

# **Simulation Innovation Workshop (SIW 2021)**

Held online

Orlando, Florida, USA  
8-12 February 2021

ISBN: 978-1-7138-3932-3

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2021) by SISO - Simulation Interoperability Standards Organization  
All rights reserved.

Printed with permission by Curran Associates, Inc. (2022)

For permission requests, please contact SISO - Simulation Interoperability Standards Organization  
at the address below.

SISO - Simulation Interoperability Standards Organization  
3100 Technology Parkway  
Orlando, Florida 32826  
USA

Phone: (781) 271-9872

Fax: (781) 271-9874

Siso-help@sisostds.org

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: curran@proceedings.com  
Web: www.proceedings.com

# TABLE OF CONTENTS

## **TUTORIALS**

C2SIM TUTORIAL .....	1
<i>C. Blais, T. DeCarlo, K. Galvin, M. Pullen, D. Reece</i>	
C2SIM ONTOLOGIES .....	55
<i>D. Reece, M. Dechand</i>	
AVAILABLE C2SIM INFRASTRUCTURE INCLUDING C2SIM SANDBOX .....	73
<i>D. Corner, M. Pullen</i>	

## **GENERAL SESSION**

M&S COHERENCE IN THE UK.....	112
<i>G. Bailey</i>	
SISO STANDARDS OVERVIEW .....	124
<i>C. Blais</i>	
OFFICE OF THE UNDER SECRETARY OF DEFENSE RESEARCH AND ENGINEERING ADVANCED CAPABILITIES - ENGINEERING: SIMULATION INNOVATION WORKSHOP SPONSO BRIEFING .....	144
<i>S. Possehl</i>	
U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND - SOLDIER CENTER: DISCUSSING FLEXIBILITY AND RESILIENCE ACHIEVED THROUGH LEVERAGING EMERGING TECHNOLOGIES.....	157
<i>C. McGroarty, L. McGlynn, S. Gallant</i>	
RELATIONSHIP BETWEEN TRADITIONAL MODELING & SIMULATION AND DIGITAL ENGINEERING .....	165
<i>B. Miller</i>	
MODELLING & SIMULATION CENTRE OF EXCELLENCE - PROTOTYPING M&S CAPABILITIES .....	172
<i>M. Biagini</i>	
M&S OF EFFECTS OF CYBERATTACKS IN DISTRIBUTED SIMULATION - AN UPDATE ON THE ACTIVITIES OF THE MSG-188 SPECIALISTS TEAM .....	180
<i>B. Boltjes, D. Granasen</i>	
NATO MODELLING AND SIMULATION GROUP .....	188
<i>R. Siegfried, S. Fernandez-Dapena</i>	
SPACE DEVELOPMENT AGENCY - DELIVERING CAPABILITIES.....	193
<i>M. Rich</i>	
SIMULATION EXPLORATION EXPERIENCE - SMACKDOWN 2021 ARCHITECTURE BRIEF.....	203
<i>M. Conroy</i>	

DEPARTMENT OF THE AIR FORCE - CHIEF MODELING AND SIMULATION OFFICER OVERVIEW.....	210
<i>R. Tempalski</i>	
HUMAN BEHAVIOR MODELLING SESSION.....	213
<i>W. Huiskamp</i>	
THE APPLICATIONS AND CHALLENGES OF BEHAVIOR MODELS .....	216
<i>P. Kerbusch</i>	
PHYSICS-BASED VIRTUAL HUMAN MODELS .....	229
<i>T. Klopfenstein</i>	
PATTERN OF LIFE DEFINITION LANGUAGE.....	242
<i>A. Easton</i>	
THE POWER OF STORY: DIGITALLY TRANSFORMING WARGAMES .....	248
<i>W. Yates, S. Gordon, W. Williams</i>	
WARGAMES FOR COMMAND DECISION SUPPORT .....	258
<i>I. McNeil</i>	

**PAPERS**

IDENTIFYING SIMULATION REQUIREMENTS TO SUPPORT CEMA TRAINING.....	270
<i>L. Schneider, A. Jerald, N. Chick, C. Anderson, V. Mittal, M. Boyce</i>	
LARGE-SCALE SWARM M&S DEVELOPMENT FOR DEFENSE SCENARIOS USING COMMERCIAL OFF-THE-SHELF (COTS) SOFTWARE.....	281
<i>H. Vo</i>	
FREE BOARDING SIMULATION USING PASSENGER BEHAVIOR AND GROUPING.....	295
<i>C. Bossard, M. Jones</i>	
CROSS DOMAIN SECURITY IN M&S – INITIAL LESSONS LEARNED FROM AIRPOWER DISTRIBUTED SIMULATION TRAINING APPLICATION EXPERIMENTS.....	305
<i>M. Roza, C. Teerling, J. Quarmyne</i>	
INCULCATING METACOGNITION AND CRITICAL THINKING: STANDARDS FOR IMPLEMENTING VIRTUAL HUMANS .....	317
<i>D. Davis, F. Stassi, M. Davis</i>	
AIR FORCE ENTERPRISE MODELING, SIMULATION AND ANALYSIS AND THE DIGITAL ENTERPRISE .....	334
<i>D. Panson, K. Cade, B. Robey</i>	
THE EXPANSION OF CYBERBOSS COMMON CYBERSPACE REPRESENTATIONS TO INCORPORATE NOVEL CYBERSPACE ELEMENTS .....	343
<i>O. Hasan, J. Welch, B. Burch, N. Vey, A. Geddes</i>	
EXTENDING THE COMMAND AND CONTROL SYSTEM TO SIMULATION SYSTEM INTEROPERATION (C2SIM) STANDARD TO ADDRESS EXCHANGE OF CYBERSECURITY INFORMATION .....	353
<i>C. Blais</i>	

THE APPLICATION OF FLOW-BASED PROGRAMMING TO THE CODE GENERATION OF SIMULATION MODELS.....	364
<i>C. McGroarty, C. Metevier, S. Gallant, J. Gallogly, K. Snively, A. Raval</i>	
SECURITY IN SIMULATION – NEW AUTHORIZATION OPPORTUNITIES IN HLA 4.....	377
<i>B. Moller, M. Karlsson, R. Herzog, D. Wood</i>	
SISO MODELING AND SIMULATION IN NATO FEDERATED MISSION NETWORKING .....	387
<i>J. Pullen, R. Brook, K. Galvin</i>	
DISSEMINATING STANDARDS EFFECTIVELY: CONCEPTUALIZING COMMUNICATIONS PLANS TO ENHANCE ADOPTION.....	399
<i>D. Davis, M. Rosenberg, D. Burns</i>	
CONTROL AND MANAGEMENT OF CLUSTERED SIMULATION SYSTEMS .....	411
<i>E. Bearss, R. Zinser</i>	
DATA DISTRIBUTION TECHNOLOGIES FOR MISSION TRAINING THROUGH DISTRIBUTED SIMULATION ENVIRONMENTS.....	418
<i>Z. Lubsen, G. Tillema</i>	
EXPERIENCES FROM THE SISO SPACEFOM AT THE EUROPEAN SPACE AGENCY.....	431
<i>B. Moller, T. Gray, S. Kay, A. Kisdi, K. Buckley</i>	
DEVELOPMENT OF CLOUD-ENABLED LIVE, VIRTUAL AND CONSTRUCTIVE AGILE TRAINING.....	443
<i>C. Rodabaugh, E. Watz, T. Harmer</i>	
THE EVOLUTION OF DATA: CREATING AN ADAPTABLE DATA STORAGE AND RETRIEVAL CAPABILITY .....	453
<i>E. Watz, P. Newbauer</i>	
MODELING AND SIMULATION APPLIED TO MULTI DOMAIN OPERATIONS .....	462
<i>T. Holland, C. Turnitsa</i>	
THE USE OF AUTOMATED REASONING WITH THE COMMAND AND CONTROL SYSTEM TO SIMULATION SYSTEM INTEROPERATION (C2SIM) STANDARD .....	473
<i>C. Blais, M. Dechand, M. Dembach, S. Singapogu</i>	
INTRODUCING RIDE: LOWERING THE BARRIER OF ENTRY TO SIMULATION AND TRAINING THROUGH THE RAPID INTEGRATION & DEVELOPMENT ENVIRONMENT .....	498
<i>A. Hartholt, K. McCullough, E. Fast, A. Reilly, A. Leeds, S. Mozgai, V. Ustun, A. Gordon</i>	
SEMANTIC FIDELITY NOMENCLATURE: AN ALTERNATIVE TO SIMULATION "LOW-MEDIUM-HIGH" FIDELITY MONIKERS.....	509
<i>R. Roca</i>	
MSAAS BASED ARCHITECTURE FOR DYNAMIC SYNTHETIC ENVIRONMENTS IN DISTRIBUTED SIMULATIONS.....	522
<i>A. Gerretsen, R. Smelik, N. Smith</i>	
INTERNET OF THINGS (IOT) AGENT FRAMEWORK FOR ASSESSING IOT IMPACT VIA SIMULATION IN THE LOOP.....	532
<i>J. Beel, D. Mumme, R. McGraw, D. Thomas, C. Lanclos, J. Hamilton</i>	

## **PRESENTATIONS**

DEEP REINFORCEMENT LEARNING (DRL)-DRIVEN CYBER SIMULATION ENGINE.....	542
<i>A. Kam</i>	
UTILIZING OMG DDS SECURITY TO ENABLE MULTI-LEVEL SECURITY FOR JOINT LIVE, VIRTUAL AND CONSTRUCTIVE TRAINING .....	555
<i>P. Pazandak, R. Proctor, J. Upchurch</i>	
WEB SERVICES FOR MODELING & SIMULATION, ANOTHER WAY TO SUPPORT INTEROPERABILITY .....	564
<i>J. Ruiz, E. Krasowski</i>	
DESIGNING METROLOGY FOR AUTOMATED DRIVING SYSTEMS SAFETY USING NIST CPS FRAMEWORK .....	571
<i>A. Bharracharjee, M. burns, E. Griffor, T. Roth</i>	
SIMPLIFYING THE INTEGRATION OF SIMULATION INTO CLASSROOM TRAINING - OPEN SYSTEMS INTEGRATION WITH DDS FOR HYBRID AR/VR LVC TRAINING .....	589
<i>D. King, K. Benson</i>	
REPEATABLE UNIT TESTING OF DISTRIBUTED INTERACTIVE SIMULATION (DIS) PROTOCOL BEHAVIOR STREAMS USING WEB STANDARDS "A STREAM IS A STREAM" .....	598
<i>D. Brutzman, T. Brennenstuhl, T. Norbraten</i>	
SIMULATION INTEROPERABILITY READINESS LEVELS .....	609
<i>K. Morse, D. Drake, G. Schleh</i>	
INTEROPERABILITY FOR UTM SIMULATION STANDARDIZATION .....	622
<i>A. Streit, O. Tenghoff</i>	
LEGION: A PROPOSED NEW SISO STANDARD FOR SCALABILITY AND INTEROPERABILITY .....	627
<i>C. Bouwens, L. Granowetter, B. Holcomb</i>	

## **Author Index**