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SISO-STD-020-2020

Standard for
Land Operations Extension
to
Command and Control Systems -
Simulation Systems Interoperation

Version 1.0

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Prepared by:
Command and Control Systems - Simulation
Systems Interoperation
Product Development Group

Revision History

Version	Section	Date (MM/DD/YYY)	Description
1.0	All	29 March 2020	Initial version from balloting

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At the time this product was submitted to the Standards Activity Committee (SAC) for approval, the Command and Control Systems - Simulation Systems Interoperation Product Development Group had the following membership and was assigned the following SAC Technical Area Director:

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Introduction

Military operations in today's world are increasingly driven towards coalition participation and as such are dependent on effective interoperation between participating coalition systems. The growth of digitized C2 systems and the need for coalition interoperation has created a need for standards to represent and exchange digitized C2 information and for these systems to interoperate.

The Simulation Interoperability Standards Organization (SISO) supports the identification and creation of standards and guidelines to help in the interoperability of simulation and more broadly to tackle issues related to M&S. Two main types of documents exist: guidelines and standards, the first mostly related to processes definition and the second mostly related to data structuration, with or without a reference model associated.

Command and Control Systems to Simulation Systems Interoperation (C2SIM) is a standard for expressing and exchanging Command and Control (C2) information among C2 systems, simulation systems, and robotic and autonomous (RAS) systems in a coalition context. The C2SIM Core is designed to provide a method to exchange information needed across multiple domains. The C2SIM Core is unencumbered by domain specific information, which is instead provided through specific extensions. This permits user to implement the smallest possible logical data model (LDM) consisting of the C2SIM Core and necessary extensions.

The Land Operations Extension (LOX) augments the Core and Standard Military Extension (SMX), adding the components necessary to exchange data concerning plans and orders in scenarios with land-focused operations. The LOX requires the C2SIM core and SMX; in the ontology, LOX imports SMX, which imports the C2SIM core.

As an extension of the C2SIM, this LOX documentation supplements the C2SIM main document. Users should reference the C2SIM main documentation to fully understand C2SIM concepts, as they are not restated in extension documentation.

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1   Overview

Command and Control Systems to Simulation Systems Interoperation is being developed as a standard to support interoperation between C2 systems, simulation systems, and robotics and autonomous systems (RAS) in a coalition context. The SISO C2SIM Product Development Group (PDG) replaced the Coalition Battle Management Language (C-BML) and Military Scenario Definition Language (MSDL) PDGs and Product Support Groups (PSGs). The C2SIM Core provides the minimum necessary information as a foundation for extension operations. The Land Operations Extension (LOX) builds on the C2SIM Core and C2SIM Standard Military Extension (SMX).

This document standardizes the LOX extension for C2SIM. The document is purposely quite brief because the mechanics of C2SIM, including its extensions, are defined in the basic C2SIM Standard. Most of the additional value in LOX is contained in the ontology that is established by this document. Like the Core and SMX ontologies established by the C2SIM standard, the LOX ontology will be maintained by the SISO C2SIM Product Support Group.

1.1   Scope

The Land Operations Extension (LOX) for C2SIM covers the behaviors of entities engaged in surface operations against surface threats. The LOX builds on and is dependent on the C2SIM Core standard.

1.2   Purpose

This document describes the methods used to extend the C2SIM to include land operations and provides a normative description of the scope and use of the extension. Additionally, as the initial extension to the C2SIM standard, this document is an exemplar for other extensions.

1.3   Objectives

The primary objective of this standard is to provide C2 systems, simulation systems, and RAS the ability to use the C2SIM LDM to generate an XML schema suitable to their needs to represent and exchange digitized C2 information. Using the LDM, systems can generate data needed for scenario execution in the land operations domain. This objective does not preclude direct use of the core and extension ontologies; for example, in systems directly implementing the Web Ontology Language (OWL) representations.

1.4   Intended Audience

The primary intended audience of this extension standard is aligned with the C2SIM Core standard. It is however specialized to those who seek to interoperate C2 systems, simulations, and Robotic and Autonomous Systems (RAS) with regard to land warfare.

2   References

2.1   SISO Documents

The following SISO documents were used in generating the policies and procedures defined herein. When the following documents are superseded by an approved revision and that causes a conflict with this document, the revision of the below-referenced documents shall supersede this document. These documents are available by through the SISO web site at https://www.sisostds.org/.

Ref:	Document Number	Title	Date
[1]	SISO-PN-010-2014 revision 1.1	C2SIM Product Nomination	14 Sep 2017
[2]	SISO-STD-011-2014 Version 1.0	Standard for Coalition Battle Management Language	14 Apr 2014
[3]	SISO-STD-007-2008	Standard for Military Scenario Definition Language	Reaffirmed 11 May 2015
[4]	SISO-STD-010-2020	Standard for Command and Control Systems – Simulation Systems Interoperation	25 April 2020

2.2   Other Documents

Ref:	Document Number	Title	Date
[5]	MIL-STD-2525B, 30 January 1999, w/Change 1, 1 July 2005	Defense Information Systems Agency, Department of Defense. MIL-STD-2525B, Common Warfighting Symbology.	1 July 2005
[6]	NATO APP-6	MILITARY SYMBOLS FOR LAND BASED SYSTEMS	May 2011
[7]	MIP JC3IEDM	JC3IEDM, Annexes, and .xsd Domain Values; www.mip-interop.org	2020
[8]	NIMA TM 8358.1	Datums, Ellipsoids, Grids, and Grid Reference Systems. Edition 1. US National Imagery and Mapping Agency (NIMA)	20 September 1990
[9]	NIEM	USA National Information Exchange Model	
[10]		ANSI SPARC Architecture	
[11]	LOX OWL v3.1		Dec 2018
[12]	Webster	Webster's New World College Dictionary	2018

2.3   Bibliography

	Document Number	Title
1.	SISO-ADM-002-2008	SISO Policies and Procedures (P&P)
2.	SISO-ADM-003-2008	SISO Balloted Products Development Process (BPDP)
3.	SISO-ADM-005-2004	Policy for: The Style and Format of SISO documents
4.	SISO-PDG-PN-MSDL-2005-002-15	MSDL Product Nomination
5.	XML World Wide Web Consortium (W3C) web site	XML Schema http://www.w3.org/2001/XMLSchema http://www.w3.org/TR/xmlschema-1/).
6.	UN/CEFACT XML Naming and Design Rules	United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) XML Naming and Design Rules Version 2.0 of 17 February 2006

3   Definitions, Acronyms, and Abbreviations

English words are used in accordance with their definitions in the latest edition of Webster's New Collegiate Dictionary [12] except where special SISO product-related technical terms are required.

3.1   Definitions

All necessary definitions are provided in the main C2SIM standard.

3.2   Acronyms and Abbreviations

Acronym/Abbr	Definition
BMNT	Begin Morning Nautical Twilight
BSO	Battle Space Object
CBRN	Chemical, Biological, Radiological, Nuclear
COA	Course of Action
COP	Common Operational Picture
DIS	Distributed Interactive Simulation
EENT	End Evening Nautical Twilight
EXCOM	Executive Committee
GCC	Geocentric Coordinate
GDC	Geodetic Coordinate
IFF	Identification, Friend or Foe
JC3IEDM	Joint Consultation, Command, and Control Information Exchange Data Model
METOC	Meteorology and Oceanography
MOOTW	Military Operations Other Than War
NBC	Nuclear, Biological, Chemical
RAS	Robotic and Autonomous System

4   Structure of the Land Operations Extension LDM (Informative)

Note: The C2SIM LOX Ontology is a reference C2SIM domain extension ontology. It imports the C2SIM core ontology and the SMX extension. Both of those are required to support the LOX ontology.
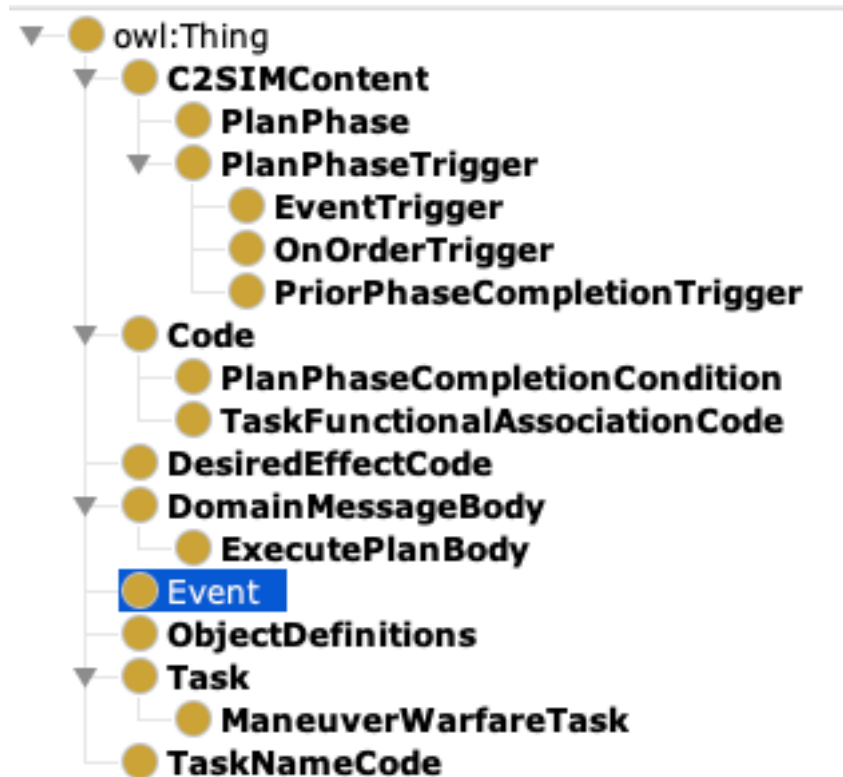

Figure 1: LDM LOX Ontology Hierarchy