

Can Acquiring Structured Data Improve a Learning Content Development Environment?

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Overview

- ▶ **Problem Statement**
- ▶ **Structured Data and its Benefits**
- ▶ **NPS Survey Summary**
- ▶ **Structured Data Acquisition Policy Overview**
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Problem Statement

- ▶ **Minimal governance or standardization for the acquisition, design and development, or life cycle management of CBT curricula.**

Acquisition

Design/Development

Lifecycle Management

Source: *NAVINGEN Computer Based Training Study. (March 2009)*

Quantitative Basis for Integrated Data

“Of the 408 projects submitted for Computer-Based Training and PC-Simulation Maintenance, *two-thirds* reported the primary reason for the maintenance request was due to equipment or publication changes. Better integration of technical information with training would alleviate some of this rework.”

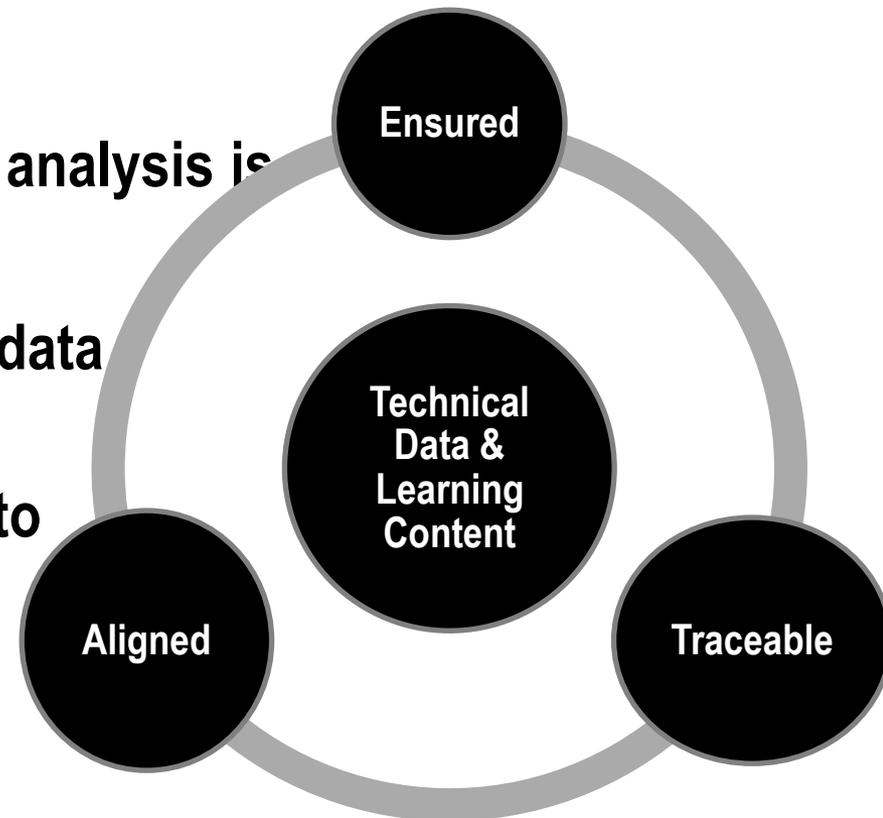
Source: *Computer-Based Training & Personal Computer-Simulation Prioritization and Cost Estimation Assessment for NETC COO Supporting FY10/11 Spend Plan and POM12 Submittal (NETC 2009)*

Structured Data & Acquisition

- ▶ **Structured learning data based on specifications is a content management best practice.**

- ▶ **Benefits:**

- ▶ **(MS A) Ensure** logistical support analysis is linked to product support.
- ▶ **(MS B) Trace** spiral development data development.
- ▶ **(MS C) Align** tech data products to fielded and configured systems.



Structured Data and its Benefits

► Formal representation of data (separated from context)

- Examples: S1000D, DITA: <http://xml.coverpages.org/xmlApplications.html>

Feature	Benefit
Device Rendering:	Structured markup allows content to be deployed to different devices without locking the content into the device.
Style Rendering	Structured markup allows for a diversity of styles to be applied to the same data.
Write Once:	Structured markup allows content to be isolated as a single entity for multiple purposes.
Multi Lingual:	Structured markup allows for effective transformation of content from one language to another.
Standard Management	Structured data allows collections of related information types to be managed in a common strategy.

One Survey on Structured DoD Technical Data

- **Survey Title:** Should S1000D be required by DoD?
- **Sponsor:** OSD P&R
- **Conducted by:** Naval Postgraduate School
 - (Oct 2009 – May 2010: 204 participants)
- **Focus:** Use of an XML based data markup specification → S1000D
- **S1000D:** a technical data specification for life cycle management
- **Primary results to question:**
 - All DoD systems? (40.6%)
 - New acquisitions but not legacy? (62.7%)
 - Large ACAT (I/II) but not small acquisitions? (51.3%)
 - 74% believed S1000D markup provides benefit to technical data and training integration.
 - [Link to NPS Survey on Use of S1000D](#)

Structured Data in Acquisition Policies

- **DoD policies providing clear direction for acquisition planning and management as each relates to learning content and structured data:**
 - ▶ **DoD Instruction 5000.2 – Operation of the Defense Acquisition System**
 - ▶ **1322.26 - Development, Management, and Delivery of Distributed Learning**
 - ▶ **The Defense Acquisition Guidebook**
 - ▶ **DoD Directive 8320.02 – Data Sharing in Net-Centric DoD**

As-Is “Data Management” References in 5000.02

- **Section 5, Technology Development Phase (Milestone A)**
 - Para 7 - “Technical Development Strategy” shall include a ***data management strategy***.
- **Section 8, Operations and Support Phase (Milestone C)**
 - Life-cycle sustainment considerations include supply; maintenance; transportation; sustaining engineering; ***data management; configuration management; HSI***
- **Enclosure 12 “Data Management and Technical Data Rights”**
 - “Program Managers for ACAT I and II programs, regardless of planned sustainment approach, ***shall assess the long-term technical data needs of their systems and reflect that assessment in a Data Management Strategy (DMS).***”

As-Is “Training” References in System Acq Policy (5000.02)

– Enc 2 – Procedures

- Section 8 - Operations and Support Phase
- C – Phase Description , (1) Life Cycle Sustainment
 - Optimize Operational Readiness:
 - (a) Human-factors engineering to design systems that require minimal manpower; **provide effective training**; can be operated and maintained by users.

– Enc 6 - Integrated Testing and Evaluation Planning

- Section 2 - Planning Requirements
 - (3) Test planning and conduct shall take full advantage of existing investment in DoD ranges, facilities, and other resources.
Embedded instrumentation shall be designed and developed to facilitate training, logistics support...

As-Is “Training” References in System Acq Policy (5000.02)

– Enc E - Human Systems Integration Planning

• (e) Training

- The PM shall develop training system plans to maximize the use of new learning techniques, simulation technology, ***embedded training and distributed learning (DoD Instruction 1322.26 (Reference (b))***, and instrumentation systems that provide “anytime, anyplace” training and reduce the demand on the training establishment.

As-Is State for Data Mgt Guidelines in 5000.02

- **Very high level**
- **No specific “how to” guidance on:**
 - **data management techniques.**
 - **training development techniques.**
 - **Front-end analysis**
 - **Reuse**

- **5.4. The Heads of the DoD Components shall:**
 - **5.4.1. Develop and implement regulations and procedures for developing, managing, and delivering distributed learning consistent with this Instruction and other applicable DoD Directives.**
 - **5.4.2. Support the other DoD Components in sharing, exchanging, and reusing distributed learning content.**
 - **5.4.3. *Provide life-cycle management for distributed learning content.***

- **No specific guidance on how to implement life cycle management for DLC.**

- **5.1.2.1 – Key Program Documents**

- Acquisition Strategy – “...it should address how the ***product support package*** required to support the materiel management, distribution, technical data management, support equipment, maintenance, ***training***, configuration management, engineering support, supply support, and failure reporting/analysis, functions will be acquired.”

- **5.1.6.2. Data and Software Requirements and Contractor’s Assertions Lists**
 - Specific CDRL items intended to convey ***form, fit, and function*** data or that are intended to provide operating, maintenance and ***training data (such as technical manuals)*** should be identified as such.

As-Is “Training” References in the DAG

- **5.4.2.2.1. Initial Life-Cycle Sustainment Plan**
 - Supportability Analysis Process – “Training and HSI requirements, including the ***training requirements/objectives (for both operator and maintenance training) relative to training courses, materials, and training equipment*** to enable personnel to effectively perform tasks supporting the CONOPS and the maintenance concept.

S1000D Reference in the DAG

- **4.2.3.1.7.1. Data Acquisition**
- Data acquisition encompasses ***all activities*** that create, obtain, or access data from internal or external sources to satisfy data requirements driven by the data strategy. ***When at all possible, data should be acquired in a structured format that is independent of the method of access or delivery and defined by or based on open standards.***
- Consider the following standards for defining the structure of digital data:
 - ISO 10303, Standard for the Exchange of Product Model Data (STEP)
 - Object Management Group (OMG) Systems Modeling Language (SysML), (<http://www.omg.sysml.org/>)
 - ***S1000D International Specification for Technical Publications Utilizing a Common Source Database (<http://www.s1000d.org/>)***

▶ Data Sharing in a Net-Centric DoD

- Direct the use of resources to implement data sharing within the Global Information Grid (GIG).
- **The Directive sets data policy in section 4, para 4.2:**
 - Data assets shall be made visible by *creating and associating metadata (“tagging”), including discovery metadata, for each asset.*
 - **Para 4.7 - “semantic and structural agreements for data sharing *shall be promoted through communities (e.g., communities of interest (COIs)), consisting of data users (producers and consumers) and system developers.***

Cost Benefit Analysis

- **Title:** CBA of a Bridge to Integrate the Management of Technical Information for Producing Technical Manuals & Training Courses
- **Sponsor:** OSD/AT&L/RTOC
- **Conducted by:** Institute for Defense Analyses & ADL
 - (May 2009 – Nov 2010)
- **Focus Metric:** Measure the *reduction in hours* needed to develop and manage integrated data.
- **Measurements Based on four “Bridge Project” principles**
 - ▶ Technical information structured in S1000D
 - ▶ Technical information stored in common source database
 - ▶ Connect learning content development tools to common source database
 - ▶ Quickly identify information in need of life cycle review.

Cost Benefits Analysis – Data Sets

- ▶ **The following results have been extracted from the analysis of two areas:**
 - ▶ **32 activities required to develop a 500 page technical manual**
 - ▶ **Activities and manuals based on Hull, Mechanical & Electrical content at NAVSSES Philadelphia**
 - ▶ **80 activities required to develop one hour of courseware**
 - ▶ **Activities drawn from Submarine Learning Center, Groton, CT and factored against the 3,292 hours of courseware delivered to Navy e-Learning in 2009.**

Cost Benefit Analysis: Methodology

- **Estimated the savings for producing a nominal technical manual and a nominal training course.**
 - **Scaled up the results to the Navy-wide production.**
- **Current steps were compared to a “to-be” integrated data development and management process.**
 - **Differences based on structured content and Bridge principles.**
- **Staff hour estimates needed to perform all tasks for the nominal products were captured.**
 - **Estimated staff hours needed to perform Bridge business model were subtracted from the as-is system.**
- **Savings were calculated by applying average hourly pay rates for content developers.**

Cost Benefit Analysis: Results

- ▶ **Reduction of Life Cycle Support Hours**
 - **Technical Manual → 490 hrs (6%)**
 - **One hour of courseware → 66 hrs (16%)**
- ▶ **Estimated 10-Year Savings**
 - **Range from \$32M to \$165.5M**
- **Range due to “Sensitivity Analysis”**
 - **Regional pay scales**
 - **Amount of technical-based training**
 - **Future infrastructure and software investments**
 - **Training development and execution**

In conclusion...

- ▶ **Can Acquiring Structured Data Improve a Learning Content Development Environment?Yes....**
 - ▶ 66% of curriculum changes driven by system changes.
 - ▶ No governance and infrastructure technical curriculum life cycles.
 - ▶ 205 survey participants want OSD to develop S1000D policy.
 - ▶ OSD policies advise the use of structured data for all product support.
 - ▶ CBA suggests reduction in total data ownership costs are lowered with structured data and centralized management.
- ▶ **...But...**
 - ▶ Government must fund sustainment activities for structured data to be a benefit to learning content development environments.

In conclusion

- **...And...**
 - **The major improvement needed for technical DoD curriculum is a governance policy that calls for and defines a next generation concept of operations for aligning technical and training data for all acquired systems.**

Thank you!

Questions/Comments?

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