XML Best Practices: The United States Military

The U.S. Department of Defense was early to recognize the value of XML to enable interoperability, leading to significant initiatives by the military branches. Other enterprises can leverage these efforts.

Elements of the U.S. military have been leaders in looking to Extensible Markup Language (XML) as a means of enabling interoperability among disparate content stores and applications. There are five major activities.

**Task Force Web** ([www.tfw.navy.mil](http://www.tfw.navy.mil)) is a U.S. Navy initiative to Web-enable Navy applications. "Web-enabling" means that applications will be accessible to users (with appropriate access privileges) from their desktops, handhelds and network appliances via a portal. Using the application will be possible regardless of the local operating system or applications. XML, with the Web services infrastructure as the foundation (see Note 1), is the key enabling component for integration. The Web-enabled Navy supports:

- Common access for afloat and onshore resources
- Warfare and business applications
- Common data sources and data consolidation

The Naval Tool for Interoperability and Risk Assessment (NTIRA) is an application that presents capability views of naval combat organizations, ships and onshore organizations to help planners and decision makers assess the effect of budget changes on war fighting capabilities. The initial case study (reported in September 2002) was to deploy NTIRA as user-facing services for the Naval Enterprise Portal; today, it exists as a client/server implementation.

**DON XML Policy:** The Department of the Navy’s (DON) XML Policy was issued in December 2002. ([http://164.224.120.193/itpolicyadmin/Uploads/0106UTQ59315.pdf](http://164.224.120.193/itpolicyadmin/Uploads/0106UTQ59315.pdf)). This document provides direction on:

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**Core Topics**
Knowledge & Content Mgmt., Collaboration & E-Learning: Content, Media and Publishing; E-Workplace Systems and Technology

**Government:** E-Government Applications and Infrastructure Technologies and Standards

**Key Issues**
What standards are evolving around e-government?

How will e-government affect IT infrastructure issues?

How will enterprises improve the operational efficiency of their e-workplace infrastructures during the next five years?

**Strategic Planning Assumptions**
Led primarily by DISA and the U.S. Navy, the U.S. government will build large XML component repositories by no later than year-end 2006 (0.7 probability).

By 2008, shared public vocabulary repositories will be the most common method of sharing XML data models (0.6 probability).

**Note 1**
**The Core Web Services**
The foundation standards enabling Web services are:

- Universal Description, Discovery and Integration (UDDI) for creating directories and finding Web resources
- Simple Object Access Protocol (SOAP) to send requests and replies for services
- Web Services Description Language (WSDL) to describe the Web-accessible service and its interface
• Which standards organizations are to take precedence in defining XML technical standards. The technical specifications of the World Wide Web Consortium (W3C) take precedence over other accredited bodies — the International Organization for Standardization, American National Standards Institute and others

• How application-specific XML components are to be selected for reuse — reuse standards work from commercial efforts first, then follow U.S. Department of Defense (DOD) standards and lastly follow DON standards

• The prohibition of use of proprietary extensions to XML specifications by DON XML developers

• The DON will follow the DOD guidance for registration of XML components with the DOD XML Registry.

The document also outlines responsibilities for developing XML governance policy, and the DON's XML Working Group responsibilities for XML implementation strategy and XML namespaces coordination. Namespaces coordination work is essential because XML namespaces identify the Universal Resource Identifiers (the Web locations) for XML component definitions. A namespace is the reference that determines whether an XML definition is known by an application. If the namespace matches the one an application has as its reference, it will know how to process the incoming data stream that points to that namespace.


The Developer's Guide provides various key guidelines, including:

• Guidance on developing XML components (XML elements and attributes) as well as XML schemas (complete transactions). Gartner has maintained for some time that there are advantages to developing smaller pieces of XML that can be reused in other transactions and models (see Note 2).
DON XML developers are directed to register components (for example, elements) in the DOD XML Registry to determine if elements already exist and reuse predefined components that are registered there, to reuse predefined vocabularies and to seek standards developed by voluntary consensus standards groups (see Note 3).

Document type definitions (DTDs) may be used for document-oriented content (such as paragraphs or chapters), but the data-oriented XML schema language is preferred for XML model design.

XML schema development should be the joint effort of business and functional data experts, program managers and IT specialists. Specifically, it should not be the sole task of the IS staff and XML component names should not be taken from relational database names. The Developer’s Guide provides suggestions about naming conventions for XML elements and attributes, a task that often creates great contention among participants.

**Data Repository:** In April 2002, the Office of the Secretary of Defense established the DOD XML Registry and Clearinghouse for XML components. The executive agent is the Defense Information Systems Agency (DISA; see http://diides.ncr.disa.mil/xmlreg/user/index.cfm), which has worked on XML repositories dating back to 1998.

The significance of this work and role is twofold:

- It provides a common methodology for registering the XML data models and sharing with other organizations that need to represent and exchange data about the same entities (for example, organizations, equipment, intelligence). The methodology can reduce the arbitrariness of data model creation, increase reuse and reduce cost.

- It allows different parties to register XML schema (valid XML data structures; see Note 4) and vocabularies (smaller XML components that are not necessarily schema) for other users to find and reuse as necessary. This makes the repository behave as a dictionary in which different organizations have shareable data models by using the same data definitions.

In addition, the Registry will contain a data element dictionary and data models in simple ASCII from the Defense Data Dictionary System. The repository will also store standard metadata for all XML data assets. This approach will be identified through changes to the DOD Data Administration policy to be defined during 2Q03.

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**Note 2**

Related Research

“Can Language Help Build XML-Defined Standards?”

“Here’s What’s Wrong With XML-Defined Standards”

“ASC X12 Proposes CICA for XML Specification Definition”

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**Note 3**

Voluntary Consensus Standard

Voluntary consensus standards are developed by domestic or international organizations through processes characterized by 1) openness, 2) a balance of interest, 3) due process, 4) an appeals process, and 5) consensus (general agreement but not necessarily unanimity).

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**Note 4**

Valid vs. Well-Formed XML

An XML document is “valid” if it has an associated document type declaration (a DTD or schema) and the document complies with the constraints defined in the declaration. The document is “well-formed” if it conforms to the rules of XML syntax as defined by the W3C.
U.S. Air Force: The Air Force is XML implementation guidelines and procedures to ensure consistency and avoid duplication of effort across Air Force commands. It anticipates that the first set of implementation guidance should be complete and disseminated by the end of 2Q03.

The Air Force plays a leading role in the effort to migrate the U.S. and NATO Message Text Formats (USMTF and NATO MTF, respectively) to XML representations. It has developed an AF XML-MTF road map to guide future work on this and related DOD XML messaging activities.

The Air Force Scientific Advisory Board recommended the Joint Battlespace Infosphere (JBI) concept in 1999 (see www.rl.af.mil/programs/jbi/) as an infrastructure to integrate, aggregate and distribute information to all combat echelons. XML is a key enabling technology to create the link between content creators and content consumers to deliver the “right information to the right user at the right time in the right format” to multiple devices, including PCs and wireless mobile devices (see www.mitre.org/pubs/edge/winter_02/wild.html). XML is key to describing metadata for content and “fuselets,” JBI construct for simple processing applications.

The Air Force Departmental Publishing Office recently selected PureEdge's XML-based electronic forms product that will enable personnel worldwide to file e-forms with electronic signatures. It is converting 18,000 forms that are used by more than 750,000 uniformed and civilian Air Force personnel worldwide.

U.S. Army: Since the early 1990s, the Army has led work in publishing its administrative, technical, equipment, training and doctrine publications in Standard Generalized Markup Language (SGML, XML's predecessor). In 2000, by using SGML source files and transforming them to XML, the Army began publishing in XML and plans to cut over to XML source files in the near future. It has a composition engine to output the SGML and XML files to print, Portable Document Format (PDF) and Web format, and will be switching to the Document Style Semantics and Specification Language (DSSSL) for composition on demand for the XML files. It has developed a set of Microsoft Word templates for content creation that are automatically transformed to SGML; these will be upgraded to convert directly to XML. It also maintains the Army SGML/XML Registry and Library of SGML/XML constructs. The library includes DTDs, XML Stylesheet Language (XSL), XML Stylesheet Language — Formatting Object (XSL-FO), Formatting Output Specification Instance (FOSI), DSSSL and SGML/XML tag definitions.

Other XML activities include:
Access and navigation of many official Army documents are supported with XML (see U.S. Army Administrative Publications and Forms at www.army.mil/usapa/epubs/New_Releases_1.html).

The Army has developed technology for technical manual delivery as Interactive Electronic Technical Manuals, where the troubleshooting logic is embedded in the document or enabled via links to electronic resources (see the Army Publishing Program at http://docs.usapa.belvoir.army.mil/jw2/xmldemo/r25_30/head.asp).

The Army is working on an XML-based program for managing the content collected by electronic forms across Army business processes.

The Value: The results of the U.S. military's XML efforts, begun during the last few years, should soon result in benefits manifested as shorter development cycles, more shared resources within and between military organizations, increased data model reusability and higher-quality data through successive "scrubbings" by multiple organizations. Commercial enterprises can profit from borrowing from these efforts. Led primarily by DISA and the U.S. Navy; the U.S. government will build large XML component repositories by no later than year-end 2006 (0.7 probability). By 2008, shared public vocabulary repositories will be the most-common method of sharing XML data models (0.6 probability).

Bottom Line: The U.S. military is deeply engaged in developing Extensible Markup Language-based resources. These will be used within the military branches, but can and should be used by commercial enterprises as well. There are three guidelines that should be followed:

- Look to the Defense Information Systems Agency repository framework as a best practice for developing a shared vocabulary repository. Use established repository components wherever possible.
- Use the U.S. Department of the Navy's XML Developer Guide as a template for your enterprise's XML developer rulebook.
- Look to the Army for leading work on formatting XML data with stylesheets.