances and partnerships
- Establish favorable security conditions

## National Military Strategy
- Decisiveness
- Integration
- Agility

## QDR
- Agility to prepare for asymmetric challenges and to hedge against uncertainty
- Enterprise-wide changes to ensure that organizational structures, processes and procedures effectively support strategic direction.
- Developing a 21st Century Total Force
  - Reconfiguring the Total Force
  - Building the right skills
  - Designing an Information Age Human Capital Strategy

## DoD Civilian HCSP
- Sustaining a capable, agile and decisive civilian workforce

## USD(AT&L) Human Capital Plan
- High-performing, agile and ethical workforce

## DoD M&S Policy (Strategic Vision for DoD M&S (Objective 5))
- People that:
  - Are well-trained
  - Employ existing models, simulation, and data to support departmental objectives
  - Advance M&S to support emerging departmental challenges

## MSCO C&CC Business Plan
- Increase interoperability
- Increase reuse of models and simulations and the data used by models and simulations
- Provide a framework where Communities and Services can combine efforts to meet common and individual objectives.
- Ensure that current and emerging DoD capabilities and concerns are represented in models and simulations at the fidelity and level of detail required by M&S users.
- Provide an educated and informed workforce capable of managing, developing, and using M&S effectively.

## DoD M&S Human Capital Strategy
- Develop M&S Leadership
- Establish a High-Performing DoD M&S Workforce
- Institute Recruitment and Retention Practices
- Institutionalize M&S Talent Development/Knowledge Management
- Evaluate Human Capital Effectiveness
Problem

- M&S is not realizing its potential for cost savings in DoD
  - Customers of M&S do not know how to employ M&S effectively
    - Which tools to use, when to use them, how to use them, how to get them.
  - Customers of M&S do not understand risk and benefits of using M&S
- Education can help drive wider acceptance and better use
Prototype Educational Elements for Acquisition / TE

The Approach

- Identify requirements using a wide set of stakeholders for focused initial audience

- Survey existing US educational programs to identify gaps

- Develop educational offerings to cover gaps using the best US university programs

- Make them widely available
  - Web
  - DAU CLMs
  - University Courses
  - Short courses
  - Public domain

- Track return on investment longitudinally
Original Project Intent

Project Overview Design

Consisting of Academic Partners Including:
George Mason University; John Hopkins University
Applied Physics Lab; Old Dominion University; University of Alabama at Huntsville; University of Central Florida;
Air Force Institute of Technology; University of California, San Diego; Stevens Institute; and Texas A&M

Stakeholder Group

Joint Organizations
Army
Navy
Air Force
Marines
Acquisition
Training
Planning
Testing
Analysis
Experimentation

M&S Human Capital Strategy

Review of Consolidated BOK

M&S Body of Knowledge

Workforce Survey Focus Groups
Stakeholder Group

Joint Organizations
Army
Navy
Air Force
Marines

Acquisition
Training
Planning
Testing
Analysis
Experimentation

Learning Matrix/Instructional Content

M&S Human Capital Strategy

M&S Body of Knowledge

P13: Understand the trades between using a general model and a custom model, including the VV&A implications.

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Stakeholder Group:
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- Army
- Navy
- Air Force
- Marines

Workforce Survey Focus Groups:
- Workforce
- Survey
- Focus Groups

M&S Body of Knowledge:
- Review of Consolidated BOK

M&S Human Capital Strategy:
- Planning
- Training
- Analysis
- Experimentation

Project Overview Design
Original Project Intent

Project Overview Design

Stakeholder Group

Learning Matrix/Instructional Content

Learning Architecture/Instructional Framework

Army
Navy
Air Force
Marines
Acquisition
Training
Planning
Testing
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Experimentation

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- Analysis
- Experimentation

M&S Human Capital Strategy

M&S Body of Knowledge

Prototype Educational Elements for Acquisition / TE
Prototype Educational Elements for Acquisition / TE

Project Overview Design

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Learning Matrix/Instructional Content

Learning Architecture/Instructional Framework

M&S Human Capital Strategy

M&S Body of Knowledge

Prototype Educational Elements for Acquisition / TE

Application of Educational Elements to Other Communities and Services

Army
Navy
Air Force
Marines
Acquisition
Training
Planning
Testing
Analysis
Experimentation

Workforce Survey
Focus Groups

Review of Consolidated BOK
16 Courses planned for development
M&S in the Acquisition Life Cycle, Parts One and Two
M&S Strategy and Support Plans
M&S Requirements and Evaluating M&S Proposals
Contracting for M&S
M&S In Decision Risk Analysis and Mitigation
Best Practices in M&S
M&S Environments
M&S Data Strategies
M&S for Test and Evaluation, Introduction and Advanced
Introduction to Engineering M&S Applications
Physics-based M&S
Basic Engineering Concepts in M&S, parts 1 & 2
Topics in the Application of Engineering M&S

Four Certificate programs:
- **M&S Management**
  - Intro to DoD M&S
  - Modeling and Simulation in the Acquisition Life Cycle, Parts 1 & 2
  - Best Practices in M&S
- **M&S Acquisition**
  - M&S Strategy and Support Plans
  - M&S Requirements & Evaluating Proposals
  - Contracting for M&S
  - M&S in Decision Risk Analysis

- **M&S Test and Evaluation**
  - M&S for Test and Evaluation. Introduction and Advanced
  - M&S Environments
  - M&S Data Strategies

- **M&S Engineering Integration**
  - Physics-based M&S
  - Basic Engineering Concepts in M&S, Parts 1 and 2
  - Selected Topics in the Application of Engineering M&S

Certificates can be credited toward resident and non-resident NPS degree programs.
Current path will result in products that provide the education and training that acquisition and T&E professionals need to use M&S effectively in their jobs.

For more information about this project, please see [www.nps.edu/MSAcq](http://www.nps.edu/MSAcq), or contact:

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Questions?