

## MBDE Digital Thread — Live and In-Person

For DSI, 2022 was *The Year of the Digital Thread*, the year in which the digital integration capabilities that we’ve been demonstrating for the last eight years were finally an idea whose time has come.

In August, the physical demos of the standards-based digital thread at AUTOTESTCON in National Harbour, Maryland were among the biggest hits of the show. MBSE models from Cameo or Capella were imported into **eXpress** to create diagnostics that—after having been validated in **eXpress**—were then used by DSI Workbench to isolate faults that were inserted on a physical circuit card (depicted below).

The same data from **eXpress** was also translated to ATML and—in a parallel thread—used by a sequence of industry tools to define the signals, describe the test equipment and generate the actual code run on the test station (depicted below), the results of which were interpreted and displayed within DSI Workbench.

What really excited people is that the entire thread is comprised of published standards and open exchange formats. The interest was so intense that DSI—along with its “thread-partners” at Reston Software, Sphera Technology and NI—made arrangements to share this capability with an even larger audience.

Enter Raytheon, who generously offered to host the demo in their state-of-the-art Immersive Design Center (depicted below) in McKinney, Texas. This facility and its helpful staff made the coordination of all the feeds from different cameras and computers into the single window of a Webex call seem like child’s play!

Counting those who attended in person (some flying in from out of state) and those participating virtually, the demo was viewed live by over 180 people! Recently, a video of the demo was posted on DSI’s web site, where it is receiving even more views. Big interest in such a small world—truly an idea whose time has come!



Benjamin Bossa of Sphera discussing the standards-based digital thread with a group assembled at DSI’s booth at AUTOTESTCON.



The Raytheon Immersive Design Center in McKinney, Texas.

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### Latest Software Versions

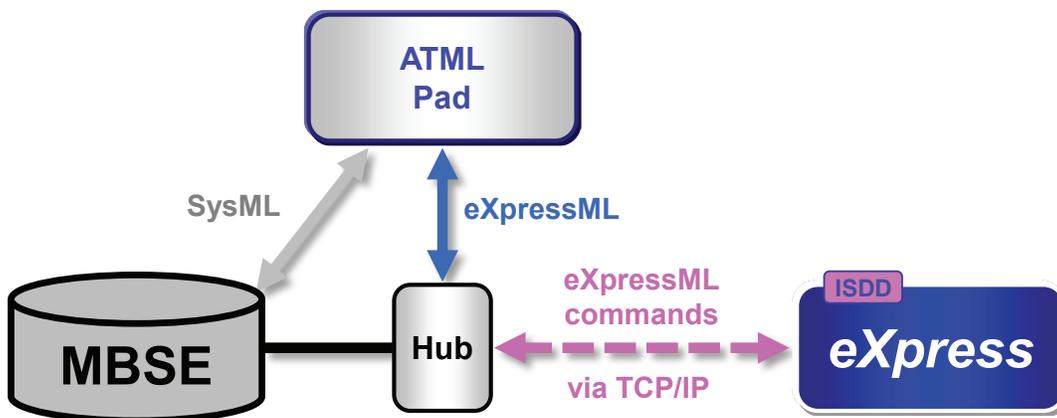
• <b>eXpress</b>	7.5.1	10/22
• <b>eXpress</b> Design Viewer	2.1.0	6/22
• Run-Time Authoring Tool	6.1.2	8/22
• DSI Workbench	5.1.1	9/22
• STAGE	Act II, Scene 3	10/16

# Model-Based Diagnostic Engineering: First Steps

There has been much talk of late about incorporating sustainment-related data into digital threads and MBSE (Model-Based Systems Engineering) repositories. Full-blown digital integration is obviously the goal...but where should one begin? Here are some possible ways in which you can bring model-based diagnostic data from **eXpress** into your overall digital engineering solution.



**Model-Based Diagnostic Engineering** – Jump-start **eXpress** modeling using design data from MBSE databases (such as MagicDraw or Capella); then record details of the diagnostic design back into SysML models.



**Automated Modeling & Analysis** – Use the ISDD module to communicate with **eXpress** across a network, sending commands that perform remote modeling, analyses (Testability, FMECA, FTA, Sneak Path) and diagnostic generation.



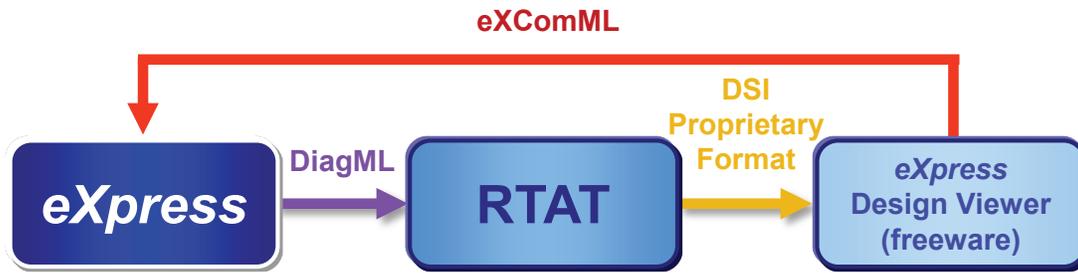
**Populate MBSE Databases** – Translate data from electronic design engineering tools first into **eXpressML** and then into SysML, thus creating MBSE models from legacy data.



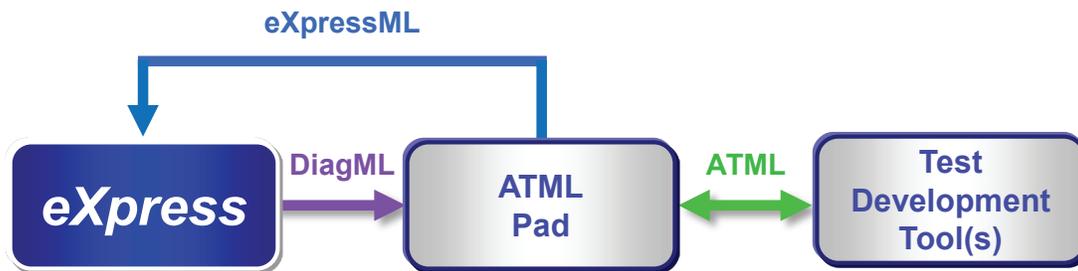
**Enhance using eXpress** – Before converting it to SysML, import the model into **eXpress** and make any additions that are necessary to support diagnostic engineering.



**Guarantee Consistency** – Import test definitions into **eXpress** to ensure that nomenclature and attributes are consistent between the diagnostic design and test development efforts.



**Collaborative Model Reviews** – Distribute *eXpress* diagnostic design data among project stakeholders for review and comments using the *eXpress* Design Viewer.



**Test Development** – Translate test definitions and attributes from *eXpress* into ATML Test Descriptions (IEEE 1671.1) for use in the automated generation of test program code.



**Test/Diagnostic Documentation** – Use test definitions and diagnostic sequences generated in *eXpress* to develop TRDs (Test Requirements Documents) and written test procedures.



**Fielded Diagnostics** – Populate third-party IETMs (Interactive Electronic Technical Manuals) and Diagnostic Reasoners using diagnostic procedures developed in *eXpress*.



**Turn-key Diagnostics** – Deploy static or dynamic diagnostic procedures from *eXpress* in DSI Workbench or one of DSI's other diagnostic reasoners.

# What's Coming in 2023?

Here is some of what we've got planned for the upcoming months.

## eXpress 7.5.2 (Q1)

- Import/export test defs using eXpressML
- Ability to import models from Capella
- Help Feature Overhauled and Updated

## Closing the Loop (Q2)

- eXComML format for comments & feedback
- Redline capability in WB & Design Viewer
- Review comments interactively in eXpress

## More Test Implementation Properties (Q2)

- Ability to define conditions (motor on/off, etc.)
- Assign starting & ending conditions to tests
- Constrain diagnostics based on conditions

## TestDRIVE (Q1)

- Support for new eXpressML commands
- Remote Model Error Checking
- Remote Configuration Management

## Continuing Education Classes (Q1)

- Defining Tests with multiple outcomes
- Modeling FPGAs using eXpress
- Intro to Fault Tree Analysis in eXpress

## New Dongle Policy for DSI Workbench (Q1)

- For WB 4.12, the use of currently licensed dongles on existing platforms remains unchanged
- For WB 5.0 and later, contact DSI to either transfer your dongle license to a node-locked license or explore an alternative solution.

## DiagML Summit (Q2)

- Virtual meeting of DiagML Consortium (Suggested Date: May 16, 2023)
- Review schema documentation
- Ratify DiagML 3.0

## ISDD Ontology (Q2)

- Develop domain ontology for eXpress
- Describe all elements in eXpressML
- Support grass-root integration efforts

## Training Course Schedule

Course Number	Prerequisite	Course Description	Dates	Location	POC
CE-323	none	Continuing Education: Defining Tests with Multiple Outcomes	January 24, 2023 One 90-minute session	Virtual: Webex	info@dsiintl.com
CE-324	none	Continuing Education: Modeling FPGAs using eXpress	February 7, 2023 One 90-minute session	Virtual: Webex	info@dsiintl.com
CE-325	none	Continuing Education: Introduction to Fault Tree Analysis in eXpress	February 21, 2023 One 90-minute session	Virtual: Webex	info@dsiintl.com
TLS-100	2 hours home study prior to first session (video)	System Diagnostics Concepts and Applications Basic Modeling & Introduction to Testing Introduction to Testing & Analysis	Starting March 6, 2023 Eight 4-hour sessions (Mon-Thu for 2 weeks)	Virtual: Webex In Person: Orange, CA	info@dsiintl.com
TLS-100	2 hours home study prior to first session (video)	System Diagnostics Concepts and Applications Basic Modeling & Introduction to Testing Introduction to Testing & Analysis	Starting May 8, 2023 Eight 4-hour sessions (Mon-Thu for 2 weeks)	Virtual: Webex In Person: Orange, CA	info@dsiintl.com

## World Wide Representatives



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