Expanding AIMSS High-End IETM Capabilities with *eXpress* and ReasonPro

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Presentation Overview

- **IETM Basics**

- **AIMSS Background**

- **AIMSS General Authoring Capabilities**

- **Expanding AIMSS Class 5 Capabilities**

IETM Basics

- ## IETM Background
  - **IETM Definition by DoD** – "Package of information required for diagnosis and maintenance of a system, optimally arranged and formatted for interactive screen presentation to the end-user."
  - IETM designed for electronic screen display to an end user, and has the following characteristics:
    - Designed and formatted for screen presentation to enhance comprehension
    - Made up of interrelated data that end-user can access in a variety of ways
    - Interactive data provides procedural guidance, navigational directions, and supplemental information

IETM Basics (Cont.)

- **Tri-service IETM Specifications**
  - IETM look and feel requirements (MIL-PRF-87268)
  - IETM content requirements (MIL-PRF-87269b)

- **ETMs and IETMs are classified by their...**
  - **Display:** Presentation of text/graphics to user
  - **Functionality:** User capabilities
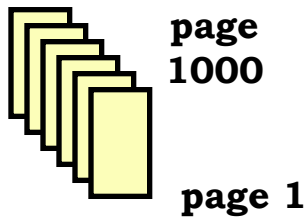 - **Data Format:** Electronic storage of text & graphics

- **There are currently 5 Classes of ETMs/IETMs**
  - Class I through V
  - Or Type I (Class I–III) and Type II (Class IV–V)

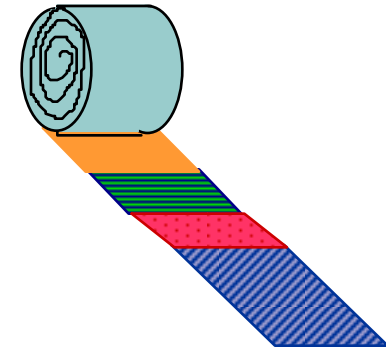# IETM Basics (Cont.) – ETM Characteristics

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- **Class I through III or Type I**

✓**Static Presentation**
✓**Link Navigation**
✓**Linear Data**
✓**File Management**

Class I

page 1000

page 1

Class II

Class III

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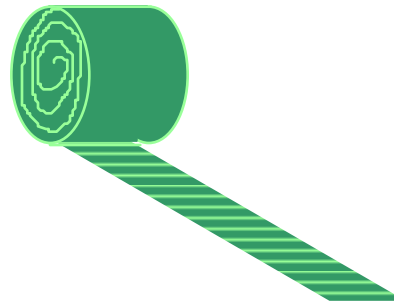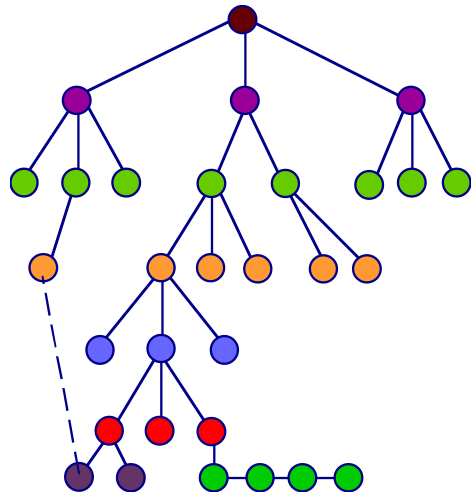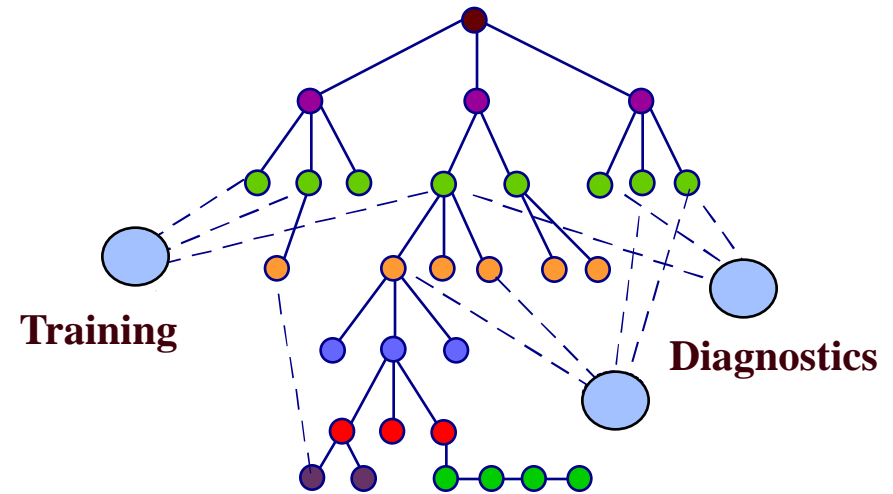
■ **Class IV and V or Type II**

✓**Dynamic Presentation**
✓**Structured Navigation**
✓**Hierarchical Data**
✓**DBMS**

Class IV

Class V

Training

Diagnostics

IETM Basics (Cont.) – Class 4/5 IETM Benefits

- **Allow a user to locate required information faster and more easily than possible with a paper technical manual**

- **Easier to comprehend since the IETM is specifically configured for the system under diagnosis**

- **Require less physical storage than paper**

- **Provide powerful interactive troubleshooting procedures, not possible with paper technical manuals**

- **Shared data allows for easier update saving time and money**

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■ Proven Value Proposition[1]

- – 25-35% less time for maintenance activities

- – 50% less time looking for needed maintenance information

- – 35% improvement in troubleshooting accuracy

- – Minimum 15% improvement in MTTR

[1] Based upon military studies of IETM effectiveness

AIMSS Background

- **Developed in 1992**
  - Presentation system developed under contract to the Navy for the AEGIS Weapon System program
  - Adapted internally-developed expert system tools to support IETM development
  - Applications were integrated in 1993 and sold as a COTS IETM development system

- **Redesigned in 1999**
  - Full MIL-PRF-87269A compliance with partial implementation of draft "b" revision (element-level versioning, XML linking)

- **Today - Market Leader**
  - AIMSS is used on more DoD programs than any other high-end class IV/V IETM development system on the market

AIMSS Programs

- Expeditionary Fighting Vehicle (EFV) – U.S Marines
- Standard Terminal Automation Replacement System (STARS) – FAA Program
- Landing Platform Dock (LPD) – U.S. Navy
- Rolling Airframe Missile (RAM) – U.S. Navy
- Digital Modular Radio (DMR) – U.S. Navy
- Advanced Synthetic Aperture Radar System (ASARS) – U.S. Air Force
- AN/MPQ-64 Sentinel – U.S. Army
- Wide Area Augmentation System (WAAS) – FAA Program
- AEGIS Weapon System – Various IETMs – U.S. Navy
- Bradley A3 Fighting Vehicle – U.S. Army
- AN/UYQ-70 Advanced Display Systems – U.S. Navy
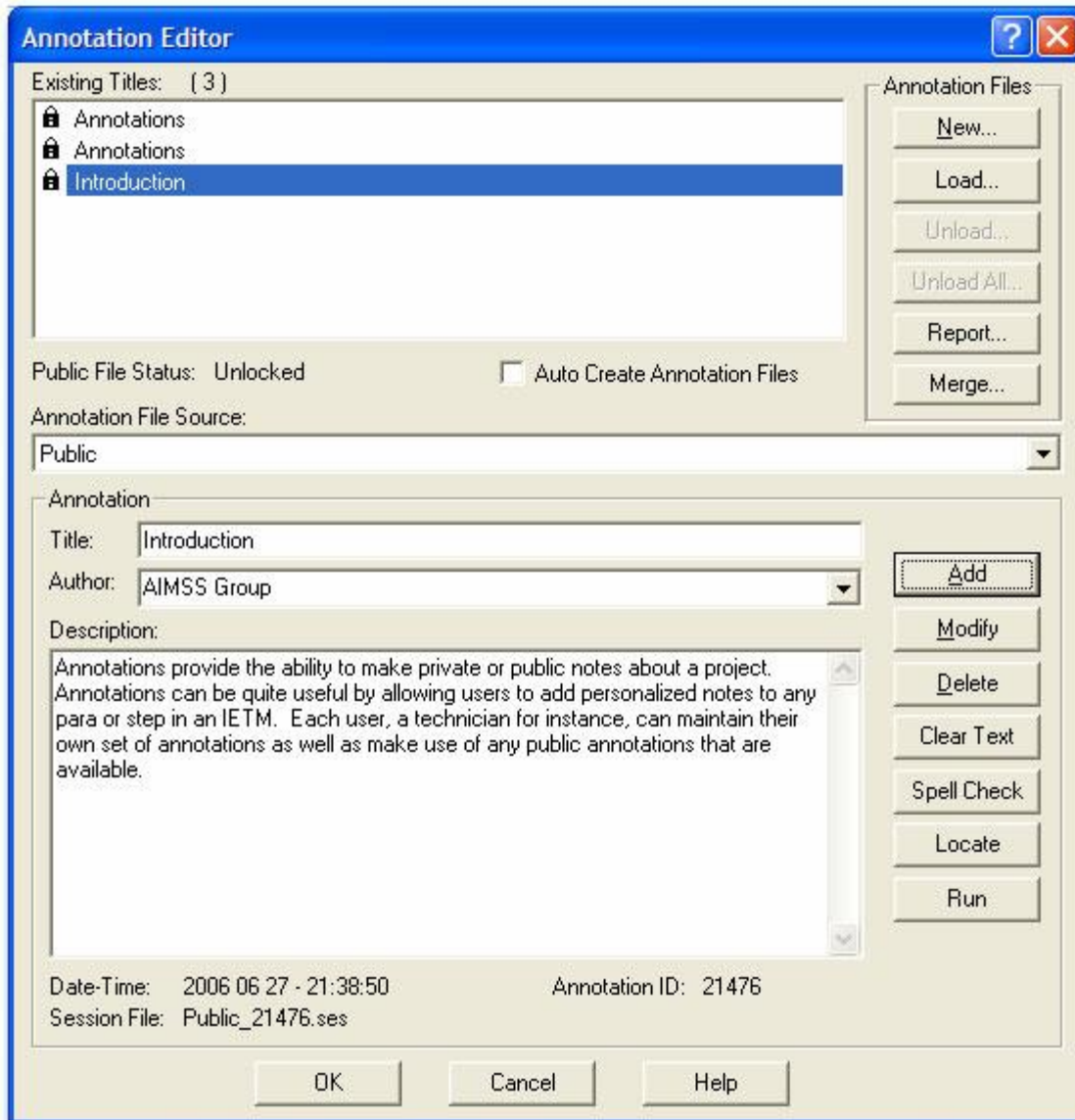
AIMSS General Capabilities

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Integrated Authoring and Runtime Viewer

Customizable Tool Bars

Structure Editor provides a Hierarchical View of IETM Objects

WYSIWYG Text Editing

Intuitive Navigational Panel

Fully Integrated Graphics Package

Built-in IETM Engine keeps track of all Variables and Navigation History
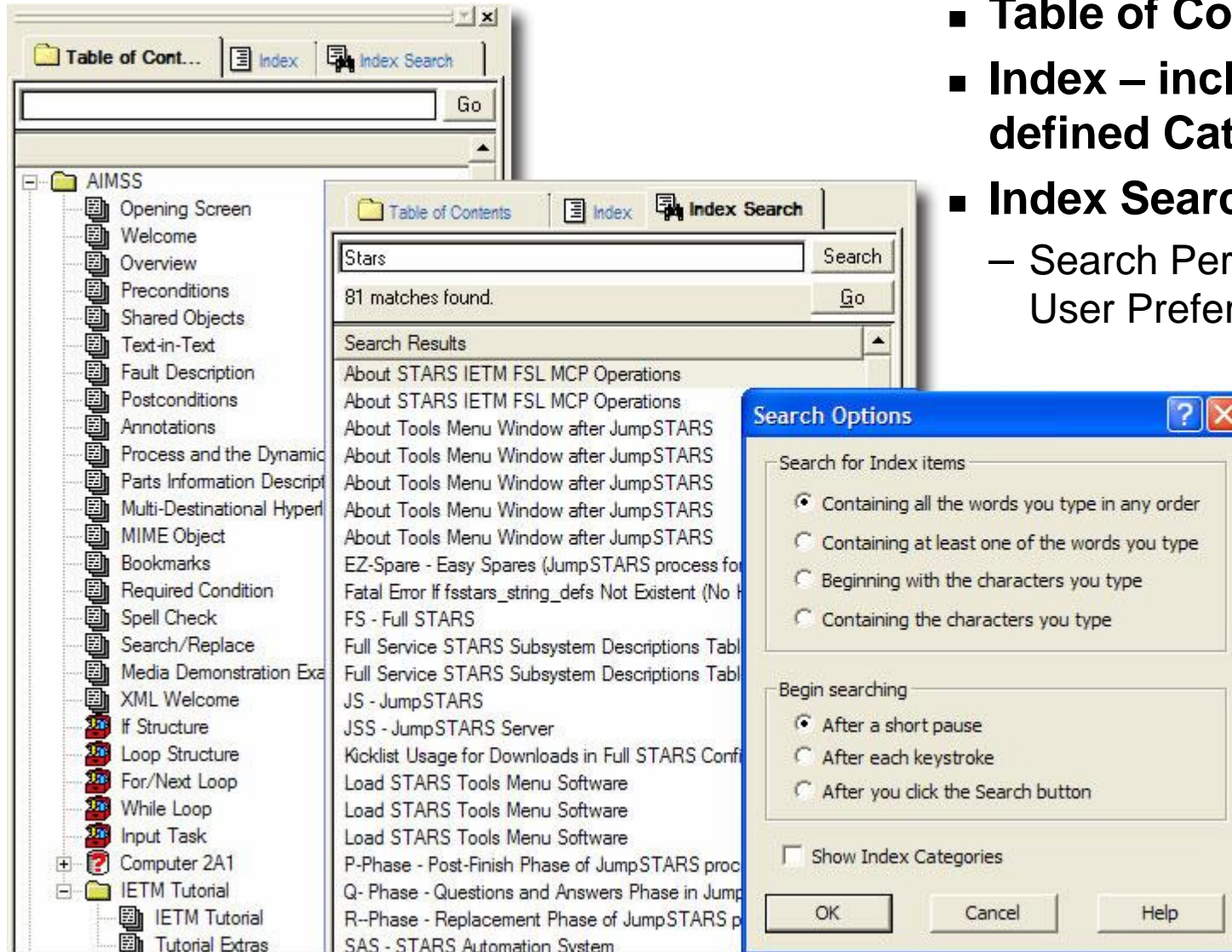
AIMSS General Capabilities – Annotations

Annotations allow the Authors or End-Users to add comments within the IETM

– Annotations automatically added to the Public Annotation file

– Users can also created individual "private" Annotation files

– Auto Save Session capability allows Users to "Run" an Annotation comment

- Restores all variable and Navigation History resulting in User Navigating to the Annotation comment location

- Often used for reviewing IETM content

AIMSS General Capabilities – TOC and Index

- **Table of Contents**
- **Index – includes Author defined Categories**
- **Index Search Capability**
  - Search Performed based on User Preference

AIMSS General Capabilities – In-Line Hyperlinks

- **Four kinds of In-Line Hyperlinks:**
  - **Holdup**
    - Temporarily display a particular object
  - **Stayup**
    - Displays a particular object in a Window that can be moved around as required
  - **Goto**
    - Used to Navigate to a different location in the IETM and continue IETM flow
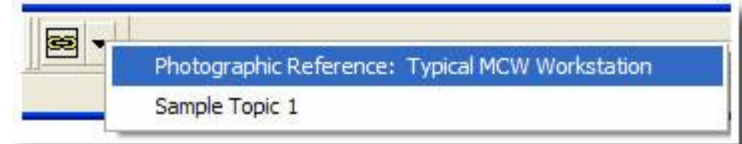 - **Gosub**
    - Used to Navigate to a different location in the IETM then automatically return to the location from which it was launched
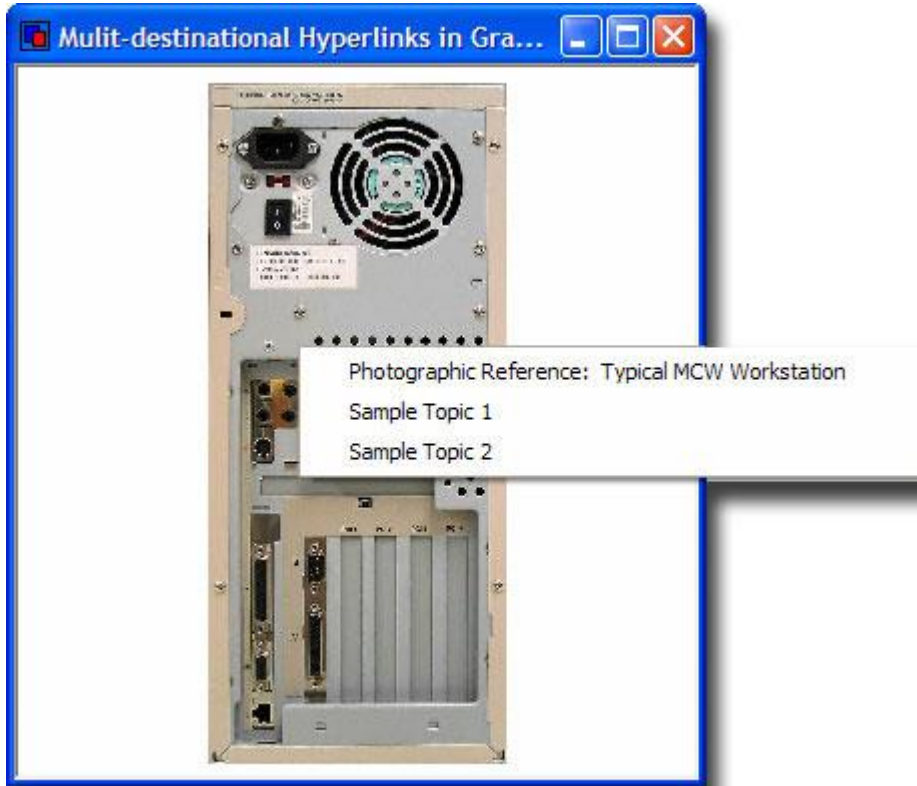
- **In-Line Hyperlinks can be in Text, Graphics, Tables**

AIMSS General Capabilities – Out-of-Line Hyperlinks

- **Out-of-Line Hyperlinks are located on the Navigation Panel**

- **There may be one or more Out-of-Line links on a particular screen**

- **Similar to an In-Line Hyperlink**
  - Supports all four types of links:
    - Holdup
    - Stayup
    - Goto
    - Gosub

- **Persistence based on location in Structure where added**

AIMSS General Capabilities – Multi-destinational Hyperlinks

Multi-destinational Hyperlink shown in Graphic with menu activated

- **Multi-destinational Hyperlinks are in-line and allow for multiple destinations**
- **Supports all four types of links:**
  - Holdup
  - Stayup
  - Goto
  - Gosub
- **Multi-destinational Hyperlinks are supported in Text, Graphics, Tables**

AIMSS General Capabilities – Miscellaneous

- **Bookmarks**
  - Used to hold places in the IETM so that they can be returned to at a later time
  - Bookmark file can be saved and restored at a later date
- **Sessions**
  - Each time the IETM is opened and used a session is created
  - Sessions contain all Variable and Navigation History
  - Sessions can be saved and restored at a later date
  - Session files can be shared with other Users or Authors
    - A session file can be restored on another PC using the same IETM database
- **Configuration**
  - Configurations can be saved and restored at a later date
    - Saved file contains all Configuration Variables
  - Configurations can be automatically loaded at start-up

AIMSS General Capabilities – COM Objects

- **What is COM? – Component Object Model**

- **COM objects are like small separate programs or functions that are used inside a larger program or as stand-alone functions**

- **COM objects allow for embedding or using other objects within the IETM.**
  - Calculator
  - Calendar
  - Media player
  - Acrobat Reader

- **May also embed function that are never displayed to the User**

- **COM interface extends AIMSS to provide "true" Class 5 Functionality**

AIMSS General Capabilities – COM Objects (Cont.)

AIMSS Author Showing Embedded COM Object

Flash COM Object Visual Interface

Flash COM Object shown in Structure Editor

COM Interface allows for extending IETM Functionality

Expanding AIMSS Class 5 Capabilities

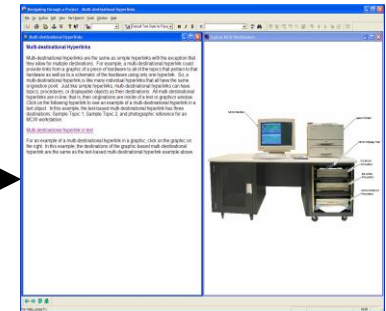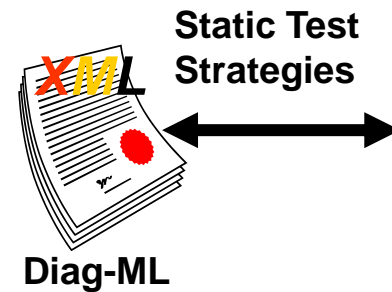- **DSI International** – Static Test Strategies
  - eXpress

- **Impact Technologies** – Dynamic Test Strategies
  - ReasonPRO

DSI International – Static Test Strategies

- ## DSI's eXpress
  - Provides capture and diagnostic development with a simple and intuitive graphical design interface
  - Design Capture for both up-front and legacy designs
  - Diagnostics and Testability Analysis
  - Prognostics Design Influence
  - Reliability Engineering Support
  - Maintainability Engineering Support
  - Validation and Verification
  - Sensor Optimization and Trade-off Studies
  - 1553 Bus Modeling
  - Export Diag-ML (XML) Static Fault Trees
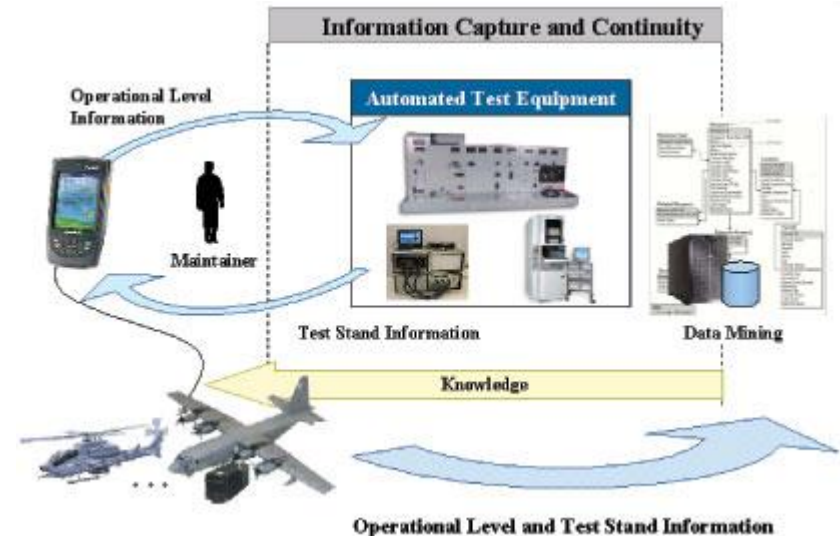   - Currently looking for sponsor to develop this interface

XML

Static Test Strategies

Diag-ML

Impact Technologies – Dynamic Test Strategies

- **Impact's ReasonPro**
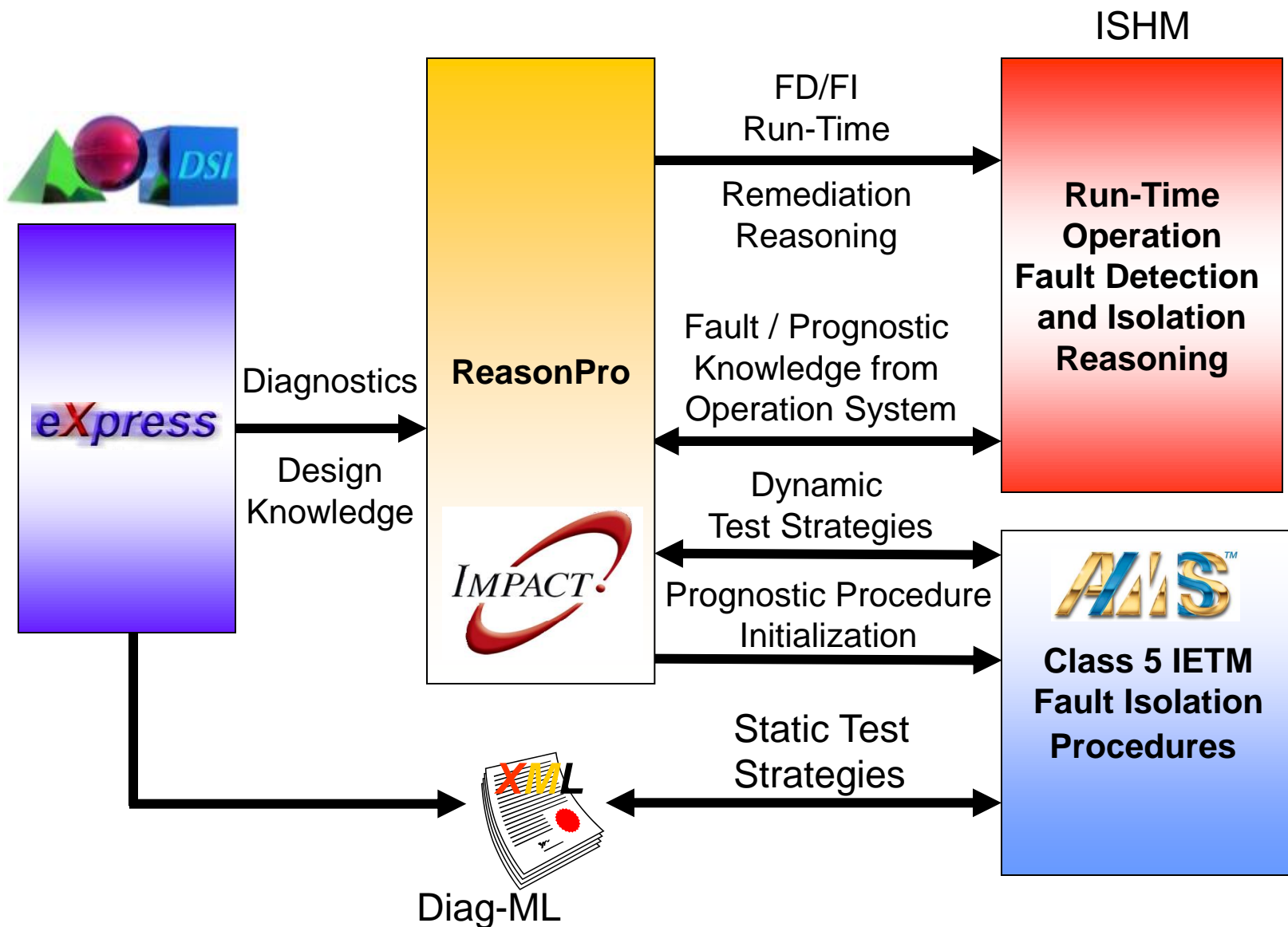 - **System Perspective Diagnostics**
    - Improved fault isolation
    - Enhanced usage of BIT
    - Embedded diagnostic identification
    - Better ambiguity Reduction
  - **Advanced Reasoning**
    - Integration of discrete diagnostics
    - System monitoring
    - At-Wing™ health management
    - Severity assessment and prognostics
    - I-Level enhanced diagnostics

Information Capture and Continuity

Operational Level Information

Automated Test Equipment

Maintainer

Test Stand Information

Data Mining

Knowledge

Operational Level and Test Stand Information

IMPACT·

Expanding AIMSS Class 5 Capabilities

ISHM

DSI

eXpress

Diagnostics

Design Knowledge

ReasonPro

IMPACT.

FD/FI Run-Time

Remediation Reasoning

Fault / Prognostic Knowledge from Operation System

Run-Time Operation Fault Detection and Isolation Reasoning

Dynamic Test Strategies

Prognostic Procedure Initialization

Class 5 IETM Fault Isolation Procedures

XML

Static Test Strategies

Diag-ML

Expanding AIMSS Class 5 Capabilities

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AIMSS Author Showing Embedded ReasonPro Interface

ReasonPro COM Object Shown in Structure Editor

ReasonPro COM Object Visual Interface

COM Interface allows for extending IETM Functionality