



SEDRIS

Usage Assessment

Overview

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BACKGROUND

High Level Task (HLT)

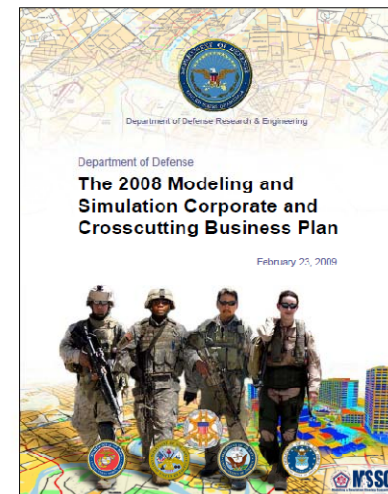
Strategic Vision for DoD Modeling and Simulation

Empower DoD with modeling and simulation capabilities that effectively and efficiently support the full spectrum of the Department's activities and operations.

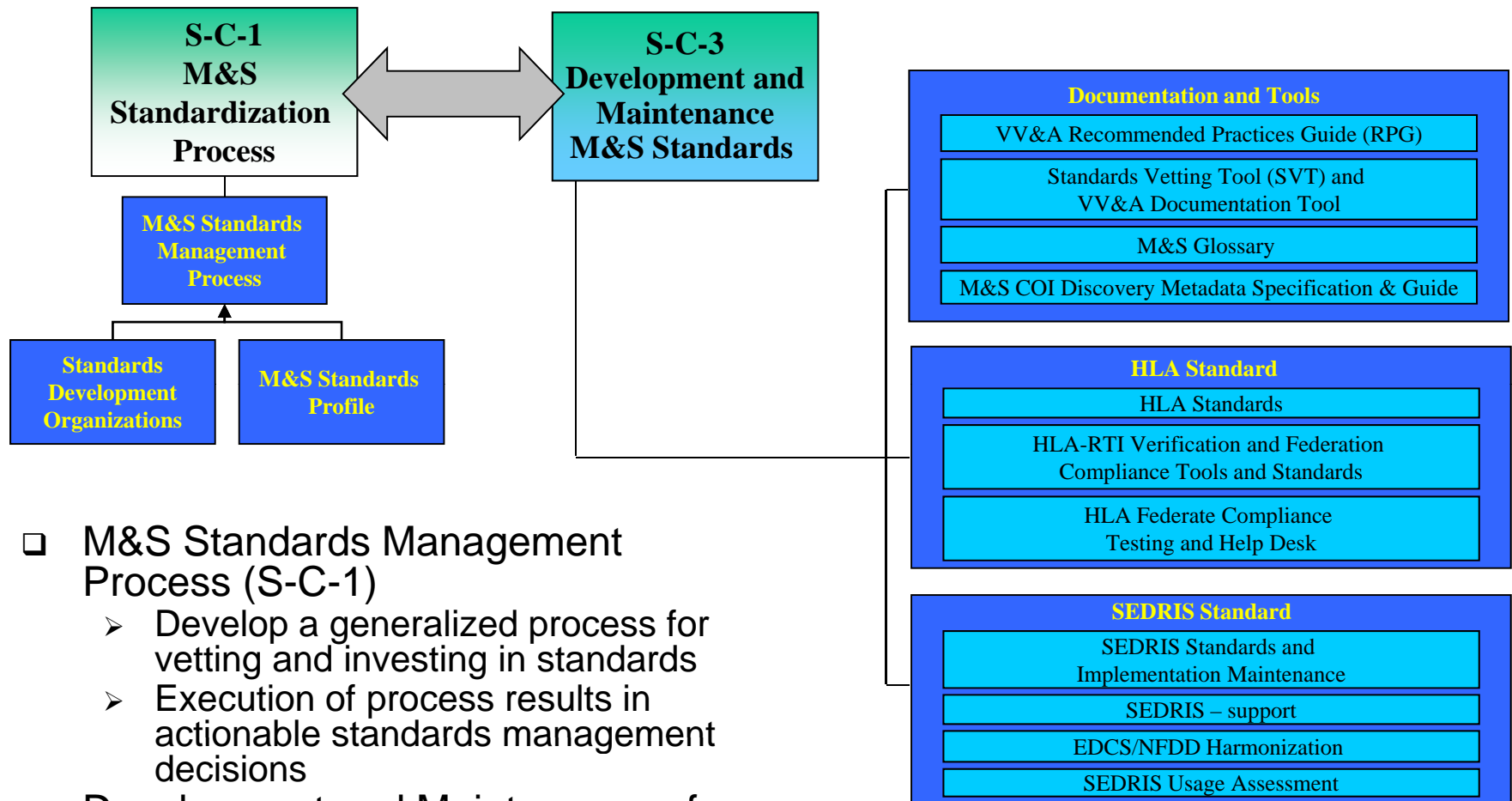
- ❑ To achieve progress toward the M&S Strategic Objectives, the M&S SC identified several critical HLTs to be executed in FY09-10
- ❑ One of the HLTs, which supports the “Standards” Strategic Objective is the S-C-3 HLT
 - Develop and Maintain M&S Standards
- ❑ One of the initiatives under the S-C-3 HLT is the SEDRIS Usage Assessment

Strategic Objectives

- 1: Standards**
- 2: Interoperability**
- 3: Visibility**



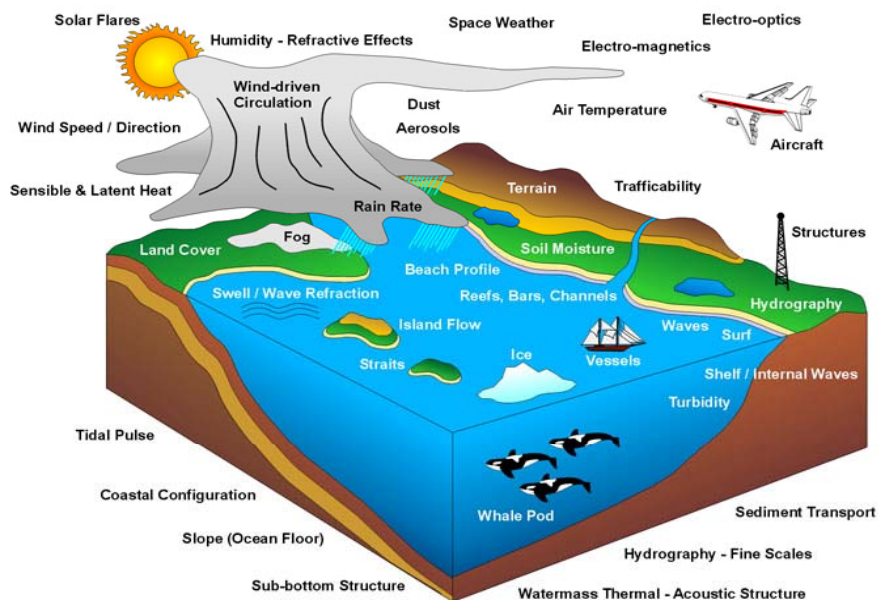
S-C-1 & S-C-3 HLT



- ❑ M&S Standards Management Process (S-C-1)
 - Develop a generalized process for vetting and investing in standards
 - Execution of process results in actionable standards management decisions
- ❑ Development and Maintenance of M&S Standards (S-C-3)
 - Manages corporate-level M&S standards
 - Makes recommendations and provides user feedback on future standards decisions

SEDRIS* Overview

SEDRIS - All Environmental Data



Motivation: Facilitate the unambiguous understanding, transformation, and exchange of environmental data in order to realize major improvements in M&S cost-effectiveness.

Scope: Comprehensive approach to describe all environmental information and relationships among data elements, including polymorphism. May be used in any application domain.

Utility: (1) To build mediation services for the exchange of environmental data among multiple end-user applications and formats (*i.e.*, taking data from various sources, both conventional and non-conventional, in different formats, and integrating them into a single database); (2) to access, relate, and integrate environmental data and effects in different spectrums (*e.g.*, visual, radar, infrared); (3) to express environmental data requirements. (4) to convert positional information among earth models; (5) to build various useful software applications, including converters and tools.

Five Components: The Data Representation Model (DRM), Environmental Data Coding Specification (EDCS), and Spatial Reference Model (SRM), are used to express the semantics and representational schema of environmental data. The Application Program Interfaces (API) and SEDRIS Transmittal Format (STF) are used to exchange environmental data.

Standards: These five components are defined in a series of eight international standards (ISO/IEC 180xx family), available at standards.sedris.org. The DRM, EDCS, and SRM standards can be extended via online registries.

Software development kits (SDKs), along with associated documentation, are used to build standards-compliant software applications. SDKs are provided in various software languages and for multiple computing platforms.

Converters and tools, built using the SDKs, include converters between STF and end user formats (*e.g.*, Shapefile, CTDB, GRIB), inspection and verification tools (*e.g.*, SEE-IT, Focus), and visualization tools (*e.g.*, Model Viewer, Side-by-Side).

User support services: Tutorials, papers, presentations, and Help Desk services are available at www.sedris.org.

* **SEDRIS** originally stood for **Synthetic Environment Data Representation and Interchange Specification**, but as development progressed it became clear that name was not adequately descriptive. It is now used without definition.

SEDRIS USAGE ASSESSMENT

Tasking and Methodology

Tasking (summarized): Determine...

- ❑ Who is using SEDRIS standards
- ❑ How those standards are being used (to meet what DoD mission)
- ❑ What SEDRIS standards and associated technologies are being used
- ❑ What would be the impact to the user if SEDRIS activities were curtailed

Methodology:

- ❑ Developed one-page SEDRIS overview and questionnaire for users of environmental data
- ❑ Widely distributed questionnaire via multiple email distribution lists
 - M&S IPT, NTSA, NDIA M&S Cmte, SISO, I/ITSEC, HPCMO, SimSummit, etc.
- ❑ Binned and reviewed responses to produce initial assessment
- ❑ Interviewed 40% of SEDRIS users (resource limited) to:
 - (a) resolve any inconsistencies in a response
 - (b) clarify associations
 - (c) identify/clarify supported programs and activities
 - (d) assess user impact of changes to SEDRIS support
- ❑ Provide briefing and written report with findings & recommendations

Caveats

- ❑ Findings are based on inputs from the U.S. Defense Community
 - Findings ignore inputs from other nations, other U.S. government agencies, etc.
 - The U.S. Defense Community includes DoD and other organizations providing funded support to DoD, including:
 - Contractors
 - FFRDCs
 - UARCs
 - Academia
- ❑ We associated U.S. Defense Community responses with DoD Components and the (then six) M&S User Communities, with multiple associations possible
 - For example, if a UARC was working for the Navy in support of acquisition and testing activities, its response was credited as Navy, Acquisition Community, and Testing Community associations
- ❑ The cited associations are based on interviews wherever possible
 - If an interview was not conducted, we accepted the DoD Component and M&S User Community associations claimed by the respondent (via email)

Response to Questionnaire

- ❑ 188 total responses
- ❑ 181 responses from environmental data users
 - 21 from outside the U.S. Defense Community (other U.S. gov't agencies, foreign nations)
 - 160 from U.S. Defense Community (all statistics that follow are based on this #)
- ❑ Responses by types of environmental data used:
18% space, 48% atmosphere, 74% terrain, 28% ocean, 72% manmade or natural objects, 53% effects, 13% other
- ❑ Responses by type organization:

76 DoD (Gov't) →
74 DoD Contractors
10 FFRDC/UARC/Academia
160 total

40 USA
18 USAF
9 USN
3 USMC
1 Joint Command
5 Other DoD (OSD, Defense Agencies, Field Activities, etc.)

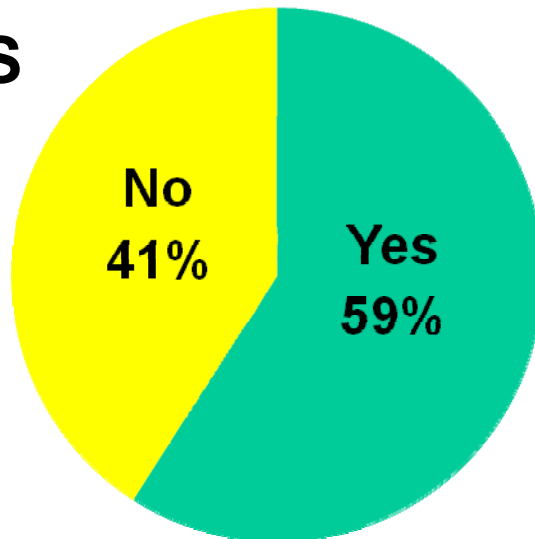
Finding: Broad user cross-section responded

U.S. Defense Community Respondents

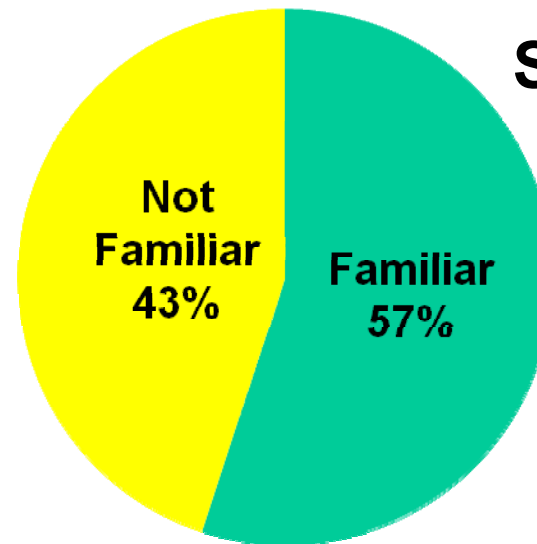
Among 160 U.S. Defense Community respondents:

- **94 (59%) use SEDRIS (directly and/or indirectly)**
- 66 (41%) use SEDRIS directly
- 86 (54%) use SEDRIS indirectly (*i.e., by using OneSAF, TENA, SE Core, CCTT, WARSIM, RUGUD, Side-by-Side, SEE-IT, TerraTools, etc.*)
- 66 (41%) don't use SEDRIS
- **68 (43%) had only a vague, or no, familiarity with SEDRIS**
(*i.e., some non-use of SEDRIS is attributable to a lack of awareness*)

**SEDRIS
Use**



**SEDRIS
Familiarity**



Findings: - Most environmental data respondents are SEDRIS users
- SEDRIS familiarity not as high as assumed

What SEDRIS Products Are Being Used

The 66 direct SEDRIS users employ these SEDRIS products:

- ❑ Five core components (and associated standards)
 - Data Representation Model (DRM): 30
 - Environmental Data Coding Specification (EDCS): 43
 - Spatial Reference Model (SRM): 46
 - Application Program Interfaces (APIs): 28
 - SEDRIS Transmittal Format (STF): 37
- ❑ Online registries (to extend the standards): 20
- ❑ Software Development Kits (SDKs): 33
- ❑ Tools and converters: 44
- ❑ SEDRIS support services: 40

Finding: All SEDRIS products are being used

Defense Community SEDRIS Users

303 associations of the 94 direct and/or indirect users of SEDRIS:

➤ DoD Component supported

- 71% USA (30+4, 30, 3)
- 12% USAF (0+2, 9, 0)
- 17% USN (1+3, 11, 1)
- 16% USMC (2+4, 9, 0)
- 16% Joint Cmd. (1+6, 5, 3)
- 13% Other DoD (3+0, 7, 2)

Key

- 1st # = DoD orgs (own component + others)
- 2nd # = Contractors
- 3rd # = FFRDC/UARC/academia

➤ M&S User Community supported

- 35% Acquisition (16, 15, 2)
- 11% Analysis (6, 4, 0)
- 26% Experimentation (13, 9, 2)
- 20% Planning (10, 8, 1)
- 24% Testing (13, 8, 2)
- 62% Training (21, 33, 4)

Key

- 1st # = DoD orgs in that community
- 2nd # = Contractors
- 3rd # = FFRDC/UARC/academia

Finding: SEDRIS is used broadly among the DoD Components and M&S User Communities

Some Programs & Activities Using SEDRIS

Using SEDRIS directly:

- ❑ Aircraft simulators: B-2, B-52, C-130, KC-10, KC-135, MH-60, SH-60, T-45, UH-6
- ❑ Apache Recurring Skills Trainer
- ❑ Army Nat'l Guard (ANG) Joint Training Experimentation Program
- ❑ ANG Experimentation Combat Training Capability
- ❑ Battle Lab Experimentation Test
- ❑ Battle Lab Collaborative Simulation Environment
- ❑ Battlespace Terrain Reasoning & Awareness
- ❑ Close Combat Tactical Trainer
- ❑ Complete Acoustic Training System
- ❑ Common Training Infrastructure Architecture
- ❑ **Future Combat Systems (FCS)**
- ❑ JFCOM Joint Experimentation
- ❑ JMETC / TENA SDA
- ❑ Joint Common Object Model
- ❑ **JSF (F-35) Visual DB Development**
- ❑ Marine Corps Instrumented Training System
- ❑ NGA Geodesy

- ❑ NSA Zones of Protection
- ❑ One SAF
- ❑ SE Core
- ❑ Simulation for Dynamic Situational Awareness & Prediction (AFRL)
- ❑ Terra Harvest Unmanned Ground Sensor Controller (DIA)
- ❑ Urban Operations Training System
- ❑ USMC Range Modernization & Transformation
- ❑ USMC Deployable Virtual Training Environment
- ❑ WARSIM
- ❑ **Zumwalt DDG-1000**

Using SEDRIS indirectly:

- ❑ Classified programs at Boeing Virtual Warfare Center
- ❑ Constructive analyses supporting the **Global Nuclear Defense System** (DTRA)
- ❑ **Joint Tactical Radio System**
- ❑ **Littoral Combat Ship (LCS)**
- ❑ USMC CACCTUS
- ❑ USMC Combat Convoy Simulator

A partial list, gathered during interviews with 40% of SEDRIS Users

SEDRIS Usage May Grow

- ❑ 68 respondents (43%) had only a vague or no familiarity with SEDRIS
 - Unfamiliarity was highest in USAF, USN, and Other DoD
- ❑ Many respondents suggested more education and publicity
 - *“Need to educate Survivability M&S community”* (USAF Aeronautical Systems Center/END)
 - *“SEDRIS overview class at I/ITSEC”* (Boeing Virtual Warfare Center)
 - *“Overview of SEDRIS components & how they work together”* (Honeywell)
 - *“Educate the simulation community”* (SAIC - TSMO/SMDC)
 - *“Overview of capabilities and available features”* (DTRA)
 - *“Better DoD support – more advocacy, dedicated sponsorship”* (TRMC)
- ❑ 38 said they don’t use SEDRIS now, but don’t know about the future
- ❑ 13 said they don’t use SEDRIS now, but will in the future
 - Six of those previously had only a vague, or no, familiarity with SEDRIS

Finding: SEDRIS usage will likely increase as familiarity increases

Suggestions to make SEDRIS more Useful or Usable

Many suggestions received, in 4 areas (a few examples shown for each):

- ❑ Education and outreach
 - User guides and detailed “how to” manuals (Northrop Grumman)
 - Greater publication/awareness of SEDRIS (Janus Research)
 - Annual SEDRIS technology conference (SAIC, PM FCS)
- ❑ Management initiatives
 - Integrated roadmap of releases and updates (Honeywell)
 - SEDRIS stakeholder consortium (RDECOM - STTC)
 - Provide source code for some of the sample tools (Boeing)
- ❑ Technical component improvements
 - Tools and converters to go into and out of *de facto* industry standard formats and toolkits, such as GeoTIFF, Shape, and OpenFlight (NAVAIR)
 - Spatial Reference Model enhancement with ISO 18026 Amendment 2 (NGA)
 - Keep all tools up to date (PM FCS)
- ❑ Support services
 - Make website less confusing & abstract; provide readily usable stuff (ONI)
 - Seamless integration with online data sources (JHU APL)

Finding: Users have many helpful suggestions for improving SEDRIS

User Impact If SEDRIS Support Curtailed

- ❑ **No SEDRIS support services (help desk, website, program support)**
 - *“If these services are not provided, then SEDRIS will not be used.”* (Boeing)
 - *“...without [this documentation] we’d treat the software as unmaintainable/unsupported and thus either as a risk or seek alternatives”* (DIA)
- ❑ **No tools and utilities**
 - *“SEDRIS to CTDB has no replacement; can save 40-80...hours”* (Boeing)
- ❑ **No SEDRIS standards**
 - *“Would take several man-years to implement [what’s] in the SRM”* (NGA)
 - *“[Would negate] cost savings in taking the problems from general problems to specific problems”* (JHU APL)
 - *“Would devolve into [suboptimal] point solutions...”* (IDA)
 - *Without EDCS “would make up our own attribution”* (ERDC)
 - *Without SRM standards maintenance would “add an FTE to support”* (BAE)
 - *“Without STF no solution would be provided for correlated DBs... Without SEDRIS capability, it would not be done.”* (SRI)

Findings:

- Curtailment of support risks driving end-users away & raising overall DoD costs
- User community perceives M&S CO support is indicative of SEDRIS’ future
- It is more cost-effective for DoD to pay for this support centrally

Questions?

BACKUP SLIDES

Questionnaire

- Organization name, POC info
- Environmental data you work with? How?
- Familiarity with SEDRIS?
- Use of M&S products that use SEDRIS (e.g., TENA, OneSAF, SE Core, Side-by-side)?
- Direct use of SEDRIS?
 - Which of five core components?
 - Online registries?
 - Software development kits?
 - Tools or converters?
 - SEDRIS Support services?
- What could be done to make SEDRIS more useful or usable to you?
- If you considered using SEDRIS, but don't, what factors led to that decision?
- Are you considering using SEDRIS in the future?
- Remarks

Some Example Comments About SEDRIS

Critical

- ❑ *OpenFlight is the industry standard and... easily extensible... SEDRIS appears to be a DoD fabrication (aka - ADA). [TARDEC]*
- ❑ *SEDRIS has its uses, but the flight simulation community... is far better served by a more efficient and lightweight method of sharing data, such as the Air Force's CDS ... or the Navy's NPSI suite [NAVAIR]*
- ❑ *As long as the producers of environment data do not use SEDRIS, then there's really no reason for the consumers to use it. [Mitre]*

Laudatory

- ❑ *SEDRIS SRM and associated software are absolutely crucial for continued functioning of TENA Middleware & Object Model software [SAIC]*
- ❑ *SEDRIS is not perfect by any means but ...is a large step in the right direction. ... It is important from a cost and productivity standpoint to retain a commitment to open standards in all industries [Boeing]*
- ❑ *SEDRIS was the key enabler for us to be able to create correlated, high-fidelity, geo-referenced terrain which, in turn, was the key enabler in developing LVC federations [SRI]*

Finding: Conflicting opinions, many misunderstandings