Modelling and Simulation Standards in NATO Federated Mission Networking

MSG-211 Technical Course Introduction

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Lead, MSG-211

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Purpose

- Identify and describe standards and practices for application of Modelling and Simulation approved for use in Federated Mission Networking (FMN).
  - As described in Federated Mission Networking (FMN) Procedural Instructions and Service Instructions.
  - Inform personnel from across NATO organizations, nations, and partner nations, in particular the Science and Technology Organization (STO), Allied Command Transformation (ACT) and Allied Command Operations (ACO), and supporting organizations, and nations participating in NMSG.

- Provide operational and technical information on identified M&S standards in FMN through lecture and hands-on instruction.

Instructors

- Dr. Curtis Blais, Research Faculty, Naval Postgraduate School, USA

- Dr. Mark Pullen, Professor Emeritus, George Mason University, USA

- Maj (Retd) Kevin Galvin, Thales Enterprise Architect / C2 Expert, Thales UK

- Ms. Magdalena Dechand, Project Manager for Interoperability, Fraunhofer FKIE, DEU

- Mr. Tom van den Berg, Systems Engineer, TNO Applied Physics Laboratory, NLD

Course Agenda, Day 1, Hybrid: Introduction to FMN and Applicable M&S Standards

- **0730**   **Greeting and Introductions, Dr. Curtis Blais**

- **0735**   **1.1 Introduction to Federated Mission Networking, Mr. Kevin Galvin**

- **0820**   **1.2 Overview of M&S standards for FMN, Dr. Curtis Blais**

- **0900**   **1.3 Overview of C2 Systems – Simulation Systems Interoperation (C2SIM) standard, Dr. Mark Pullen**

- **0945**   **1.4 Break – Presenters will be available for questions/discussion**

- **1000**   **1.5 High Level Architecture (HLA) / NETN standards overview, Mr. Tom van den Berg**

- **1045**   **1.6 Overview of M&S as a Service (MSaaS), Ms. Magdalena Dechand**

- **1115**   **1.7 Benefits of M&S to military commands using FMN, Dr. Curtis Blais**

- **1145**   **1.8 Q&A session to seek feedback with a focus on operational utility of M&S in FMN and issues that need to be addressed in order to ensure uptake by industry**

- **1200**   **End of Day 1 presentations**

Course Agenda, Day 2, Hybrid: Detailed Technical Information on the M&S Standards and their Application

- **0730   2.1 MSG-201 activity supporting standardization for FMN, Mr. Kevin Galvin**

- **0800   2.2 Overview of the SISO, IEEE, NMSG standards processes, Dr. Curtis Blais**

- **0830   2.3 Technical description of C2SIM including highlights of various experimentation and demonstration events, Dr. Mark Pullen**

- **0915   2.4 Break – Presenters will be available for questions/discussion**

- **0930   2.5 Walkthrough of supporting ontologies, using Protégé and annotated slides, Ms. Magdalena Dechand**

- **1015   2.6 Technical description of HLA/NETN including interoperation with C2SIM and MSaaS, Mr. Tom van den Berg**

- **1115   2.7 CWIX Testing of M&S standards for FMN, Dr. Mark Pullen**

- **1145   2.8 Q&A session to seek attendee feedback with a focus on the technical aspects of C2SIM**

- **1200   End of Day 2 presentations**

Course Agenda, Day 3, Hands-On NPS LVC Laboratory, Watkins Annex

Presented by: Dr. Mark Pullen (GMU) and Mr. Christian Fitzpatrick (NPS)

- 0730   **3.1 Workshop introduction**

- 0800   **3.2 Review of M&S standards for FMN**

- 0900   **3.3 Break**

- 0915   **3.4 Technical details of C2SIM**

- 1015   **3.5 Technical details of HLA/NETN**

- 1045   **3.6 Hands-on military simulation exercise, including VR-Forces and MASA SWORD**

- 1215   **3.7 Discussion – student ideas input**

- 1230   **Workshop ends**

Instructor Biographies: Dr. Curtis Blais

- Dr. Blais is a member of the research faculty in the Naval Postgraduate School's Modeling, Virtual Environments, and Simulation (MOVES) Institute. He has over 49 years of experience in modeling and simulation, including specification, development, and application, as well as software engineering management.

- Dr. Blais is a contributor to Simulation Interoperability Standards Organization (SISO) activities, with particular focus on support to ongoing improvement to and application of the C2SIM standard for information exchange across C2 systems, simulation systems, and robotic and autonomous systems. He holds B.S. and M.S. degrees in Mathematics from the University of Notre Dame and a Ph.D. in MOVES from the Naval Postgraduate School.

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Instructor Biographies: Ms. Magdalena Dechand

- Magdalena Dechand is a project manager for interoperability projects with Fraunhofer FKIE, Germany. She is an expert in spoken and written language and has years of experience in ontology engineering and exploitation. Since 2015, she has worked with the SISO C2SIM Product Development Group on the C2SIM standard and applied it in different use cases, partly in C2SIM-related NATO groups such as MSG-145, MSG-193, MSG-194 and MSG-201. Since 2023, she also has been responsible for Multilateral Interoperability Programme (MIP) projects at Fraunhofer FKIE and supports its modelling and standardization efforts. She holds an M.A. degree in Communication Research and Phonetics from the University of Bonn, Germany.

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Instructor Biographies: Maj (Retd) Kevin Galvin

- Kevin Galvin is currently a Systems Capability Researcher for Advanced Architecture Concepts working for Thales Research, Technology & Innovation in the United Kingdom and a Thales Expert in Enterprise/Systems Architecture and in Command and Control to Simulation/Autonomous Systems Interoperability. He spent almost 40 years in the British Army. He has a Master's Degree from Cranfield University in Defence Modelling and Simulation. He recently completed a 5-year research project into Hybrid Autonomous Systems in partnership with Bristol University to understand Human-Machine Teaming, the application of Artificial Intelligence and Machine Learning and how we architect for design of autonomous systems. He is a member of the NATO Architecture Capability Team (ACaT) and was a co-author for NATO Architecture Framework Version 4 and led the syndicate that developed the NATO Mission Threads Methodology endorsed in May 2022. He is an instructor for NAFv4 in support of the NATO School Oberammergau. He has been a member of SISO since 2001 and is currently Co-Chair of the C2SIM Product Development Group/Product Support Group. He is Co-Chair of NATO M&S Group 201 M&S in Federated Mission Networking (FMN). In addition, he is a member of the British Computer Society, Institute of Leadership and the International Council on Systems Engineering (INCOSE). He has authored or co-authored a number of papers in relation to architecture and modelling and simulation.

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Instructor Biographies: Dr. Mark Pullen

- Dr. Mark Pullen retired after many years as Professor at George Mason University, where he headed the C4I and Cyber Center. He is also known for significant roles in networking and distributed simulation at the Defense Advanced Research Projects Agency and his work with the SISO C2-Simulation Interoperation product development group that developed C2SIM.

- Dr. Pullen is a Fellow of the IEEE, Fellow of the ACM, and licensed Professional Engineer. He received the IEEE Harry Diamond Memorial Award and the Defense Superior Service Award and was a leader in the team that received the NATO Scientific Achievement Award for 2013.

Instructor Biographies: Mr. Tom van den Berg

- Tom van den Berg is a senior Systems Engineer in the Modeling and Simulation department at TNO Applied Physics Laboratory, The Netherlands. He holds an M.Sc. degree in Mathematics and Computing Science from Delft Technical University and has over 25 years of experience in distributed operating systems, database systems, and simulation systems.

- His working areas include simulation systems engineering, distributed simulation architectures, systems of systems, and concept development & experimentation. Tom is a member of several SISO Product Development / Support Groups and participates in a number of NATO M&S standardization activities.