eXpress™ Newsletter

Volume 12, Number 3 Fall 2002

eXpress Users Group Meets in Huntsville

This year's *eXpress* User's Group meeting in Huntsville, Alabama provided users from many diversified disciplines the opportunity to share in the emerging diagnostic synergies. This year's User's Group, however, was primarily influenced by the use of diagnostic development in the System Engineering Process. The most significant discussions were in regard to space based programs such as the Second Generation Reusable Launch Vehicle. However, Integrated Vehicle Health Management (IVHM), or by other names this concept is known, appears to be the trend among requirements that many customers are demanding.

If you didn't make it to the User's Group meeting this year, plan on joining us next year in sunny southern California.

The Power Point presentations given at the *eXpress* User's Group are available for free download on the DSI web site (www.dsiintl.com) or by CD by making a request to DSI by phone, fax or E-mail.

Northrop Awards DSI on Second Generation Reusable Launch Vehicle

Northrop Grumman recently presented DSI a Supplier Excellence award based on their outstanding performance on our NASA TA-5 Integrated Vehicle Health Management (IVHM) contract. DSI is currently supporting our analysis and optimization tasking with expert technical support on their *eXpress* diagnostics software and developing an IVHM System Modeling Environment (ISME) software module to support our diagnostics modeling software development process. DSI's teamwork, positive can-do attitude and diagnostic modeling experience have enabled Northrop Grumman to achieve high ratings from NASA on our current contract.

Clyde W. Dennison, Jr.
Northrop Grumman, IPT Lead

Anaheim Angels Take the World Series

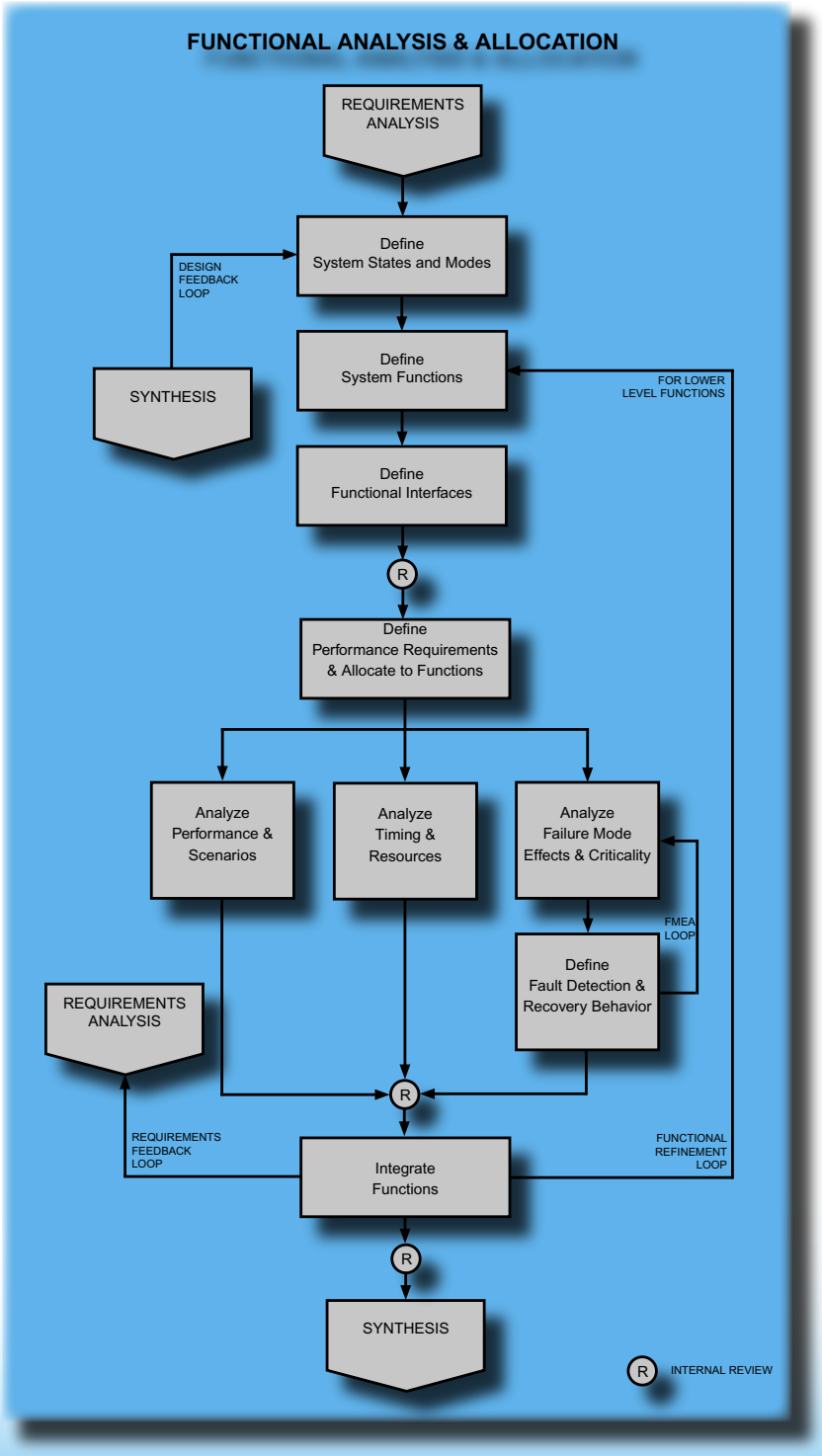
We would like to extend our congratulations to the Anaheim Angels (2 miles from DSI) and all their fans for their recent victory in the World Series! This World Series provided us with an excellent showcase of team work. The success of the team as a whole is not a function of any particular individual achievement but rather of a group of individuals working in a united process throughout the entire season. This exemplifies a true analogy of the powerful affects of a united systems engineering approach. Credit of this analogy goes to Mr. David Tyler of TYX who gave a presentation at the *eXpress* User's Group, which identified this required ingredient of the system engineering process. Thanks, Dave for drawing this parallel and way to go Angels! Let's have a repeat!

Inside this Issue...

Early Functional Analysis & Allocation in the System Engineering Process (Part 2)

In the last *eXpress* Newsletter, we provided an overview of the System Engineering Process and how diagnostic requirements are defined and integrated early in a program. The importance of early functional allocation and analysis can not be stressed enough. Prior to initiating Functional Analysis and Allocation, the requirements must be well defined and allocated. This task is represented in the very top source block in the diagram below labeled "Requirements Analysis". *eXpress* can be a very useful tool in the requirements allocation task by developing a requirements allocation model, but that's a topic for another newsletter.

In many situations, the Functional Analysis will identify or refine previously defined requirements and, therefore, a method to provide "feedback" into the process is necessary. In the lower left of the process flow below, you will notice that this "Requirements Feedback Loop" has been taken into account for within this subprocess.



As the Functional Analysis begins, the analyst must define various attributes of the system such as System States and Modes, System Functions, and Functional Interfaces. The activity may periodically be influenced by design feedback and functional refinement feedback. These feedback inputs shouldn't perturb the process but rather enhance the synergy necessary to flush-out important system engineering / diagnostic issues.

Once the definition of key system elements are identified, an internal review provides the team with the opportunity to collaborate, refine, and verify that all functions and interfaces are identified.

For the *eXpress* user, these functions and interfaces are captured in the first steps of diagnostic model development by constructing the model topology, defining functional flow through use of dependencies, and creating states.

It is from the *eXpress* models that Functional Allocation can be performed. System operating modes can be captured for the analysis of various operational / maintenance scenarios, redundant hardware and multiple function paths accommodate availability requirement and Failure Modes and Effects data elements simulate potential critical failures. Testing and diagnostic alternatives are analyzed by the use of created test sets, tests, and diagnostic studies in the *eXpress* environment.

As allocations are examined, periodic adjustments are accounted by way of a FMEA loop which provides a mechanism to improve fault detection and recovery of the system design.

All of these functional data elements and allocations are integrated into the *eXpress* modeling environment. As Functional Analyses are generated directly from the *eXpress* model, valuable feedback into requirements and functional definitions help to integrate the design for optimal diagnostic performance. This iterative process continues throughout the design phase but begins to taper off as potential design changes become less feasible. This is why it is important to begin this process early.

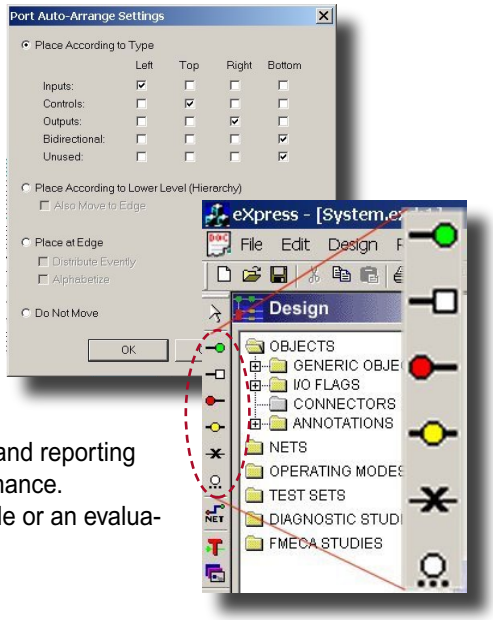
Models constructed for Functional Analysis and Allocation, can be transitioned to System Integration models and run-time host strategy and logic base for integrated vehicle health management (IVHM) systems. The TestBase program by TYX provides this bridge. Look for an IVHM demonstration system from DSI utilizing this real time capability in the next several months.

Illustration is from James N. Martin's book *Systems Engineering Guidebook—A Process for Developing Systems and Products* which is available through DSI

Introducing eXpress 5.7

DSI continues to help the industry move forward with new modeling and analysis *eXpress* tools. Some of the new features include:

- A new port creation and editing tool (shown below)
- Failure Mode and Functional Precedence
- Improved Error Capture and Identification
- Enhanced Model Templates, which can now be applied to existing models
- Numerous Interface Enhancements
- A trouble reporting system to provide users with bug reporting and tracking capabilities
- Additional Statistics and Analysis Reports
- Enhanced Re-sizing Grab Bars
- And much more...



This version of *eXpress* provides the user with an improved user interface, greater analysis and reporting capability and optimized performance. Contact DSI to obtain an upgrade or an evaluation copy of this new release.

DSI to Host Diagnostic and Maintenance Control Subcommittee Meeting

In January, DSI will be hosting a meeting of the Diagnostic and Maintenance Control (D&MC) Subcommittee of the IEEE Standards Committee SCC20. This subcommittee—which was previously known as the AI-ESTATE Subcommittee, but whose name was changed to reflect broader concerns as it moved on to other tasks—is currently working on several standards, including the IEEE Standard Testability and Diagnosability Characteristics and Metrics. DSI's Eric Gould has served on this committee since 1997.

DSI has a long history of participation in the development of industry standards, beginning in the 1980s with MIL-STD-2165—the influential Navy standard on Testability Program requirements. In the succeeding decades, DSI has been involved in standard development efforts by the military, IEEE (Institute of Electrical and Electronics Engineers), AIAA (American Institute of Aeronautics and Astronautics), and private industry.

The first 2003 meeting of the D&MC subcommittee will be held at DSI's offices in Orange, California on January 21-23. If you are interested in attending this meeting (either as a committee member or as an observer), please contact Eric Gould (egould@dsiintl.com) for maps, driving instructions or hotel recommendations.

Training Schedule

Course Number	Pre-requisite	Course Description	Dates	Location	POC
100		Concepts and Applications	27 Jan, 2003	Orange, CA	Denise Aguinaga , DSI
110		Basic Modeling	27-29 Jan, 2003	Orange, CA	Denise Aguinaga , DSI
120	110	Test Concepts and Development	30-31 Jan, 2003	Orange, CA	Denise Aguinaga , DSI
100		Concepts and Applications	26 Feb, 2003	TBD, England	Keith Ellis, Apsys
110		Basic Modeling	26-28 Feb, 2003	TBD, England	Keith Ellis, Apsys
120	110	Test Concepts and Development	3-4 Mar, 2003	TBD, France	Michel Shieber, Seriem
200	120	Diagnostic Development and Assessment	5-6 Mar, 2003	TBD, France	Michel Shieber, Seriem
210	200	FMECA Development and Assessment	7 Mar, 2003	TBD, France	Michel Shieber, Seriem
100		Concepts and Applications	9 April, 2003	Orange, CA	Denise Aguinaga , DSI
110		Basic Modeling	9-11 April, 2003	Orange, CA	Denise Aguinaga , DSI
120	110	Test Concepts and Development	14-15 April, 2003	Orange, CA	Denise Aguinaga , DSI
200	120	Diagnostic Development and Assessment	16-17 April, 2003	Orange, CA	Denise Aguinaga , DSI
210	200	FMECA Development and Assessment	18 April, 2003	Orange, CA	Denise Aguinaga , DSI
100		Concepts and Applications	12 May, 2003	Orange, CA	Denise Aguinaga , DSI
110		Basic Modeling	12-14 May, 2003	Orange, CA	Denise Aguinaga , DSI
120	110	Test Concepts and Development	15-16 May, 2003	Orange, CA	Denise Aguinaga , DSI
200	120	Diagnostic Development and Assessment	2-3 June, 2003	Orange, CA	Denise Aguinaga , DSI
210	200	FMECA Development and Assessment	4 June, 2003	Orange, CA	Denise Aguinaga , DSI
220	210	eXpress Interoperability	5 June, 2003	Orange, CA	Denise Aguinaga , DSI

DSI Welcomes Don Stoller

DSI is pleased to announce the latest addition to our family. In October of this year, Don Stoller joined the team as Diagnostic Scientist. Don brings with him over 17 years of experience from Honeywell, working with both Military and Space systems. Don has an extensive background in developing system integrated autonomous self-test and embedded diagnostics, redundant system management, FDIR (Failure Detection Isolation and Repair), organizational/depot level health management modeling, board-level inherent testability assessments, BIT (Built In Test) requirement validation, and system mission readiness analysis. Don's expertise also includes program planning, management, scheduling, and cost accounting. Don's small town upbringing and interpersonal skills make him an exceptional customer interface. Don is presently representing DSI on Integrated Health Management effectiveness studies. Welcome Aboard Don!

Seasons Greetings from DSI

DSI would like to take this opportunity to wish all our user's, customers, business associates, and friends a Very Merry Christmas and a Happy New Year. We hope that this holiday season provides you and yours the opportunity to enjoy the season, reflect upon our blessings and the upcoming year.

Happy Holidays from DSI!

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As the leading seller of Diagnostic Software, DSI understands the importance of quality service and support. To meet the needs of our customers, we offer a wide array of technical support and service programs developed to address the time-critical issues and stringent diagnostic requirements prevalent on many of today's programs. DSI is ready to help with specialized software development, diagnostic modeling and analysis, advanced mentoring, data management processes and a host of customizable support services to address specific customer needs.

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