## **I/ITSEC 2021 DIS 101 Tutorial Outline, ID # 21031**

* What is distributed simulation? Scaling from isolated networks to the Web.
* Military modeling & simulation, distributed simulation standards, interoperability
* Underlying TCP/IP network requirements common to all distributed simulations
* DIS: goals, design principles, basic structure, stability, Entity State PDUs explained
* DIS: distributed identification of all participants, Entity Types and Entity IDs
* DIS: tracks and Coordinate Systems, real time clocks, packet PDUS, code APIs
* DIS: collisions, shooting, Dead Reckoning, Smoothing, visual synchronization
* DIS and Open-DIS: DIS standard development, ongoing implementation efforts
* Resources and References for further activity, including latest open-source software builds

*Learning Objectives.*  The learner will be able to:

* Identify what standards are used by distributed simulations for military use.
* Identify what types of communication protocols are used for various networks.
* Identify what aspects needs to be standardized, and what aspects can be customized, to support diverse simulations with differing models and goals.
* Identify how DIS techniques for dead reckoning (DR), visual smoothing and distributed collision detection can reduce network traffic.
* Learn prospects for new capabilities expected in Compressed DIS and DISv8.

*Intended audience:* modeling & simulation professionals plus intermediate-level practitioners interested in distributed simulation capabilities and network characteristics.

Prerequisite knowledge. Familiarity with potential capabilities of distributed simulation is valuable. Some programming experience is helpful but not required.

Several areas of future work are in progress. Supplementary materials include summaries for

* Support for SISO standardization work-in-progress on DIS version 8 and Compressed DIS (C-DIS)
* DIS PDU recording/playback/streaming for interpolator-driven X3D Graphics visualization in HTML
* Experimental XML Schema, stream processing, and potential Big Data analytics
* Data Format Description Language (DFDL) parsing/unparsing and DIS Ontology for Semantic Web
* Potential addition of OpenDIS7 library in Python programming language and a OpenC2SIM bridge

Complete tutorial slideset is maintained and regularly updated online as part of an NPS graduate course at

* <https://gitlab.nps.edu/Savage/NetworkedGraphicsMV3500/tree/master/conferences/IITSEC2021>

For a corresponding half-day Open-DIS workshop, these materials will be customized to meet the needs of I/ITSEC participants. We emphasize numerous programming examples and encourage participants to run code themselves, on their laptops during the tutorial and with community support before/after the workshop. Helpful feedback from IITSEC 2020, SISO SIW 2020 and VIITSEC 2021 make this tutorial and workshop appropriate as a regular offering that complements the regularly offered Friday workshop on HLA and TENA.

Full NPS MOVES course materials on Networked Simulation with primary emphasis on DIS are found at

* <https://gitlab.nps.edu/Savage/NetworkedGraphicsMV3500>

Open-DIS library projects are maintained online in open source at <https://github.com/open-dis>

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