



# New Features Guide

## New Features Guide

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## CUSTOMER RESOURCE OPTIONS

Supporting users throughout their entire journey of learning model-based systems engineering (MBSE) is central to Vitech's mission. For users looking for additional resources outside of this document, please refer to the links below. Alternatively, all links may be found at [www.vitechcorp.com/resources](http://www.vitechcorp.com/resources).



### [Webinars](#)

Webinar archive with over 40 hours of premium industry and tool-specific content.



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Short videos to guide users through installation and usage of Vitech software.



### [A Primer for Model-Based Systems Engineering](#)

Our free eBook and our most popular resource for new and experienced practitioners alike.



### [Help Files](#)

Searchable online access to Vitech software help files.



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Library of technical and white papers for download, authored by Vitech systems engineers.



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As engineering continues its digital transformation, the focus has turned from digitalization of individual processes and repositories to creating an “authoritative source of truth” and connecting the engineering lifecycle. It is critical that model-based systems engineering be an enabler and a connector of the digital thread, digital twin, and digital engineering rather than a siloed endeavor. The GENESYS™ open architecture combined with its “your data your way” mentality naturally supports this new focus.

In GENESYS 6.0, we focus on enabling the ecosystem to support the engineering of systems across all industries while enhancing the power and experience for systems engineers. This release provides a major new connector as well as enhancements to existing connectors to better bridge the “air gap” between system and detailed design. GENESYS 6.0 includes new guides to better equip your team as you connect your digital chain and your environment to the critical information in the system repository. This release also features new capabilities to better search and manage the system repository (particularly during critical reviews) as well as enhancements to the user experience and new options when deploying GENESYS across your enterprise.

### CONNECTING THE ENGINEERING LIFECYCLE

System design in a complex world is a collaborative effort. It requires the effective engagement of customers, stakeholders, engineers, and subject matter experts. Done well, systems engineering is the connective tissue across the engineering team, setting the big picture, eliciting insights, and connecting the critical analytics. It is not about producing a specification (whether that be in a document or a model) for the next level of design. Instead, it is about delivering a capability that effectively and efficiently meets a business need. As such, it is valuable to take the perspective of engineering systems, looking across the engineering lifecycle and evolving systems engineering to better deliver within that context.

As important as it may be, connecting the engineering lifecycle is about far more than thru-life requirements traceability. It is about effectively engaging engineers, managers, subject matter experts, and stakeholders throughout the process, embracing the collaboration necessary to properly define the problem and deliver the solution. And it is about connecting design, recognizing that the engineering of systems requires continuity across the design and lifecycle stages, working from a shared and ever-expanding knowledge base. The GENESYS open architecture was designed with this need in mind, and we continue to build upon that foundation in GENESYS 6.0.

#### ***A New Integration with Simulink®***

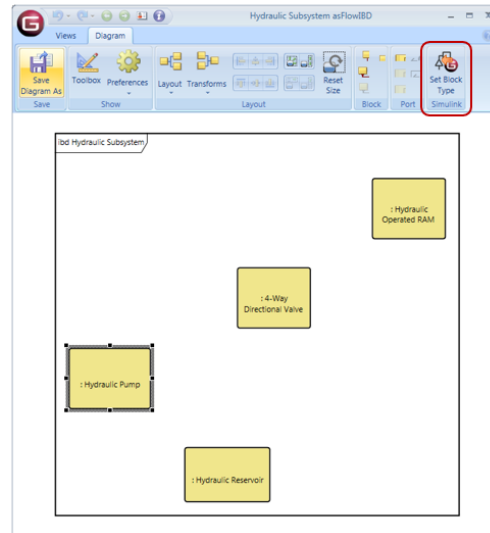
When developing a system design, there comes a time where the team progresses from the descriptive model of system, segment, and subsystem to the discrete model and the detailed design analysis of the lowest/configuration item level of the design. As the design moves from the system level through the segment and subsystem levels, the design matures through the identification, decomposition, and allocation of constraints and the parametric relationship of the constraints. In GENESYS 5.0, we provided the ability to manage this part of the design through the modeling of the parametric equations and associated (distinct) parameters with the constraint solver connection to MATLAB®. In GENESYS 6.0, we take this connection to the analytic environment to the next level with an embedded Simulink connector.

At the system level in GENESYS, the descriptive model has the general notion of how components (or blocks) in the system architecture interconnect to exchange matter, energy, and information in meeting the system requirements. This is reflected diagrammatically through the various interface diagrams, most specifically the physical block diagram and flow internal block diagram, which reflect physical connectivity. The detail of the interface descriptions contained at the lowest level of the architecture is provided through **Link** entities connecting specific component or configuration items.

The task for the design team at this level is to select and define the individual components, the connection requirements for the components, and to dynamically model and analyze the performance of the individual components to ensure satisfaction of the constraint parameters defined in the architecture.

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The embedded Simulink connector in GENESYS 6.0 allows you to connect the descriptive system model in GENESYS to the detailed design model in Simulink. To leverage this capability requires installing a small schema extension located in the GENESYS/Extensions folder. This extension adds an attribute to map an entity to a design block in Simulink and/or Simscape™. Then, through either the physical block diagram or the flow internal block diagram, you can associate the component in GENESYS with a specific block type in Simulink. The “Set Block Type” command on these diagrams opens a Simulink block browser, allowing you to associate the generic design entity within GENESYS to a specific model library element in Simulink. Setting the block type also instantiates the parameters defined in Simulink for the element into GENESYS, creating specific design parameters for the entity.



**Figure 1. Set Block Type in Simulink**

Once the components in GENESYS are associated with corresponding block types in Simulink, the GENESYS diagram can be exported to Simulink using the Simulink Exporter feature on the Project ribbon, creating a corresponding model in Simulink. This process allows the design team to move the model from GENESYS to the Simulink environment where the appropriate connections in Simulink can be made/validated, and dynamic analysis can be completed. With the detailed dynamic analysis completed in Simulink, the corresponding connections and ports can be constructed in GENESYS. As changes to the descriptive model in GENESYS or the detailed model in Simulink are made, the corresponding model can be updated.

### **Creating Custom Connectors and Utilities**

While Vitech provides many connectors today and will continue to grow its library, project teams and organizations have specialized needs to connect their workflows and leverage the “authoritative source of truth” as they engineer new capabilities. The rich library of methods and calls available to the GENESYS client software is available to the enterprise through the GENESYS open architecture. This library and the embedded documentation represent a powerful capability, but the breadth and depth of capability can make it difficult to know where to begin.

To simplify getting started, GENESYS 6.0 includes a dramatically expanded *Getting Started with the GENESYS API* guide, which walks you through an illustrated pragmatic example. This guide will not make you an expert in programming, nor will it expose you to the entirety of the information and calls available via the API. Instead, this brief guide provides an introduction to the basics of accessing model information in GENESYS. It discusses how to log in, access all entities in a class, query for attributes and targets, and more, all in the context of a simple application. Working from this starting point and the code snippets provided, those with a programming background can begin to create their own custom connectors and extensions and take full advantage of the power of the GENESYS open architecture.

The sample provided in this guide reflects a real-world (albeit simplified) use case of providing team members the ability to comment directly on the live GENESYS model. The resultant application provides team members who have been granted access the ability to review requirements and add notes without ever launching the GENESYS client. This takes advantage of the new **Note** class discussed later in *Extending the Schema*.

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### Enhancing Existing Connectors

Vitech leverages its regular drumbeat of service packs to both address issues and deploy new capabilities. Included in the GENESYS 5.0 service packs have been a number of enhancements to the Microsoft® Office® connectors, most notably dramatic performance improvements in the Excel® connector and progress indicators for both the Excel and PowerPoint® connectors. These enhancements have been included in GENESYS 6.0. (And, as with the connector enhancements released as part of the GENESYS 5.0 service packs, look for additional enhancements to several connectors throughout the GENESYS 6.0 service packs as we continuously deploy new capability to enable the ecosystem and empower your project team.)

### EXPANDING CAPABILITIES AND IMPROVING THE GENESYS EXPERIENCE

Quickly locating information and easily manipulating it is important to the system engineers working in the model. Likewise, providing information to all stakeholders on a system design project is critically important to acceptance of the system design in an organization.

### Searching the System Repository

As systems increase in scale and complexity, they exceed what any one person can retain in their head. Maintaining an “authoritative source of truth” is critical not only to align the team over time, protecting against drift and misunderstanding, but it is also essential in augmenting the individual team member. To do so, one must be able to locate information at a moment’s notice.

GENESYS 6.0 complements the existing navigation structure of packages and folders with a new flexible search capability, which allows you to search for information in the full project or a subset. Quickly identify all of the TBD’s scattered throughout your design or all references to a specific term. Look for standard text and wildcards. Search the entire project, a package, or just a folder. GENESYS 6.0 quickly returns the results and manages the list for use throughout your session, enabling you to navigate the results, see the matches, and manipulate the entities as desired.

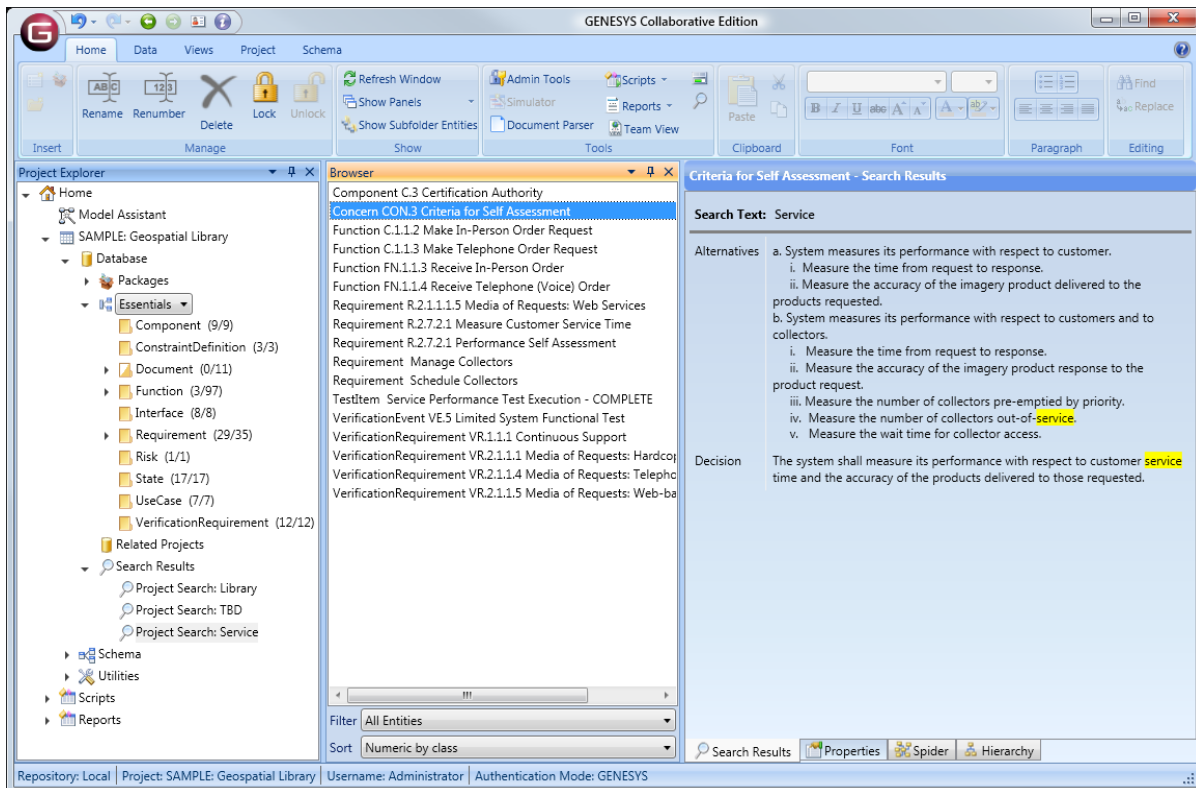
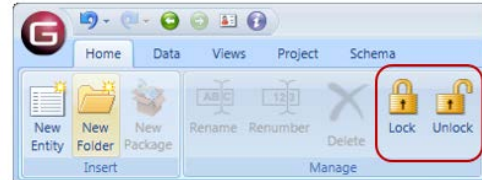


Figure 2. Navigating Search Results

### **Enhanced Model Management and Configuration**

GENESYS includes a robust access control framework that provides control over permission to read and change information at whatever granularity is required. Operating alongside the existing access control, GENESYS 6.0 introduces the capability to lock and unlock entities for even greater flexibility.

As the design model progresses through various design review milestones, it is advantageous to place part or all of the model under configuration control to prevent changes to entities during the review. To support this, GENESYS 6.0 includes the ability to lock individual entities, packages, folders, or the entire project.



**Figure 3. Lock / Unlock Button**

When an entity is locked, its attributes and parameters are locked (these constitute part of the system definition) and cannot be changed. Likewise, most of the relationships are part of the controlled system definition, but some are relationships to help you manage the system definition. Your team controls this by setting the “System Definition” property on relationship definitions in the schema. If a relationship definition is marked as “System Definition,” it is considered part of the design and cannot be changed when either the element or the target is locked. If not, the relationship can be changed, providing a flexible framework to implement your design processes.

### **Getting Started with Custom Reports**

In a collaborative environment, sometimes it is less about live connection to a digital environment than providing team members and stakeholders access to the information they need in the format they want. The GENESYS report writer provides a convenient approach to supporting a “your data your way” mentality, generating fit-for-purpose views blending text, tables, and graphics for a diverse set of audiences and needs directly from the authoritative repository. To help those unfamiliar with the banded approach to report writing common across many data-driven environments (as well as those unfamiliar with the way the GENESYS information model is structured), GENESYS 6.0 includes a new *Introduction to Writing Reports*.

The reporting guide provides a step-by-step explanation and development of a sample report using the GENESYS report writer. This document walks you through the report writer features and how bands operate as they iterate across the model to generate formatted documents that can be saved in various formats such as Adobe® PDF and Microsoft RTF. Like the API guide, this getting started document does not aim to make you an expert in reporting. (A focused training class is available for those specialists who wish to go deeper and hone their skills.) Instead, the objective is to provide everyone the essentials so that they can quickly understand the basics and begin creating custom reports to meet their needs.

### **Improving the Block Diagram Experience**

Many systems engineering diagrams highlight two objects and their connections – notably the interface, physical, and internal block diagrams illustrating the connectivity in the physical architecture; state transition diagrams specifying the valid transitions between system states; and class diagrams for object-oriented models. In GENESYS 5.0, the connector lines on these diagrams were often recomputed and redrawn when you didn’t want them to be – a frustrating experience.

Improvement in the way these diagrams are managed, and the routing of connector lines and labels was previously released in a service pack and is now included in GENESYS 6.0. This enhancement improves line management of block diagrams such that lines are not automatically redrawn for minor changes in diagram block size or location. Placement and sizing of blocks on these diagrams should be made prior to moving connection points for lines and changing the routing of lines on the diagram to make the overall management and look of the diagram proper.



### ADDITIONAL REFINEMENTS

#### ***Flexibility in Deployment***

To provide additional flexibility for users and IT departments, the GENESYS 6.0 installation process includes new configuration options. First, users who maintain their projects on a GENESYS Server no longer have to install a local copy of SQL Server Express. (Installing SQL Server Express locally still allows users to maintain local projects and sandboxes, but some IT organizations prefer to manage all SQL installations centrally.) Second, a stand-alone installation is available for the GENESYS license manager for those organizations who wish to manage a shared pool of licenses across their project or their enterprise.

#### ***Auto-Select in Dialogs***

Often, when performing a series of commands, you want to re-select the same object in a dialog. For example, when inserting functions on an activity diagram or mapping functions to a requirement, you may be selecting from the same folder. GENESYS 6.0 transparently tracks the last selection for many different dialogs, automatically selecting this item when available. This allows you to work more efficiently, maintaining your flow between various operations.

#### ***A GENESYS University Edition***

With the release of GENESYS 6.0, Vitech now offers a university edition of GENESYS to support systems engineering education. This edition is made available free for classroom use by qualified instructors and their students, providing students access to a full-featured systems engineering environment as they learn and hone their systems engineering skills. Educators wishing to explore the use of GENESYS for their systems engineering education program may contact [Vitech's University Program administrator](#) for more information.

### EXPANDING THE MODEL

Building on practical experience and research, GENESYS 6.0 extends the underlying schema (metamodel) in two areas: ability to include stakeholders in the system design, and enhancement of the verification aspects. Both represent extensions to the existing schema rather than changes of any aspect of the schema. Prior GENESYS schemas continue to be supported in GENESYS 6.0. However, to take advantage of the entire set of features and capabilities in GENESYS 6.0, we recommend upgrading your projects to the GENESYS 6.0 schema.

Of particular note in the GENESYS 6.0 schema is the new **Note** class. Developing a well-designed system requires frequent communication with stakeholders and customers. They have a stake in the system and they want to participate in the design process. In GENESYS 6.0, we have extended the schema to allow stakeholders and customers the ability to comment on virtually any aspect of the design model.

The **Note** class gives model reviewers the ability to provide additional information or a query regarding the characteristics of a particular entity in the design model. A Note can be related to any other entity in the model. The Note properties allow the design team to status the note, provide decision on incorporating the comment, and elevate the importance of the Note by relating the Note to a **ChangeRequest**, **Concern**, or **Risk**.

This expansion will allow you to collect and capture the comments made by anyone reviewing the model and allow for review of the comments prior to making changes to the basic design. The utility of this feature is highlighted and used as an example to build a custom application in *Getting Started with the GENESYS API*.

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### Comprehensive List of GENESYS 6.0 Schema Changes

- New classes
  - **Note**
- New relation pairs
  - *comments on / has comments*
  - *identifies / identified by*
- Class changes
  - **Element**
    - Added *has comments* relation with target class **Note**
  - **Document**
    - Added target class **Note** to *documents* relation
    - Added target class **VerificationEvent** to *supplied by* relation
  - **Nexus**
    - Added *identified by* relation with target class **Note**
  - **Requirement**
    - Added target class **TestActivity** to *basis of* relation
    - Added target class **VerificationEvent** to *specifies* relation
  - **Component**
    - Added target class **VerificationEvent** to *supplied by* relation
  - **TestActivity**
    - Added *assigned to* relation with target class **Organization**
    - Added *based on* relation with target class **Requirement**
  - **Organization**
    - Added target class **TestActivity** to *responsible for* relation
  - **Risk**
    - Added *identified by* relation with target class **Note**
  - **VerificationEvent**
    - Added *specified by* relation with target class **Requirement**
    - Added *supplies* relation with target classes **Component** and **Document**
- Facility changes
  - Added **Note** class to Systems Engineering facility

### Migrating Projects from pre-v60 Schemas

Given the nature of the schema changes made in the v60 base and Capability Architecture Definition schemas, minor project migration is required to transform specific classes and specific attributes. To best support this migration, GENESYS 6.0 provides a schema migration utility on the Project tab.

This utility is targeted at the standard Vitech schemas. If your project uses a customized schema, additional migration support may be required. If you have made schema extensions and would like to understand what special steps – if any – are required to support your extensions, please contact [Vitech Customer Support](#) with a copy of your extensions. We are happy to review these and advise you in your migration accordingly.

The migration from a v50 to a v60 schema includes adding new relations, a new class, and several relationship changes between classes. We have also added abbreviations for several of our included parameters and attributes.

**Note:** You do not have to migrate your schema in order to make use of GENESYS 6.0. You should assess your project needs, your project lifecycle, and the changes present in the v60 schemas to determine if, and when, to migrate your schemas. Project teams nearing a major milestone or approaching conclusion should strongly consider remaining with their current schema. We recommend that others move to the v60 schemas to take advantage of the latest improvements in the systems engineering metamodel.





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