



Modeling and Simulation CMMI: A Conceptual View

Frank Richey

Illinois Institute of Technology Research Institute

There is a lack of guidelines for determining an organization's modeling and simulation (M&S) competency level such as maturity or capability. This makes it difficult for a customer to identify innovative companies who successfully deliver M&S-intensive products better, faster, and cheaper than the competition. This article advocates inclusion of M&S as a discipline into the Software Engineering Institute's Capability Maturity Model® IntegrationSM. This enhancement should provide the most efficient and cost effective means to identify and or improve a company's capability to manage the development, acquisition, and maintenance of M&S products and services.

Where can you find official acknowledgements or certifications that distinguish modeling and simulation (M&S) organizations as mature, capable, reputable, or accomplished? Development of both the modeling and simulation profession and the industry is inhibited by the fact that there is no generally accepted set of inherent qualifications or functional competencies. The lack of guidelines for determining M&S professional competency makes it difficult to establish and deliver educational programs. Furthermore, the lack of M&S metrics and standards for functional competency makes labor market transactions inefficient for both buyers and sellers of M&S professional services.

How can acquirers ensure their success by identifying contractor(s) who can provide M&S intensive systems that are delivered and maintained with predictable and improved cost, schedule, and quality? We are aware that M&S systems are software driven. However, can acquisition professionals be assured that any accomplished software development organization is capable of providing a quality M&S product within the projected cost and schedule? If not, then perhaps some consideration should be given to ways in which an M&S development organization can be recognized for its M&S capability.

The Software Engineering Institute's (SEI) Capability Maturity Model® IntegrationSM (CMMISM) can serve as a means for identifying a company's process maturity level in software, systems engineering, and acquisition. It could be of greater use to the members of the Department of Defense (DoD) M&S community and to the M&S community at large if M&S were included (see Figure 1). Also, it would be helpful to be able to recognize, among the high maturity level software development organizations, which ones are proficient as M&S developers and in which area of M&S their expertise resides.

Should Modeling and Simulation be an Integrated Component?

The Capability Maturity Model Integration provides:

An ordered collection of best practices.

A description of "WHAT" is required, not "WHO" or "HOW."

A road map for the technical discipline and management process improvement.

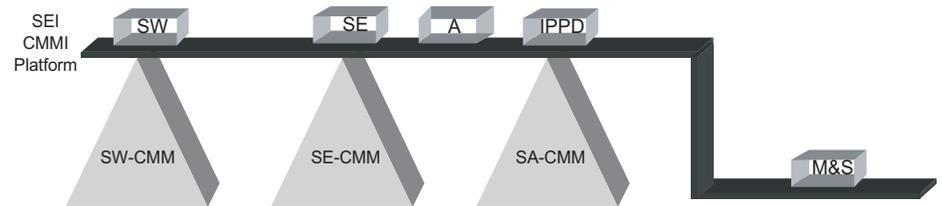


Figure 1: Integrated Product and Process Development (IPPD)

M&S Industry Standards and Best Practices

An industry standard provides an accepted technical approach for the design and development of communication systems, system architectures, and information systems. Industry standards for the life-cycle development of M&S systems do not yet exist. By conforming to an international standard for M&S design and development, organizations are confident that their M&S system modifications for enhancements, interface definitions, and interoperability can be realized more easily, cohesively, and cost effectively.

SEI has a large DoD and commercial audience, and its' CMMI model provides a product suite that offers an infrastructure that can be used to champion an industry standard for the design and development of M&S products and services. The designated standard should be cohesive and conform to its' associate disciplines, software, and system engineering (ISO/IEC 15504). The CMMI model's "Expected" and "Informative" component areas offer generic and specific practices, sub-practices, notes, and discipline-specific amplifications that are an existing structure that can be extremely beneficial for specifying industry standards and best practices for building M&S products.

Standards are important and beneficial because they refer to the formal mandatory requirements developed and used to prescribe consistent approaches for design and development of products (e.g., ISO/IEC standards, Institute of Electrical and Electronic Engineers standards, etc.). M&S supported by an international discipline standard would be equipped with the technical means to foster collaborative environments among different organizations or nations. These collaborative environments could address the interoperability of M&S systems between and among the military services, DoD government, non-DoD government, commercial, and international organizations.

SEI states that its "Product Suite represents a consensus-based approach to identifying and describing best practices in a variety of disciplines." We cannot think of a more convenient and appropriate vehicle to house and provide reference material for M&S industry best practices and standards.

M&S CMMI Activities

The Defense Modeling and Simulation Office (DMSO) has established an XMSO M&S CMMI Steering Group whose charter is to represent the M&S community in determining the feasibility of adding M&S as a discipline to the CMMI. It will also establish the

strategic direction and plan for the evolution and development of M&S process areas, practices, and amplifications for the CMMI Product Suite. The steering group will review and propose industry standards for M&S development, maintain the M&S CMMI requirements baseline (A-Specification) and Concept of Operations (ConOps), and ensure satisfaction of these requirements.

The plan is to extend the M&S CMMI Steering Group beyond the Defense Services Modeling and Simulation Offices (Defense Modeling and Simulation Office, Army Model and Simulation Office, Marine Corps Modeling and Simulation Management Office, Navy Modeling and Simulation Management Office, and Air Force Agency for Modeling and Simulation) to include the M&S DoD government, non-DoD government, and commercial communities. Any organizations with comments, ideas, or interest in participating in the steering group meetings may contact the author directly. ♦

About the Author



Frank Richey is a senior software engineer for Illinois Institute of Technology (IIT) Research Institute, Alexandria, Va., providing a broad spectrum of experiences at the senior Systems and Software Engineering level. Currently, he is exploring the feasibility of defining an industry benchmark for assessing the credentials, capabilities, and organizational maturity of companies that provide modeling and simulation products and services for the Defense Modeling and Simulation Office. He is a member of the Institute of Electrical and Electronics Engineers and the

Washington, D.C., area Software Process Improvement Network. He recently presented his white paper, "Modeling and Simulation Capability Maturity Model Exploration," at the fall 2001 Simulation Interoperability Workshop. Richey's experience includes the Internal Revenue Service modernization and 13 years of continuous Department of Defense experience. He has a bachelor's degree in computer and information science from Temple University.

**IIT Research Institute
1701 N. Beauregard Street
Alexandria, VA 22311
Phone: (703) 575-3296
E-mail: frichey@iitri.org**



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