

M&S AS A DISCIPLINE – FOUNDATIONS, PHILOSOPHY, AND FUTURE

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BIOGRAPHY

Dr. Tolk has been a faculty member (Full Professor) in the Department of Engineering Management and Systems Engineering at the Old Dominion University from 2006 to 2013. He held a joint appointment with the Modeling, Simulation, and Visualization Engineering department. He received his Ph.D. in Computer Science (1995) and has a M.S. in Computer Science (1988) from the University of the Federal Armed Forces, Germany. His emphasis was Applied Systems Science and Military Operations Research. Dr. Tolk was Senior Research Scientist at the Virginia Modeling Analysis & Simulation Center (VMASC) from 2002 to 2006. He was Vice President for Land Weapon Systems at the German company I.A.B.G., the main contractor for the German Ministry of Defense for Operations Research and Simulation applications for analyses, training, and experimentation, from 1998 to 2002. He was project manager for decision support systems and integration of M&S into Command and Control systems from 1995 to 1998. He was an Officer in the German Army Air Defense from 1983 to 1995. He received the Excellence in Research award from the Frank Batten College of Engineering and Technology in 2008, the first Technical Merit Award of the Simulation Interoperability Standards Organization (SISO) in 2010, and from the Society for Modeling and Simulation (SCS) the Outstanding Professional Contribution award in 2012 as well as the Distinguished Professional Achievement award in 2014. Dr. Andreas Tolk edited six text books on systems engineering and modeling and simulation. He published more than 250 articles and papers in journals and conferences. He received over 30 best paper awards for his contributions. Dr. Tolk served as the Technical Evaluator and Raporteur for NATO's Research and Technology Organization for the annual NATO M&S Symposium between 2003 and 2011. He served on the IEEE Computer Science board for the IEEE Smart Grid Vision for Computing: 2030 and Beyond as an expert for M&S and interoperability. Dr. Tolk is senior member of IEEE and SCS and member of ACM, MORS, NDIA, and SISO. He represents ACM SIGSIM on the Board of Advisors for the Winter Simulation Conference.



ABSTRACT

Modeling and Simulation (M&S) as a discipline requires M&S Science to understand the general principles that build the foundations of M&S as a discipline, M&S Engineering to find general methods and solution patterns that can be applied to various problem domains, and M&S Applications to find real M&S-based solutions to real world problems. It also requires a deeper understanding of its epistemological and computational constraints from its students. The presentation addresses the mathematical foundations, the

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resulting philosophical implications, and looks into the future potential contributions of M&S in decision support on all levels. One of the main ideas is a paradigm shift from finding and supporting the best strategy towards allowing to take all alternatives into account and avoid bad and unstable alternatives.