

## Chapter 1 – BACKGROUND OF MSG-058 EFFORT

Conceptual models are key to the transformation of user needs and requirements to modeling and simulation (M&S) design, implementation and use. Conceptual models form the bridges of understanding between the users of M&S, the military domain experts that have the necessary knowledge that must be represented in M&S, and the software and simulation engineers that implement simulations. Neither a standard practice for conceptual model development nor consensus definition of conceptual model content currently exists. Where conceptual modeling is practiced, it is typically defined on a project-to-project basis. A recommended best-practice including specification of the content of conceptual models for M&S will increase user understanding of the capabilities of those M&S, thus increasing their reusability and interoperability.

The North Atlantic Treaty Organisation (NATO) Modeling and Simulation Group (NMSG) was established within the Research and Technology Organisation (RTO) in 1999, with an objective to favour re-use and interoperability of M&S within the Alliance, and NATO/PfP Nations. So far, within NATO, as within the international M&S community, the interoperability objective has been mainly addressed at the “technical level” using open standards developed by the Simulation Interoperability Standards Organization (SISO), Institute of Electrical and Electronics Engineers (IEEE) or International Organization for Standards (ISO), such as the High Level Architecture (HLA) that was adopted by NATO as early as 1998. Those standards have provided a first step to interoperability and a state-of-the-art way to interconnect simulations and tools to build distributed systems of simulations; but it is recognized that existing standards are neither intended nor sufficient for specification and controlled exchange of semantics and concepts.

Since the beginning of the NMSG activity, it was recognized that HLA was only a preliminary step to satisfy the M&S technical interoperability concern and that the final objective was still to achieve a more ambitious M&S “interoperability level”. This final objective should be to achieve a common understanding and use of information exchanged between simulations for better satisfying military requirements for education, training and operational support. Without conceptual models, history has shown that simulation developers often do not sufficiently understand the military domain to be modelled, implement M&S that do not reflect the intended reality, and thus do not satisfy the user’s needs. Further, conceptual models form the basis of an important step in Verification and Validation – determining that the application domain has been described sufficiently to meet users’ needs while accurately incorporating Subject-Matter Expert (SME) knowledge.

SISO recognized the importance of better defining and advising the M&S community on the importance of conceptual models not only for the interoperability issue but also to form a basis for simulation development, foster re-use, and to support Verification and Validation (V&V) activities. A SISO Task Group was created in 2003 to address the topic of conceptual models with the potential objective of developing a new standard, or more precisely a “guide”, to help practitioners building conceptual models. While this SISO Task Group did not proceed to the publication of such a guide, it nevertheless produced interesting and valuable output that can be exploited to produce a recommended practice guide for the elaboration of conceptual models.

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