Ministry of Defence

DEFENCE MODELLING & SIMULATION OFFICE (DMSO)

TECHNICAL AUTHORITY (TA)

DEFENCE MODELLING & SIMULATION (M&S) STANDARDS PROFILE (DMSP)

10 October 2023

Version History

Version	Date Issued	Comments
V1	29 Nov 11	Initial version issued
V2	13 Jan 13	Version 2 issued with the following standards removed: • SCORM • SCORM-Sim And the following standards added • DDS • CDB • X3D OpenFlight standard description refreshed.
V2.1	25 Jan 13	Document renamed from DTSI to DTEC, reformatted and Version History added. Introduction of Def Stan 03-50 to support the DMSP.
V3.0	30 Jun 14	Preference for Collada indicated with FBX withdrawn. The status of some standards updated.
V4.0	30 Nov 14	Def Stan 03-44: "A Generic Process for the Verification & Validation of Modelling and Simulation & Synthetic Environments Systems" retired and replaced with SISO-GUIDE-001-2013 “Guide for Generic Methodology for Verification and Validation (GM-VV) to Support Acceptance of Models, Simulations, and Data”.
V5.0	13 Nov 15	Document renamed following DTEC rebranding. 3D model preference updated to be OpenFlight. HLA affirmed as the preferred interoperability protocol. MODAF, JC3IEDM and XML withdrawn as non-M&S specific and covered in other MOD policy.
V6.0	11 Dec 17	Acknowledges emergence of C2SIM, Guidelines on Scenario Definition (GSD) and WebLVC. Common DataBase (CDB), Simulation Reference Markup Language (SRML) and Distributed Debrief Control Architecture (DDCA) recognised as open standards. Maturity and versions of standards added. Re-introduction of some current standards. Clarity over NATO Education & Training Network (NETN) Federation Architecture and FOM Design (FAFD) rather than just NETN Federation Object Model (FOM. Reuse and Interoperability of Environment & Data Processes (RIEDP) added. Various minor document format changes. DTEC replaced with Defence M&S Coherence (DMaSC).
V7.0	7 Nov 19	Clarification on governance including the introduction of JSP 939.

		Rewording of how the DMSP reflects M&S Policy and Strategies Introduction of Def Stan 00-102: Policy on the Application of Geospatial Information Standards GSD identified as an open standard and no longer emerging.
V8.0	19 October 2020	New additions: - Space Reference (SR) FOM - C2Sim (inc Standard Military Extension (SMX)) - C2Sim Land Operations Extension (LOX) - Urban Combat Advanced Training Technologies (UCATT) Laser Engagement Interface (LEI) Test Plan Removed: - C2SIM-TaskingReporting - ingested into C2Sim Status changed to Superseded: - C-BML - MSDL
V9.0	10 November 21	Addition to text: The DMSP Relationship with other M&S Standards Profiles
V10	10 November 22	Updated to reflect formation of the Defence M&S Office (DMSO) replacing DMaSC. Updated new standard added for Link 16. Included the emerging AIS standard. The term Synthetic Natural Environment (SNE) truncated to Synthetic Environment (SE).
V11	10 October 2023	Purpose of document updated to reflect that some non-specific M&S standards are included that should be used for M&S project/programme purposes. Addition of ODF for documentation Addition of OpenXR Addition of Cyber DEM Inclusion of UCATT FOM

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Introduction

1. The broad aim of the *Defence Policy for M&S*, as detailed in Joint Service Publication (JSP) 939, is to ensure enterprise wide technical coherence for M&S based systems promoting Value for Money (VfM) at the enterprise level, exploiting investment and supporting more effective M&S-based capability.

2. The Defence M&S Office (DMSO) has been established to promote and support the above aim. DMSO high-level requirements for all M&S based systems are as follows:

   a. Value for Money across the Enterprise (highest priority);

   b. Clearly identified M&S requirements helping to provide vertical coherence (against policy);

   c. Conformance to selected standards;

   d. Commonality and re-use of data, models and platforms; and

   e. Consistent, enduring, accessible, agile and adaptable M&S solutions.

Governance

3. Governance for the DMSP is provided by JSP 939: Defence Policy for Modelling & Simulation (M&S) that is owned by DCDS (MilCap) with responsibility delegated to DMSO.

4. JSP 939 states that any simulation capability or solution change activity must be compliant with DMSO Technical Authority (TA) direction beginning with the engagement of the Defence Simulation Centre (DSC) Front Door[1].

[1] The DSC Front Door provides a single point of contact for all Defence M&S matters. It can be contacted at UKStratCom-DSC-Enquiries@mod.gov.uk

5. JSP 939 continues by adding that the DMSO TA will:

a. Identify those simulation standards that Defence should follow;

b. Develop relevant architectures; and

c. Assure systems and services compliance in order to ensure capability coherence.

The DMSO TA will support the Top Level Budgets (TLBs) in making the most appropriate acquisition choices for Defence; where serious conflicts of interest arise, these will be referred to the Military Capability Board (MCB).

Purpose

6. The purpose of the DMSP is to:

a. Identify the preferred and mandated M&S standards for Defence; and

b. Provide an introduction to the importance, and guidance in the selection, of standards in M&S in its broad usage across Defence.

It is intended to cover all M&S specific standards of relevance to Defence and is designed to provide benefit to the MOD, Industry and Academia. It is not intended to provide implementation guidance which is deemed project business.

7. The DMSP also includes standards that although not specific to M&S, are deemed to support DMSO aims.

8. The DMSP is a living document to reflect that M&S standards are continually developed and maintained and will be reviewed regularly.

9. In more detail, this DMSP:

a. Defines the process by which the DMSO approved list of M&S standards are managed in the MOD;

b. Lists, categorises and provides an overview for DMSO approved M&S standards and their status; and

c. Specifies in detail any data models that are to be used to promote interoperability.

10. Should a proposed capability or solution change be unable to comply with a specific DMSO identified M&S standard identified in Annex A (for whatever reason), a waiver is to be sought from the appropriate DMSO Service Command Technical Authority (SCTA) for such

variation(s) explaining how the proposal provides VfM for Defence at the Enterprise level. If such a 'DMSO Waiver' is issued, it is to be recorded in the appropriate DMSO Capability Technical Assessment Report (CTAR) by the appointed DMSO Technical Authority (TA) representative.

11. Effectiveness and authority for the DSMP is supported by Def Stan 03-50 DMSP[2].

Background

12. The MOD and wider Defence community recognises that common M&S standards are required to address issues with:

a. **Communications** – the interconnectivity and communications between simulation and other related systems, e.g. C2 systems;

b. **Interoperability** – the exchange and use of information between simulation and other related systems including the use of common data;

c. **Costs** – reducing costs and providing better value for money; and

d. **Re-usability** – the ability to be able to re-use data from one system to another, often learning from experience.

13. Defence policy calls for the use of open standards and the avoidance of proprietary standards. Although it is not always possible to achieve this directly, any proprietary standards that are chosen must be common or community standards such that they can be opened and converted by a suitable array of COTS tools. In order to add clarity to this statement, any unapproved modification or enhancement to an open standard results in the creation of a proprietary standard and therefore is to be avoided.

14. The NATO M&S Standards Profile (NMSSP)[3], also known as Allied M&S Publication 01 (AMSP-01), has been created and is being maintained by the NATO Modelling & Simulation Group (NMSG) to provide guidance on the selection and use of M&S standards to promote and foster interoperability and reuse across Allies. The NMSSP also informs NATO M&S stakeholders on new and emerging standards and can be described as an informative rather than prescriptive document.

15. It should be noted that 'open' standards are not cost free. Standards have to be maintained and therefore open standards need to be managed by the community. Further, just because an approved standard has been selected it does not mean work ceases, for example,

[2] Def Stan 03-50 available from https://www.gov.uk/uk-defence-standardization

[3] AMSP-01 (NMSSP) available at https://nmsg.sto.nato.int/

the content of any data models used in a High Level Architecture (HLA) federation has to be agreed so that everyone in the federation knows what the data enclosed represents.

16. Further to the above, it is accepted that the use of recommended standards may reduce functionality and thus may seem unattractive but the overall benefits to Defence in terms of reuse and interoperability may outweigh such drawbacks.

Scope

17. In order to create a working synergy, and to promote international interoperability (on the assumption that Allies do the same with any M&S standards profiles that they maintain), the DMSP is designed to be derived from, and therefore aligned to, the NMSSP as far as possible. But where necessary it can be tailored and enhanced to suit the specific requirements of the MOD. The DMSP may therefore contain a small number of standards not listed in the NMSSP to include UK specific variants but these will be kept to a minimum.

18. In keeping with the format and content of the NMSSP, and to promote synergy between it and this DMSP, standards and recommended practices in this document are classified in the following categories:

a. M&S methodology, architecture and processes in the following sub-categories:

(1) **Architecture frameworks** – This subcategory contains standards that govern high-level development of systems, typically at the enterprise level. Such standards are typically very general and not specific to M&S system development, although they are still applicable.

(2) **Systems Engineering processes** - This subcategory includes both generic and M&S-specific systems engineering processes, which typically describe the steps that must be followed to successfully develop a system.

(3) **Verification and Validation** – V&V is a key issue because these activities ensure that M&S systems are built according to specification, fit for their intended use, and documented accordingly. Note that V&V is not a unique acronym in this area; VV&A, which stands for Verification, Validation and Accreditation (or Acceptance) is also widely used.

b. **Conceptual modelling and scenarios** - Conceptual modelling (CM) is the translation of user requirements into formal statements that are understandable by both humans and machines. The purpose of scenario standards is to enable the exchange, archiving and reuse of scenarios by describing them using standardized means.

c. **M&S interoperability** - This category contains standards that support the development and execution of connected, distributed M&S systems and supports the reusability of artefacts when combined with other systems that are compliant with the same standards.

d. **Information exchange data model** - Data needs to be exchanged between components of distributed simulation systems and the structure of the data (number of fields in a message, number of bytes per value, etc.) needs to be specified.

e. **Software engineering** - Many software engineering standards have been adopted by the M&S community because simulation systems depend so heavily upon software. Such standards cover a very wide range of issues from software development methodologies, programming languages, data formats, etc.

f. **Synthetic Environments (SEs)** - The development, archiving and reuse of terrain or visual databases is a very important part and a significant cost driver of M&S systems. Database development is a complex process and the interoperability of environmental databases is also a key issue. Many de facto standards are in use and official standards are few or just emerging. For clarity and ease of use, SE standards have been categorised in the following manner:

(1) **General** – for standards that are very flexible and do not predefine how environments are to be modelled.

(2) **Data sources and formats** – for standards that define the organization of structured data.

(3) **Imagery & 3D models** – for standards that define how 2-dimensional images and 3 dimensional entities are to be created, described and stored.

(4) **Interchange of environmental data** – for standards that define how 2-dimensional images and 3 dimensional entities are to be interchanged.

(5) **Production processes** – for standards that define how environmental data and 3 dimensional entities are to be produced, described and recorded.

(6) **Visualisation** – for standards that define how environmental data is to be visualised.

g. **Simulation analysis and evaluation** – intended to include standards that define how simulation data is captured at run-time and processed afterwards for analysis purposes.

Types of M&S Standards Covered and Definitions

19. Standards that can be defined as providing a measurement or value are included in the DMSP. Conversely, excluded from the DMSP are commercial or government-owned products or applications or tools that are in large use and sometimes improperly called standards - an example of something that does not meet the inclusion criteria could be a particular COTS virtual simulation that is widely used in the MOD. In essence, a standard is an agreed way of doing something.

20. There are 5 main types of standard that are covered by the DMSP but the definitions are not necessarily mutually exclusive. Standards can be described as follows:

a. **Official** – these types of standards are developed by Standards Development Organisations (SDOs) with legal and recognised standing such as the International Standards Organisation (ISO), the Institute of Electrical and Electronic Engineers (IEEE) or the Simulation Interoperability Standards Organisation (SISO). The majority of M&S standards described in this profile are official standards;

b. **De facto** – these ("in practice") standards are those that are commonly used but are not official. They mainly originate from industry and their use has been expanded into the wider M&S community for practical reasons. A good example of a de facto standard is OpenFlight which is very common;

c. **Open** – open standards are developed by a SDO to which membership is open, and the standard is available to the public for developing compliant products (with or without some license fee). They are not controlled by a single vendor. The key points which qualify standards' openness are:

(1) Membership to the developing organisation is sufficiently open, thus allowing users to influence the development of standards;

(2) Public availability of the standard once it is completed; and

(3) Possibility to use it free of charge for any purpose.

The use of open standards in a user application should be free and without restrictions and the necessary documentation should be available on fair and equitable terms. Standards that do not respect this principle of openness were not selected in this profile;

d. **Proprietary** - or privately owned standards that are controlled by one company. When a proprietary standard is widely used, it becomes a de facto standard even though it is not governed by a SDO; and

e. **Local** - A local standard can be considered as a standard within a specific organization but is not in use in the international or any wider community.

The DMSP and MoD M&S Policy and Strategies

21. The DMSP will assist the MOD, Industry and Academia to efficiently achieve the goals of the Defence Policy for M&S and comply with appropriate governance as set by DMSO. It will be referred to within the MOD's Knowledge in Defence (KiD)[4] on-line tool.

[4] Available at https://www.kid.mod.uk/ or via the Defence Gateway (https://www.defencegateway.mod.uk/).

22. The publication will also assist with the achievement of any Front Line Command (FLC) M&S strategy that requires interoperability of simulations and compatibility of the representation of synthetic environments. The broad adoption of nominated distributed simulation standards and representation standards will be necessary to achieve this aim.

23. Compliance with specified simulation engineering and simulation management standards will be a necessity for the effective, coherent and VfM supply and exchange of technology, tools and products. This is required if Defence is to address its strategic goals as set out in JSP 939.

24. As a general rule, standards chosen for the DMSP will ultimately be open – created and supported by the simulation community; proprietary standards are to be avoided wherever possible. Therefore, it follows that if Industry does not like a standard chosen for reasons relating to its content or operation, they have the ability to get involved with the M&S standards community and modify that standard.

The DMSP Relationship with other M&S Standards Profiles

25. The Background section above (paragraphs 11 to 15) describes the relationship between the DMSP and NATO's AMSP-01 but there are other M&S Standards Profiles in existence. Whereas there is no desire to incorporate other standards profiles within the DMSP, there may be instances where is there is value in referral.

26. To this end, it is noted that there is informative value in the text of the following two SISO standards[5]:

a. SISO-GUIDE-005-2021: Guide for 'A Standards Profile for the Use of Modeling and Simulation in Support of Acquisition Activities'; and

b. SISO-REF-066-2021: Reference for 'A Standards Profile for the Use of Modeling and Simulation in Support of Acquisition Activities'.

Preferred Characteristics of Standards

27. As recognised in the SISO Policy and Procedure document, the main qualities which make preferred standards for inclusion in the DMSP are the following:

a. **Relevance** - a standard shall be relevant to the targeted user/developer community;

b. **Substantive content** - a standard shall provide meaningful information and/or results;

[5] https://www.sisostandards.org/page/Standards

c. **Timely production** - in an efficient manner, to ensure that the product is useful to the community;

d. **Reviewed** - by the technical community to which the product applies & largely accepted;

e. **Generality** - as general as possible, while still maintaining usefulness, to support the broadest community of current and future users;

f. **Stability** - established and changed only as necessary. They should be prototyped and tested before being proposed for adoption to demonstrate their maturity;

g. **Supportability** – maintenance of the integrity of the existing product suite and the needs of the user; and

h. **Testable** - adherence to standards should be wholly or mostly objectively testable rather than subjective to allow compliance checking.

28. Non-M&S specific standards are not included within the DMSP as they will be covered by other MOD engineering policies, e.g. the use of NATO Architecture Framework (NAF). It should be noted that specific raw SE (geospatial) data sources and formats must comply with JSP 465: Defence Geospatial Intelligence Policy.

Maturity of Standards

29. In terms of maturity, standards and guidance documents are characterised as either Mandated, Current, Emerging, Superseded, Obsolete or Cancelled. These categories are defined as follows:

a. **Mandated** - a current standard that requires compliance because of a government statute or regulation, an organizational internal policy, or contractual requirement;

Note: It is acknowledged that Mandated is not a maturity (but a direction) status but it may be used to apply further direction.

b. **Current** – a standard of the latest issue or amendment and not superseded, obsolete or cancelled. The status usually applies to standards for equipment or processes that are up-to-date or are in general use;

c. **Emerging** - a standard is considered emerging if it is sufficiently mature to be used within the definition of future planned systems;

d. **Superseded** - a standard is one that has been replaced by a later issue or amendment. They may be superseded by either the same document with a higher issue or amendment level, or by an entirely different standard;

e. **Obsolete** - these standards contain accurate information at the date of being made obsolete but are no longer applicable to equipment or processes. Provided that subsequent information has not invalidated the content, an obsolete standard could still be of use to historic systems or processes but risks must be identified and mitigated by the User in a Standardization Management Plan; and

f. **Cancelled** - standards have been totally withdrawn from service and are not to be used. A particular revision or issue of a document can be classified as cancelled and the next issue or revision of the same document can supersede the cancelled document.

30. It is the role of the DMSO TA to agree and decide which of the above categories applies to each MOD M&S standard and that each standard's maturity is reviewed annually.

Management of the DMSP

31. The DMSP is managed in the following manner:

a. The DMSP will be maintained by the DMSO TA with input from other relevant elements of the MOD including dstl, Industry and Academia but the MOD will retain the right to decide upon content;

b. Content of the DMSP will be formally reviewed annually. There may be other associated electronic communications that take place in support of this activity;

c. The DMSO TA will continue to be involved with:

(1) The maintenance of the NMSSP, which will inform the DMSP and acts as an over-arching document;

(2) SISO, which will allow the UK to influence, participate and monitor emerging M&S standards as well supporting existing ones. Note: SISO is recognised by ISO and IEEE as the premier SDO for M&S and also has a technical agreement with NATO and the Open Geospatial Consortium (OGC); and

(3) Other Allies and Partners for Peace (PfP) M&S standards work as deemed appropriate by the DMSO TA in order to inform the DMSP and promote interoperability.

ANNEX A: DMSP Selected Standards

Standards selected for current inclusion in the DMSP can be seen in the following table:

Category	Standard	Maturity	Type	Current Version	Comments
M&S methodology, architecture, processes and guides:					
Systems Engineering processes	DSEEP	Current	Open	IEEE 1730™-2010	Distributed simulation engineering process. https://standards.ieee.org/develop/wg/DSEEP.html
	DMAO	Current	Open	IEEE 1730.1™-2013	Multi-architecture overlay, part of DSEEP. https://standards.ieee.org/findstds/standard/1730.1-2013.html
Verification and Validation	GM-VV Introduction	Current	Open	SISO-GUIDE-001.1-2012	Guide for Generic Methodology for Verification and Validation (GM-VV) to Support Acceptance of Models, Simulations, and Data, GM-VV Volume 1: Introduction. https://www.sisostandards.org/page/Standards
	GM-VV Implementation	Current	Open	SISO-GUIDE-001.2-2012	Guide for Generic Methodology for Verification and Validation (GM-VV) to Support Acceptance of Models, Simulations, and Data, GM-VV Volume 2: Implementation Guide. https://www.sisostandards.org/page/Standards

Category	Standard	Maturity	Type	Current Version	Comments
Conceptual modelling and scenarios	MSDL	Superseded	Open	SISO-STD-007-2008	Standard for Military Scenario Definition Language (MSDL). https://www.sisostandards.org/page/Standards
	C2Sim (inc SMX)	Current	Open	SISO-STD-019-2020	Command and Control Systems to Simulation Systems Interoperation (C2SIM) inc Standard Military Extension (SMX). https://www.sisostandards.org/page/Standards
	C2Sim LOX	Current	Open	SISO-STD-020-2020	C2Sim Land Operations Extension (LOX). https://www.sisostandards.org/page/Standards
	GSD	Current	Open	N/A	Guidelines on Scenario Definition. A SISO Guidance Product for "Guideline on Scenario Development for Simulation Environments. https://www.sisostandards.org/page/Standards

Category	Standard	Maturity	Type	Current Version	Comments
M&S interoperability	HLA	Mandated	Open	IEEE 1516™-2010	IEEE Standard for High Level Architecture for Modeling and Simulation — Framework and Rules. STANAG 4603 refers. https://standards.ieee.org/findstds/standard/1516-2010.html
	DIS	Current	Open	IEEE 1278.1™-2012	IEEE Standard for Distributed Interactive Simulation, Open network protocol standard for linking real-time platform-level simulations. https://standards.ieee.org/findstds/standard/1278.1-2012.html
	DDS	Current	Open	v1.4	OMG Standard. A Data-Centric Publish-Subscribe model for distributed application communication and integration. http://www.omg.org/spec/DDS/1.4/
	FEAT	Current	Open	SISO-STD-012-2013	The Federation Engineering Agreements Template (FEAT) provides a format for recording agreements about the design and use of distributed simulation. https://www.sisostandards.org/page/Standards
	OpenXR	Current	Open	V1.0	The OpenXR standard provides an API aimed for application developers targeting virtual reality or augmented reality hardware. This enables developers to build applications that will work across a wide variety of devices. https://www.khronos.org/OpenXR/

Category	Standard	Maturity	Type	Current Version	Comments
	WebLVC	Emerging	Open	N/A	A developing front-end for LVC simulations enabling web and mobile applications to play in traditional M&S federation. https://www.sisostandards.org/page/Standards
	SRML	Current	Open	SISO-STD-009-00	A specification that enables simulations and other content to be served, received, and processed using web technologies. https://www.sisostandards.org/page/Standards
Live simulation	UCATT	Mandated	Open		Aa set of open international standards to allow live simulation systems to interoperate in a multinational training environment. https://www.sisostandards.org/page/Standards
				SISO-STD-016-00-2016, Standard for UCATT Laser Engagement Interface	
				SISO-GUIDE-003-00-2016, Guide for UCATT Live Simulation Standards and Architecture	
				SISO-REF-059-00-2015, Reference for UCATT Ammunition Table	
				SISO-REF-073-00-2020, Test Plan for UCATT Laser Engagement Interface	

Category	Standard	Maturity	Type	Current Version	Comments
Information exchange data model	RPR FOM	Current	Open	SISO-STD-001.1-2015	A hierarchy of object and interaction classes for HLA that provides the capabilities defined in the DIS standard. https://www.sisostandards.org/page/Standards
	NETN FAFD	Mandated	Open	AMSP-04	A NATO reference document intended to provide architecture and design guidance for developing distributed simulation. https://www.sisostandards.org/page/Standards
	SR FOM	Mandated	Open	SISO-STD-018-00-2020	A collection of HLA-compliant data constructs, modelling standards, and execution control process standards that support interoperability between simulations in the space domain. https://www.sisostandards.org/page/Standards
	C-BML	Superseded	Open	SISO-STD-011-2014	. A standard language for expressing and exchanging plans, orders, requests, and reports across command and control (C2), M&S and autonomous systems. Moving to C2SIM https://www.sisostandards.org/page/Standards
	UCATT FOM	Mandated	Open	SISO-STD-021-2021	A standard for the communication between different EXCONs of Live Simulation systems in a multinational training environment. https://www.sisostandards.org/page/Standards

Category	Standard	Maturity	Type	Current Version	Comments
Information exchange data model cont.	Cyber DEM	Emerging	Open	N/A	A standard under development, the Cyber DEM seeks to represent cyber events and objects in a format independent of simulation interoperability solutions, but which is unambiguously translatable to those solutions. The Cyber DEM will provide the common representation of these cyberspace conditions so they can be transmitted bi-directionally between cyber ranges, cyber simulations, and the test / training environments supported by traditional kinetic simulation. https://www.sisostandards.org/page/Standards
	Enumerations	Mandated	Open	SISO-REF-010-2023	The specification of numerical values and associated definitions for fields that are identified as enumerations in architectures such as HLA and DIS. https://www.sisostandards.org/page/Standards
	Link 16 Simulation	Current	Open	SISO-STD-002-2021	Standard for Link 16 Simulation updates the standard for Link 16 message exchange and Joint Tactical Information Distribution System (JTIDS) network simulation in the DIS and HLA interoperability frameworks. https://www.sisostandards.org/page/Standards

Category	Standard	Maturity	Type	Current Version	Comments
Information exchange data model cont.	Link 11 Simulation	Emerging	Open	SISO-STD-005-2023	A standard under development for Link 11 message exchange and JTIDS network simulation in the DIS and HLA interoperability frameworks. https://www.sisostandards.org/page/Standards
	AIS Simulation	Emerging	Open	N/A	A standard under development for the maritime Automatic Identification System (AIS) in the DIS and HLA interoperability frameworks. https://www.sisostandards.org/page/Standards

Synthetic Environments (SEs):					
Note: For SEs, with the rapid change of technology in this area, and not just for simulation purposes, the geospatial formats that could be used are very large in number. For this reason and in an attempt to be coherent with Defence Geospatial community, the DMSO TA will support the use of the standards identified in Def Stan 00-102: Policy on the Application of Geospatial Information Standards where possible.					
Processed data sources and formats	Shapefile	Current	De facto	July 1998	A shapefile is an ESRI vector data storage format for storing the location, shape, and attributes of geographic features. http://www.esri.com/library/whitepapers/pdfs/shapefile.pdf
	DTED	Current	Official	MIL-PRF-89020B	Digital Terrain Elevation Data (DTED) is a standard for a uniform matrix of terrain elevation values that provides basic quantitative data for systems and applications that require terrain elevation, slope, and/or surface roughness information. https://www.nga.mil/ProductsServices/TopographicalTerrestrial/Pages/DigitalTerrainElevationData.aspx
	GeoTIFF	Current	Official	v1.0	An open source Geo metadata standard which allows dereferencing information to be embedded within a Tagged Image File Format (TIFF) file. http://web.archive.org/web/20160403164508/http://www.remotesensing.org/geotiff/spec/geotiffhome.html
	JPEG2000	Current	Open	ISO/IEC 15444	An image compression standard and coding system. https://www.iso.org/ics/35.040.30/x/
	CDB	Current	Open	OGC CDB 1.2	A standardized model and structure for a single, “versionable”, virtual representation of the earth. http://www.opengeospatial.org/standards/cdb

Category	Standard	Maturity	Type	Current Version	Comments
3D models	OpenFlight	Current	De facto	v16.7	A 3D geometry model file format, under proposal to OGC as an Open Standard. http://www.presagis.com/products_services/standards/openflight/more/openflight_specifications/
Production processes	RIEDP	Emerging	Open	N/A	Developing standards looking at the production and reuse of environmental databases. https://www.sisostandards.org/page/Standards
Visualisation	CIGI	Mandated	Open	SISO-STD-013-2014	Standard for Common Image Generator Interface (CIGI), Version 4.0 covering interoperability across real-time image generators and host systems through a common method for communications. https://www.sisostandards.org/page/Standards
Simulation analysis and evaluation	DDCA	Mandated	Open	SISO-STD-015-2016	An object model that is designed to specify the states and behaviours required for multiple discrete debrief systems to interoperate during a distributed debrief event. https://www.sisostandards.org/page/Standards

Category	Standard	Maturity	Type	Current Version	Comments
General	SEDRIS EDCS	Current	Open	ISO/IEC 18025: 2005(E)	The Environmental Data Coding Specification (EDCS) provides a mechanism to specify the environmental "things" that a particular data model construct is intended to represent. Covered by the Feature Data Coding STANAG 4662. http://www.sedris.org/edcs.htm
	SEDRIS SRM	Current	Open	ISO/IEC 18026: 2009(E)	The Spatial Reference Model (SRM) allows the context in which coordinates, directions, and distances are defined to be known succinctly, and converted accurately into multiple definitions and representations of geo- and non-georeferenced space. Spatial reference model – STANAG 4663. http://standards.sedris.org/#18026
Miscellaneous	Open Document Formats (ODF)	Mandated	Open	OASIS Standard (OpenDocument) Version 1.2	This standard specifies the characteristics of an XML-based application-independent and platform-independent digital document file format, as well as the characteristics of software applications which read, write and process such documents. This standard is applicable to document authoring, editing, viewing, exchange and archiving, including text documents, spreadsheets, presentation graphics, drawings, charts and similar documents commonly used by personal productivity software applications. http://docs.oasis-open.org/office/v1.2/OpenDocument-v1.2.html