

# **THE INTERACTIVE ELECTRONIC TECHNICAL MANUAL (IETM)**

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**Introduction to the Interactive Electronic Technical Manual (IETM) Concept, the DoD IETM Specifications, Emerging Navy Policy, and Approaches by Leading Navy Programs**

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# Existing Technical Manual Problems

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- **Costly to Produce and Manage**
- **Very Difficult to Field Changes (Change Pages)**
- **Difficult to Integrate with Automated Logistics Processes**
- **Poor Usability and Comprehensibility**

# The IETM Concept

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- **Utilize Emerging Technology Advances in Electronic Storage, Access, and Display**
- **Use Automated Authoring Capability to Develop Information Data Base**
- **Utilize User Friendly Electronic Display System**
- **Integrate IETM into Other Shipboard Automated Logistics Support and Diagnostic Systems**

# Operational Field Tests

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## Army, Navy, and Air Force Tests Documented:

- **Increases in User Performance - Less Errors and More Accurate Troubleshooting**
- **Satisfactory Performance from Less Experienced Personnel ->> Less Training Requirements**
- **Very High Level of User Acceptance**

# Summary of Payoff of IETMs

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- **Demonstrated Faster and More Accurate Maintenance**
- **Better Performance from Less Experienced Technicians**
- **Reduced TM Weight and Storage Allocation on Ships**
- **Eliminate Fleet Time to Maintain Paper TM Changes**
- **Technicians Want Them - Motivated to Use Effectively**

# Need Now is For Standards

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- **General Agreement in All Services that IETMs are Better than Paper TMs/TOs. No further tests needed.**
- **Need now is for:**
  - Authored Data Base Standards**
  - New Quality Assurance Procedures**
  - Presentation Systems Standards**
  - Business Cases for Conversion**
  - Procurement Procedures and Guidelines**

# **CURRENT DOD SPECIFICATION SUITE**

## **Interactive Electronic Technical Manuals (IETMs)**

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**FINAL SPECIFICATIONS WERE ISSUED ON 20 NOV 1992:**

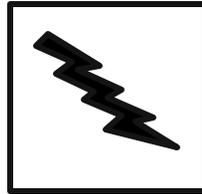
- **GENERAL IETM CONTENT, STYLE, FORMAT, AND USER-INTERACTION REQUIREMENTS  
(MIL-M-87268)**
- **IETM REVISABLE DATA BASE REQUIREMENTS  
(MIL-D-87269)**
- **IETM QUALITY ASSURANCE PROGRAM  
(MIL-Q-87270)**

# **GENERAL CONTENT, STYLE, FORMAT, AND USER-INTERACTION SPECIFICATION (MIL-M-87268)**

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- **General Content and Style Requirements for:**
  - Administrative Information**
  - Text**
  - Graphics**
  - Prompts**
  - Warnings, Cautions, and Notes**
  - Display Formats (Frame Templates)**

**WARNING**

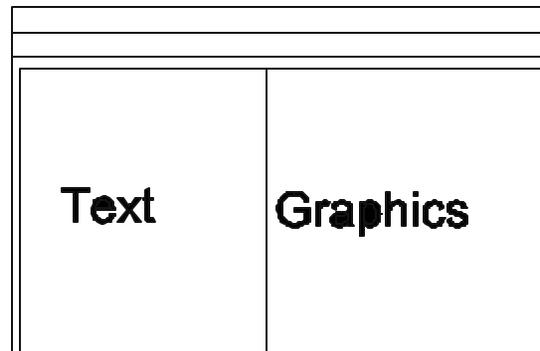


**Removal of cover without  
disconnecting power cord  
may result in severe  
electric shock.**

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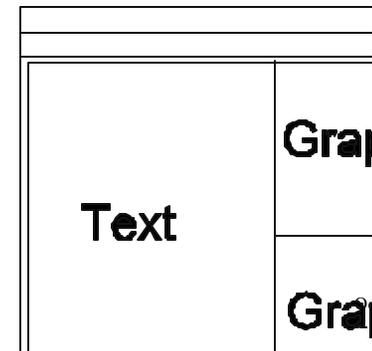


**One Text Pane**



**Text**

**Graphics**



**Text**

**Graphic**

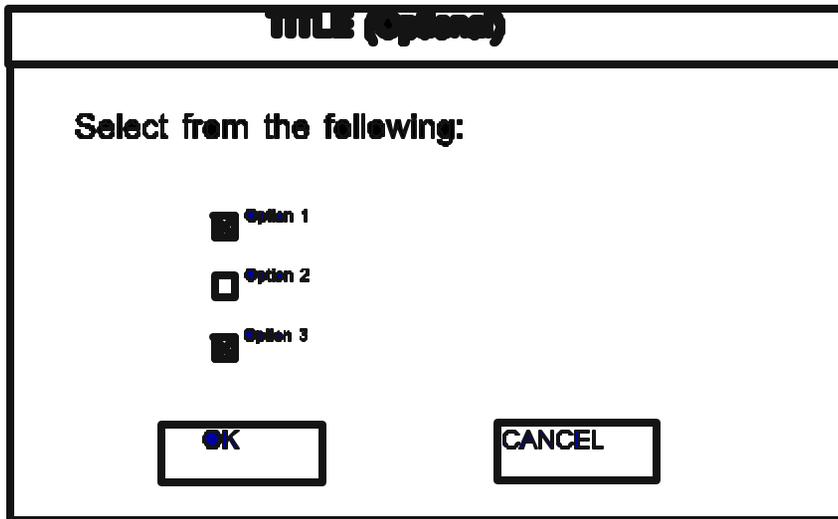
**Graphic**

# **STANDARD GRAPHICS USER-INTERFACE**

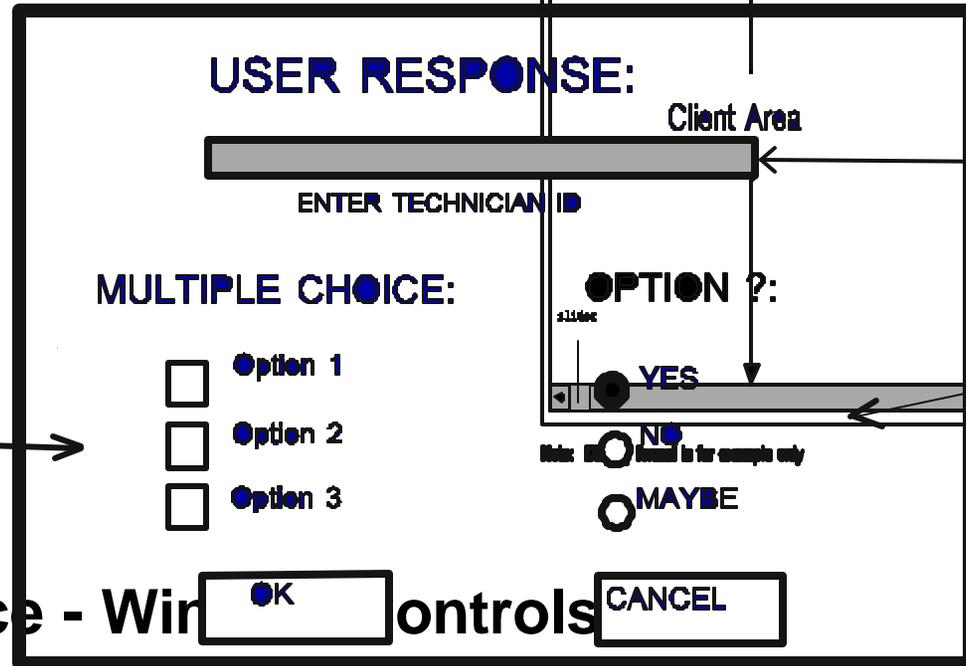
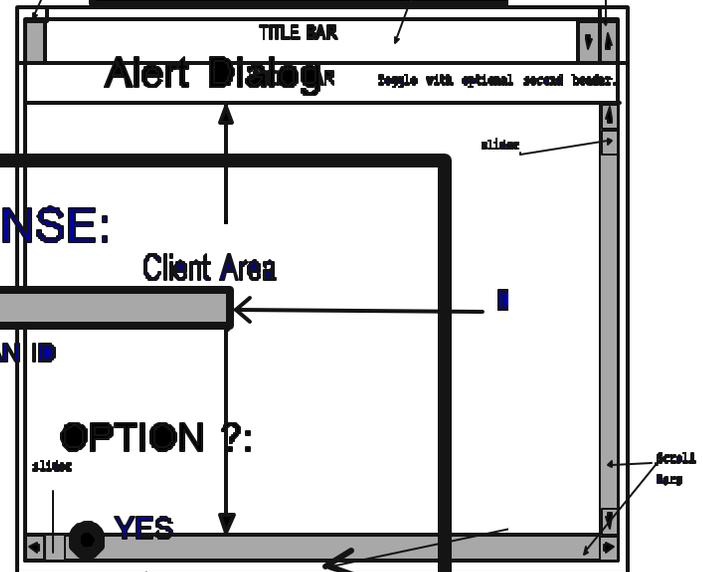
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- **Determines Most User-Interaction Features**
- **Implementable in Commercial Packages**  
**MOTIF, OPEN LOOK, WINDOWS**
- **Standardized Interaction-Function Dictionary**  
**(Can be Hard or Soft Keys, Select Buttons)**
- **Custom Features Restricted to Client Area**
- **Common "Look-and-Feel" among DOD IETMs**

Figure 10.10.10



Multiple-Choice Dialog



Multiple Choice Buttons

# Graphic User Interface - Windows Controls

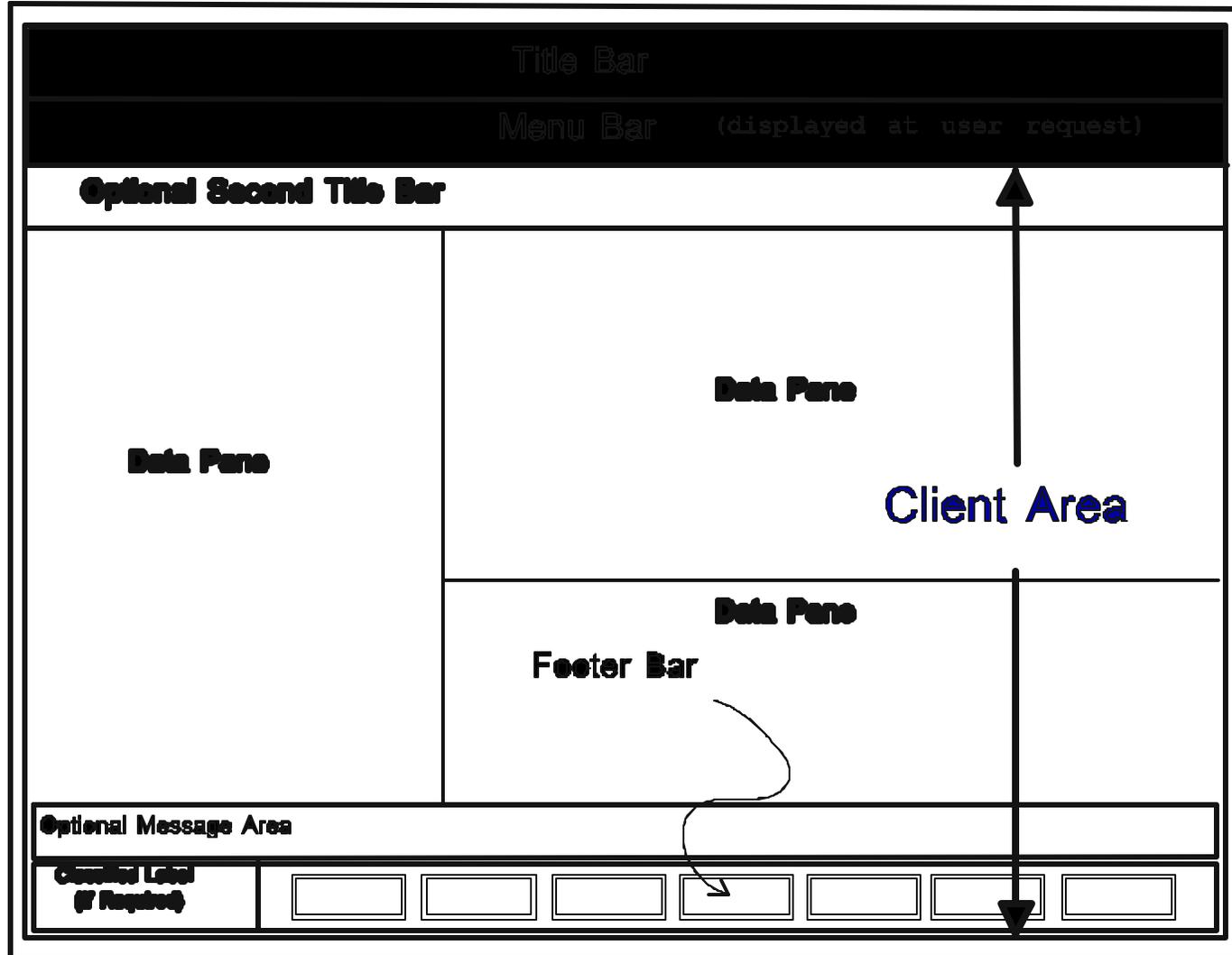
A combination of dialogs can be used in a single

Specific format for example only.

# **STANDARD DISPLAY TEMPLATE**

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- **TM Information Displayed in Window Panes**
- **Client area of Standard User Interface**
- **Header Bar**
- **Menu Bar**
- **Optional Message Bar**
- **Footer Bar with TM Selection Functions**
- **Coordinated Text and Graphic Windows**



**Note:** Display format is for example only

## Sample Layout for IETM Frame

# **REVISABLE IETM DATA BASE: MIL-D-87269**

- **Describes Basic Data Structure**
  - Networked Nodes with Links, Attributes, Prompts**
  - Option for "Smart" Nodes (IF-NODES, FOR-NODES)**
  - SGML Generic-Level Architectural Framework**
  - HYTIME for Internal and External References**
- **Content-Specific DTDs are based on Generic Level**
  - Standard Data-Element Description and Names**
  - Specific Attributes Specified for Each Data-Entity**
  - Specifies Basic Linkages (Relationships) of Entities**

# **IETM Data DTDs and Tags for Interchange**

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- **SGML Document Type Definitions (DTDs) are contained in the Data Base Specification**
- **Can be used to specify an interchange (ASCII "flat-file") version of the Data Base**
- **Includes the Tag Set needed to identify the Data Base elements and attributes**
- **Can be translated back into a data-base Structure for additional processing (i.e. View Packaging)**
- **Standard Content-Specific DTDs allow standard Presentation-System-Neutral File format**

## **Steps in IETM Creation and Use Process**

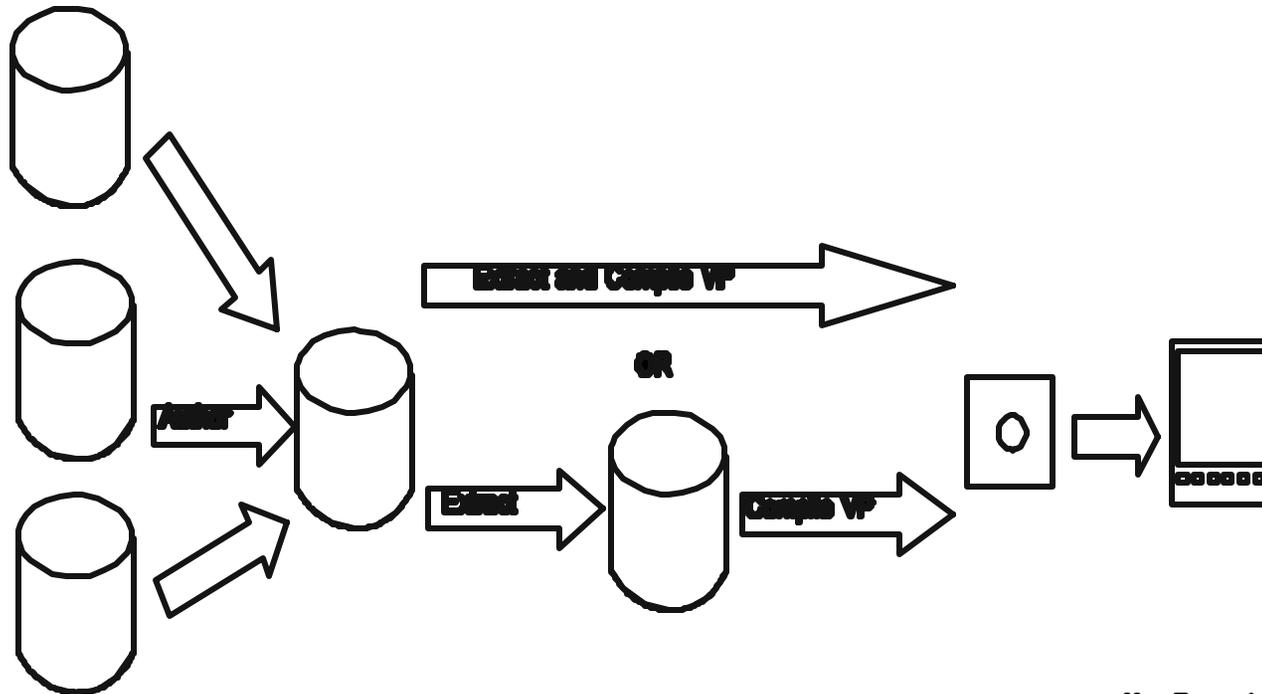
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**IETM Developer Authors IETM DATA BASE**

**DATA BASE can be SGML Tagged in Neutral Form**

**VIEW PACKAGES** are extracted from the **DATA BASE** and compiled for Distribution to the User.

**VIEW PACKAGES** are then viewed Interactively on an **ELECTRONIC DISPLAY SYSTEM (EDS)**



Source Data  
Eng. Drawings,  
LSAR, Other Files

Variable Data  
Base Maintained  
by Contractor with  
Structure, Relationships, Attributes accordance with MIL-D-67200

Neutral Flat File Version of Data Base Management System in accordance with MIL-M-67200

# The IETM Preparation and Use Cycle

# **QUALITY ASSURANCE PROGRAM MIL-Q-87270**

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- **QA Plan Prepared by Contractor**
- **Approved and Made Part of Contract**
- **Covers Data Base Generation to End Product**
- **Validation on User Delivery Device**
- **Sets up QA Organization outside of IETM Authors**
- **Emphasis on Process of Creating IETM**

# **Role of Specifications in Processes**

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**IETM DATA BASE is Structured and Data Elements named and/or tagged according to MIL-D-87269**

**DATA BASE ENTITIES are developed according to Content and Style Requirements of MIL-M-87268**

**IETM EDS Presentation Software is developed according to Formatting and User Interaction Requirements of MIL-M-87268**

**Entire Development Process is conducted according to the Requirements of MIL-Q-87270**

## **Role of Specifications in Processes (Con'd)**

**Specifications for VIEW PACKAGES, the associated VP PREPARATION PROCEDURES and the ELECTRONIC DISPLAY SYSTEM Hardware must be separately negotiated for each procurement. Specifications for these items are provided separately by the procuring activity as no Tri-Service Specifications have been developed at this time.**

# **Key Issues in an IETM Environment**

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- **Authoring Systems**
- **Information Objects**
- **Opportunities for Additional Standards**
- **Next Generation Issues**

# Authoring Systems

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- **Authoring systems used to produce IETM Data Bases, not run-time files for presentation system.**
- **DoD will not specify authoring system, it will specify the data base product authored.**
- **Requires a rethink of the basic building blocks of authored data. Move away from paragraphs, sections, and chapters and move to an Information Object as the basic building block for content.**

# Information Objects

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- **Information Object contains the data for one "thought" to be presented, typically, in a single frame (e.g., a small block of text, graphic associated with that text, associated warnings, cross references to additional information, preconditions to determine if thought should be presented).**
- **It also contains all the data as to what interaction is available in the frame to respond to that thought (e.g., Displayable prompt, menu of possible responses, next node associated with each menu option).**

# **Opportunities for Additional Standards**

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- **Indexing across multiple View Packages**
- **Optical Media Standards for Distribution Media**
- **More detailed Style Guides needed to achieve Common "Look and Feel"**
- **Usability of IETM Specifications with emerging PDES/STEP Technical Publications Standards, AECMA 1000D, and ATA 2100**

# Next Generation Issues

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- **Multi-media (initially sound, continuous-tone pictures, and animation)**
- **Moving to Interactive TV and HDTV**
- **Illustrations from 3-D models.**
- **Training and diagnostics will get top billing**
- **Real-time (Just-in-Time) training**
- **Virtual Reality Training Concepts**
- **New Input/Output Mechanisms (Virtual Images, Voice Recognition, Eye Trackers)**
- **Technology will drive changes in presentation systems**

# **Opportunities for Additional Standards**

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# **Navy Policy on Electronic TMs**

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- **No Clear Written Policy Now Exists**
- **Navy ETM Working Group Prepared Draft ETM Implementation Plan and Proposed Policy**
- **Plan and Policy Delayed Awaiting Formulation of Permanent Working Group under WSSQMB**
- **WSSQMB TMWG Now has Charter and Action to Update ETM Plan and Prepare Policy Position**

# **Summary of Draft TMWG Plan and ETM Policy**

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- **TMWG Plan and policy Expected to be Similar**
- **Based on Five Different ETM Classes (detailed on following slides)**
- **Establish Written Standards for Each of the Five Classes as Soon as Possible**
- **General Policy Statement to move to Some Level of Paperless ETM as Soon as Practical**
- **Individual Programs to Develop Detailed Implementation Plans to Migrate to Appropriate Level of ETM, Possible in Stages**

# **DoD Class Definitions for Electronic Technical Manuals**

**Prepared by the Tri-Service Working Group for IETMs**

**These definitions were agreed to by the members of the Tri-Service Working Group with the understanding that they would be formally coordinated within the individual Services at a later time and were subject to change. It was also agreed that they were to be considered "useful" definitions only and were not, at this time, considered to be sufficiently detailed nor unambiguously defined so as to be suitable for procurement purposes.**

# **Class 0. Non-Electronically-Indexed Page Images [Not an ETM]**

**Systems of Digitized Page Images that are intended for electronic archival filing or Print-on-Demand. These allow pages to be viewed on an electronic display but have no detailed index for navigation through the document for the purpose of on-line usage.**

# **Class 1. Electronically Indexed Page Images**

**Systems of Digitized Page Images intended for Full-Page Display and use allowing navigation by means of an automated intelligent index to the page images for user access (e.g., Navy Advanced Technical Information System - ATIS). These systems can be used in a library or reference setting for reading and research use.**

## **Class 2. Electronic Scrolling Documents**

**Systems for Interactive Display of ASCII-Encoded Documents using an intelligent index and Hypertext tags inserted into a tagged document file. In general, the document is the result of a simple conversion from a page-oriented document but with little or no reauthoring by a subject matter expert with the exception of adding hypertext tags. These allow a user to navigate through the document, but have very limited, if any, author inserted navigation aids or a content-driven "NEXT" function.**

## **Class 3. Linear Structured IETMs**

**Interactive Display of Technical Information which is SGML tagged using MIL-D-87269 tags to the maximum extent possible and using a Hypertext presentation system for display in accordance with MIL-M-87268. It is based on a linear document file and not a hierarchically accessed Data Base. Navigation is based on author developed constructs employing features such as prompted dialog boxes and content driven logical "NEXT" function. A mature system would include training and diagnostic functionality.**

## **Class 4. Hierarchically Structured IETMs**

**Interactive Electronic Display of Technical Information specifically authored into and maintained in a non-redundant relational or object-oriented data base. These source data are subsequently packaged into a run-time form for Interactive Presentation in accordance with the DoD IETM Specifications (MIL-M-87268, MIL-D-87269, and MIL-Q-87270). This class differs from Class 3 largely in the manner in which the source data is managed. The user presentations can be very similar and would include training and diagnostic functionality in mature systems.**

## **Class 5. Integrated Data-Base IETIS**

**Integrated Electronic Technical Information System (IETIS) for Interactive Presentation of all of the ETM/IETMs associated with a major operational entity (e.g., ship, air squadron, shore depot) integrated together with the data for other operational data processes including Expert-System rules for the display of Technical Information, and other user-applications such as communications and administrative support. This Class is intended to include future applications and features not yet sufficiently mature for current production use.**

# **Emerging ETM Standard Setters**

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**Class 1 and 2 - Standards set by Existing Navy Owned Capability (TMPODS and ATIS)**

**Class 2 and 3 - NAVSEA 04TD Proposing to Make GTS Capability the Standard (Martin Marietta Syracuse Design)**

**Note: NAVAIR and some other Navy Programs have alternative approaches to Legacy Conversion (the focus of Class 2 and 3).**

## **Emerging ETM Standard Setters (Con'd)**

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**Class 4 - Customized Systems being developed for Major Systems (AEGIS, Trident II, V-22, NAVAIR R&D - AMIDD).**

**No one preeminent system has emerged.**

**Class 5 - No Existing Capability Operational (under new tighter definition, though many claim this status under earlier definitions).**

# Commercial Interactive Document Standards

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**DoD has taken the lead in Interactive Document Standards in which the Information Creator wants to control the interaction; e.g., the IETM need.**

**Commercial Standards have come from the University Community or the traditional paper manual publishers and leave most of the interaction control up to the reader/user; e.g., World Wide Web, Davenport Group, Novel, Interleaf.**

## **DoD Organizations involved in IETMs**

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**CALS Office in OASD(A&T) has had function since 1989. OASD(L) has shown recent interest.**

**CDNSWC Chairs Tri-Service Working Group for IETMs  
under CALS Office**

**DISA/CFS claims DoD lead for Digital Document Standards  
and Multi-Media Standards but does not have IETM  
Specifications at this time (Still in CALS Office)**

# DOD IETM Policy Office

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**No one organization has taken strong stand to set detailed policy on IETMs.**

# **SOWs and CDRLs**

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**Every procurement is unique at this time.**

**MIL-Specs are good for new acquisitions where contractor has the charter to fill in the details.**

**IETM Specifications are by design General Specifications and need specific tailoring.**

**Navy has Draft Implementation Guides for MIL-M-87268 and MIL-D-87269 out for comment but they need more work before final coordination.**

# **Acquisition Managers Guide for IETMs**

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**TMWG Committee chaired by PHD\NSWC (CDNSWC, NAVAIR, NAVSEA-NSDSA, and others members) developing guide with specific examples. Due sometime in mid to late FY95.**

**Initial Draft Available - Serves as General Guide but no real examples.**

# **Programs Developing Class 4 IETMs and the Authoring/Presentation Environment they use.**

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<b>AEGIS</b>	<b>(Hughes Authoring Pres S/W with Martin Marietta and Ratheon)</b>
<b>V-22</b>	<b>Grumman Authoring S/W, Bell-Boeing)</b>
<b>AMIDD</b>	<b>(NAVAIR R&amp;D) (McDonnell Douglas Aerospace Custom System)</b>
<b>TRIDENT II</b>	<b>(Martin Marietta Pittsfield Custom System)</b>
<b>FDS (IUSS)</b>	<b>(Loral, IBM COTS Presentation S/W)</b>

## **Class 3 IETM Systems**

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**NAVSEA - Martin Marietta Syracuse has developed capability (COTS and Government S/W) used by several NAVSEA Programs (Info Access Presentation System)**

**NAVAIR - Sikorski (VH-60) has capability for interactive IETM based on CALS MIL-M-28001 Tagging Scheme (Electronic Book Dynatext Presentation System)**

**Common commercial product with potential - Interleaf World-View S/W being examined by several programs**

# Cost Estimates

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**Cost hard to estimate - little production experience.  
General belief - cheaper than paper in starting new.**

**Best Guess based on NAVSEA GTS Conversion**

**\$5 per page for simple Class 2 Conversion from  
clean pages.**

**\$20 additional per page for value added by subject  
matter expert for Class 3 upgrade.**

# **Approaches Used by Major Navy Programs (Overview Discussion)**

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**SPAWAR IUSS/FDS**

**AEGIS FCS**

**NAVAIR AMIDD**

**V-22 Aircraft**

**BSY-2 Submarine Combat System**

**VH-60 Helicopter**

**NAVSEA Gas Turbine System**

**SPAWAR IUSS/FDS**

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- **Initial TMCR cited preliminary version of IETM Specs**

- **Sole Source to Hardware Provider (IBM now Loral)**
- **Agreement to use final version of Specs when issued**
- **Contractor has done most of the innovation and Selected Authoring System and Presentation Systems**
- **Used Air Force Style Guide as initial Guide**

# AEGIS FCS

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- **Created Group to develop Style Guide and DTD**  
**Style Guide based on MIL-M-87268**  
**DTD based on MIL-D-87269**
- **Selected Hughes AIMSS after study of available Class 4 IETM systems**
- **Lead for Conversion given to PHD/ NSWC (i.e., the Government ISEA)**
- **Contractors assisting in providing data to PHD/NSWC**  
**Initial Capability Nov/Dec 1994 (Fire Control Sys)**

# NAVAIR AMIDD

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- **Comprehensive R&D Demonstration for NAVAIR**
- **Aimed at F-18 E/F - Possible backfit to F-18 C/D**
- **MDA (F-18 Supplier) building custom system.**
- **Integrates IETM, Diagnostics, Flight Debrief, and Maintenance Historical Data.**

# V-22 Aircraft

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- **TMCR developed citing IETM Specifications**
- **Commitment to use LSAR as source for IETM Data • Base Contractor Selected Grumman (JSTARS Team) as Primary Technology for IETM Authoring**
- **Long Lead-Time Program - Years to Author IETM Data**

# **BSY-2 Submarine Combat System**

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- **Developed entirely by Contractor (Martin Marietta)**
- **Fielding IETMs for BQG-5 Sonar Component**
- **Model for Standard Class 3 IETM for NAVSEA**
- **Formal Specification now being prepared for Navy use**
- **Big payoff in integrated training material**

# VH-60 Helicopter

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- **Interactive Links added to Standard CALS SGML tagged ASCII (i.e., MIL-M-28001)**
- **Contractor Developed Class 3 IETM Solution (Sikorski) • "Free" to Navy but requires Contractor to prepare and maintain**
- **Uses COTS (EBT Dynatext) Viewer**

# **NAVSEA Gas Turbine System**

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- **Based on BSY-2 Implementation**
- **Initial OCR and SGML Tagging done by service bureau**
- **Great Lakes trainers and NAVSESS subject matter experts add reorganization and interactive functionality**
- **Being promoted by NAVSEA as standard Navy Solution for legacy data conversion (Class 3)**