Modeling and Simulation Professional Certification Commission

Summer 2004

MSPCIG PlanV21

Executive Summary

The modeling and simulation profession, industry and market are rapidly maturing, yet lacked the identity, unity and perceptible coherency of associated domains such as computational science, systems engineering and training delivery. This lack of identity and the associated fragmentation of this evolving industry are an impediment to the necessary development and application of modeling and simulation technologies and practices.

Development of both the profession and the industry is inhibited by the fact that there is no generally accepted set of qualifications or functional competencies that are inherent in modeling and simulation. Additionally, there is no specific form of officially certifying professional modeling and simulation practitioners. The lack of guidelines for determining professional competency makes the establishment and delivery of educational programs difficult. Furthermore, the lack of availability of metrics and standards for functional competency makes labor market transactions inefficient for both buyers and sellers of professional services.

An Implementation Program was developed to establish organizations and processes whereby professional certification for the modeling and simulation industry may be conducted in a consistent and dependable way.

Under the auspices of the National Training Systems Association, the Modeling and Simulation Professional Certification Commission (MSPCC) is the organization for developing and providing the professional certification. The Implementation Group was formed to define and implement the Modeling and Simulation Professional Certification Commission and establish the Modeling and Simulation Professional Certification Board (MSPCB), an element of the Commission.

Section I of this Plan specifies the implementation process that was used to establish an inaugural certification program for modeling and simulation professionals by June of 2001. The inaugural certification was focused on the Defense Training Simulation Professionals (DTSP), represented at forums such as the Interservice/Industry Training, Simulation and Education Conference. Having been developed in concert with a wide range of simulation professionals outside of DTSP, the initial Level certification was implemented to be expressly and systematically extensible to the broad spectrum of modeling and simulation professionals. Following the inaugural certification, the Implementation Group continued the development of consistent professional guidelines and processes that encourage the expansion of the program beyond the recognized limited scope of Defense Training Simulation Professionals.

Section II outlines the initial program specification for the Modeling and Simulation Professional Certification Commission and Board. Under an estimated two years of supervision by the Implementation Group, section II, the Modeling and Simulation Professional Certification Commission Specification, and the associated appendices will

be developed into freestanding professional guidelines for the Commission and Board for the advancement and administration of the program.

MODELING AND SIMULATION PROFESSIONAL CERTIFICATION IMPLEMENTATION

1.1 NEED AND INTENTION

Circumstance: The modeling and simulation profession, industry and market are rapidly maturing, yet lacked the identity, unity and perceptible coherency of associated domains such as computational science, systems engineering and training delivery. This lack of identity and the associated fragmentation of this evolving industry is an impediment to the necessary development and application of modeling and simulation technologies and practices.

In particular, the development of both the profession and the industry is inhibited by the fact that there is no generally accepted set of qualifications or functional competencies that are inherent in modeling and simulation**.** Additionally, there is no specific form of officially certifying professional modeling and simulation practitioners. The lack of guidelines for determining professional competency makes the establishment and delivery of educational programs by both public and private education and training institutions difficult. Furthermore, lack of availability of metrics and standards for functional competency makes labor market transactions inefficient for employers, acquirers and producers of modeling and simulation systems and services.

An Implementation Program was developed to establish organizations and processes whereby professional certification for the modeling and simulation industry may be conducted in a consistent and dependable manner.

Under the auspices of the National Training Systems Association, the Modeling and Simulation Professional Certification Commission (MSPCC) is the organization for developing and providing the professional certification. The Implementation Group was formed to define and implement the Modeling and Simulation Professional Certification Commission and establish the Modeling and Simulation Professional Certification Board (MSPCB), an element of the Commission*.*

This Plan specifies the implementation process that was necessary and sufficient to establish an inaugural program for clear and useful certification of simulation professionals by June 2001. The inaugural certification was focused on the Defense Training Simulation Professionals (DTSP), represented at forums such as the Interservice/Industry Training, Simulation and Education Conference. Having been developed in concert with a wide range of simulation professionals outside of DTSP, the initial Level I certification was implemented to be expressly and systematically extensible to the broad spectrum of modeling and simulation professionals. Following the inaugural certification, the Implementation Group

continued the development of consistent professional guidelines and processes that encourage the expansion of the program beyond the recognized limited scope of Defense Training Simulation Professionals.

1.2 BACKGROUND

Several circumstances have combined to foster an understanding of the need for certification of simulation professionals. These factors include expansion and expressed desirability of establishing the identity and integrity of the simulation industry and accelerated activity in the formation of numerous organizations focused on modeling and simulation. The formal identification of a professional cadre as a component was reinforced by discussions held among representatives of various professional societies deliberating the prudence and feasibility of such a course of action, in addition to evidence that several elements of the simulation professional constituency had been addressing the concept independently.

All evidence suggested that this was an opportunity "whose time has come" and for which acceptance had naturally evolved. The challenge in establishing a credible certification program for this complex interdisciplinary professional program was the process for program development.

The Path to Action - The state of need and opportunity for simulation professional certification had matured to such a degree as to motivate action toward implementing such a practice. Consideration of deliberate collaborative action was initially undertaken by The National Training Systems Association (NTSA) in 1999. RADM Fred Lewis, USN (ret), Executive Director of the National Training Systems Association disclosed these seminal ideas in his Keynote Address to the Summer Computer Simulation Conference, sponsored by the Society for Computer Simulation (SCS) in July of 2000.

Subsequent discussions, including an "ad-hoc" working meeting on the 18th of September, 2000 at the University of Central Florida's (UCF) Institute for Simulation and Training (IST), served to crystallize preliminary notions and to begin to build a constituency of interested individuals and organizations. The group discussed the "need for" and "processes involved" in establishing a Modeling and Simulation Professional. The ad-hoc group identified 5 subcommittee areas to be pursued. Those areas were:

I. Definition of Modeling and Simulation Professional; Core competencies
II. Academic; Accreditation; Re-certification
III. National Level Recognition
IV. *Resource Acquisition*
V. *Overarching Plan/ Process*

As a result of the first meeting, a sense of urgency to establish the profession became clear. The subcommittees discussed ideas, which were then presented at the second meeting of the ad-hoc group on November 27, 2000, prior to the opening of Inter-service/ Industry Training, Simulation and Education Conference (I/ITSEC) held in Orlando, FL. The groups continued to meet and discuss the program further during the course of I/ITSEC (27 – 30 November, 2000).

Consequent to those meetings, it was resolved to establish the Modeling and Simulation Professional Certification Implementation Working Group. The goal in forming such an organization was to systematically define and execute a program of activity that would culminate in a fully operational Modeling and Simulation Professional Certification Board and mark the beginning of effective certification for modeling and simulation professionals.

Accordingly, the challenge of establishing the initial operational Modeling and Simulation Professional Program within 6 months (June, 2001) was announced during the opening comments at the I/ITSEC 2000 conference.

It was recommended at the ad-hoc group meeting on November 30, 2000 that a formal Implementation Group and a Modeling and Simulation Professional Certification Board be created. The Implementation Group would dissolve approximately two years hence turning established process and procedures to the Certification Board and an Oversight Council for continued implementation.

Finally, the commitment to proceed was briefed at a meeting which included broad representation by NTSA, SCS, and SISO professional societies, the DoD and military services' M&S organizations, and the UK MOD Synthetic Environment Coordination Office. All of the attendees were invited to participate in the effort and expand participation. Tasks were assigned to establish a DRAFT version of a Program Plan document and to pursue actions associated with a variety of issues. These issues had originally been pursued by the ad hoc working group and thereafter would be subsumed into the scope of this Implementation Plan.

The Draft Plan was reviewed at the next meeting on December 12th, 2000, in conjunction with the Winter Simulation Conference. Revisions to the plan were incorporated and it was posted for review and comment by January 1, 2001. A web site and reflector were established to facilitate the review of program materials. Following the meeting, it was recommended that additional names and addresses be included in the review/input to program materials. Action was also taken to pursue representation by relevant professional organizations and to obtain nominations for the initial "Implementation Group". The Implementation Group consisted of 16 people plus a secretariat and representatives from the international community. The "Implementation Group" sought participation and input from all sources. The Implementation Group was charged with establishing the inaugural program and processes for program expansion.

The Implementation Group was responsible for establishing a nine-member certification board. Those who were involved in the Implementation Group were also be considered eligible for selection to the certification board. If selected, that member would be removed from the Implementation Group. If members are removed through selection to the certification board, the Implementation Group may nominate/select additional members to maintain 12 –16 members plus the secretariat and international representation.

Meetings continued during the Western Multi Conference in Phoenix on January 8 through 10, 2001. Significant progress was made in defining the profession of Modeling and Simulation and the initial Implementation Group was constructed. An exam subcommittee and certification program testing requirements were also established. The draft implementation plan was reviewed and revised accordingly.

The Initial Implementation Group (in alphabetical order):

1. Vince Amico NCS (selected to certification board)
2. Bruce Fairchild Boeing / SCS
3. Amy Henninger SOAR Technology
4. Fred Lewis NTSA
5. Bowen Loftin ODU
6. Dennis McBride IST/ Potomac Institute
7. Duncan Miller MIT
8. Hank Okraski NCS (selected to certification board)
9. Ralph Rogers ODU (selected to certification board)
10. Hessam Sarjoughian U. Arizona
11. Tom Stanford DMSO
12. Harry Thompson SISO
13. Bill Waite Aegis
14. Jeffrey Wallace consultant
15. Mark Yerkes (secretariat) UCF
16. Bernie Zeigler U. Arizona (selected to certification board)
17. Mike Zyda NPS

International:

18. Jenni Henderson UK MOD
19. Helena Szczerbicka Univ. of Hannover

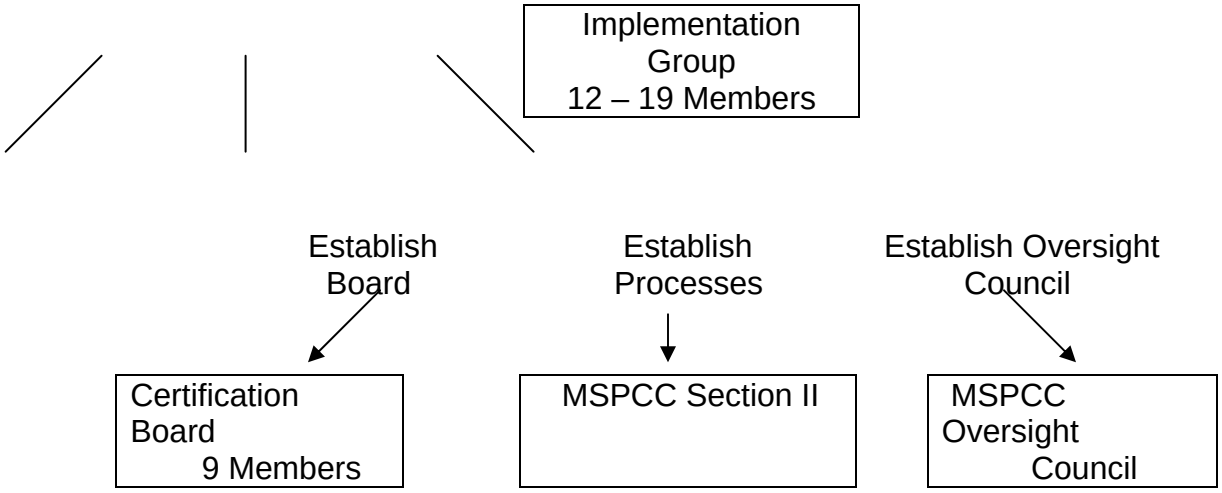
The initial Implementation Group was selected by participants in the development of the program. The participants recognized the need for a balance between the inclusion of many perspectives and the need for a few to focus action. All of those who are involved continue to have access to program documentation and are encouraged to submit comments and recommendations. The Implementation Group is a smaller business/action oriented group to guide

implementation. The group was charged to select the initial Certification Board and governing processes. The group was not automatically grand-fathered into the certification program, by virtue of solely being members of the Implementation Group.

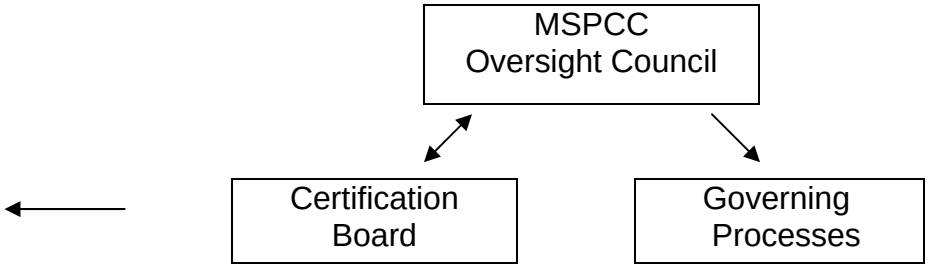
The Modeling and Simulation Professional Certification Commission is comprised of two elements. During approximately the first two years of operation, those elements are the Implementation Group and the Certification Board. The Implementation Group will then be dissolved with the Certification Commission being comprised of a Commission Oversight Council and the Certification Board.

Modeling and Simulation Professional Certification Commission
Organizational Structure

Development:
(Estimated Years 1 & 2)
Modeling and Simulation Professional Certification Commission



Execution:
(After dissolution of Implementation Group)
Modeling and Simulation Professional Certification Commission



1.3 OBJECTIVES FOR THE IMPLEMENTATION PROGRAM

The objective of the Implementation Program was to set the course to accomplish the mission and vision of the Certification Commission and to achieve satisfactory initial operation of a Modeling and Simulation Professional Certification Board, providing sustained certification of Modeling and Simulation professionals. The Implementation Program and Group will exist for approximately two years. Implementation program, activities will include:

- Establishment of the initial Modeling and Simulation Professional Certification Board competent to execute associated programmatic guidance. COMPLETE

- Establishment of the initial Program Guidelines for the Modeling and Simulation Professional Certification Board. The Board shall operate in accordance with their Program Guidelines. These guidelines are to be sufficiently explicit, detailed and well ordered to provide guidance to the Board during and following dissolution of the implementation group after approximately 24 months of operation. All relevant policies, processes and organizational relationships will be documented in the Program Guidelines. COMPLETE

- Any such agreements that are required to document inter-organizational relationships which are necessary to facilitate the operation of the Certification Board in executing its responsibilities shall be established. ONGOING: Transferred to Oversight Council

- Establishment of processes for selecting/replacing Certification Board Members. COMPLETE

- Establishment of the Modeling and Simulation Professional Certification Board as a “not for profit” organization. COMPLETE

- Establishment of policy(ies) on “Grand-fathering” of certification. COMPLETE

- Selection of initial certification criteria. COMPLETE

- Establishment of initial forms/documentation requirements for certification. COMPLETE

- Selection/empowerment of an Organization to support certification administration. COMPLETE

- Initial setting of certification and re-certification fees. While initial resources will be required for implementation, it is envisioned that the

program will ultimately be self-sustaining through fees and other income. COMPLETE

- Selection of logo/letterhead and copyrighting of necessary materials/titles. COMPLETE

- Develop and establish International aspects of the program. ONGOING: Transferred to Oversight Council

- Pursuit/establishment of relevant NAIC/SIC industry codes in support of the profession. ONGOING: Transferred to Oversight Council

- Establishment of a Certification Commission Oversight Council COMPLETE

While the Implementation Group is the voting body to establish the program, significant input will be expected from the Certification Board who will have to abide by the established processes. Ideas and opinions will also be solicited from the profession at large.

1.4 TRANSITION

A variety of organizations exist whose relationships to the Modeling and Simulation Professional Certification Commission are significant. The following Table identifies these organizations and indicates briefly their relationships to the program. It is envisioned that certification board nominations/assignments would involve the relevant organizations. These organizations (post Implementation Group) would nominate new members to fill certification board vacancies. The nominations would be submitted to the secretary of the board and would then be presented to the members of the Modeling and Simulation Professionals for selection. A process in calling for nominations will be established by the Implementation Group to ensure an appropriate mixture of industry, government and academic representation is maintained.

Figure 1.4.2 – Relevant Organizations

Organization	Representative
SISO	Harry Thompson
NTSA	Fred Lewis
SCS	Bruce Fairchild
MORS	
NCS	Hank Okraski
AIAA	
IEEE	Preston White

ACM/SIGSIM Ernie Page
Human Factors & Ergonomics Society Eduardo Salas or Peter Hancock
IIE
Informs
International Representation

The Annual Meeting of the Modeling and Simulation Certification Commission was conducted 28 November 2002. The history of implementation along with the organization to include the implementation group, certification board, exam subcommittee and transition to an oversight council and exam status were reviewed. July 2002 was selected for the end of the initial exam processes and the start of open enrollment. The exam subcommittee will meet in March to review examination and evaluation processes. November/ December 2002 was selected for establishing the oversight council in conjunction with the annual meeting. Agenda items were established for a mid year review to be conducted in conjunction with the SimSummit 18/19 July in San Diego, CA.

The July 2003 mid-year review reported on the online process for applications/approval, web site enhancements and board member workload. The Implementation Group elected to expand the certification board from the current 9 members to 12 in conjunction with the upcoming annual renewal. With certification established as valid for four years, the implementation group established a CEU subcommittee and a Recertification subcommittee to look at how courses/events would qualify for recertification and what recertification standards/requirements should apply. In establishing the Oversight Council it was determined that some members of the Implementation Group may be selected to the Oversight Council, but the Oversight Council will not include any members of the certification board.

Nominations were requested for both the Certification Board and the Oversight Council ahead of the December 2003 annual meeting. Inputs for those nominations were not complete and the selection of the members was postponed until early 2004, when nomination packages would be available. Recertification guidelines were reviewed at the 3 December 2003 meeting. The guidelines were accepted with minor adjustments and are included in section 2, Modeling and Simulation Certification Commission Specification. It was agreed that recertification should ideally be completed online. The CMSP will be required to "pledge" that their submissions are true and accurate. A "Code of Professional Ethics for Simulationists" developed by SISO was reviewed, accepted, and incorporated into Section 2, Modeling and Simulation Certification Commission Specification, with recognition to SISO and the authors.

On 10 February 2004, a final review of the nominees for the Oversight Council and the Certification Board were completed and presented to the Implementation Group for selection. Changes were made to Section 2, Modeling and Simulation

Certification Commission Specification, to increase the number of certification board members to 12, establish the 9-member Oversight Council, incorporate recertification guidelines, a code of ethics, and other revisions. The Modeling and Simulation Certification Document which includes Section 2, Modeling and Simulation Certification Commission Specification, was distributed to the Implementation Group for final comment. With the selection of the Oversight Council and incorporation of final comments into Section 2, the Implementation Group was disbanded. Future desired changes to the governing document will be submitted to the Oversight Council for their consideration/approval.

1.5 Implementation Timeline

MODELING and SIMULATION PROFESSIONAL
IMPLEMENTATION TIME LINE

18 September 2000 Kick off meeting
27 November 2000 Sub Committee Review meeting
30 November 2000 Review/ Summary Meeting
12 December 2000 Program Review
10 January 2001 Sub Committee review/ Implementation Group
27 February 2001 VTC Certification Commission Document Review
7 March 2001 Web site developed
13 April 2001 Review of Body of Knowledge and Exam criteria
7 May 2001 Certification Board, Initial exam processes and timeline
21 May 2001 Nominations for initial certification Board due
25 May 2001 Initial certification board identified
1 June 2001 Nominations due for initial examinees
13 July 2001 Initial cadre of examinees identified
18 July 2001 Implementation Group mid-year review ICW SCS
31 August 2001 Inaugural Exam issued
September/ October 2001 Exam packets returned
28 November 2001
- Annual MSPCC Meeting
  - Review of timeline
  - Organization review
  - Exam Status Round I & II and open enrollment
  - Implementation Group review
  - Oversight Council
  - Resources

28-30 January 2002
Acknowledgement of first certified professionals; Inaugural Certificates issued
Draft Process flow chart and criteria scorecard

10-15 March 2002 Exam subcommittee Meeting ICW SISO
- Exam process
- Exam Product
- Evaluation Process

18/19 July 2002
- Implementation Group Mid year Review ICW SimSummit San Diego CA
  - Round II examinations complete
  - Open Enrollment Established
  - Review established Administrative Processes

Nominations **process** for new Certification Board Members
- Post Implementation group; does relevant org nominate or do members (see/ revise pg 8 transition) eventually certified board members nominate and vote?
- Process to ensure appropriate mix; industry/ academia/ government

Oversight Council (not an Advisory Board)
- Size = 9 (with 5 being a quorum)
- Length of Service
- Qualifications (eg have served on one of the MSPCC committees or as officer in relevant organization); Who are the stakeholders? Govt/ industry/ academia or relevant organizations?
- Restrictions (eg can't also be on Certification Board)

Establish process for M&S "Hall Of Fame"
Plan Expanded certification beyond Initial Defense Orientation
Review potential for additional levels of certification; eg technician
NAICs/ SIC codes

December 2002
- Implementation Group Review
- Annual Certification Commission Meeting
  - Review/Revise qualification criteria
  - Review Exam process
- Nominations/selections for new Board Members
- Oversight Council Established
- New certification Board Members Installed
- Implementation Group Disbanded.

July 2003
- MSPCC Oversight council and board Mid year Review
- Online process for applications/approval, web site enhancements and board member workload
- Expanded Certification Board from current 9 to 12 members
- Established CEU and Recertification Subcommittees

December 2003: MSPCC Oversight Council and Board annual meeting

Nominations requested for Certification Board and Oversight Council

Recertification guidelines were reviewed

CMSPs will be required to “pledge” that their submissions are true and accurate

“Code of Professional Ethics for Simulationists”

February 2004:

Final documents prepared

Oversight Council & Certification Board selections

Implementation Group disbanded and Certification Board established

1.6 RELEVANT WORK EXPERIENCE & QUALIFICATION EXAM

An initial single level of certification, focused on the mid-level, was established for program inauguration. Seven criteria for certification were identified.

I. Math

II. Science

III. Computing

IV. Psychology/Human Factors

V. Relevant Years of Work Experience

VI. Letters of Recommendation

VII. Continuing Education

In defining the profession and interdisciplinary aspects of a modeling and simulation professional, it was determined that an examination would add significant value as confirmation of other evidence presented for certification. An examination sub-committee was created to develop the processes and initial exams. The subcommittee developed a matrix of knowledge that may be used in developing exams. Items I-IV above will be incorporated into the examination requirements.

The exam subcommittee (in alphabetical order):

1. Lou Birta	U. Ottawa	Subcommittee Vice Chair
2. Roy Crosbie	Chico	
3. Mike Lightner	Aegis	
4. Dennis McBride	IST	
5. Hank Okraski	NCS	
6. Ralph Rogers	ODU	Subcommittee Chair
7. Hessam Sarjoughian	U. Arizona	
8. Joe Swinski	DiSTI	
9. Mike Zyda	NPS	

At the February 21, 2001 VTC meeting of the Modeling and Simulation Professional Implementation Group, a Work Experience Criteria Subcommittee was created.

The Work Experience Criteria Subcommittee (in alphabetical order):

1. Amy Henninger
2. Tom Stanford (Lead)
3. Jeff Wallace

The Work Experience Criteria Subcommittee reviewed available resources and provided guidance to the Implementation Group in defining relevant work experience. It was concluded that experience criteria should be used as the initial screening of applicants to assure professional competency and that the exam would be the mechanism for confirming applicants adequate proficiency in the required body of knowledge. Once professional competency was established, the Certification Board would invite the applicant to take the Certification Examination. An applicant may be denied the opportunity to take the examination if the Certification Board deems the experience cited as insufficient.

On April 13, 2001, the committee met at the National Training Systems Association Headquarters in Arlington Virginia to review the body of knowledge and examination criteria and process. A 1997 workshop and study on "What Makes a Modeling and Simulation Professional, organized and edited by Dr. Ralph Rogers, was reviewed.

From that study, it was determined that "… a simulationist performs or is involved in one or more of the following activities:

- Discovery, design and development of basic simulation principles and methodologies
- Design, development, and manufacture of simulation and simulation-based product and analysis.
- Management and integration of simulation into programs, projects and enterprise wide development plans
- Integration of simulation into the decision processes of managers and leaders."

Further the report recognizes that "…this view of a simulationist may broadly establish what they do, it does not necessarily inform on the general capabilities required to perform those activities. More importantly, this view does not identify the specific core body of knowledge which defines and distinguishes a simulationist."

The report identifies "… that there is a core body of knowledge that anyone claiming to be a simulationist or holding a degree with simulation as part of its title should know to an appropriate level. …This simulation core consists of an

inner or foundation core grounded in a model-based discipline such as physics, engineering, human behavior, or biology. The other aspects of the inner-core include competency in the use of empirical based methodologies (i.e., statistics and experiment design) and competency in computer technology and computer science. "

"The simulation and modeling outer-core consists of the three areas of discrete systems simulation, continuous systems simulation and real-time systems simulation. These three areas should be familiar and conceptually understood by a simulationst. …. The degree or depth of knowledge in each area will vary depending on the specialization and domain of the problems pursued…..it is necessary that all simulationists receive sufficient education in these three areas to provide a common basis to facilitate communications, cooperation, and methodical exchanges within the diverse community."

The implementation group established a process to identify an initial cadre of professionals that epitomize the profession and the body of knowledge. This cadre of known professionals, "Greybeards" was invited to take the first exam, become the "plank holder professionals" and add to/ further identify the body of knowledge for the profession. The implementation group and board will build on the advice of those experts in refining the body of knowledge, certification and exam process. The "Greybeards" were not be limited to the DTSP community to maintain a wide perspective. To gather a broad community perspective, the established process encouraged a selection of nominees split between industry, academia, government and organization affiliation. Duplication in the nomination process was expected. All nominees required and received a "second" confirmation of their nomination. The implementation group recognized that the established process restrictions imposed would miss including professionals who fit the certification criteria. To correct this deficiency and further broaden the community each of the "Greybeards" were invited to nominate four additional professionals that they felt met the certification criteria, before the application process is opened to the public.

The implementation group met again on 7 May 2001 to review/ establish the Certification Board Nomination and initial exam nominees processes. Forms necessary to support the processes were identified and created. The program timelines were updated accordingly. The website www.simprofessional.org was reviewed. Future program development will use the web site as a communication tool.

On 18 July 2001, the Implementation Group met in conjunction with the Society for Computer Simulation Conference. The status on the selection of the initial cadre of professionals and the inaugural Certification Board were presented. Notification of the nominees had been sent out July 13th. Also reviewed were the website, application process, status of the examination, status on the request for Industrial Classification (NAIC previously SIC) Codes. Lou Birta, Vince Amico

and Hank Okraski agreed to work on the exam review process. Mark Yerkes was tasked with documenting the developments in the Certification Program and pursuing letters to support the establishment of the NAICS codes for Modeling, Simulation and Training. Helena Szczerbicka and Ralph Rogers agreed to continue work to establish the "Body of Knowledge".

The Inaugural Certification Board is:

Industry Members
Mr. Hank Okraski
Mr. James E. Shiflett
Mr. G.V. (Vince) Amico

Government Members
Dr. Janis A. Cannon-Bowers
Dr. Michael R. Macedonia
Dr. Steven C. Gordon

Academia Members
Dr. Ralph Rogers
Dr. Bernie Zeigler
Dr. Louis Birta

The appointment length for the first person listed in each category was for three years. The initial appointment for the other members was for two years.

The Annual Meeting of the Modeling and Simulation Certification Commission was conducted 28 November 2002. The history of implementation along with the organization to include the implementation group, certification board, exam subcommittee and transition to an oversight council and exam status were reviewed. July 2002 was selected for the end of the initial exam processes and the start of open enrollment. The exam subcommittee will meet in March to review examination and evaluation processes.

2. MODELING AND SIMULATION CERTIFICATION COMMISSION SPECIFICATION

2.1 MISSION AND VISION FOR THE MODELING AND SIMULATION PROFESSIONAL CERTIFICATION PROGRAM

The Mission and Vision for the Modeling and Simulation Professional Certification Commission are:

MISSION:

To develop and maintain an international Certification Program for Simulation Professionals recognizing standard levels of knowledge and functional competency for the certified professionals and the industry.

VISION:

A worldwide community of Modeling and Simulation professionals that values the accomplishments of individuals and provides an environment that:

1) Encourages and stimulates individual professional growth in Modeling and Simulation.
2) Promotes the development and application of Modeling and Simulation throughout society.

2.2 PROGRAM MANAGEMENT

IMPLEMENTATION GROUP:

A formal Implementation Group was created to establish the inaugural Modeling and Simulation Professional Certification Program and associated Board. The Implementation Group will dissolve after approximately two years, turning established process and procedures to the Certification Commission Oversight Council for continued implementation. The final act of the Implementation Group will be to establish a Certification Commission Oversight Council.

CERTIFICATION COMMISSION

The Modeling and Simulation Professional Certification Commission is comprised of two elements. During approximately the first two years of operation, those elements are the Implementation Group and the Certification Board. The Certification Commission is now comprised of a Commission Oversight Council and the Certification Board.
The following contingent concepts are established regarding the attributes of the prospective Certification Commission.

- The Certification Commission will be "Not For Profit"

- The Inaugural Certification Board will be comprised of 9 members.
  The Inaugural Certification Board is:

Industry Members	Term
Mr. Hank Okraski	2001 - 2004
Mr. James E. Shiflett	2001 - 2003
Mr. G.V. (Vince) Amico	2001 - 2003
Government Members	
Dr. Janis A. Cannon-Bowers	2001 - 2004
Dr. Michael R. Macedonia	2001 - 2003
Dr. Steven C. Gordon	2001 - 2003
Academia Members	
Dr. Ralph Rogers	2001 - 2004
Dr. Bernie Zeigler	2001 - 2003
Dr. Louis Birta	2001 - 2003

Certification Board membership term will be for three years with two full terms (six years) being the maximum consecutive appointment. The Implementation Group will make the initial and second year appointments. Of the initial appointments one-third will be for three years, two-thirds will be for two years. The appointment length for the first person listed in each category was for three years. The initial appointment for the other members was for two years. The Implementation Group expanded the Certification Board from 9 members to 12 members.

- At the conclusion of the second year, the implementation board will select replacements for the two-year appointees, split evenly between new two-and-three-year appointees, turning over to the Certification Commission a Board a rotation of one third of the board per year. After the third year, the oversight council will present, to the certified professional members, candidates for nomination/vote/selection. The oversight council will take necessary actions to ensure the board maintains a diverse and

interdisciplinary representation of modeling and simulation, to include a balance of industry, government and academia. The Certification Board will self nominate/select its officers annually. A member of the Certification Board cannot serve more than two consecutive years in a single selected position (e.g. president) on the board.

- Certification Board Members selected by the Implementation Group are required to be certified. The Certification Commission Oversight Council would govern any further grand fathering process.

- The Certification Commission will establish a “Hall of Fame” for lifetime recognition of outstanding leaders in Modeling and Simulation.

- The nine member Oversight Council will not include any members of the Certification Board. The initial Oversight Council members are list on the attached document, Initial Oversight Council members. Each member will serve a one-year renewable appointment, and are expected to attain their CMSP during their term on the council.

- As the applications of modeling and simulation expand with the certification process, the Oversight Council will amend this process/document to be inclusive of all endeavors in modeling and simulation. It is envisioned that the Certification Commission will continue that effort of inclusiveness while holding high quality standards. Program changes require a quorum of 5 Oversight Council members and two thirds majority vote (6 of 9 members). Conference calls, video teleconferencing and electronic voting/input are acceptable forms of meeting. Amendments will be documented in writing and appended/incorporated in this document.

- It is expected that the Modeling and Simulation Certification Board would provide an annual program review to include the Mission/ Vision of the program, the inclusiveness of all aspects of Modeling and Simulation, membership, financial status, level(s) of certification and the rigor/currency of certification requirements. The certification board may recommend and, with concurrence of the oversight council, change the requirements and established procedures to keep the certification viable in keeping with the mission and vision of the program. Changes in established requirements and procedures must obtain a two-thirds agreement by the Certification Oversight Council. Changes in program requirements and/or procedures must be communicated to the membership with sufficient lead-time allowing smooth implementation.

CERTIFICATION REQUIREMENTS:

A single level of certification, focused on the mid-level, was established for program inauguration. Certification competency domains were identified to guide the inaugural and future certifications. These domains are:

Basic educational level
Math knowledge
Science knowledge
Computing Knowledge
Psychology/Human Factors Knowledge
Project/Program Management
Work Experience
Continuing Education
Peer Reviewed Papers
Letters of Recommendation

Future levels of certification (e.g. technician) should apply these competency domains in establishing certification requirements.

For certification, an individual must show evidence of meeting relevant work experience requirements and educational requirements, provide three letters of recommendation, and pass an examination designed to confirm the previous evidence presented for certification. Certification would be valid for four years. Re-certification candidates must show evidence of continued relevant work experience and completion of continuing Professional Development/ Education requirements.

Seven criteria are used in establishing the initial certification. Items I-IV of the certification criteria will be incorporated into an examination. The examination is to be designed to be a confirmation of other evidence that has already been presented for certification.

I. Math — Calculus & statistics
Queuing, stochastic processes

II. Science — Fundamental Science
e.g. Physics, Chemistry, Biology

III. Computing — College level CS/CE course
Modeling, system theory, object oriented design, software, engineering, data analysis, project management

IV. Psychology/Human Factors Fundamental Psych/HF or ED course

V. Relevant Years of Work Experience: *

VI. Recommendations: 3 letters of recommendation
For the initial cadre of professionals, the nomination/ seconding process was accepted for this requirement.

VII. Continuing Professional Development
See Recertification Guidelines

Relevant Work Experience

The basis for the recommended Experience Criteria consists of both demonstrated experience and expertise in the field. These are expressed in terms of educational level, years of experience, type of experience, verification of experience, and membership in appropriate professional societies. The specific recommendations and their corresponding rationale follow:

Criteria 1
Applicant will be required to meet one of the following combinations of education [1] [2] and experience:

1. Doctorate and three years experience
2. Masters degree and five years experience
3. Bachelor degree and six years experience
4. Associate degree and eight years experience

The minimal formal education required should be an Associate's Degree and the education requirements should be inversely related to the experience requirements.

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1 Degree must be "earned" from an accredited college, university or technical school.

2 Degrees/diplomas from educational institutions outside the United States must be equivalent to degrees from U.S. educational institutions

Criteria 2
Applicant will be required to hold membership in at least one of the M&S-affiliated organizations listed as listed in paragraph 1.5.2 of the M&S Professional Certification Implementation Plan.

Membership in one of the affiliated professional organizations demonstrates commitment on the part of the applicant.

Criteria 3
Applicant must be able to verify proficiency in one or more of the operational and/or technical areas listed in the Experience Criteria List. The total number of years must equal or surpass the number of years of professional experience[3] selected in Criterion 1.
The applicant will submit positions held and specific contributions made in these positions to the M&S community.

Choosing from a list of skill sets enables the candidate to select proficiency areas that best match his/her experience. These Operational and Technical area lists provide guidance to both the candidate and to the Certification Board. The Board will use the list as a guide to determine if the candidate has had the right expertise for this certification. To provide the board with additional pertinent information, the applicant will be asked to expand on his selected proficiency areas in a list or essay of 1,000 words or less. Since the attached Operational and Technical area lists are focused to support the inaugural certification, they may not be not all inclusive. The 1,000 word addendum will allow the candidate to list other types of M&S training simulation experience and contributions.

Experience Criteria List

Categories of Professional Experience	**No. of Years**
Operational Experience	

3 Waivers may be granted on a case-by-case basis. Waivers should be granted based on the strength of other qualification criteria, if experience qualifications are deemed by the certification board to be less than the minimum required for certification.

Serve as Director, Deputy Director, Technical Director, Operations Officer, Database Administrator, Senior Trainer (head of the section responsible to train terminal operators; name of the position will vary) in a joint or service simulation center.	
Plan, coordinate, and execute training events supported by simulations.	
Develop and conduct defense simulation-augmented training curriculum at an academic institution.	
Show evidence of having been the principal author of the Control Staff Instruction Plan for a joint or service training exercise.	
Serve as a trainer on a new equipment training team that uses M&S as a principal means of instruction.	
Serve as the responsible individual for a joint or service training simulation.	
Serve as the senior modeling and simulation representative of a service.	
Serve as a trainer with a high-resolution simulation used to train military personnel.	
Other (please specify)	
Technical Experience	
Serve as Principal Investigator on an M&S research program in support of defense training simulation in the one or more of the following areas:	
Human Factors	
Education, Learning, or Training	
Human Performance Measurement	
Visualization and Graphics Research	
Cognitive or Behavior Modeling	
Virtual Reality Research	
Audio and Speech Technologies	
Haptics	
Optimization and Analysis techniques	
Physical, Sensors, and Weapons Systems Modeling	
Networking and Communications Technologies	
Software and/or Hardware Design Approaches	
Decision Support Systems	
Validation Methodologies	
Embedded Training	
Support M&S program in support of defense training simulation in the one or more of the following areas:	
Systems Engineering	
Project Management	
Human Factors Engineering	
Software Engineering	
Hardware Engineering	
Conceptual Modeling, Knowledge Acquisition, SME Modelers	
Systems Analysis, Software Analysis, Requirements Analysis	
Systems Design, Software Design	
Software Developer	

VV&A	
Testing	
Configuration Management	
Teach a course related to defense training M&S at an accredited academic institution.	
Other (please specify)	

Body of Knowledge

A 1997 study on "What Makes a Modeling and Simulation Professional,organized and edited by Dr. Ralph Rogers, identifies "… a core body of knowledge that anyone claiming to be a simulationist or holding a degree with simulation as part of its title should know to an appropriate level. …This simulation core consists of an inner or foundation core grounded in a model-based discipline such as physics, engineering, human behavior, or biology. The other aspects of the inner-core include competency in the use of empirical based methodologies (i.e., statistics and experiment design) and competency in computer technology and computer science. "

"The simulation and modeling outer-core consists of the three areas of discrete systems simulation, continuous systems simulation and real-time systems simulation. These three areas should be familiar and conceptually understood by a simulationst. …. The degree or depth of knowledge in each area will vary depending on the specialization and domain of the problems pursued…..it is necessary that all simulationists receive sufficient education in these three areas to provide a common basis to facilitate communications, cooperation, and methodical exchanges within the diverse community."

In addition to the certification program identifying those professionals that represent the body of knowledge, the Modeling and Certification Commission will solicit from members and examinees those references that the membership considers relevant to the profession.

Certification Process

The records for the Certification Program and Headquarters for program administration will be at the National Training Systems Association 2111 Wilson Blvd, Suite 400, Arlington, VA 22201-3061. Telephone # 703-247-2569.

OVERVIEW

The certification process has two components; namely, evaluation of credentials and evaluation of knowledge. The evaluation of credentials involves assessment of formal education, work experience and letters of reference while evaluation of knowledge relates to the grade obtained on a written examination.

The process is sequential in as much as the evaluation of credentials serves as an eligibility test for proceeding on to the evaluation of knowledge phase. An applicant can proceed to the examination phase only if his/her credentials are judged to reflect a satisfactory level of achievement in the modeling and simulation domain.

The process begins with the evaluation of the credentials dossier by two examiners. Each approves or denies the applicant based on the three components of the dossier (education, experience, letters of reference). If both examiners approve the application, then the applicant is invited to write the exam. If the application is denied because the applicant does not meet the requirements, the applicant is so informed. If only one of the evaluations is favorable, then a third examiner evaluates the application. If the third evaluation is favorable, then the applicant is invited to write the exam, otherwise the certification application is unsuccessful.

The written exam is automatically scored by the software.

If the score on the exam exceeds 70%, then the applicant is approved for certification.