

# **15th Distributed Interactive Simulation Workshop 1996**

**(DIS)**

**Orlando, Florida, USA  
16-20 September 1996**

**ISBN: 978-1-61567-178-6**

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

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571  
[www.proceedings.com](http://www.proceedings.com)

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

Copyright© (1996) by SISO - Simulation Interoperability Standards Organization  
All rights reserved.

Printed by Curran Associates, Inc. (2009)

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

SISO - Simulation Interoperability Standards Organization  
1 Donovan Drive  
Bedford, MA 01730

Phone: (781) 271-9872  
Fax: (781) 271-9874

Siso-help@sisostds.org

# TABLE OF CONTENTS

|                                                                                                                   |     |
|-------------------------------------------------------------------------------------------------------------------|-----|
| <b>Issues in Analysis and Engineering Applications in Dis++</b> .....                                             | 1   |
| <i>D.K. Pace</i>                                                                                                  |     |
| <b>In Pursuit of M&amp;S Standards</b> .....                                                                      | 8   |
| <i>L.E. McGlynn</i>                                                                                               |     |
| <b>A Proposal for Non-Run Time Engineering Standards</b> .....                                                    | 18  |
| <i>B. Butler, P. Baker, W. Tucker, D. Gross</i>                                                                   |     |
| <b>A Process View for DIS ++</b> .....                                                                            | 24  |
| <i>M.R. Lutz, W. Tucker, G. Kamisickas, R. Willis, W. Gregory, R. Severinghaus, S. Youngblood</i>                 |     |
| <b>Feild of View Algorithm</b> .....                                                                              | 37  |
| <i>R. Werner, R. Stratton</i>                                                                                     |     |
| <b>Computation of Radar Detectable Footprint and How Far is the Horizon</b> .....                                 | 48  |
| <i>R. Werner</i>                                                                                                  |     |
| <b>Developing a Data Repository for Analysis</b> .....                                                            | 60  |
| <i>M. Stahl</i>                                                                                                   |     |
| <b>An Approach to Aggregation and Deaggregation for J-MASS System Models</b> .....                                | 68  |
| <i>Martin G. Rammel</i>                                                                                           |     |
| <b>A Protocol Data Unit for Training Simulated Command Forces</b> .....                                           | 76  |
| <i>K.E. Frochs, E.L. White, J.M. Pullen</i>                                                                       |     |
| <b>Developing Standards: A Market DRiven Approach</b> .....                                                       | 83  |
| <i>R. Freeman</i>                                                                                                 |     |
| <b>Radio Communication Within HLA</b> .....                                                                       | 88  |
| <i>D. Cohen, M. Kirsh, A. Kemkes, R. Nagamati, M. Robkin</i>                                                      |     |
| <b>Verification of TARDEC's Vertronics Simulation Facility (VSF) 2005 Technologies CrewStation</b> .....          | 95  |
| <i>J. Brabbs, S. Dungrani, S. Grinaway</i>                                                                        |     |
| <b>Verification &amp; Validation of Object Oriented Simulations</b> .....                                         | 102 |
| <i>C.Q.Coe, L. Foster</i>                                                                                         |     |
| <b>Use of DIS &amp; FIWG Protocols with Live Air Players</b> .....                                                | 110 |
| <i>Ted Clowes</i>                                                                                                 |     |
| <b>Software Agents for the General Evolution of Network Technology and Simulation- A.G.E.N.T.S.</b> .....         | 115 |
| <i>S.A. Lubbers, G.J. Valentino</i>                                                                               |     |
| <b>Incorporating Command and Control into the High Level Architecture</b> .....                                   | 122 |
| <i>M. Farinacci, J.D. Roberts, B.R. Winner</i>                                                                    |     |
| <b>A Method Of Implementing Entrirt Detections in the DIS Enviroment for Use in Analysis</b> .....                | 131 |
| <i>G.G. Roussos</i>                                                                                               |     |
| <b>Doing Analysis in DIS involving Cultural PDUs for High Resolution Combat Models</b> .....                      | 136 |
| <i>G.G. Roussos, W. Caldwell</i>                                                                                  |     |
| <b>Attaining Interoperability Between ModSAF and JANUS</b> .....                                                  | 141 |
| <i>G.G. Roussos</i>                                                                                               |     |
| <b>Understanding the HLA Interface (A Job for the Intelligence Analyst</b> .....                                  | 150 |
| <i>D. Clark, P. Hoare</i>                                                                                         |     |
| <b>A Consurent Model Approach to Scaleable Distributed Interactive Simulation</b> .....                           | 160 |
| <i>H. Bahr, F.R. DeMara</i>                                                                                       |     |
| <b>Efficient Transformations from Geodetic to UTM Coordinate Systems</b> .....                                    | 168 |
| <i>R.M. Toms</i>                                                                                                  |     |
| <b>RTI Common Software Framework</b> .....                                                                        | 174 |
| <i>M. Hooks, R. Rybacki, C. Koplik</i>                                                                            |     |
| <b>Virtual Multicast Router over Internet</b> .....                                                               | 183 |
| <i>J-Y. Huang, J-F. Chen, D-C. Chuang</i>                                                                         |     |
| <b>An Exercise Development Toolset a Key to User Friendliness</b> .....                                           | 189 |
| <i>R.J. Severinghaus</i>                                                                                          |     |
| <b>The Use of Multicast and Interest Management in DIS and HLA Applications</b> .....                             | 194 |
| <i>E.T. Powell</i>                                                                                                |     |
| <b>Object-Oriented Frameworks, Simulation Programming Paradigms, and the Stow Simulation Infrastructure</b> ..... | 204 |
| <i>E.T. Powell, G.H. Tarbos</i>                                                                                   |     |
| <b>Interoperability between Distributed Simulations I: Interacting Models of Physical Processes</b> .....         | 212 |
| <i>S.Y. Harmon</i>                                                                                                |     |

|                                                                                                                                                                               |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Credible Uses of Distributed Simulation: Illustrations from the JTMD Attack Operations Phase 1 Test</b> .....                                                              | 223 |
| <i>T.K. Heuberger</i>                                                                                                                                                         |     |
| <b>Distributed Simulation of Joint Theater Missile Defense Attack Operations: Comparison with the DIS Exercise Management and Feedback Process</b> .....                      | 227 |
| <i>T.K. Neuberger</i>                                                                                                                                                         |     |
| <b>Developer's Forecast for the Simulation World</b> .....                                                                                                                    | 232 |
| <i>P. Gustavson</i>                                                                                                                                                           |     |
| <b>Aggregation Disaggregation Research- A UK Approach Update</b> .....                                                                                                        | 239 |
| <i>N. Weeden, M. Smith</i>                                                                                                                                                    |     |
| <b>Demonstration of Vertical and Horizontal Simulation Interoperability between ABACUS, ModSAF, NavySF and Janus</b> .....                                                    | 249 |
| <i>T. Usher</i>                                                                                                                                                               |     |
| <b>Anti-Armor Advanced Technology Demonstration: Summary of All Experiments</b> .....                                                                                         | 259 |
| <i>J. V. Burrell, M.A. Burrough, L. Harrington, D.P. Hodge, I.M. Johnson, M. J. McCarthy, S.K. Nguyen, J.A. Pinto, M.C. Schmidt, F.C. Wofford, T.W. Ruth, W.J. Brooks Jr.</i> |     |
| <b>Adapting MODSAF Applications to Comply with the HLA</b> .....                                                                                                              | 269 |
| <i>J.E. Smith</i>                                                                                                                                                             |     |
| <b>Addressing Questions about Including Enviromenttal Effects in the DMSO HLA</b> .....                                                                                       | 279 |
| <i>J.R. Hummel</i>                                                                                                                                                            |     |
| <b>Providing Enviromental Representation and Enviromental Effects in the DMSO HLA: Experiences from one Protofederation</b> .....                                             | 284 |
| <i>J.R. Hummel, G. Pandola, G.R. Lurie, K.L. Simunich, M. Woyna</i>                                                                                                           |     |
| <b>Universal Agg/Disagg Process</b> .....                                                                                                                                     | 296 |
| <i>B. Foss, R. Franceshini</i>                                                                                                                                                |     |
| <b>Data Structure for Scenario Interoperability</b> .....                                                                                                                     | 304 |
| <i>J-P. Faye</i>                                                                                                                                                              |     |
| <b>Detailed Design of the Modular Reconfigurable C41 Interface [MRCI]</b> .....                                                                                               | 309 |
| <i>T. Tiernan, M. Cosby</i>                                                                                                                                                   |     |
| <b>The Development of a Government-Owned DIS Visualization Tool</b> .....                                                                                                     | 346 |
| <i>P. Castiglione</i>                                                                                                                                                         |     |
| <b>Distributed Interactive Simulation Exercise Construction Toolset (DISECT)</b> .....                                                                                        | 351 |
| <i>G. Schow, B. Gajkowski</i>                                                                                                                                                 |     |
| <b>Results of the High Level Archutecture Platforms Proto-Federation Experiment</b> .....                                                                                     | 356 |
| <i>S.M. Harkrider, M.D. Petty</i>                                                                                                                                             |     |
| <b>A Multiresolution Synthetic Enviroment Based on Observer Viewpoint</b> .....                                                                                               | 366 |
| <i>D. Michel, D.L. Brock</i>                                                                                                                                                  |     |
| <b>Utilization of Neural Networks for the Development of After Action Review Systems</b> .....                                                                                | 376 |
| <i>M.L. Winburn, B.R. McQueary</i>                                                                                                                                            |     |
| <b>An Innovative DIS Validation Concept: Introduction and Application</b> .....                                                                                               | 382 |
| <i>C.T. Veit, M. Callero</i>                                                                                                                                                  |     |
| <b>Investigating Static Data Flow Analysis for Advanced Distributed Simulation Verification</b> .....                                                                         | 388 |
| <i>C. Bouwens, F. Mckenzie, C. Dean</i>                                                                                                                                       |     |
| <b>DIS To HLA Intergration, a Comparative Evaluation</b> .....                                                                                                                | 394 |
| <i>R. Gminder, M.D. Myjak, R.E. Grioux, J.K. Wicks, H. Morelos, J. Cryer, R. Dimicco, S.T. Sharp</i>                                                                          |     |
| <b>Distribution of Gridded Enviromental Data in HLA/RTI and DIS++</b> .....                                                                                                   | 405 |
| <i>S. Baumgartner, E. Schmidt, S. Olsen, R. Reynolds</i>                                                                                                                      |     |
| <b>Intergrating DIS and SIMNET into HLA with a Gateway</b> .....                                                                                                              | 414 |
| <i>A. Cox, D.D. Wood, M.D. Petty, K.A. Juge</i>                                                                                                                               |     |
| <b>Interim and Target Architecture Design for the Migration of a Legacy Computer Simulation Model to DMSO HLA compliance</b> .....                                            | 423 |
| <i>J.J. Bollwerk, T.E. Kowalsky, J.J. Revetta</i>                                                                                                                             |     |
| <b>Object Oriented Phased Array Radar Presentation over the DIS Network or, Improving Phased Array Radar Regeneration Performance with Less Real-Time Data</b> .....          | 432 |
| <i>G. Figart, C. Slaton, S. Slosser</i>                                                                                                                                       |     |
| <b>Using Encumbrance Factors to Improve Dead Reckoning Approaches to Object Regeneration and Modeling or How to Get More Bang From your Bandwidth Buck</b> .....              | 440 |
| <i>G. Figart, C. Slaton, S. Slosser</i>                                                                                                                                       |     |
| <b>Swarm Intelligence for Load Balancing in Networks</b> .....                                                                                                                | 449 |
| <i>R. Schoonderwoerd</i>                                                                                                                                                      |     |

|                                                                                                                                                            |            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>Simplified 3-D Cloud Model for Large Scale Real-Time Distribution Simulation in a DIS/HLA Environment.....</b>                                          | <b>458</b> |
| <i>S.A. Kukulich, R. Schaffer</i>                                                                                                                          |            |
| <b>Dynamic Terrain Implementation using the RTI .....</b>                                                                                                  | <b>467</b> |
| <i>D.D. Miller, S. Adelson, T. Moore, A. Janett</i>                                                                                                        |            |
| <b>The JPSD Experiment Federation Common Software .....</b>                                                                                                | <b>475</b> |
| <i>R.A. Briggs, G.J. Miller</i>                                                                                                                            |            |
| <b>HLA Testbed Data Distribution Management Experiments.....</b>                                                                                           | <b>480</b> |
| <i>J. Olszewski, L. Mellon</i>                                                                                                                             |            |
| <b>Experiences in Creating Synthetic Natural Enviroments and the Transition of HLA.....</b>                                                                | <b>489</b> |
| <i>D. Whitney, D. Wilbert, R. Schadder, R. Reynolds</i>                                                                                                    |            |
| <b>An Introduction to the HLA Interface Specifications and Object Model Template Test Procedures .....</b>                                                 | <b>499</b> |
| <i>M.L. Loper, D.W. Roberts</i>                                                                                                                            |            |
| <b>Augmenting DIS Exercise Simulation Management with Web-based Toolkits.....</b>                                                                          | <b>504</b> |
| <i>V.F. Golubic</i>                                                                                                                                        |            |
| <b>Automation in the HLA FOM Development Process.....</b>                                                                                                  | <b>510</b> |
| <i>R. Lutz, M. Hooks, K. Hunt</i>                                                                                                                          |            |
| <b>The Adaptive Response Filter.....</b>                                                                                                                   | <b>518</b> |
| <i>F.C. Gray, R. Kehlet</i>                                                                                                                                |            |
| <b>"The Third Wave" - DIS++/HLA: Next Generation of Standards for Internal Architecture of Simulators .....</b>                                            | <b>527</b> |
| <i>D. Guckenberger, E. Guckenberger, R. Whitney, G. Hall</i>                                                                                               |            |
| <b>Standard Object Interface Linkage (SOIL) (DIS?HLA for Everyone?).....</b>                                                                               | <b>537</b> |
| <i>R.J. Meyer</i>                                                                                                                                          |            |
| <b>Paving the Way for 21st Century Training the Synthetic Theater of War .....</b>                                                                         | <b>542</b> |
| <i>W. R. Johnson, C.L. Kanewske, J.T. Blake</i>                                                                                                            |            |
| <b>Prototyping a C41 Common M&amp;S Environment for Developers and Users .....</b>                                                                         | <b>552</b> |
| <i>L. Goldberg, P. Barr, B. GreenField, J. Santapietro, J. Lacetera, L. Dworkin</i>                                                                        |            |
| <b>Exercise Preparation - Applying the 1278.X Standards .....</b>                                                                                          | <b>558</b> |
| <i>D.M. Drinkwater, G.L. Gagnon, J.F. Stender</i>                                                                                                          |            |
| <b>An Implementation Strategy for Standardization Within the New Modeling and Simulation Community.....</b>                                                | <b>563</b> |
| <i>M.D. Myjak</i>                                                                                                                                          |            |
| <b>Object Oriented Analysis - Case Study .....</b>                                                                                                         | <b>574</b> |
| <i>K. Castner, B. McCauley</i>                                                                                                                             |            |
| <b>Percieved Truth Considerations in Warsim 200 .....</b>                                                                                                  | <b>580</b> |
| <i>P. Walker, D.Dall, A. Irwin, B. McCauley</i>                                                                                                            |            |
| <b>Applications for Distributed Virtual Computing Enviroments in Education and Analysis .....</b>                                                          | <b>586</b> |
| <i>J.F. Sullivan Jr., P.D. West</i>                                                                                                                        |            |
| <b>Third Generation Personal Communication Network a Candidate Network dor DIS.....</b>                                                                    | <b>593</b> |
| <i>S.G. Niri, R. Tafazolli, B.G. Evans</i>                                                                                                                 |            |
| <b>Ocean Representation in the Improved Computer Cenerated Forces Terrain Database.....</b>                                                                | <b>604</b> |
| <i>T. Stanzione, A. Evens</i>                                                                                                                              |            |
| <b>Multiple Elevation Structures in the Imprived Computer Generated Forces Terrain Database .....</b>                                                      | <b>613</b> |
| <i>T. Stanzione, A. Evans</i>                                                                                                                              |            |
| <b>Location-Based Haze in Synthetic Environments .....</b>                                                                                                 | <b>623</b> |
| <i>H. Lind</i>                                                                                                                                             |            |
| <b>Intergration of Tactical Communications Simulation into Constructive and Virtual Joint Exercises into Constructive and Virtual Joint Exercises.....</b> | <b>629</b> |
| <i>D.G. Sweigert</i>                                                                                                                                       |            |
| <b>Intelligent Addressing and Routing of Data Via the RTI Filter Constructs .....</b>                                                                      | <b>634</b> |
| <i>L.F. Mellon</i>                                                                                                                                         |            |
| <b>Author Index</b>                                                                                                                                        |            |