

VISTA R4.6 User's Guide

ORG

NASA Ames Research Center
Jet Propulsion Laboratory, California Institute of
Technology

NASA AMMOS

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VISTA is built on the Open MCT platform, developed at NASA Ames Research Center in Silicon Valley, in collaboration with NASA AMMOS and the Jet Propulsion Laboratory, California Institute of Technology (under its contract with NASA, 80NM0018D0004).

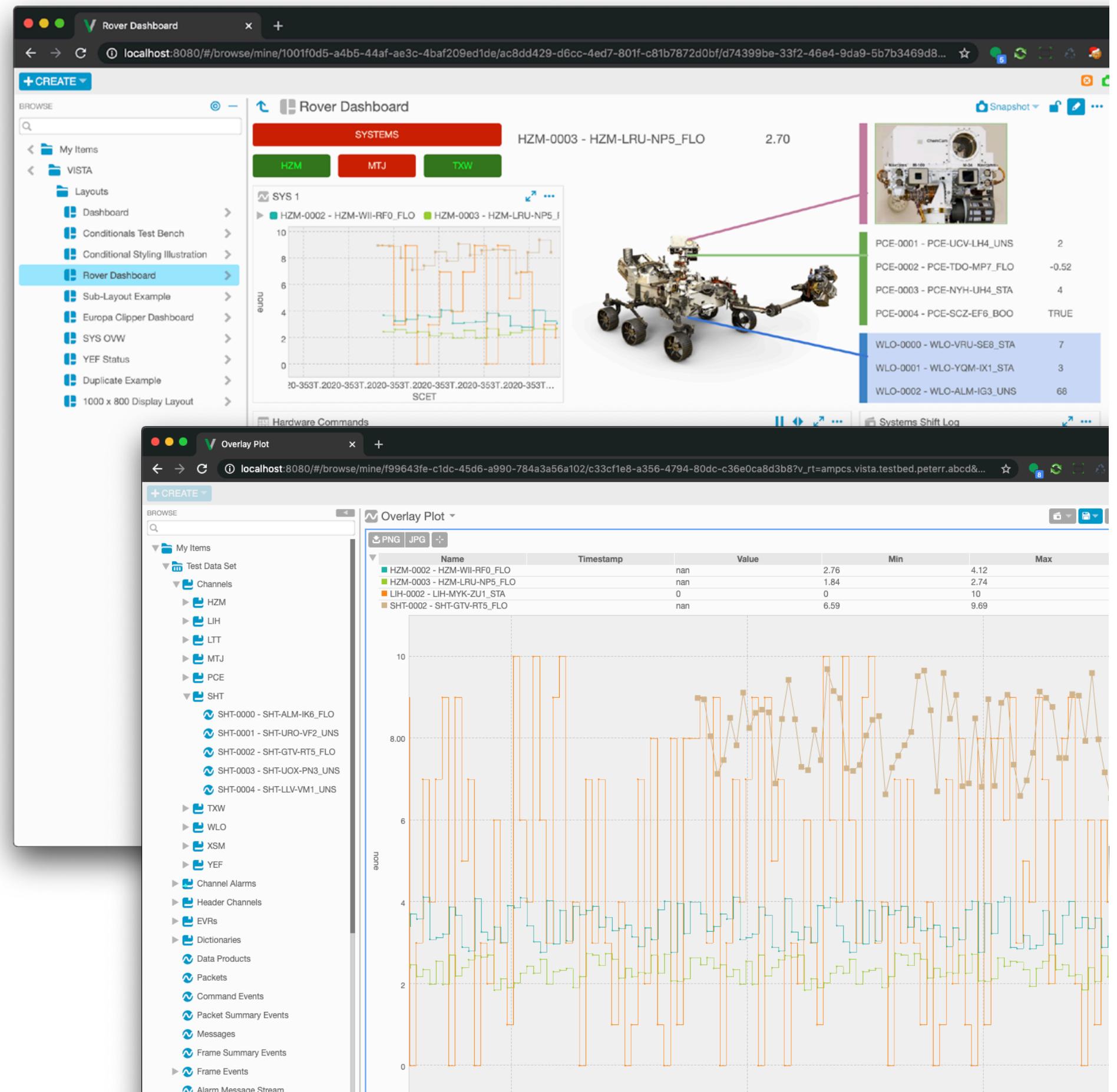


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REVISION HISTORY

Revision History

DOCUMENT V2.6.0 - APRIL 23, 2021 [VISTA RELEASE 4.6, NOT PUBLISHED TO MGSS]

- Added acknowledgment and copyright per direction.

DOCUMENT V2.5.1 - JANUARY 29, 2021 [VISTA RELEASE 4.6, NOT PUBLISHED TO MGSS]

- Remove Summary Widgets section and cross-references.

DOCUMENT V2.5.0A - JANUARY 27, 2021 [VISTA RELEASE 4.6, DOC-002798]

- Fixed erroneous release number in Revision History.
- Replaced screens on multiple pages that were possibly using sensitive data.

DOCUMENT V2.5.0 - DECEMBER 22, 2020 [VISTA RELEASE 4.6, DOC-002798]

- Updated Release Highlights starting with "New Custom Data Views" on page 8.
- Updates for new interface look and approach in Quick Start section, starting with "Starting Up and Connecting to Data" on page 11.
- Extensive updates in content and screenshots for the Overview section starting with "Introduction" on page 16.
- Reorganization of "Data Views" content, separated into "Viewing Data", "Data Set and Views" and "Custom Data Views" sections. See content starting with "Using Plot View" on page 41, "Data Set and Data Views" on page 47 and "Creating Custom Data Views" on page 92 respectively.
- Updated content for plot grid lines toggling in "Using Plot View" on page 41.
- New page for "Viewing a Table Row's Data" on page 46.
- New page for "Creating an Encoding Watch View From the Frame Summary Events Node" on page 96.
- New page for creating a custom EVR view and enable/disable EVR color coding (VCP-0047) "Creating a Custom Event Records View" on page 99.
- Updated screens and content for exporting data, starting with "Exporting an Object's Historical Data" on page 61.
- Updated content for "Overview of Creatable Object Types" on page 66.
- New content for Saved Styles on "Saving and Applying Saved Styles" on page 73.
- New page for Display Layout sizing on "Display Layout Sizing" on page 107.
- Updated content for custom format strings for VCP-0170 on "Telemetry Placed in a Display Layout as Alphanumerics" on page 108.
- Updated content for reorganized Display Layout style controls on "Layout Editing and Styling Controls" on page 112.
- Updated screenshots and content for "Using the Display Layout's Snapping Grid" on page 116.
- Updates for staleness evaluation in Condition Sets for VCP-0117 on "Working With Condition Criteria" on page 122.
- Extensive updates to content and screenshots for the Notebook, starting with "Working with the Notebook" on page 130.
- Updates for new views in "Data Set URL Fields Reference" on page 138.

DOCUMENT V2.4.0 - SEPTEMBER 2, 2020 [VISTA RELEASE 4.5, DOC-002712]

- Updated Release Highlights.
- Updated screenshot for session selection to include new ability to filter by Spacecraft ID in "Filtering By Historical Data Session".
- New content for "Data Staleness".
- Updated content for History button and menu in "Time Conductor, Fixed Timespan Mode".
- New content for "Using Plot View, Changing the X Axis".
- Content updated to cover new ability to view channel and EVR dictionary metadata on "Telemetry Channels" and "Event Records".
- New content for "Locking Objects".
- New content for "Missing Objects".
- Updated content for new option to hide plot legend when small, in "Edit an Overlay Plot, Y Axis and Legend Options".

- Revised content covering new plot marker shape options: "Edit an Overlay Plot, Plot Series Options".
- New content for "Telemetry Tables, Hiding Headers".
- Reorganized, revised and new content for editing Display Layouts.
- Updated content for font size and style.

DOCUMENT V2.3.2 - MAY 11, 2020 [VISTA RELEASE 4.4]

- Corrections and changes from feedback.

DOCUMENT V2.3.1 - MAY 7, 2020 [VISTA RELEASE 4.4]

- Many screenshot updates throughout the document.
- Revised content for Release Updates section: "What's New".
- Header channels and system status: "Header Channels" and "Quick Start: Create a Processor Statistics Layout".
- Frame Accountability and Bad Frames views: "Make a Frame Accountability View from the Frame Events Node".
- Data Set reference updates: "Data Set URL Fields Reference".
- Creatable objects descriptions updates: "Overview of Creatable Object Types".

DOCUMENT V2.3.0 - MAY 5, 2020 [VISTA RELEASE 4.4]

- Filter by multiple historical sessions: content updated in "Filtering By Historical Data Session".
- Command Messages can now be filtered by type and status. See "Creating a Filtered Custom Command Events View".
- Conditional Styling: brand new content starting with "Styling An Object With Conditional Styling".
- Condition Sets: brand new content starting with "Condition Sets Overview".
- Condition Widgets: brand new content starting with "Condition Widgets".
- Notebook: brand new content starting with "Notebook".

DOCUMENT V2.2.0 - SEP 27, 2019 [VISTA RELEASE 4.2]

Content updates for VISTA R4.2 release:

- Revised content for redesigned Status area. See "Status Area and Indicators", and "Changing the Source or Disconnecting From Real-time Data" to "Changing the Session or Discontinuing Historical Data Filtering".
- New content for "Pausing and Marking Rows in Table Views".
- Screens and content for new Clear Completed buttons in Data Products view. See "Data Products".
- Content added for "Creating a Custom Data Products View".
- Added content for the new Messages view, and creating a custom Messages view; see content starting with "Messages".
- Content for new object Export / Import functionality in "Exporting and Importing Objects".
- Content for new data clearing functionality; see "Clearing Data".
- Added "Overview of Creatable Object Types" with interactive cross-references.
- Details for "View Historic Data from a Channel Table".
- New filtering capability starting with "Filtering Overlay Plots and Tables".
- Content for new configuration settings in "Data Set URL Fields Reference".
- Many screenshots updated document-wide for parity with current user interface.

DOCUMENT V2.1.0 - JUN 5, 2019

- Updated screens for plot controls and table editing to remove possible sensitive content.

DOCUMENT V2.0.2 - JUN 3, 2019 [VISTA RELEASE 4.1]

- Updated screenshots in multiple locations for accuracy.
- Added cross references in v2.0.0 summary below.

REVISION HISTORY

DOCUMENT V2.0.1 - MAY 7, 2019 [VISTA RELEASE 4.1]

- Corrected typo in description of Channel Tables.

DOCUMENT V2.0.0 - MAY 3, 2019 [VISTA RELEASE 4.1]

- Content for new features, including: update Search to remove Type filtering and show tree results, Reorder/resize/Auto-sizing table options, Flexible Layouts, Tabs view, Frame Watch view, Channel Table, Channel Table Sets, Filtering in Overlay Plots, Printf formatting.
- Content updates for new editing functionality in "Display Layouts": updated screen in Quick Start, Screen caps done (from Open MCT), Multi-select and manipulate, New toolbar, Sub-object editing.
- Content updates for new plot features, including zoom buttons, mousewheel zoom and cursor guides. See "Using Plot View".
- Remove deprecated content: LAD Tables (replaced with Channel Tables), Fixed Position.
- Add new "What's New" section, starting with "This Release: New Views". Channel Tables and Sets: Replace LAD Tables, printf formatting, Flexible Layouts, Tabs View, Frame Watch, Display Layouts: Telemetry as alphanumerics, Drawing Objects, Multi-select, Sub-object editing, Plot features: cursor guides, zoom buttons, mousewheel zoom, Table editing: reorder/resize/auto-sizing, Fixed Position objects removed.
- Updated Data Set reference page "Data Set URL Fields Reference": added new URL fields, Added URL-to-view mapping to clarify what URLs are used by which views in the application.

DOCUMENT V1.8.1 - DEC 17, 2018 [VISTA RELEASE 4.0]

- Fixed typos, callout numbering and footer content.

DOCUMENT V1.8.0 - NOV 19, 2018 [VISTA RELEASE 4.0]

- Updated content and screens for new venue awareness user interface: Quick Starts beginning with "Starting Up and Connecting to an Active Venue" and detailed content starting with "Connecting to Data When Starting VISTA".

DOCUMENT V1.7.2 - NOV 01, 2018 [VISTA RELEASE 3.6]

- Removed "PROPRIETARY AND CONFIDENTIAL" from footer.

DOCUMENT V1.7.1 - AUG 27, 2018 [VISTA RELEASE 3.6]

- Added "Glossary" to address review comments.

DOCUMENT V1.7.0 - AUG 2, 2018 [VISTA RELEASE 3.6]

- Updated content for Status Indicators
- Updated content for clarity and accuracy related to Time Conductor, starting with "Time Conductor Overview".
- Updated content for clarity and new UI in "Using Plot View".
- Updated content for changes related to sticky table headers table views.
- Updated content for new color-coding of EVR's by level in "Event Records".
- Updated content for new feature "drag-to-rearrange in an object's Elements pool" on multiple pages including object editing, Stacked Plots, LAD Tables and LAD Table Sets.

DOCUMENT V1.6.2 - MAY 31, 2018 [VISTA RELEASE 3.5]

- Fixed missing cross-reference on pg. 6.

DOCUMENT V1.6.1 - MAY 14, 2018 [VISTA RELEASE 3.5]

- Updated content to add details about comparisons involving string, integer and float numeric field types, in "Building a Rule Condition".
- Reorganized content to better separate browsing and viewing data from composing objects. Added content and screens for data views such as EVRs, Command Events, Dictionaries, etc. New and modified content is mostly within the Data Views section starting with "Data Set and Data Views".
- Consolidated and added content and screens for export actions, starting with "Exporting an Object's Historical Data".
- Removed outdated references to Historic and Real-time Tables, and replaced with updated content and screens covering Telemetry Tables as on "Telemetry Tables".

- Data Set editing and reference was updated and moved to a new "Advanced" section, starting with "Configuring a Data Set".
- Updated screenshots in multiple places to reflect current features and menu options.

DOCUMENT V1.6.0 - APR 24, 2018 [VISTA RELEASE 3.5]

- Updated content and screens for Status indicators.
- New section, updated content and screens for real-time and historic data session selection and management.
- Added content and screens for LAD Tables.

DOCUMENT V1.5.0 - DEC 27, 2017

- Added content and screens for "Hiding a Display Layout Object's Frame".
- Added new major section for "Summary Widgets".

DOCUMENT V1.4.1 - JUN 15, 2017

- Added Revision History (this page) and fixed missing Table of Contents section header for "Interface Overview".
- Addressed typo on page "How the Time Conductor Affects Objects".

DOCUMENT V1.4.0 - MAY 25, 2017

- Updated content and screens for new plot configuration options: "Quick Start: Create a Stacked Plot", and Plotting starting with "Using Plot View" through "Edit a Stacked Plot".

DOCUMENT V1.3.1 - OCT 28, 2016

- Updated content and screens for new Fixed Position Displays.
- Updated content and screens for Data Set configuration options.

DOCUMENT V1.2.0 - SEP 30, 2016

- Updated content and screens for new design and functionality of the Time Conductor.
- New content and screens for Data Products, starting with "Data Products".
- New content and screens for Packets, starting with "Packets".

DOCUMENT V1.1.0 - MAR 30, 2016

- Initial published version.

GLOSSARY

Glossary

Channel Stream: A streaming real-time telemetry source configured in VISTA within a Data Set.

Composable Object : Any type of object in VISTA that can be created and edited by the user.

Composition: In VISTA, the act of creating or editing an object, including the determination of which objects are contained within a given object as well as configuration options for each.

Containment: In VISTA, many objects are composed of other objects, and hence are said to "contain" them. Folders, Display Layouts, Plots, Tables and more all contain other objects.

Context Menu: A user interface element that provides a set of options as a menu, contextually tailored for a given object type. Often invoked by "right-clicking" or "ctrl-clicking" an object in VISTA. See "Context Menus" on page 6.

CSV: Comma Separated Values, a common file export format for data in which each line represents a record, with commas separating field values. More on exporting data starting at "Exporting an Object's Historical Data" on page 6.

Data Set: A VISTA object that collects a variety of data resource types via URLs into a single, accessible data object that exposes data collections as view objects to the rest of the application. See "Data Set and Data Views" on page 6 for more.

Data Views: Built-in views for the different data types exposed by a Data Set; includes Telemetry Channels, EVR's, Dictionaries, and more. See "Data Set and Data Views" on page 6 for more.

Dialog: A common user interface element presented in VISTA as an overlay to solicit input from the user or to provide a quick view of an element.

Dictionary: In VISTA, a Data View of the deployment-configured mission dictionary. The Dictionary exposes meta-data and information about the missions's telemetry and enumerated channels as well as event records. More information starting with "Dictionaries" on page 6.

Display Layout: A type of composed view object that allows the placement and sizing of other views in a two-dimensional canvas area. For more, see "Display Layouts" on page 6.

Enumerated Channel: A telemetry channel that encodes state-based information, such as "ON" and "OFF". Typically values are stored as numeric indices, with a dictionary lookup utilized to convert to a human-readable string.

Export: In VISTA, the act of extracting data or content from the application for use outside it.

Filtering: In a VISTA table view, filtering refers to only displaying rows of data in which one or more columns include data that match a user-entered value.

Historic Data: Data retrieved and displayed via a query against a datetime span with a discrete beginning and end.

Inspection Pane: In VISTA, a user interface element that provides meta-data and configuration options for the currently in-view object. More info at "Inspection Pane" on page 6

Channel Table: In VISTA, a type of composable tabular view that always displays available data for each of its constituent channels in alphanumeric format. "Channel Tables and Channel Table Sets" on page 6 has more information.

Link: In VISTA, a Link is a shortcut to another object, similar to a symlink or alias in other computer systems. See "Original Objects and Links" on page 6.

Min-Max Query: A technique employed to optimize the performance of data queries associated with plot views. For example, in a time-based plot of a telemetry channel in which there are 100 pixels available to display in the time axis, retrieving more than 100 data points is wasteful – no more than 100 points can be rendered in that space. A min-max query allows the dimensions of the rendering space to be included as part of the query, so that the server can optimize and return the sufficient number of data points, and no more, to accurately represent the data.

Object: In VISTA, an object is the fundamental building block of the application. Both built-in (Telemetry Channel, Dictionary, EVR View, etc.) and created elements (Display Layouts, Telemetry Tables and more) are all considered objects. More at "Original Objects and Links" on page 6.

Pane: A portion of the main user interface of VISTA, which is divided into three main panes: the Browsing Area with the Object Tree, View Area and the Inspector. See "Interface Overview" on page 6.

Plot (Overlay and Stacked): A strip chart visualization of data values over time for one or more telemetry channels. There are two types of plots available in VISTA: overlay, in which channels share a common Y axis and overlay each other and stacked, in which each channel maintains its own Y axis and hence stack on top of each other. More information at "Overlay and Stacked Plots Overview" on page 6.

Plot Line: A rendered line that connects data points in a plot. See "Edit an Overlay Plot, Plot Series Options" on page 6.

Plot Marker: The visual indicator of an actual data point in a plot. "Edit an Overlay Plot, Plot Series Options" on page 6.

Properties: In VISTA, many objects have properties associated with them, such as their name, plot display options, fields to include, etc.

Real-time Data: Data retrieved and displayed in an ongoing basis as it becomes available to the server and application.

Session: An specific instance of an AMPCS down or uplink session, which are uniquely identified by a number and hostname. VISTA uses sessions to determine what data to display at any given time. More on configuring and using sessions in VISTA at "Connecting to Data When Starting VISTA" on page 6.

Status Bar: An area at the bottom of the VISTA interface that displays the current status for a number of aspects of the application via Status Indicators. It also displays warning messages when necessary. See "Interface Overview" on page 6.

Status Indicator: A small iconic representation of a system or attribute of VISTA that are displayed in the Status Bar area. Hovering over any of the indicators will expand them, providing more details and available actions. See "Status Area and Indicators" on page 6.

Summary Widget: Button-like objects that dynamically assess and display status for one or more contained telemetry channels based on the matching of user-configured rules and values. More info than you can shake a stick at starting with "Summary Widgets" on page 6.

Telemetry Table: In VISTA, a type of composable view object that displays data for one or more contained telemetry channels in a tabular view.

Time Conductor: An interface in VISTA that allows control of the time context and bounds of

data queries for many VISTA view types. See "Time Conductor Overview" on page 6.

Topic: A named container of one or more sessions provided by AMPCS. More information starting with "Connecting to an Active Venue" on page 6.

View: Any component which can be displayed to a user. Views may be a single indivisible item, or be composed of other view types.

View Object: A single instance of a view. Can be composed by the user, or built-in as part of a particular VISTA deployment.

DOCUMENT V2.6.0 - APRIL 21, 2021

Added acknowledgement and copyright per direction

RELEASE HIGHLIGHTS

New Custom Data Views

- 1 Encoding Watch View:** See "Creating an Encoding Watch View From the Frame Summary Events Node" on page 96.
- 2 Event Records View:** Event color application can now be customized. See "Creating a Custom Event Records View" on page 99.
- 3 Packet Summary View:** See "Creating a Custom Packet Summary View" on page 101.

The image displays three separate windows of the VISTA software interface, each showing a custom data view:

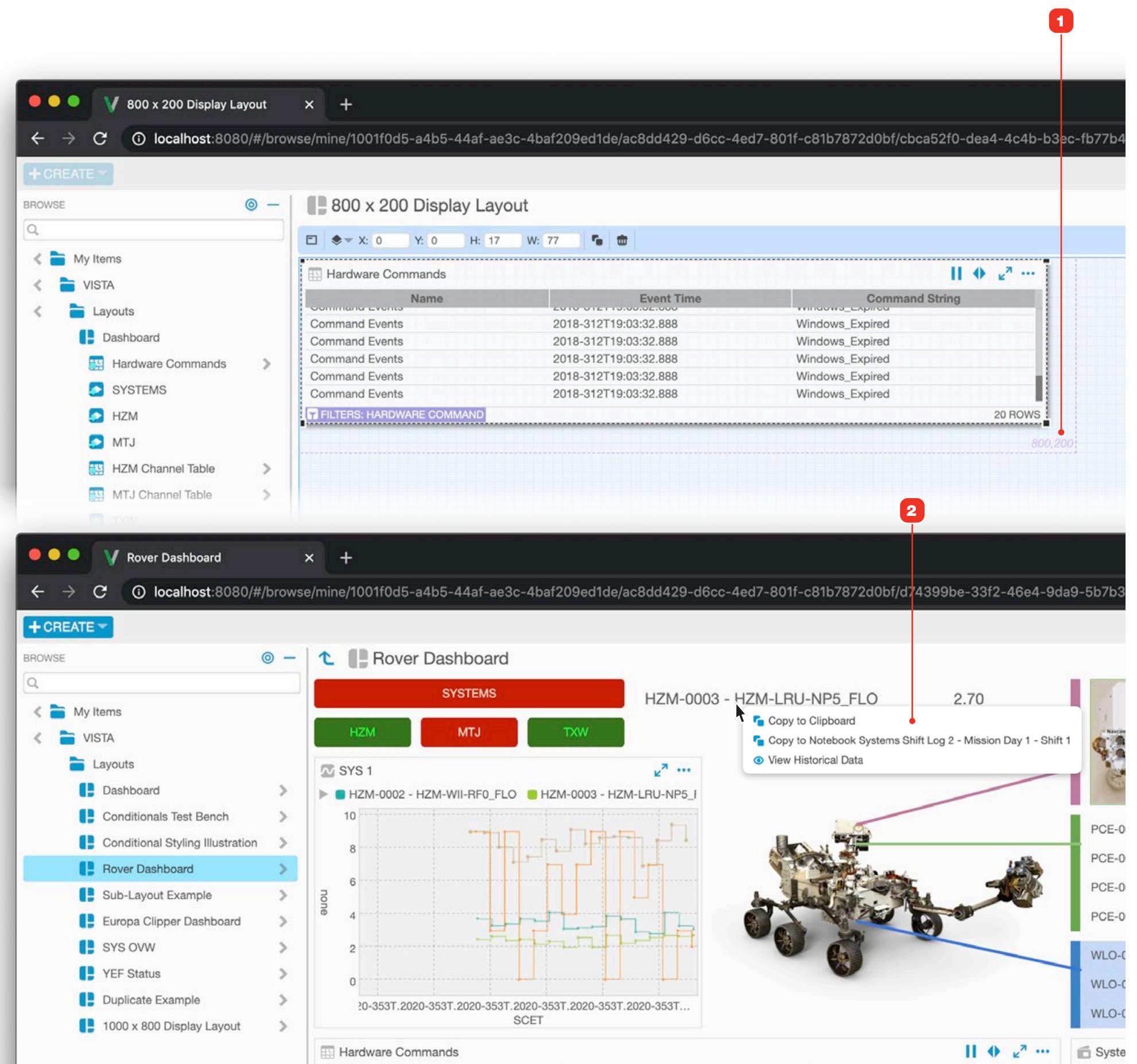
- Encoding Watch View (Top Window):** Shows a table of FSW Valid Frames (450), FSW Invalid Frames, and FSW Idle Frames (7). A red box labeled '1' points to the title bar of this window.
- EVR View (Middle Window):** Shows a table of Event Records (EVRs) with columns for EVR Name, SCET, ERT, SCLK as Float, LMST, Record Type, Module, Level, Message, Metadata Value, Metadata key, and Event ID. A red box labeled '2' points to the title bar of this window.
- Packet Summary View (Bottom Window):** Shows a table of FSW Valid Packets (10), FSW Invalid Packets (5), and FSW Fill Packets (0). A red box labeled '3' points to the title bar of this window.

Each window includes a sidebar for 'BROWSE' items and an 'INSPECT' panel on the right side showing properties and styles for the respective view.

RELEASE HIGHLIGHTS

Copy Telemetry Values and Layout Dimensioning

- Copy Telemetry Values:** telemetry added to a Display Layout as an alphanumeric can now be copied directly into a new Notebook entry, or to the clipboard. See "Capturing Data Into a Notebook Entry" on page 133.
- Set Display Layout Dimensions:** configure a desired pixel size for a Display Layout, and see an indicator while editing. See "Display Layout Sizing" on page 107.



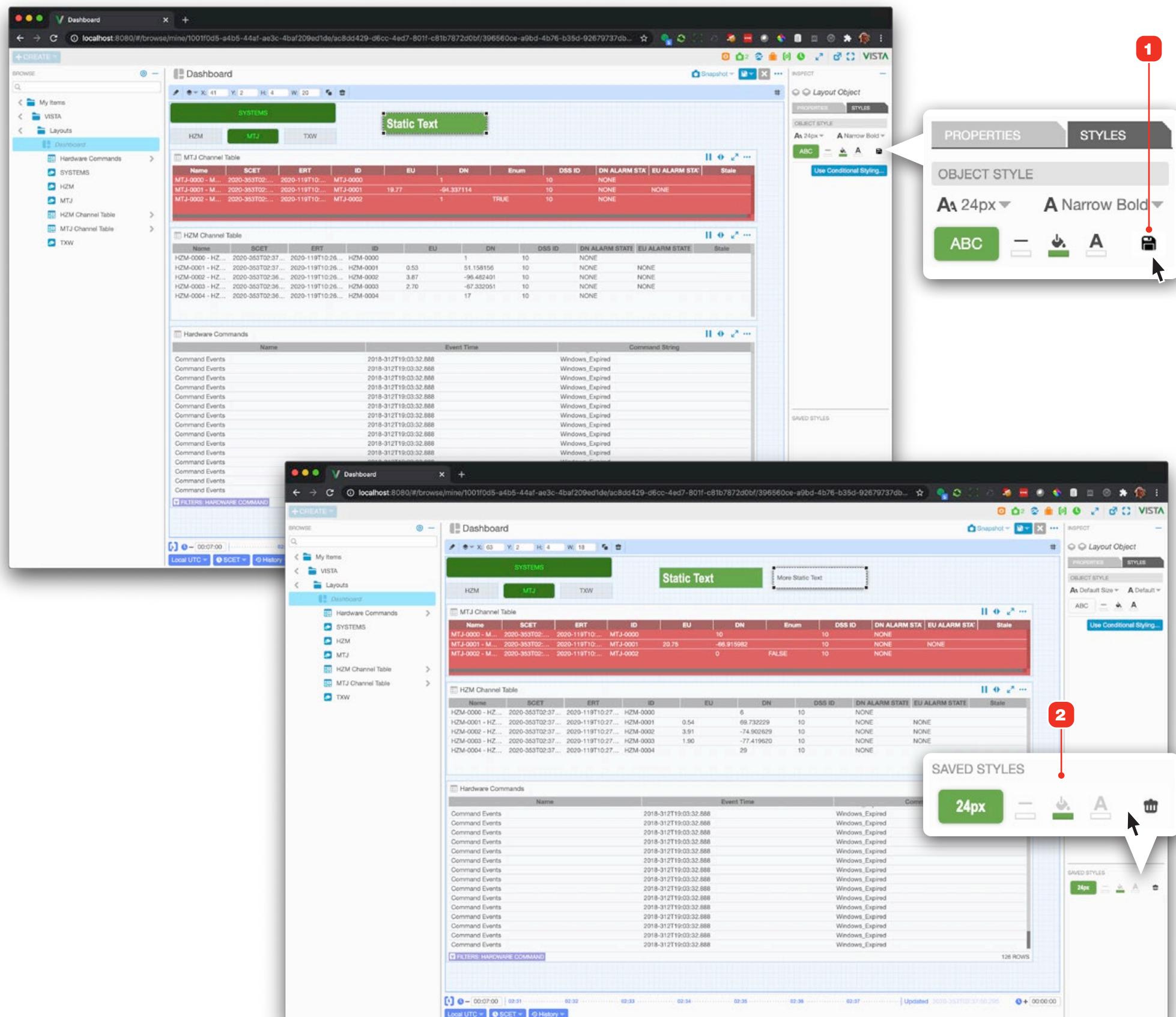
RELEASE HIGHLIGHTS

Saved Styles

Styles can now be saved and applied to other objects. Saved Styles created while styling any type of object can be reused and applied to any other object, and Saved Styles can be used for both static and Conditional styling.

- When mousing over the style controls, a "Save" icon will appear. Click this to save the style.
- Saved styles appear in the "Saved Styles" section of the Inspector pane. Editing a view or selecting an element in a layout and clicking a saved style will apply all applicable settings of that style to that element.

See "Saving and Applying Saved Styles" on page 73 for more.



QUICK START

Starting Up and Connecting to Data

When starting up VISTA, you must connect to a data source to begin using the application. Depending on your configuration, you will have access to historical data and also real-time streaming data.

CONNECTING TO REAL-TIME DATA

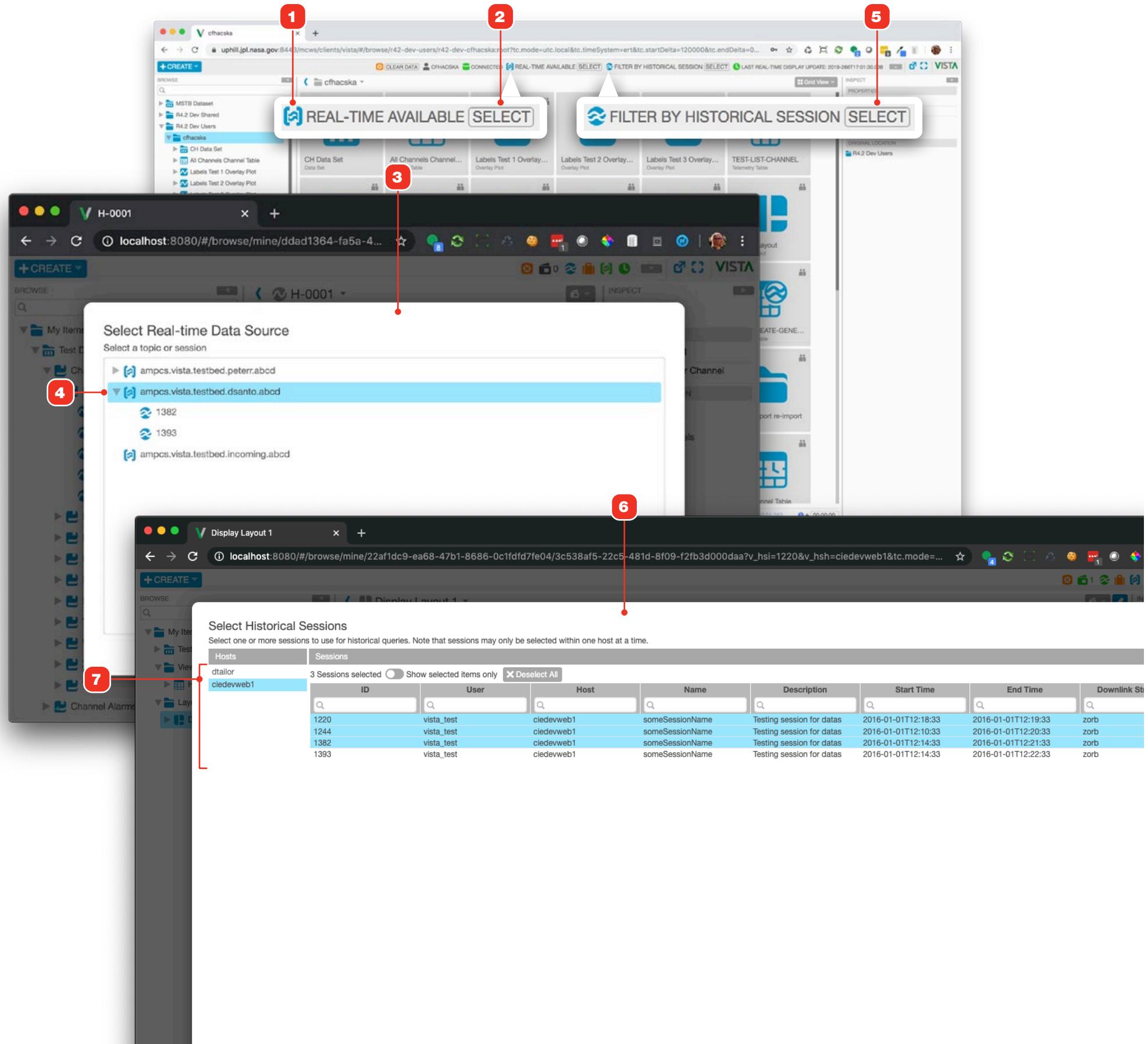
- 1 When real-time streaming data is available, the Real-time connection indicator will appear in light blue.
- 2 To select an available real-time session, click this button to display the Real-time Data Source selection dialog 3.
- 4 Real-time Topics and their Sessions are displayed in a tree view; Topics may contain one or more real-time Sessions. Selecting a Topic will include data for all Sessions in that Topic, even as new Sessions are added to that Topic. Click a Topic or Session to select it; you may only select one at a time.

FILTERING HISTORIC DATA BY ONE OR MORE SESSIONS

- 5 Click this button to display the Historical Session selection dialog 6 and a table of available historic data sessions.
- 7 All available hosts and their sessions will appear here. Click to select a session, then hold the shift key and click to select multiple sessions.

MORE DETAILS

- "Connecting to Real-time Data" on page 32.
- "Filtering By Historical Data Session" on page 34.



QUICK START

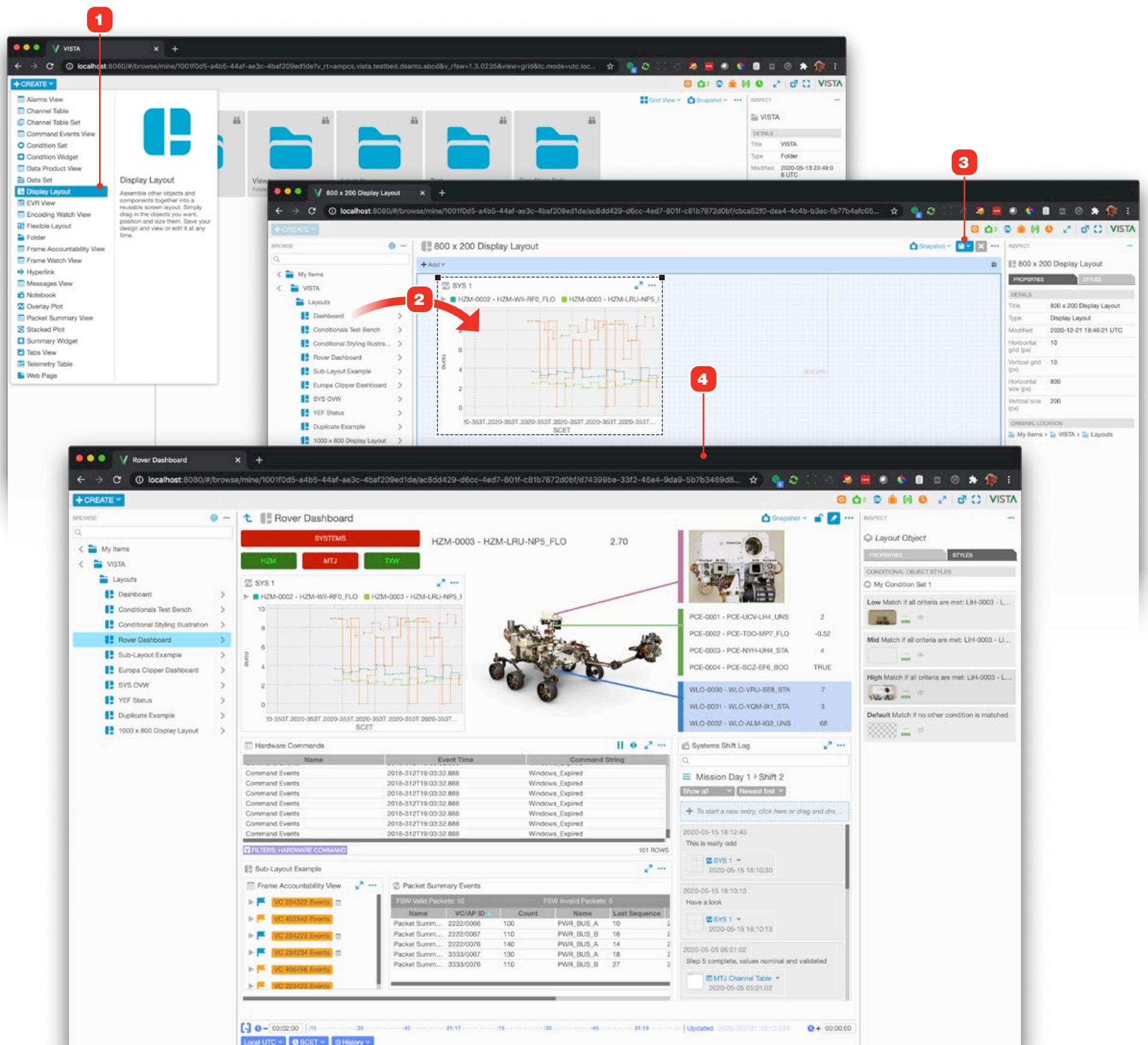
Create a Screen Display

Create a screen that includes multiple telemetry items together in one view.

- 1 Create a new Display Layout. See "Creating A New Object" on page 65 for more.
- 2 Find, drag in and position the elements you want.
- 3 Save your Layout.
- 4 The final result.

MORE DETAILS

- "Creating A New Object" on page 65
- "Editing An Object" on page 68
- "Display Layouts" on page 105



QUICK START

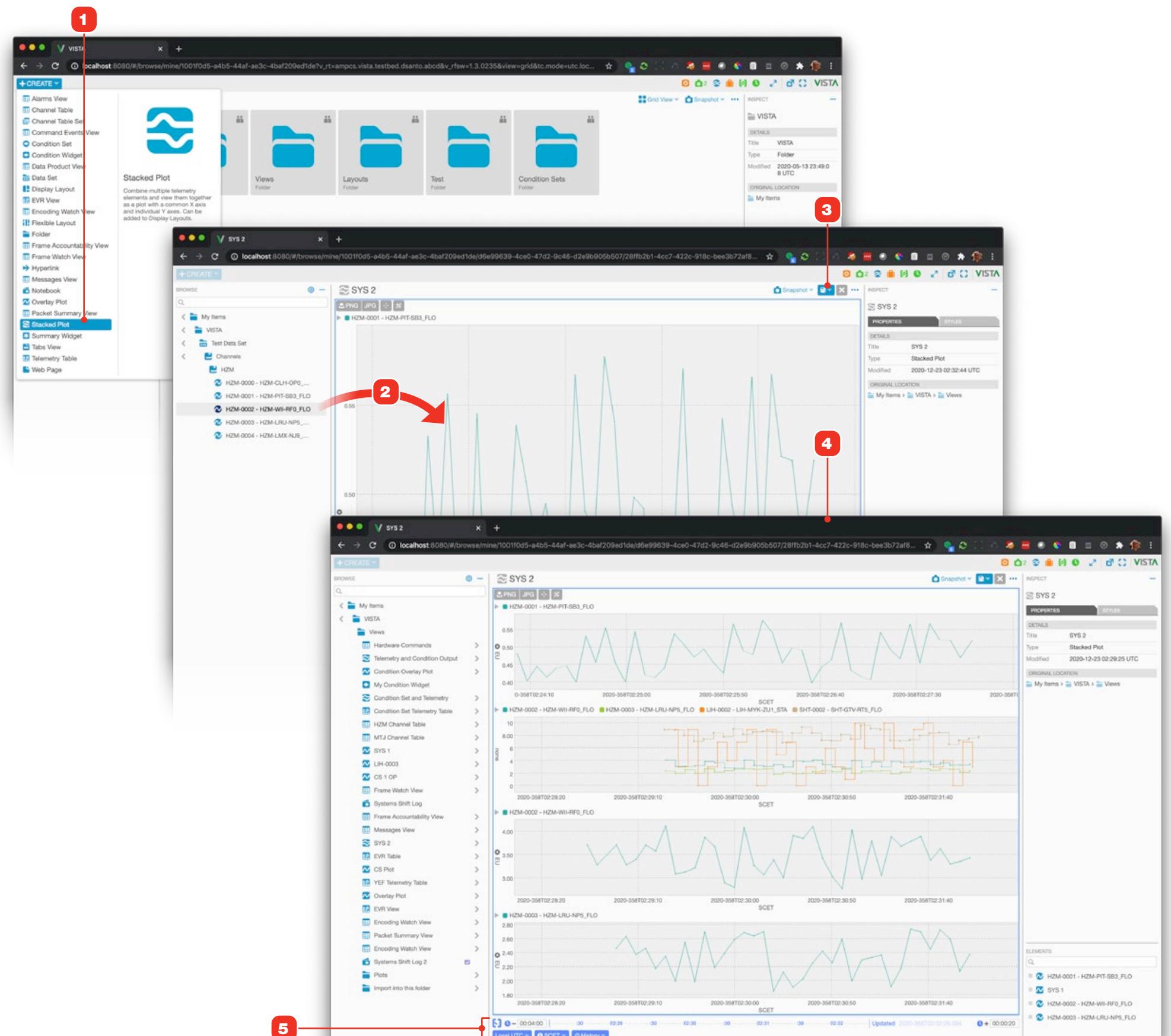
Create a Stacked Plot

Bring together multiple telemetry channels in a stacked plot view with a common X axis. If you want to include an Overlay Plot **5** as a stacked element, create and save your Overlay Plot first, then add it in step **2** below.

- 1** Create a new Stacked Plot.
- 2** Find and drag in the telemetry channels and Overlay Plots you want. You can drag in as many items as you like.
- 3** Save your work.
- 4** The final result. Pan, zoom and explore the view as needed within each plot and by using the Time Conductor.

MORE DETAILS

- "Creating A New Object" on page 65
- "Editing An Object" on page 68
- "Overlay and Stacked Plots Overview" on page 78
- "Edit a Stacked Plot" on page 84
- "Edit an Overlay Plot" on page 79
- "Time Conductor Overview" on page 28



QUICK START

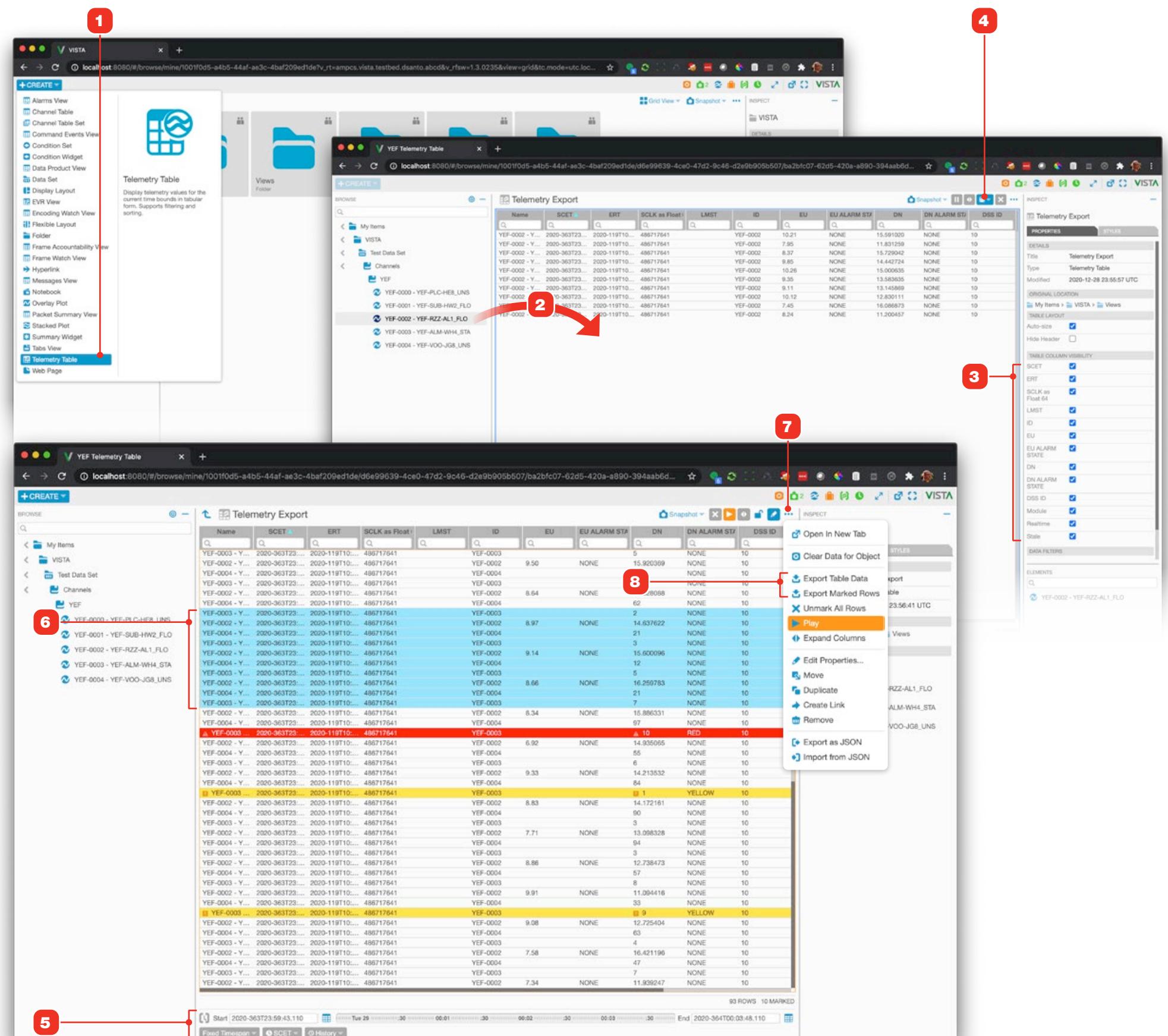
Collect And Export Historical Data for Multiple Channels

Although you can export any channel's historical data by context clicking it in the tree, exporting data for multiple channels in the same file requires a bit of setup. To do this, add multiple channels to a Telemetry Table, and then export that table's data. Here's how.

- 1 Create a new Telemetry Table.
- 2 Find and drag in the telemetry channels you want. You can drag in as many telemetry channels as you like.
- 3 Hide or show columns that you'd like to exclude or include respectively.
- 4 Save your changes and exit Edit mode.
- 5 In Fixed Timespan Mode, adjust the Time Conductor to set the datetime range that you are interested in.
- 6 You can export all the table's data, or optionally only selected rows.
- 7 Click the table's "More Options" button to display its menu.
- 8 To export all the table's data, select "Export Table Data". To export only selected rows, select "Export Marked Rows". If your browser is set to prompt you for a download location on your computer, you'll be able to name your exported file and select a save location in the subsequent system dialog box. Otherwise, the file will automatically be named "export.csv".

MORE DETAILS

- "Exporting an Object's Historical Data" on page 61
- "Creating A New Object" on page 65
- "Editing An Object" on page 68
- "Telemetry Tables" on page 85
- "Time Conductor, Fixed Timespan Mode" on page 29



QUICK START

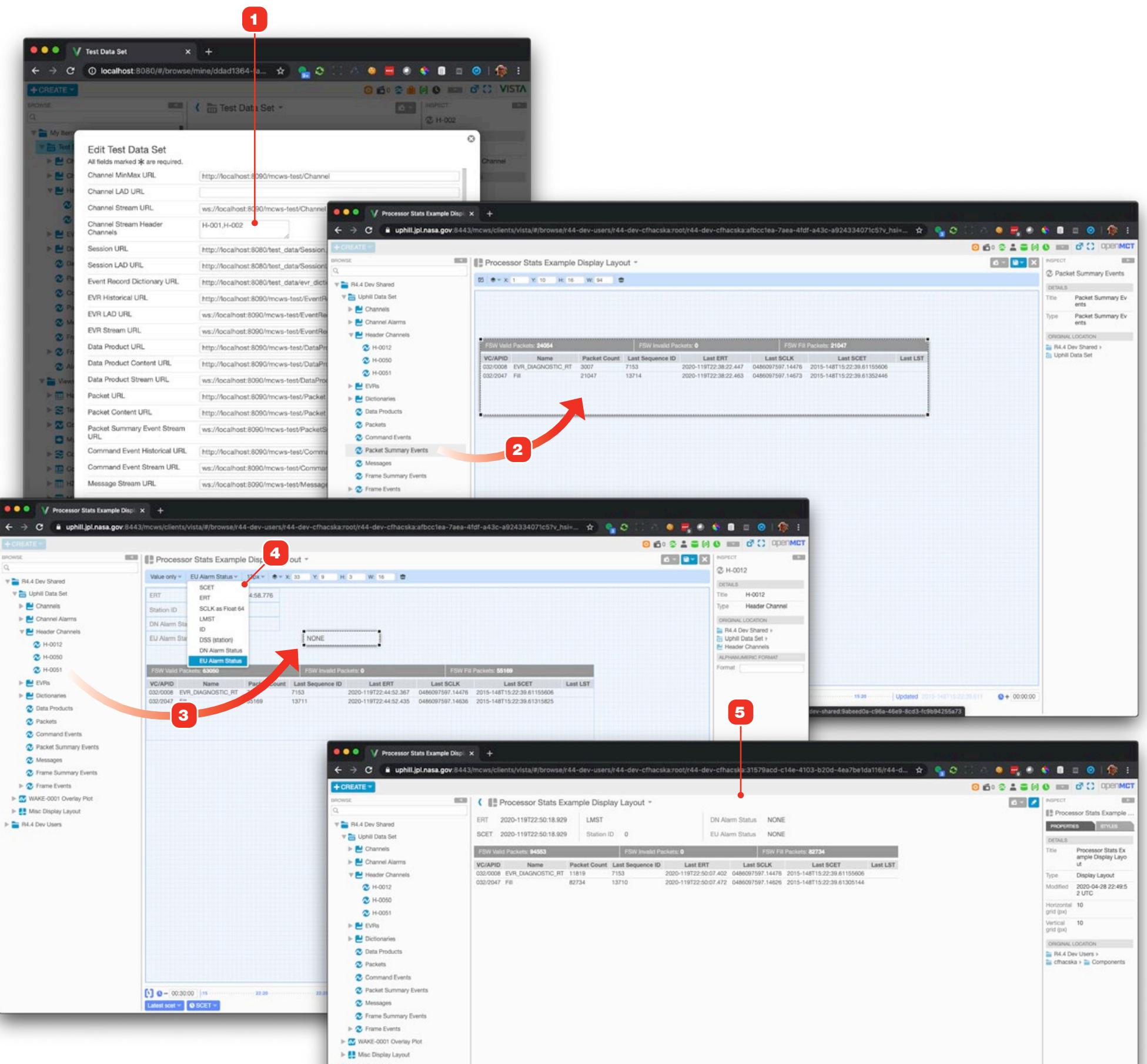
Create a Processor Statistics Layout

Use Header Channels and the Packet Summary Events node to create a reusable processor statistics Layout component.

- 1 Configure your Data Set to use Header Channels.
- 2 Create a new Display Layout, then select and drag the Packet Summary Events node into it.
- 3 Drag your Header Channels into the Layout, position and choose which fields **4** will display. Configure the field to only display its value; add Text elements to create labels. Note that you can add the same channel more than once in order to display all the necessary fields.
- 5 This Layout can now be included as a common component in other Display and Flexible Layouts.

MORE DETAILS

- "Configuring a Data Set" on page 137
- "Header Channels" on page 60
- "Creating A New Object" on page 65
- "Edit a Display Layout" on page 106



OVERVIEW

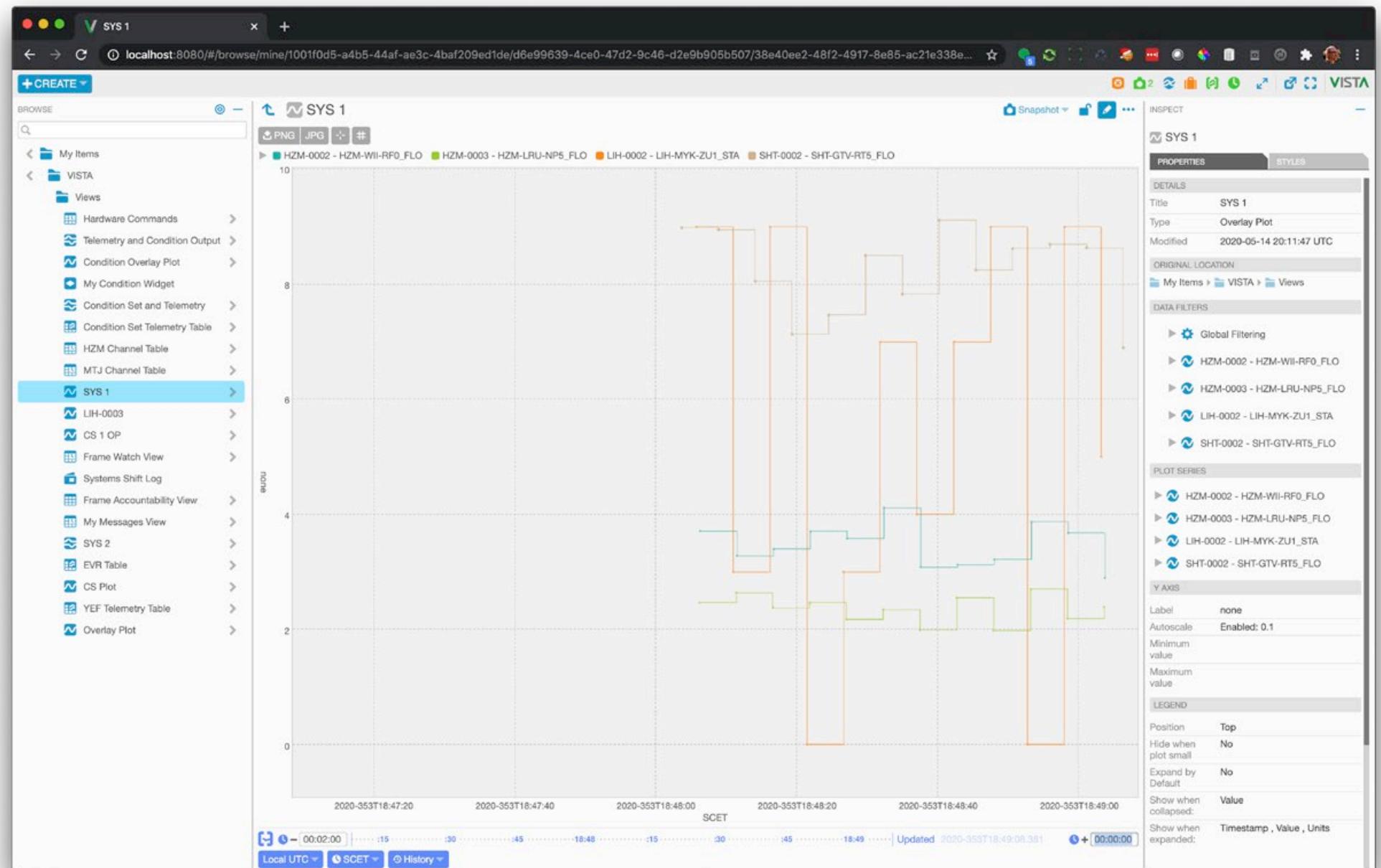
Introduction

VISTA (VISeualization for Telemetry Analysis) is a web-based, multi-mission telemetry monitoring and analysis tool suite that allows deep access to mission data coupled with powerful compositability features. Users can rapidly view and explore data in a variety of visualizations, as well as create many different types of views that can be saved and shared with others. It runs in the browser with no software required to be installed, on both desktop and compatible mobile devices.

BROWSER CONSIDERATIONS

The application is a web-based application that runs in a browser, and as such may have some idiosyncrasies that those who are more familiar with standard desktop applications should be aware of.

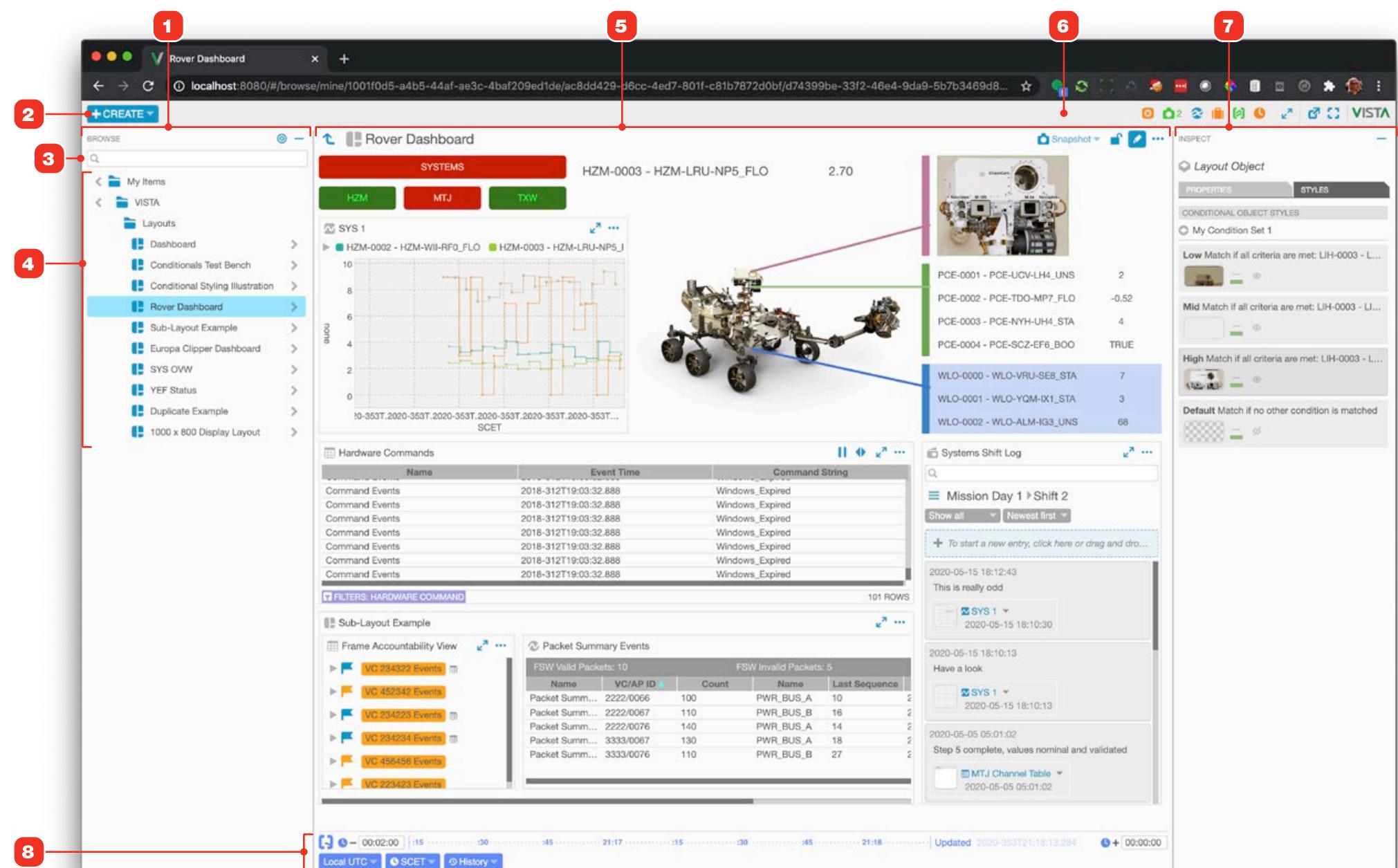
- **Supported Browsers:** While VISTA should still work and perform well in most modern popular browsers such as recent versions of Firefox and Safari, the application has been developed and tested mainly in Google Chrome – it's highly recommended to use that browser. Internet Explorer is not recommended or supported.
- **Back and Forward Buttons:** Using the browser's Back and Forward buttons may present unpredictable results, and isn't recommended. Use the application's available buttons to navigate within the app.
- **Backspace Button:** Avoid use of your keyboard's Backspace button (except when editing text), which in most browsers is mapped to the action of browser Back.



OVERVIEW

Interface Overview

- 1 Browsing Pane:** Includes the Create button to create new objects, Search and the Object Tree.
- 2 Create Button:** All objects in the application (other than pre-existing data objects) are created via this button and its menu 8. See "Creating A New Object" on page 65 for more.
- 3 Search:** Search allows you filter the Object Tree. See "Searching" on page 23.
- 4 Object Tree:** This contains all the objects you have access to, both telemetry objects and user-created objects. Single-click an item to select it and display its contents in the view area. If an item has an arrow to its right, click the arrow to drill into that item's contents in the tree view.
- 5 View Area:** The view area shows the contents of a particular item. Different types of items provide different views of their contents. For example, you view the contents of a layout in the Object Tree as a list of items, but when seen in the View area, the Layout presents those items in its composed, "laid out" view.
- 6 Status Area:** Shows several indicators showing the current status of the application, and provides some application-wide setting capabilities. For more, see "Status Area and Indicators" on page 27.
- 7 Inspection Pane:** This pane shows useful information about the currently selected item. See "Inspection Pane" on page 24 for more.
- 8 Time Conductor:** Controls the time context for all time-aware views in the application, setting the time scope for all data displayed. See "Time Conductor Overview" on page 28 for more.



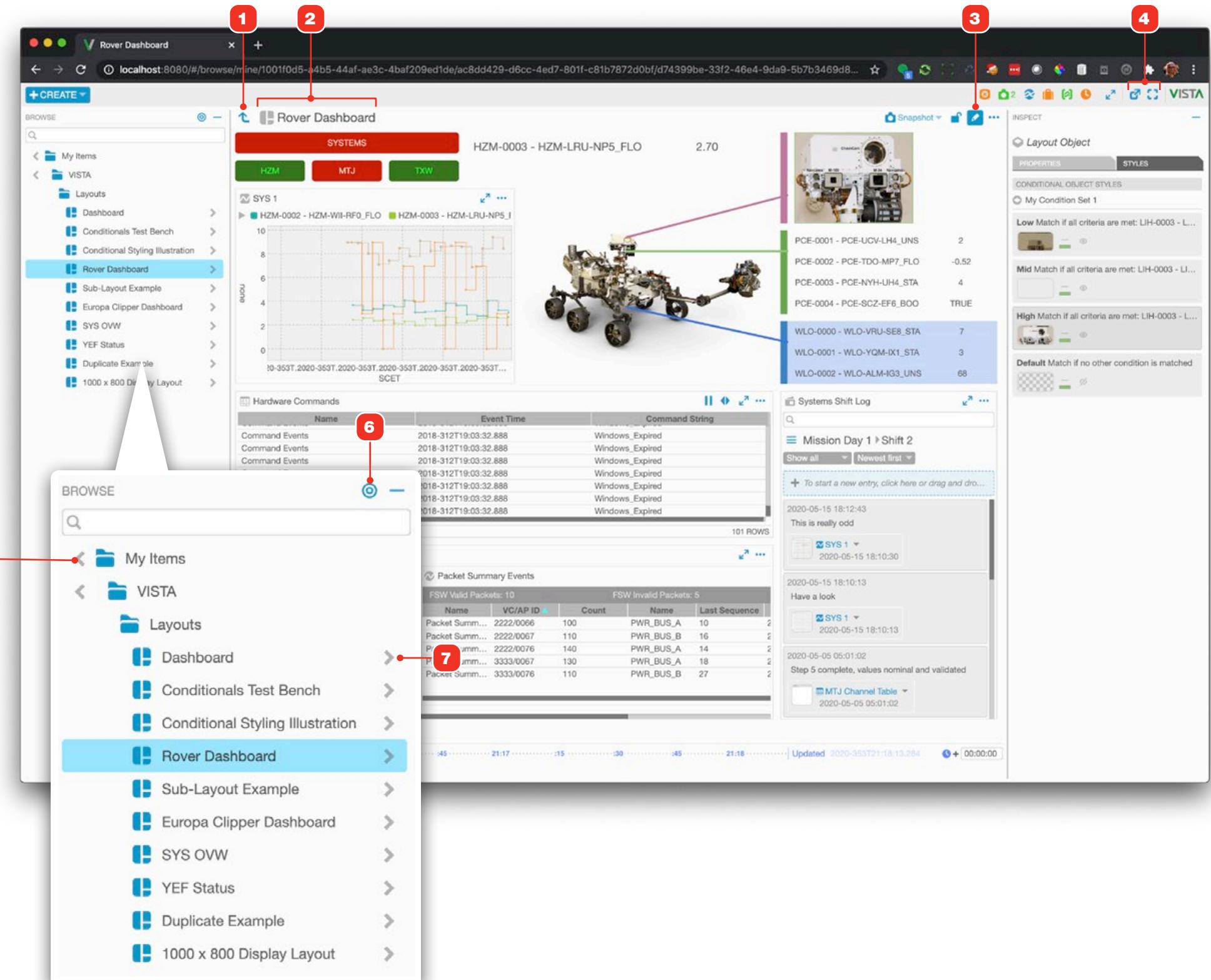
OVERVIEW

Viewing Objects

- 1 Navigate Up:** Navigates the view "up" to the object that contains the current object. This is also known as its parent.
- 2 Current Object Type and Name:** Title of the currently selected object being viewed.
- 3 Edit Button:** Click to edit the current object. This only applies to "composable" objects (those that can be created via the Create menu) so this button may not always appear.
- 4 View Buttons:** Some types of items have certain capabilities available to their view in the upper right of this area:

 View in New Browser Tab	Open the current object in a new browser tab.
 View fullscreen	Expand the current view to occupy the full area of the display.

- 5 Tree Navigation "Up":** Navigates the tree view up to the parent of the item clicked.
- 6 Sync Tree View:** Clicking this synchronizes the tree to bring the currently navigated object **2** into view in the tree.
- 7 Tree Navigation "Down":** Navigates the tree view down into the item clicked. Items will only display this arrow if they have children elements.



OVERVIEW

Original Objects and Links

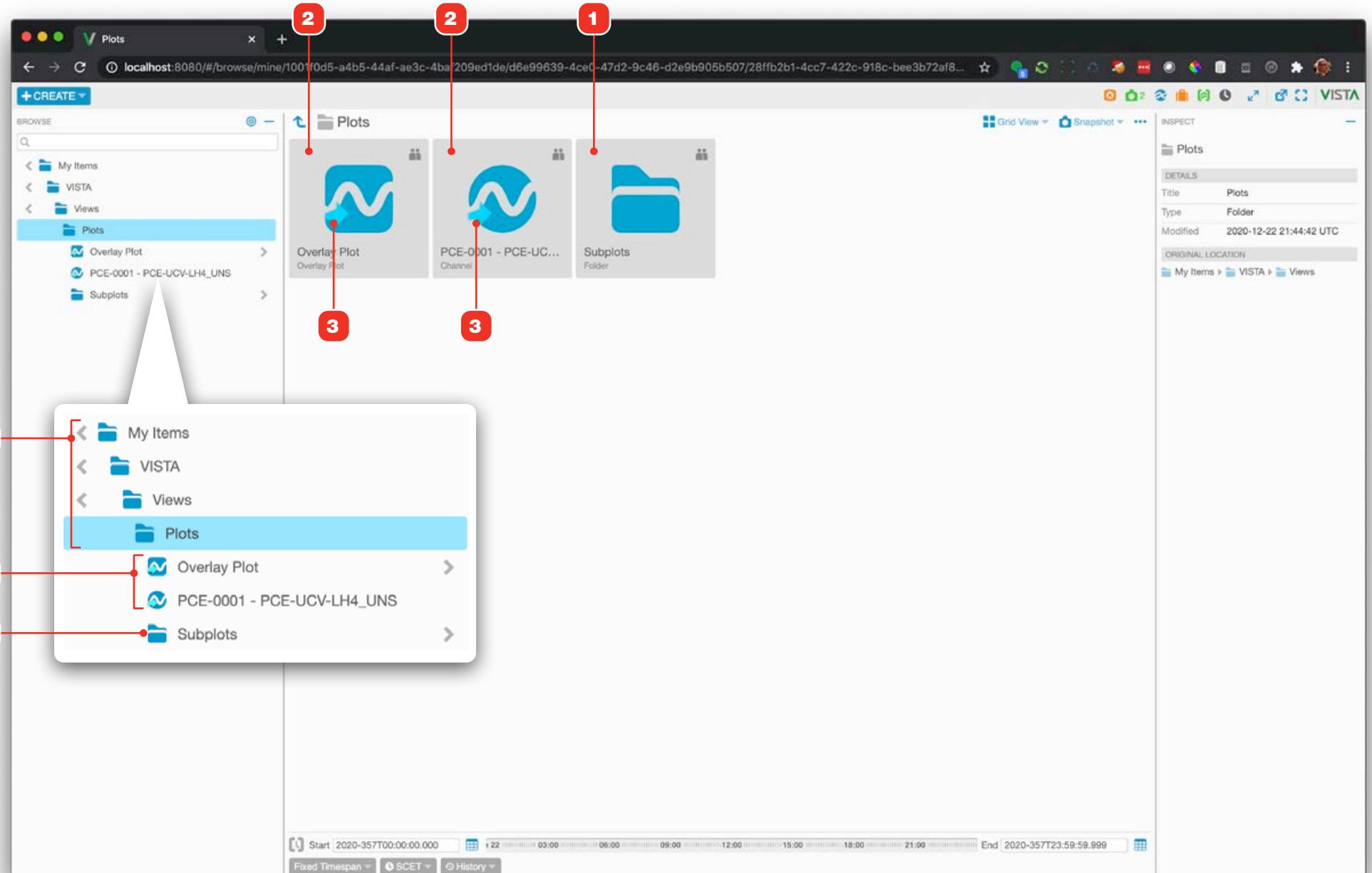
Objects in the application are either "original" objects **1** or Links **2** to original objects. Links are the same as symlinks in Unix, or aliases in the Mac OS.

When you first create an object, that object is considered an original. When that object is placed into another object, like a folder or a Display Layout, a Link is created to its original. Changing the original in one place automatically updates all Links to that original - editing a Link is actually editing the original object. You can create a Link to any original object and place it where you like.

Links are distinguished visually from originals via the inclusion of a small arrow symbol **3** in the lower left of their type icons.

1 Original objects.

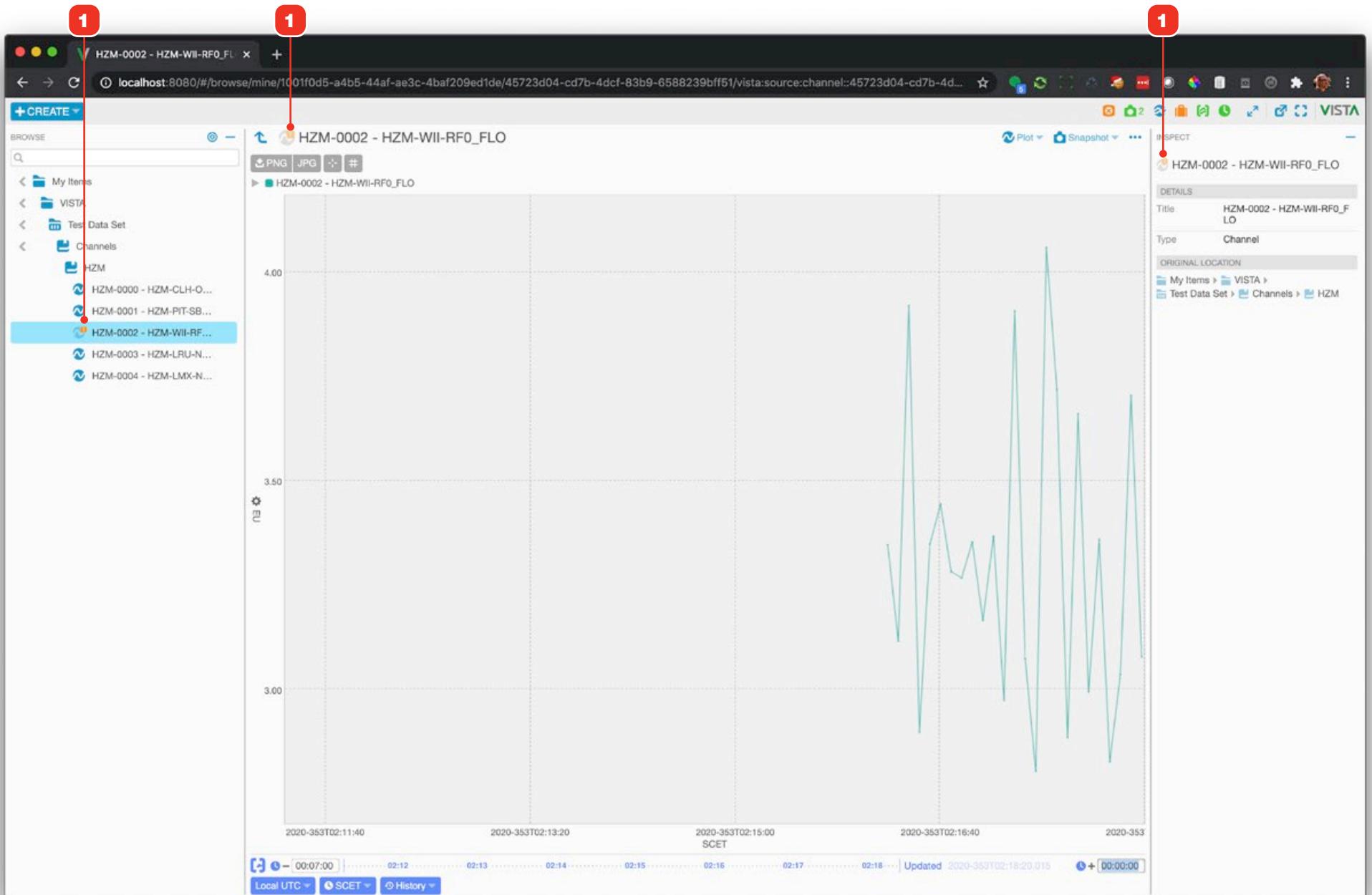
2 Links to objects.



OVERVIEW

Suspect and Missing Channels

- 1 Channels can be marked as "suspect" in the data source, or may be missing if removed from the dictionary. In both cases, those channels will be visually indicated with indicators as shown here.

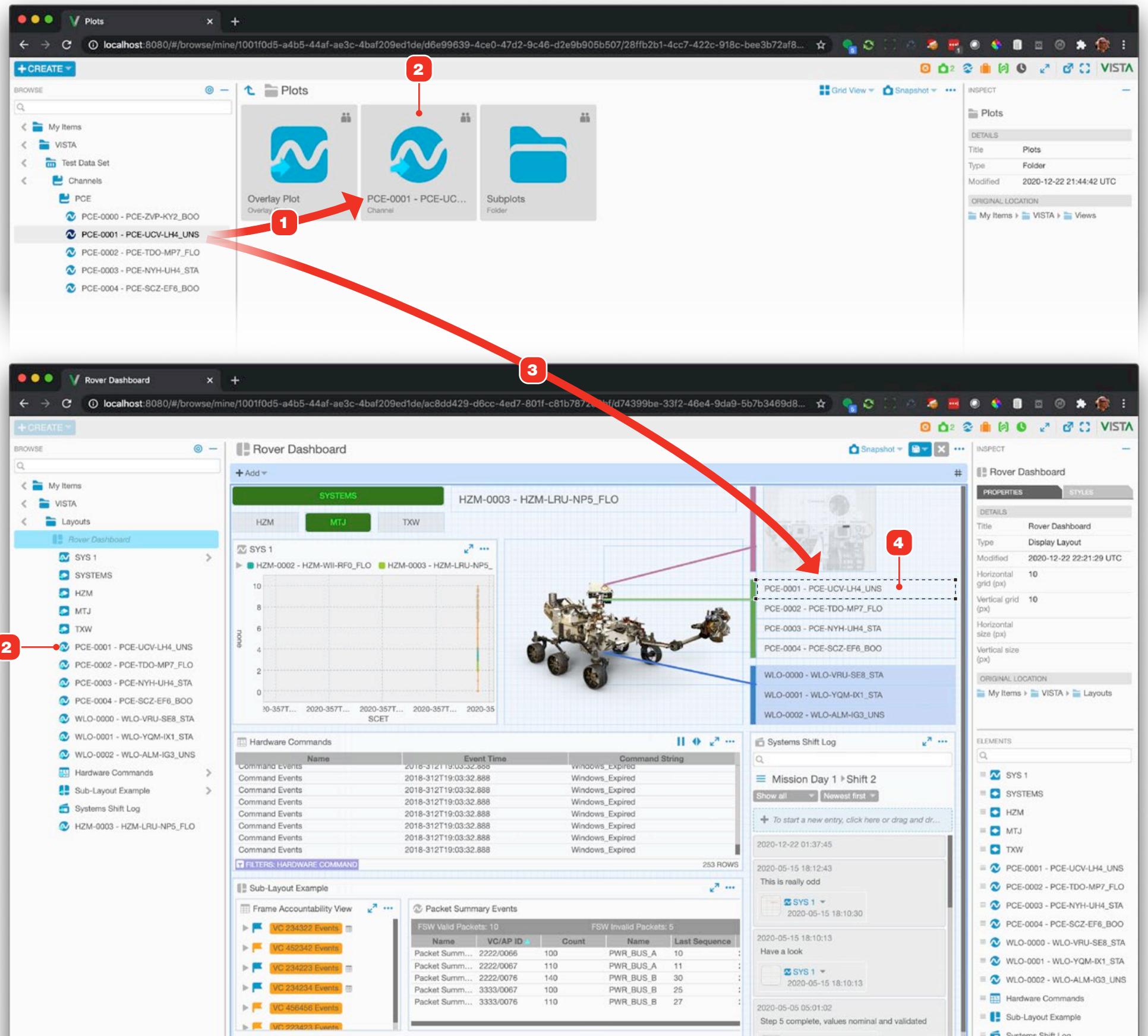


OVERVIEW

Dragging and Dropping Objects

The application supports drag and drop for many actions. The result depends on what you're dragging and where you're dropping it.

- 1 Dragging from the tree into a Folder will create a "link" 2 within that folder to the original. See "Original Objects and Links" on page 19 for more on Links.
- 3 Dragging from the tree into the main view of another object will also create a link to the original, but will also add that item to the destination object in a meaningful way. In this example, dragging a telemetry channel onto a Display Layout adds that channel as an alphanumeric display 4 to the layout's canvas. See "Editing An Object" on page 68 for more on this.

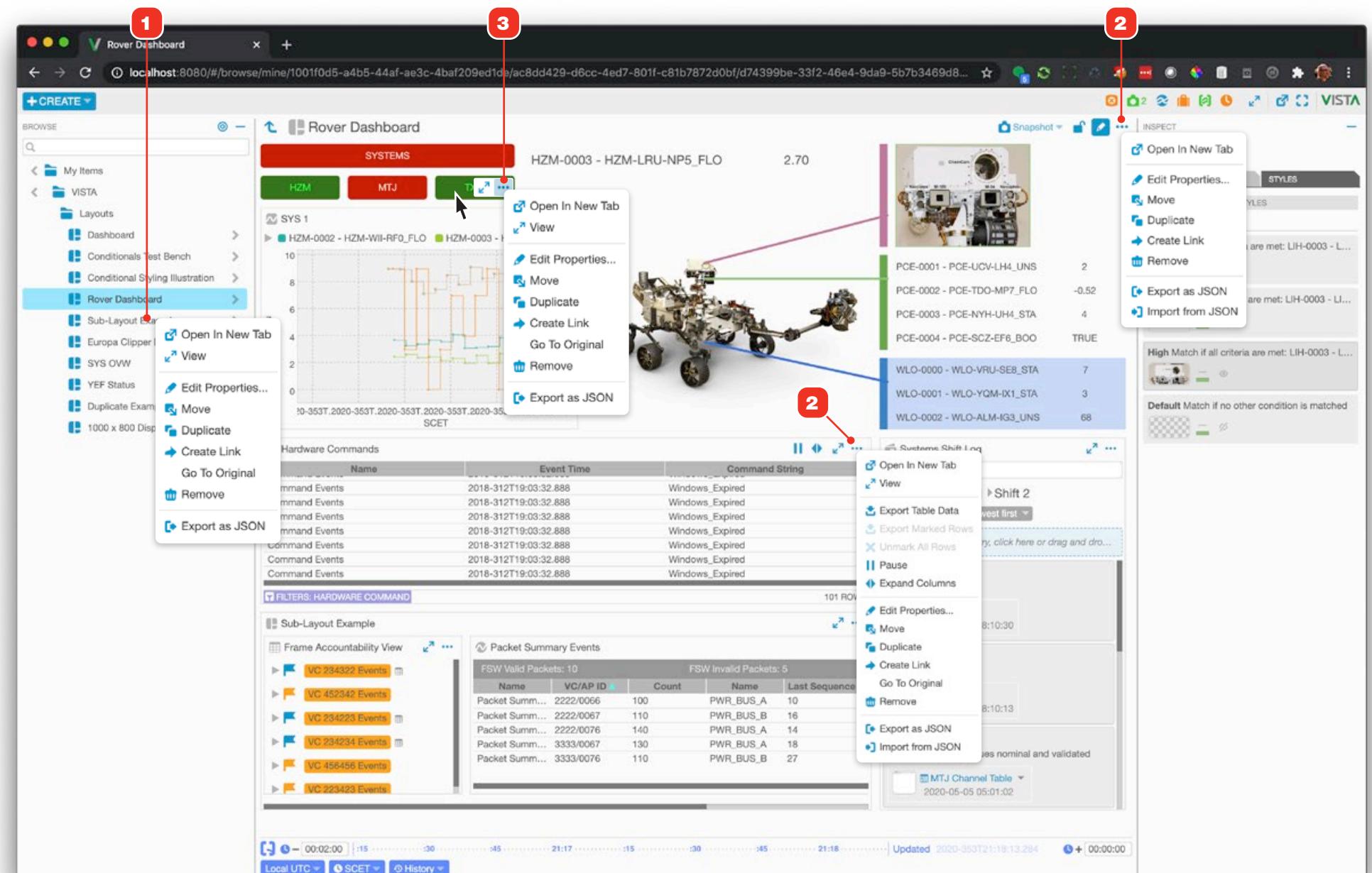


OVERVIEW

Context Menus

Context menus allow many operations to be performed on objects in the application. Available actions are dependent on the type of object and its current context. Here are some of the most common actions usually available. See content elsewhere in this document for details on capabilities each different type of view.

Menu Item	Description
Open in New Tab	Creates a new browser tab, navigates to the object and displays with that object's default view.
View	Displays the related element in a fullscreen overlay, allowing more detailed exploration of an item without navigating away from the current view.
Go to Original	Only available for Links. Navigates to the Link's original object.
Create Link	Only available to original objects. Create a link to the object.
Edit Properties	Only available to objects that have editable properties. Displays the Edit Properties dialog for the object.
Duplicate	Only available to objects that can be duplicated. Displays the Duplicate dialog for the object.
Move	Only available to objects that can be moved. Displays the Move dialog for the object.
Remove/Delete	Only available to objects that can be removed or deleted. If object is a Link, displays Remove; otherwise, displays Delete.
Export as JSON	Exports the selected item's configuration. See "Exporting and Importing Object Configurations" on page 64.
Import from JSON	Imports and exported configuration. See "Exporting and Importing Object Configurations" on page 64.
Export Data	Allows the export of the data within the selected object.



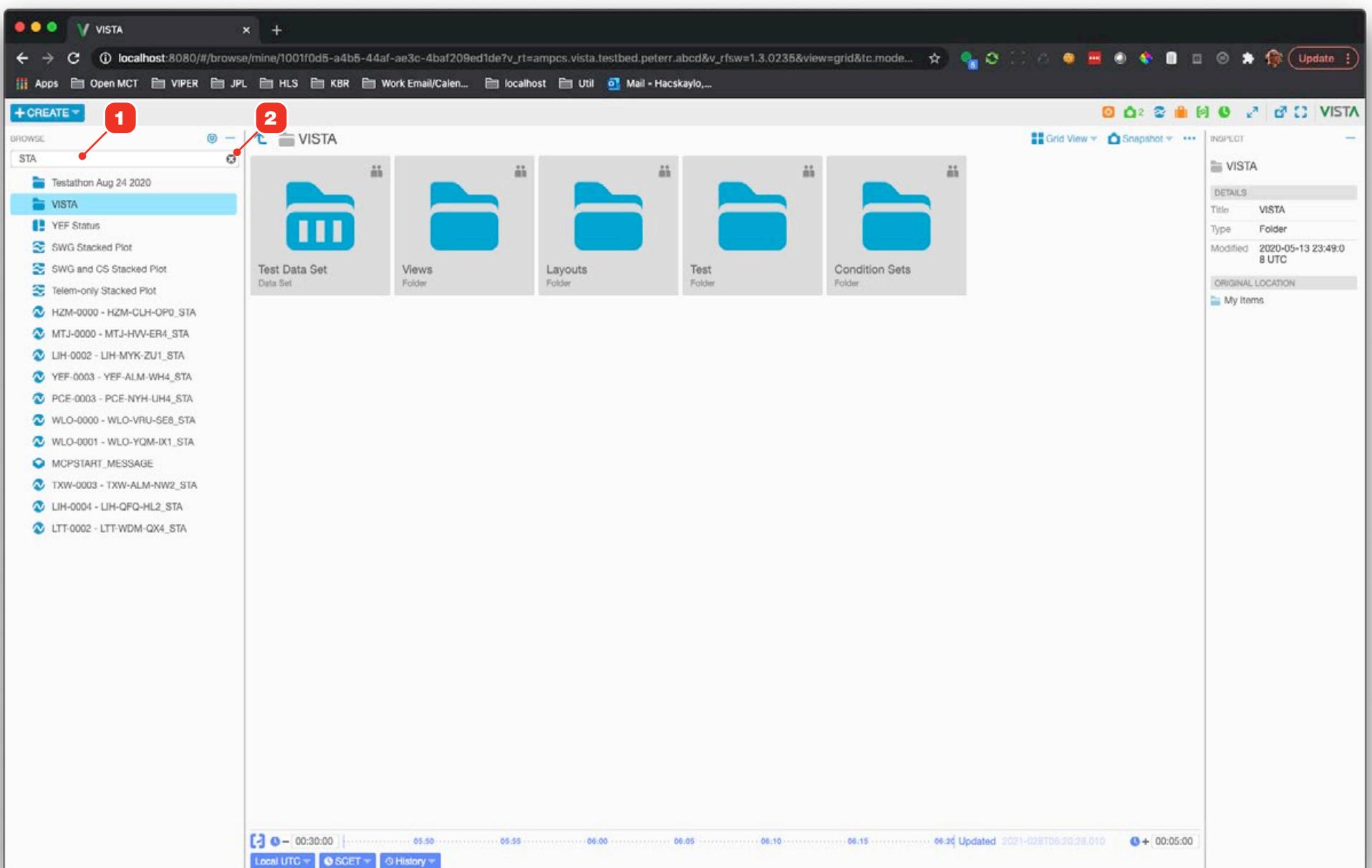
Context menus are accessed two different ways:

- 1 Context-click objects in the Object Tree to display their context menus. Context clicking gestures vary per operating system and hardware, but most commonly are available via right-mouse button click on an item.
- 2 Many objects in various views will display a "More Options" icon button . Clicking this button displays that object's context menu. In some views, the "More Options" button may be hidden until hovering over an item **3**.

OVERVIEW

Searching

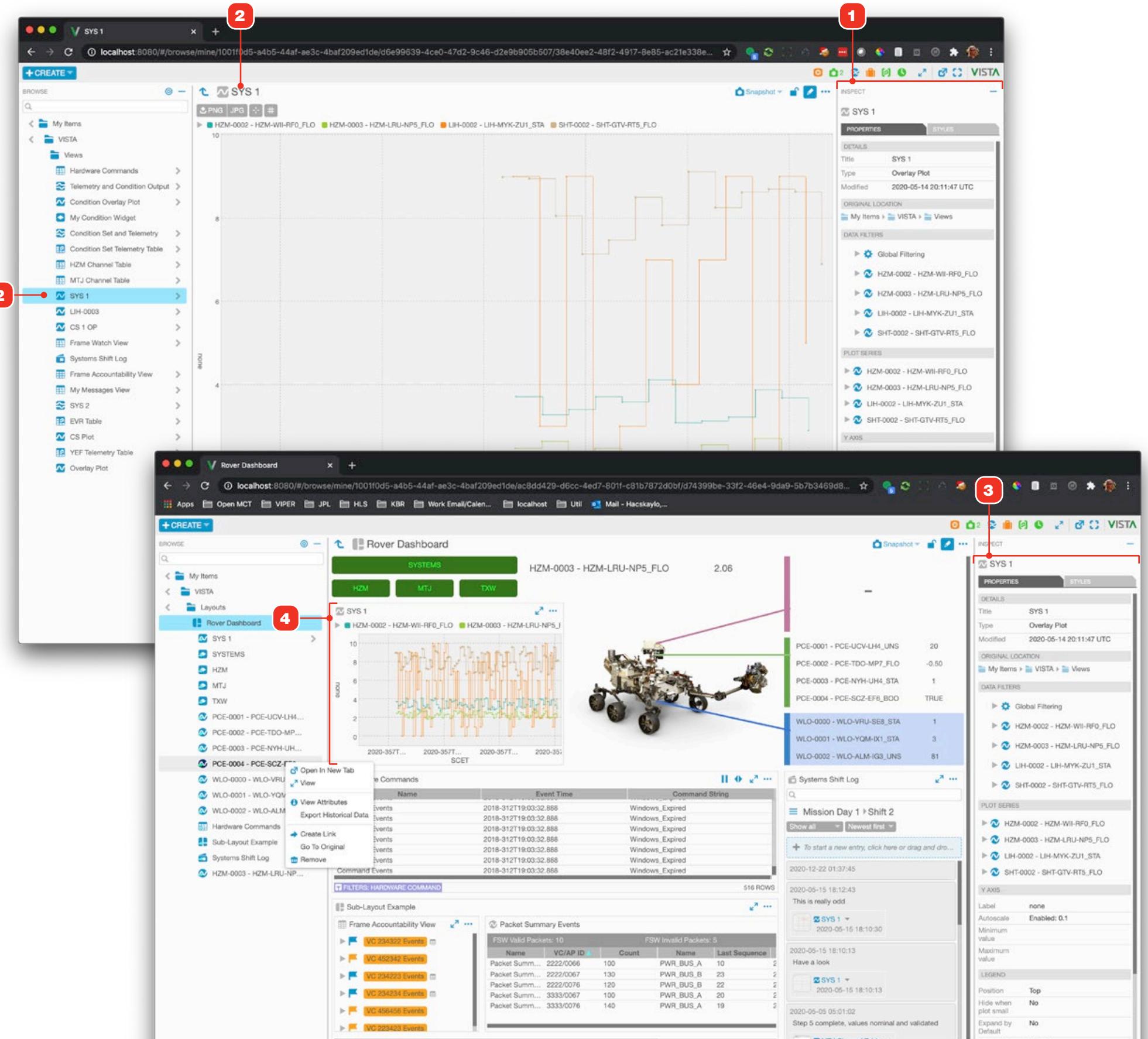
- 1 To search for an object, start typing the Search field. Matching results will begin to appear as you type.
- 2 To clear your search and go back to the Object Tree, click this button.



OVERVIEW

Inspection Pane

- 1 The Inspection pane gives you useful information on the currently navigated to object **2**.
- 3 When a component object of a Display or Flexible Layout is selected, the Inspection pane will provide information about that item **4**.

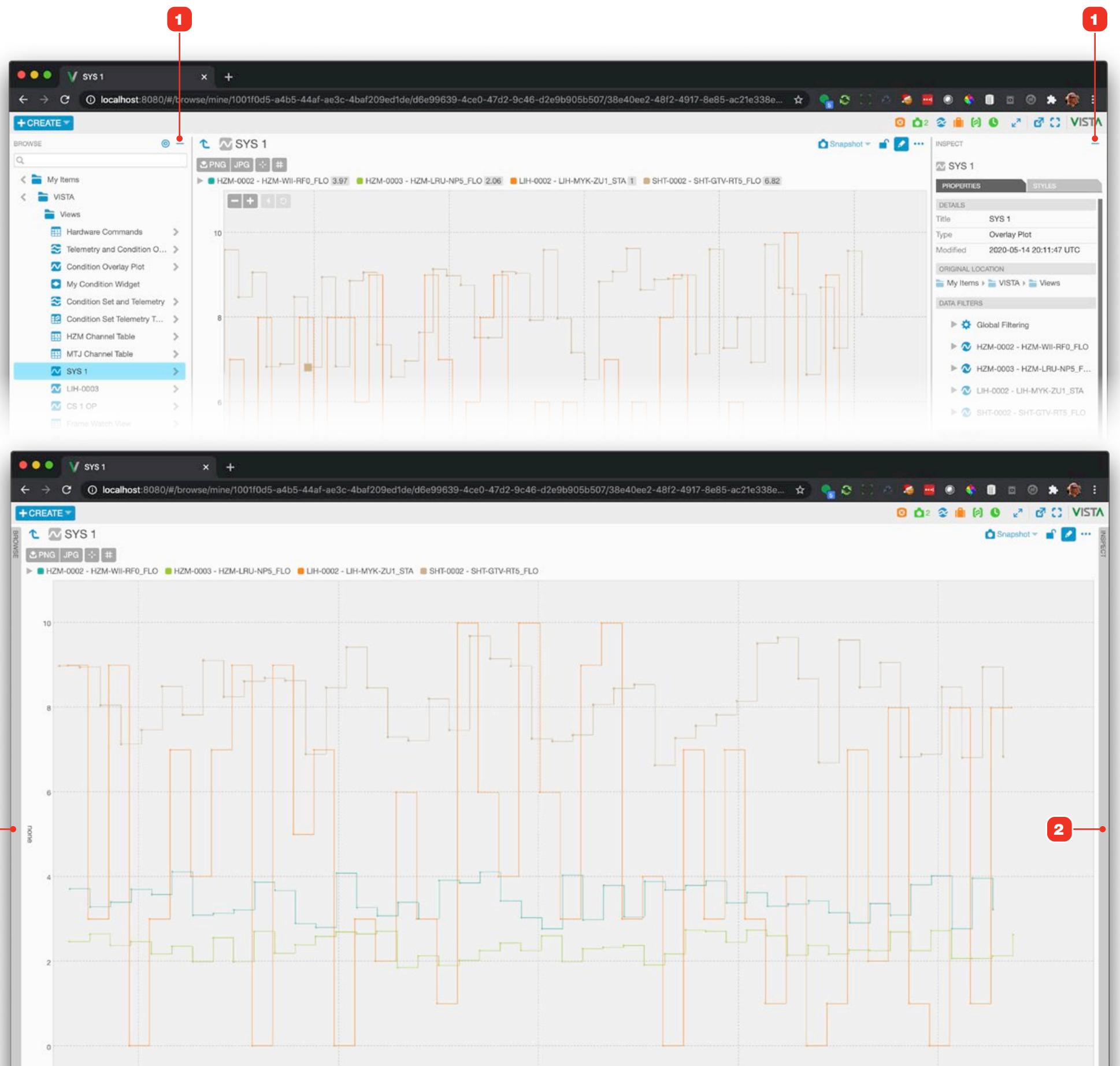


OVERVIEW

Expanding and Collapsing View Panes

You can expand the area available to the main view by collapsing both the Browse and Inspection panes.

- 1 To temporarily collapse a pane click the pane's "collapse" button.
- 2 To re-expand a collapsed pane, click anywhere in its collapsed area.

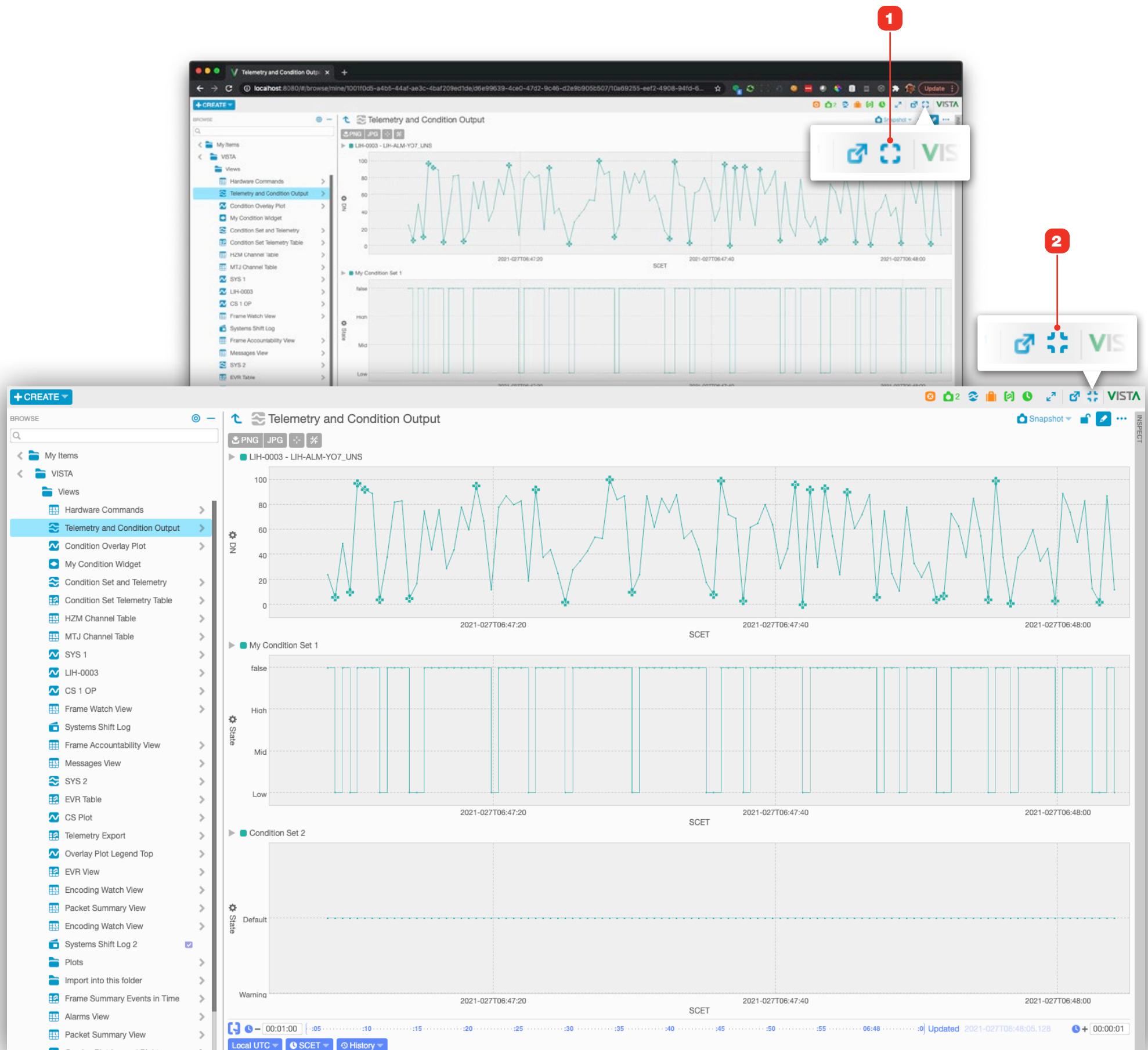


OVERVIEW

Fullscreen Mode

While in fullscreen mode, all browser window "chrome" - the window edges, address bar, bookmarks, etc. - is hidden, allowing the application to occupy every bit of the screen.

- 1 The application can be toggled into fullscreen mode by clicking the Fullscreen button.
- 2 While in fullscreen mode, click the Fullscreen button again to exit fullscreen mode.

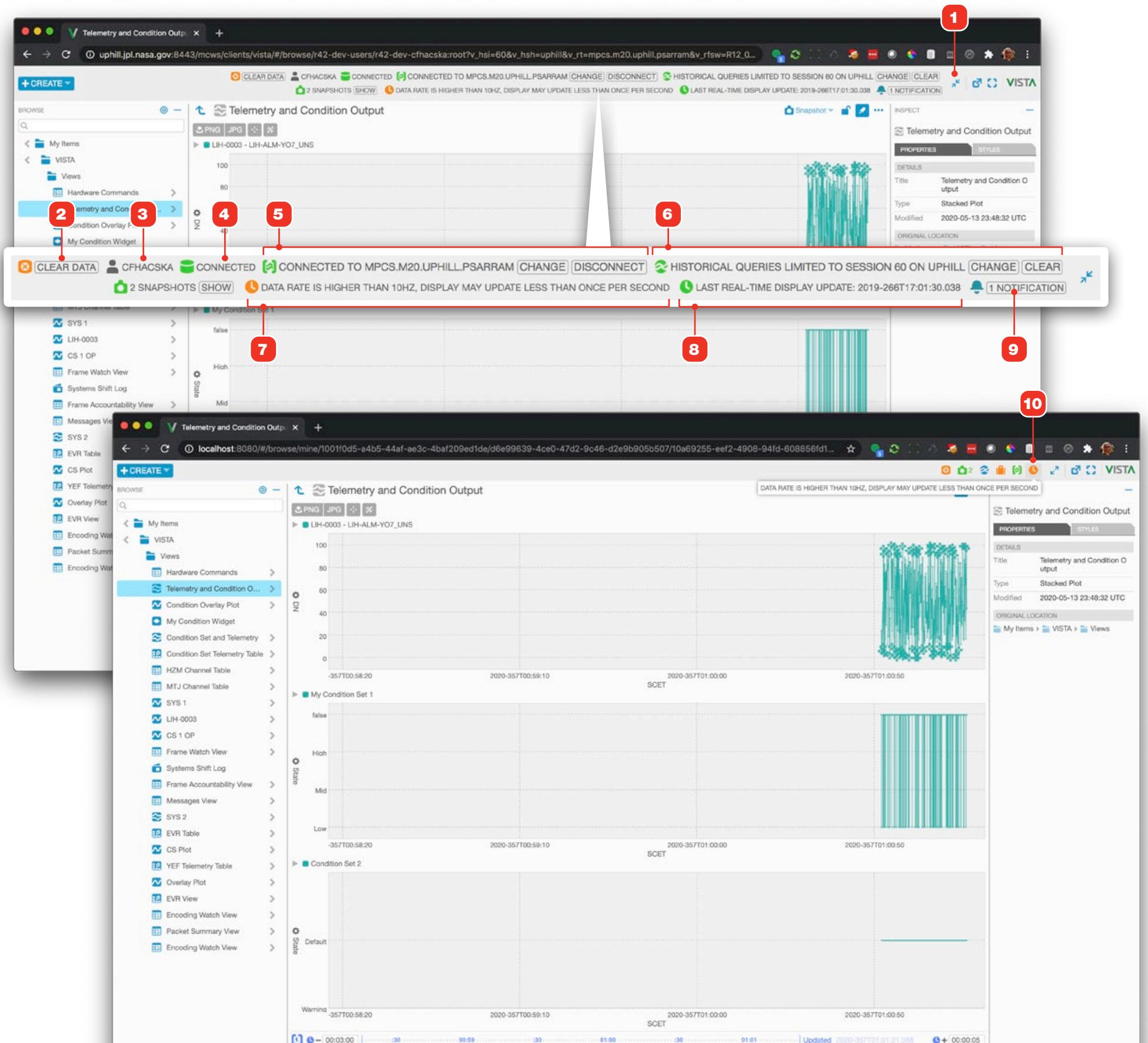


OVERVIEW

Status Area and Indicators

The Status area shows current status for a number of aspects of the application and provides application wide data connection capabilities. It also displays warning messages when necessary.

- 1 By default, the Status area is displayed in its expanded view. To collapse the Status area, click this button. Clicking the button again when the area is collapsed will expand it again.
- 2 This control allows data to be temporarily cleared from the main view. See "Clearing Data" on page 36 for more.
- 3 The Current User indicator displays the username of the currently logged-in user.
- 4 The Persistence Database indicator displays the current connection status to the server that saves all items that you create and edit. This should always display with a green color with the word "Connected".
- 5 The Real-time Status indicator shows the availability of real-time data. If a real-time connection is available (but not yet connected to), the icon will display with a light blue color and a button that allows you to connect to a real-time data source. See "Connecting to Real-time Data" on page 32 for details.
- 6 The "Filter by Historical Session" indicator shows the current status of historical session filtration. By default, VISTA will use all data from all historical sessions when available. You can filter by a particular session by clicking the displayed button. See "Filtering By Historical Data Session" on page 34 for more.
- 7 If the incoming data is faster than 10 Hz, this indicator will display.
- 8 If real-time data is available and has been received by VISTA, this indicator will display the last update datetime.
- 9 If there are any system notifications that should be brought to your attention, the Notifications indicator will display, with the number of notifications and a button giving you access to the Notifications dialog to view them.
- 10 Hovering over any icon when the area is collapsed will display a bubble with the same details and controls for that item that appear in the expanded mode.



TIME CONDUCTOR

Time Conductor Overview

The Time Conductor **1** and **2** controls the time bounds of data queries for many VISTA view types. Settings in the Time Conductor persist as you navigate between objects, allowing you to quickly explore data in any number of telemetry objects in a given timeframe. When multiple object types are placed in a Display Layout, the Time Conductor allows you to set their time bounds in a single action. The current Time Conductor settings are encoded in the URL, so you can bookmark and share specific timeframes.

TIME CONDUCTOR MODE TYPES

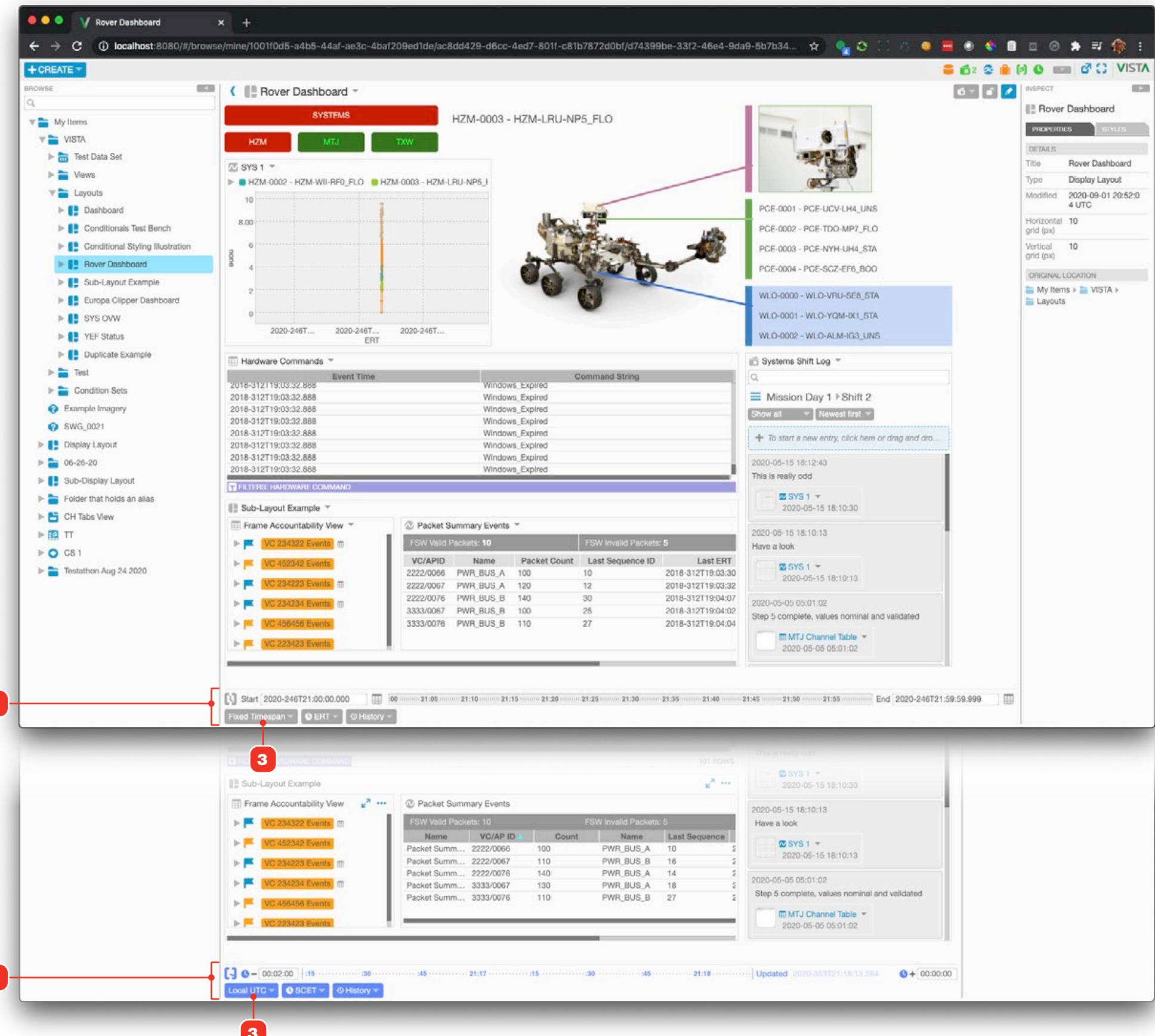
The Time Conductor has two basic mode types: fixed timespan and real-time.

- 1 Fixed Timespan Mode:** Queries and makes data accessible to displays within a fixed timespan. Start and End bounds are discrete datetimes.
- 2 Real-time Modes:** Connects to available real-time data and streams it continually to displays. The End bound is an offset from "now", and the Start is a negative time offset from the Start.
- 3 Mode Selection Control:** Sets the mode for the Time Conductor:

Mode	Mode Type	Time Formats
Fixed Timespan Mode	Fixed Timespan	ERT, SCET, SCLK
Local UTC	Real-time	ERT, SCET
Latest SCET	Real-time	SCET
Latest ERT	Real-time	ERT
Latest SCLK	Real-time	SCLK

RELATED

- "Time Conductor, Fixed Timespan Mode" on page 29
- "Time Conductor, Real-time Modes" on page 30
- "How the Time Conductor Affects Object Types" on page 31



TIME CONDUCTOR

Time Conductor, Fixed Timespan Mode

The Time Conductor in Fixed Timespan Mode queries and makes data accessible to displays within a fixed timespan. Start and End bounds are discrete datetimes. Incoming real-time data will be displayed if the Start and End time bounds encompass "now", but the display will not automatically advance to keep new data in view.

1 Time System: Controls the current time system (ERT, SCET, SCLK, etc.) used by the Time Conductor and all displayed objects. Plots, table and other views will adjust their time indicators to use the selected format.

2 Start and End Datetime Range Inputs: Enter a valid datetime value to define a date range to query and display. The format of the datetime is based on the current setting in the Time Format control **1**. Note that you can enter partial values - for example, if the Time Format is SCET, entering "2015-300T" is the equivalent of 2015-300T00:00:00.000. The start must precede the end. If you enter an incorrect the value, the input will turn red indicating that you must correct your input. Input formats are as follows:

Format Set in 1	Input Entry and Display Style
SCET, ERT	2015-300T23:59:59.999 <4 digit year>-<3 digit day of year>T<2 digit hours, 00 to 23>: <2 digit minutes, 00 to 59>:<2 digit seconds, 00 to 59>. <3 digit milliseconds, 000 to 999>
SOL	SOL-100M24:59:59.999 SOL-<SOL number>M<2 digit hours, 00 to 23>: <2 digit minutes, 00 to 59>:<2 digit seconds, 00 to 59>. <3 digit milliseconds, 000 to 999>
SCLK	123456.789012 <Floating point decimal number>

3 Tick Line: In Fixed Timespan Mode, the Tick Line can be dragged left or right to pan the time window while preserving the current window duration. For example, dragging the Tick Line one minute to the left will subtract a minute from both the Start and End inputs and update the main view just as if the inputs were manipulated directly.

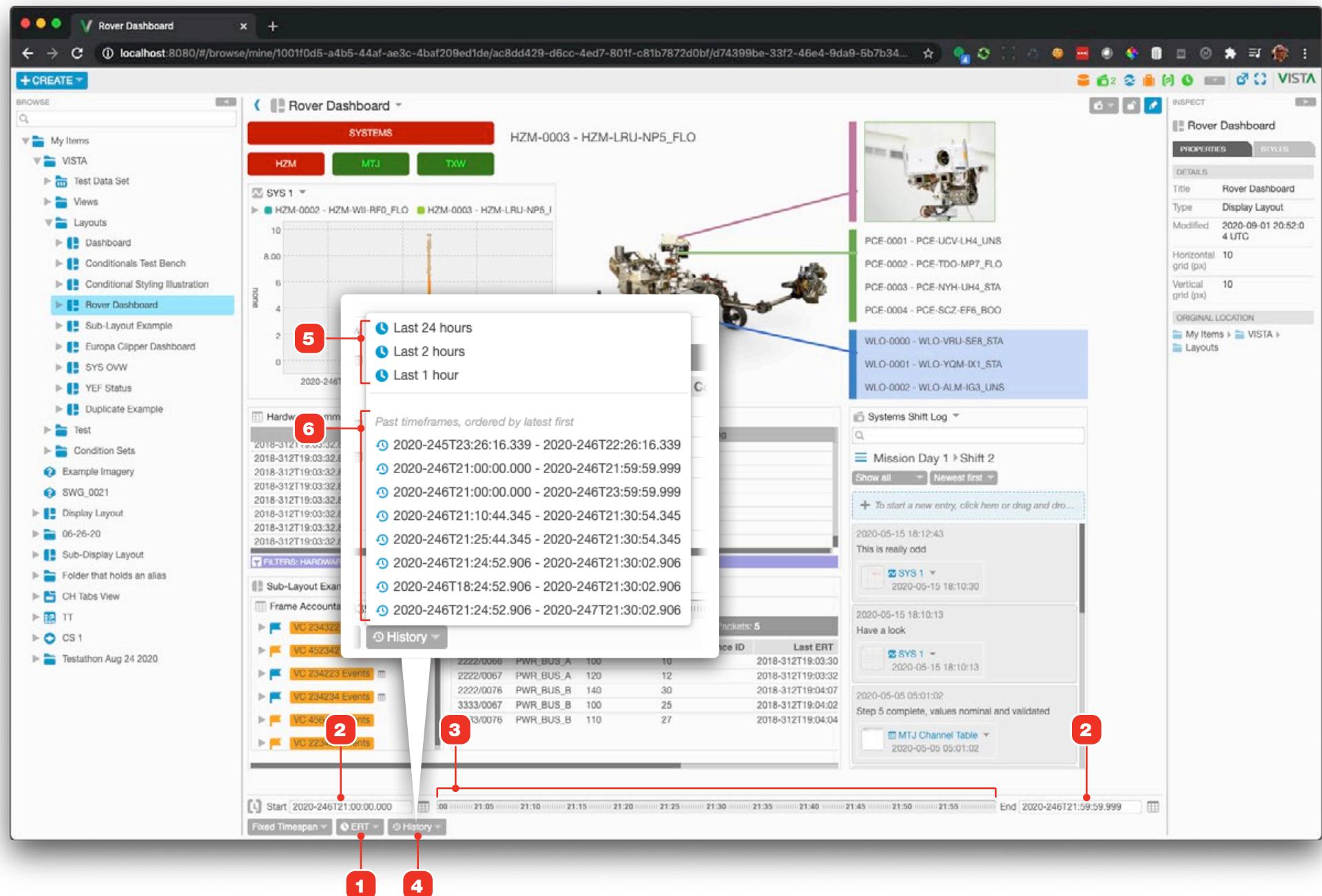
4 History: Click this button to display the History menu, which includes timespan presets **5** and past timeframes **6**.

5 Useful Boundary Presets: Your deployment configuration may include useful timespan presets similar to those shown here.

6 Past Timeframes: The History menu also tracks changes to the Time Conductor's bounds: every they are changed, the prior Start and End bounds settings are saved here. Saved entries can be clicked to restore the Time Conductor to those bounds. Entries are ordered newest to oldest, and the menu will track up to 10 boundary settings. After 10 entries, the oldest entry will be pushed out to make way for the newest.

RELATED

- "Filtering By Historical Data Session" on page 34



TIME CONDUCTOR

Time Conductor, Real-time Modes

The Time Conductor in one of its real-time modes is primarily useful in monitoring real-time streaming data as it comes in. Rather than a fixed span of time as used in Fixed Timespan Mode, the real-time modes treat time like a "moving window" in which the right side **4** of the window is "now" and the left side **3** is a negative offset in time from the right side. As new data streams in, the Time Conductor and displays automatically advance and update to keep that data in view. Both the left and right sides of this "window" can be changed by entering different values.

1 Time Format: Controls the current time format used as inputs by the Time Conductor and all displayed objects. Plots and other views will adjust their time indicators to use the selected format.

2 Mode Selection Details:

Mode	Details
Local UTC	The Time Conductor will automatically advance and displays will update themselves based on ticks from a UTC clock. ERT and SCET time formats are both available.
Latest SCET, ERT and SCLK	The Time Conductor and displays will only advance and update when data becomes available based on what type of latest tick (SCET, ERT and SCLK) has been selected.

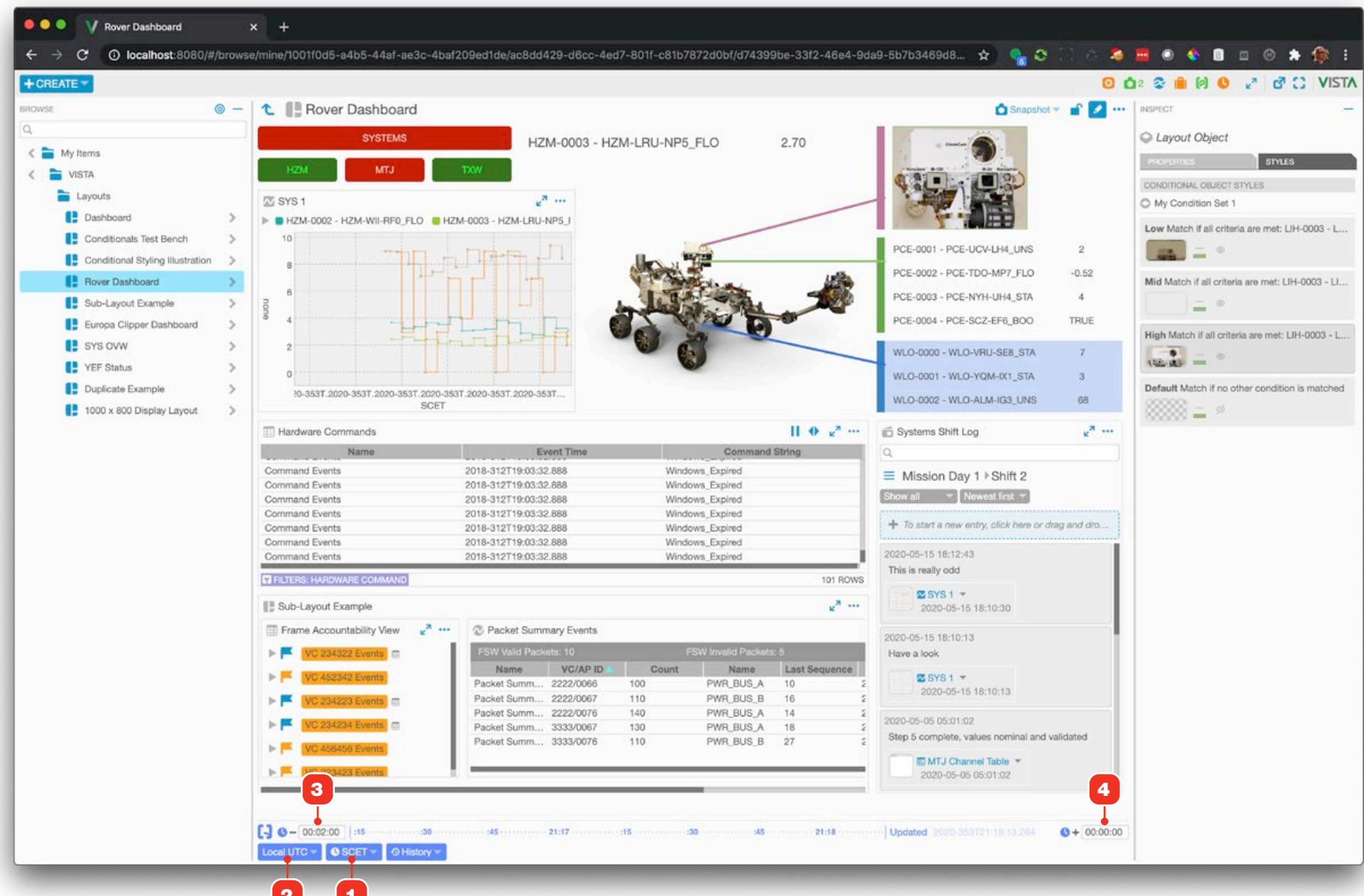
3 Left Side Time Range Input: Enter a valid time value to define the amount of time offset from the right side **4**. The format of the datetime is based on the current setting in the Time Format control **1**. If you enter an incorrect the value, the input will turn red indicating that you must correct your input. Input formats are as follows:

Format Set in 1	Input Entry Styled
SCET, ERT	23:59:59 <2 digit hours, 00 to 23>:<2 digit minutes, 00 to 59>:<2 digit seconds, 00 to 59>
SCLK	123456.789012 <Floating point decimal number>

4 Right Side Time Range Input: Controls the offset from now, and defaults to 00:00:00 so that "now" is at the right-most side of the Time Conductor and time-based X axis plots. Setting a value here other than 0 will add "padding" into the future, which could be useful if predictive data is being compared to incoming real-time data. Input format and behavior are as described in the Left Side Time Range Input **3**.

RELATED

- "Connecting to Real-time Data" on page 32

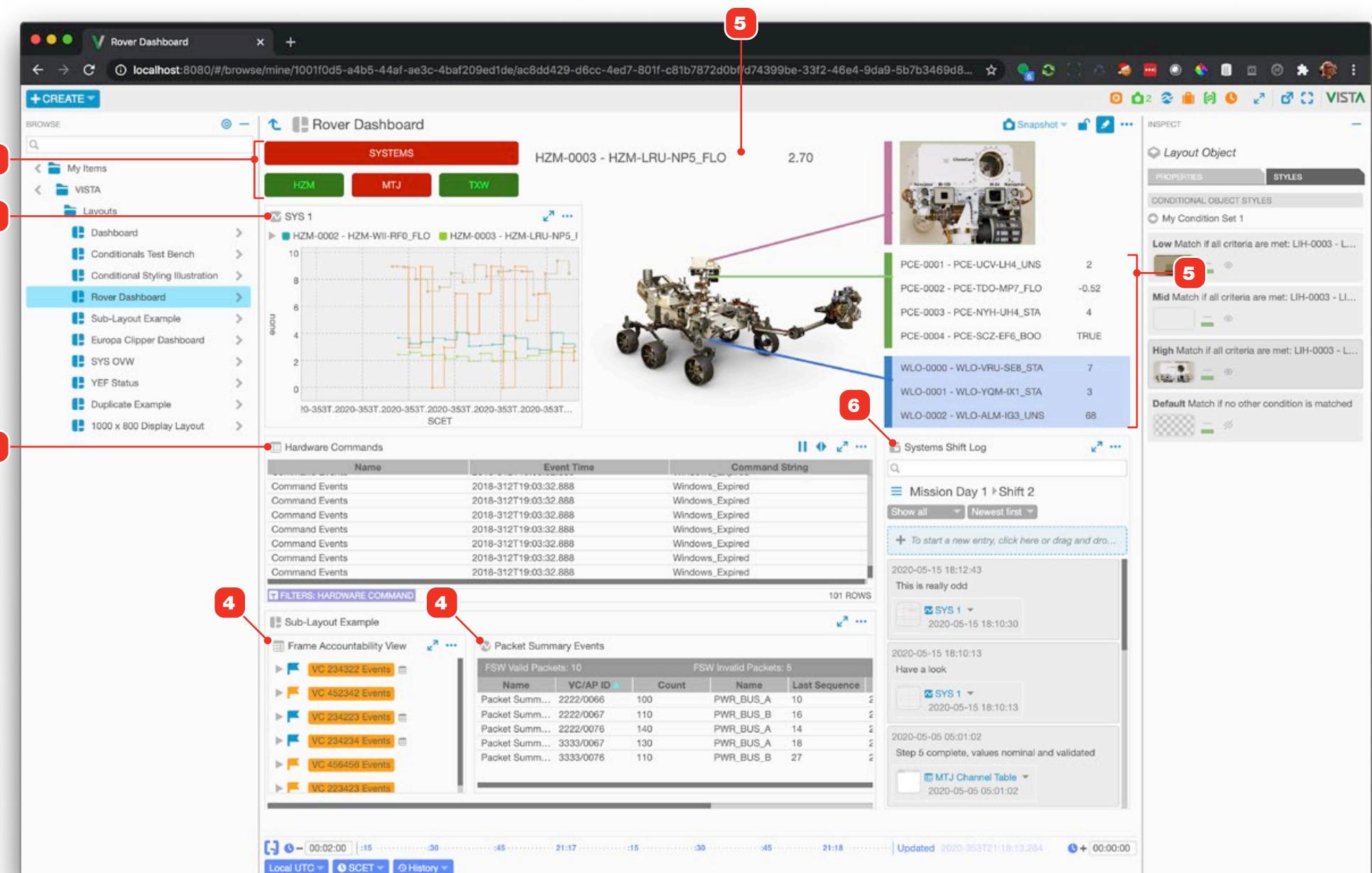


TIME CONDUCTOR

How the Time Conductor Affects Object Types

The table below illustrates how VISTA objects are affected by the Time Conductor. Some objects will constrain the data they display to the Start and End bounds of the Time Conductor. Other object types like Channel Tables and Sets, Data Product views and others will ignore the Time Conductor and always display their latest data. Some view types don't display time-based data at all - those rows are shown grayed out.

Category	Object Type	Data Constrained to Conductor Bounds	Always Displays Latest Data
Data View	Channel Alarms	✓	
Data View	EVRs	✓	
Data View	Dictionaries		
Data View	Data Products	✓	
Data View	Packets	✓	
Data View	CommandEvents	✓	
Data View	4 Frame Events, Packet Summary Events		✓
Composable View	Folder		
Composable View	1 Condition Widgets		✓
Composable View	5 Alphanumerics		✓
Composable View	2 Overlay and Stacked Plot	✓	
Composable View	3 Telemetry Table	✓	
Composable View	Channel Table		✓
Composable View	6 Notebook		
Composable View	Web Page		
Composable View	Link		
Composable View	Data Set		

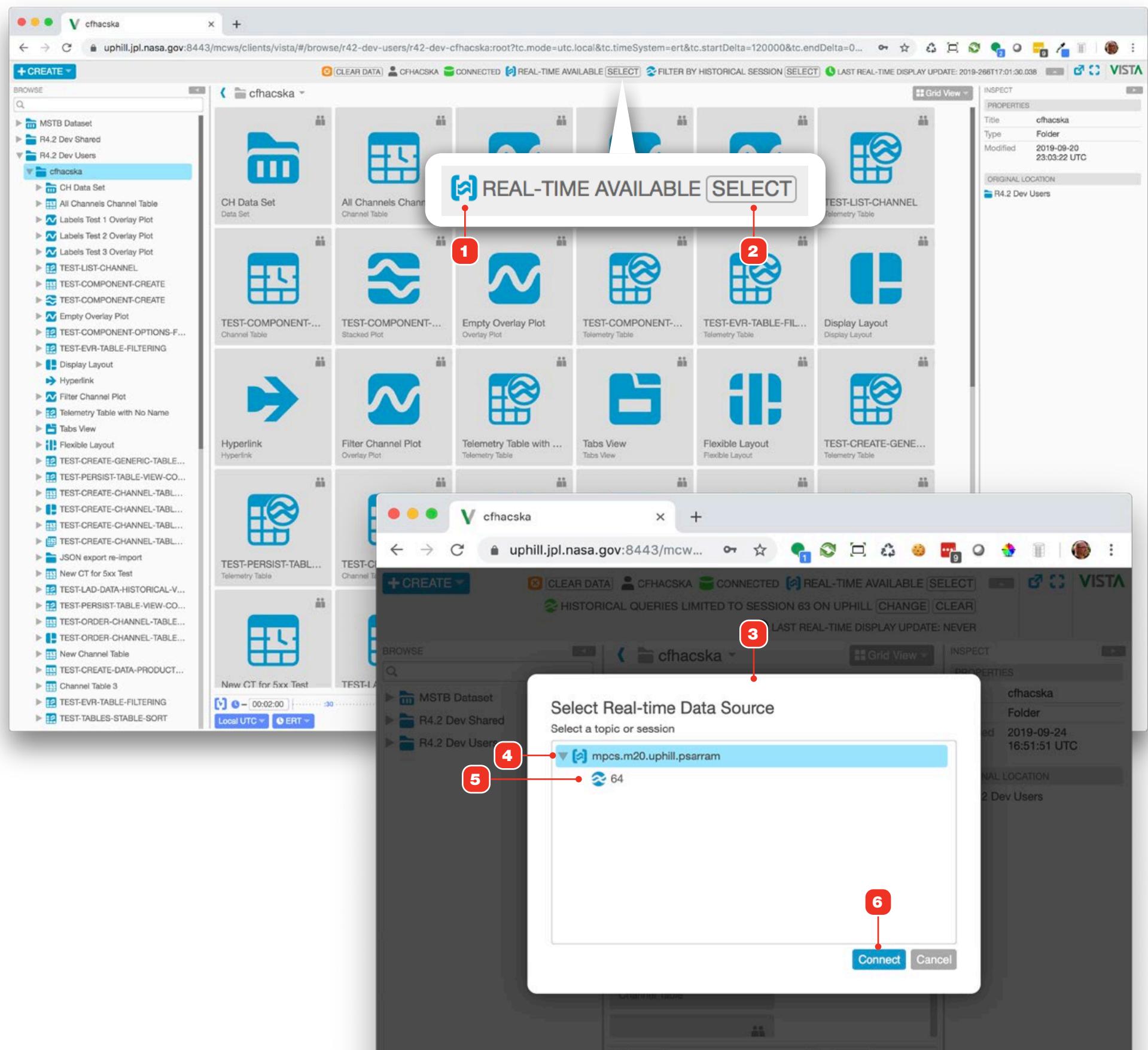


CONNECTING TO DATA

Connecting to Real-time Data

VISTA must be connected to a data source to operate usefully. When you first start up VISTA, you'll be prompted to connect to a data source. You can choose from amongst active live venues streaming data, or connecting to a historical data session.

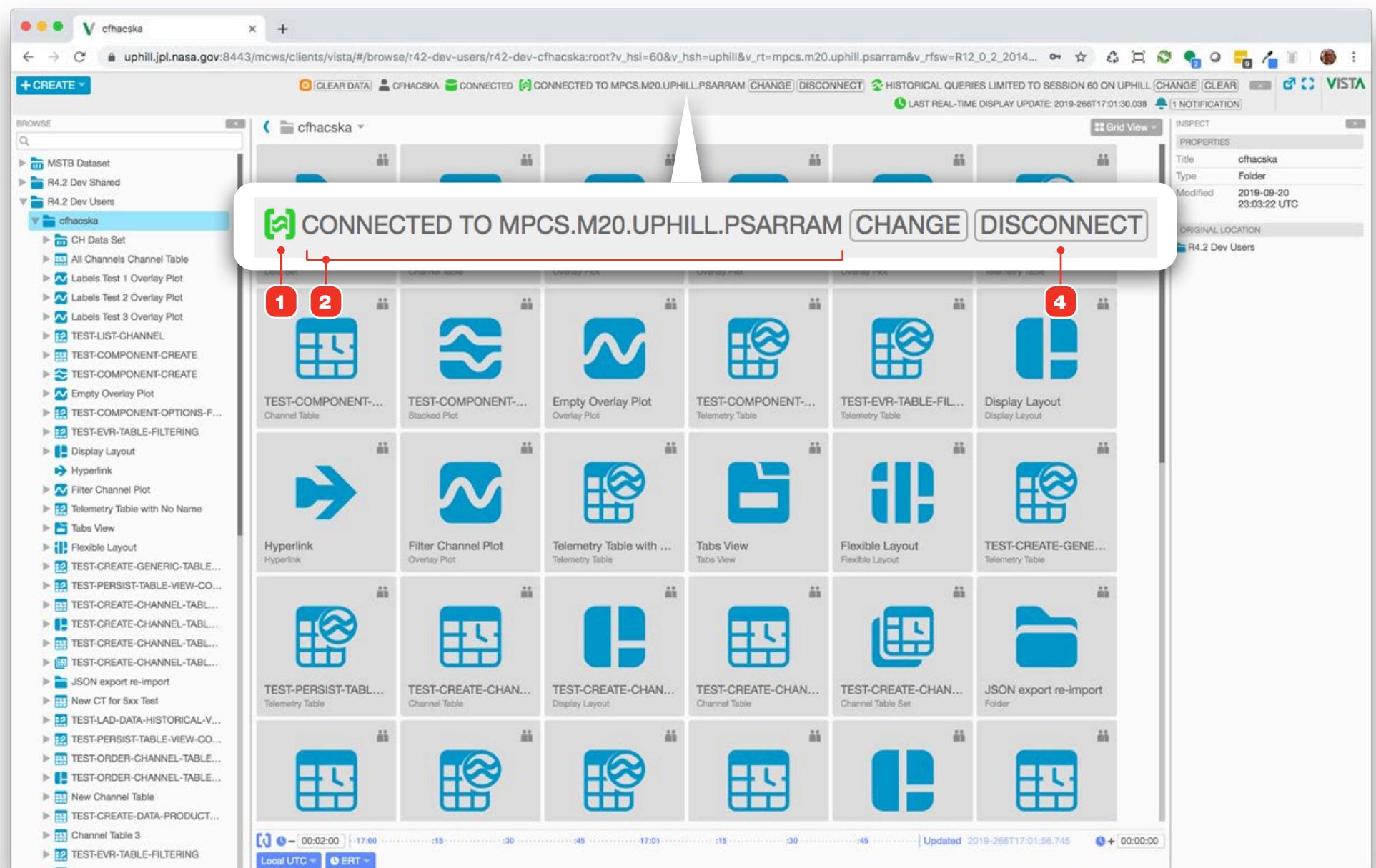
- 1 When real-time streaming data is available, the Real-time connection indicator will appear in light blue.
- 2 To select an available real-time session, click this button to display the Real-time Data Source selection dialog 3.
- 4 Real-time Topics and their Sessions are displayed in a tree view; Topics may contain one or more real-time Sessions. Selecting a Topic will include data for all Sessions in that Topic, even as new Sessions are added to that Topic. Click a Topic to select it; you may only select a single Topic at a time.
- 5 Real-time Sessions appear within a Topic. Selecting a Session will limit your data connection to that session; Click a Session to select it; you may only select a single Session at a time.
- 6 Click "Connect" to finish.



CONNECTING TO DATA

Changing the Source or Disconnecting From Real-time Data

- 1 When a real-time source has been connected to, this indicator will display in green.
- 2 The current real-time Topic or Session that has been connected to.
- 3 Clicking the "Change" button will display the Real-time Data Source selection dialog, allowing you to select a different real-time Topic or Session. For more, see "Connecting to Real-time Data" on page 32.
- 4 Clicking the "Disconnect" button will immediately disconnect the application from any real-time data sources.

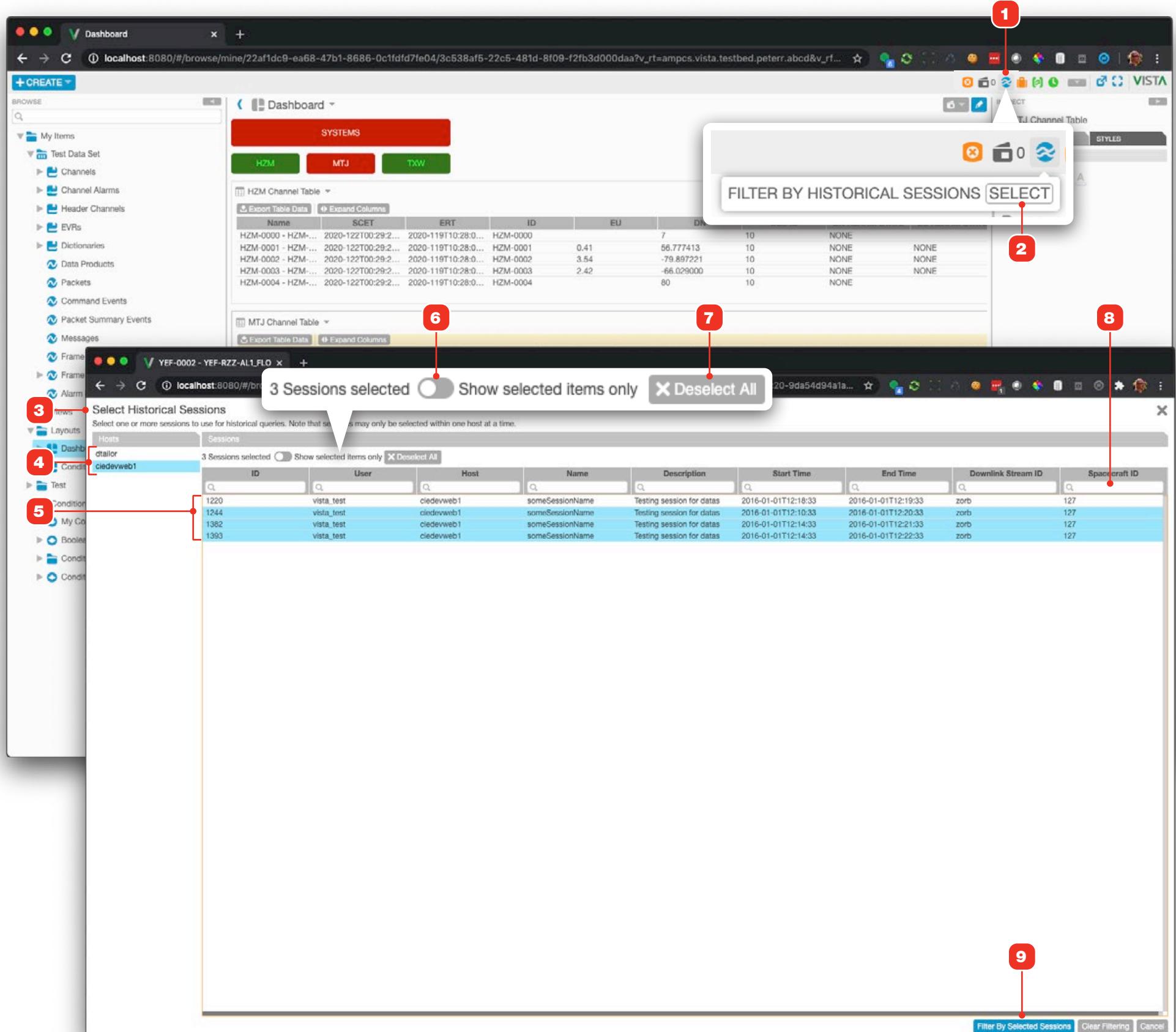


CONNECTING TO DATA

Filtering By Historical Data Session

By default, VISTA will use data from all available historical sessions. You can filter by one or more selected sessions using these steps.

- 1 If the status area isn't expanded, hover over the Historical Session indicator to display its menu and Select button **2**.
- 2 Click this button to display the Historical Session selection dialog **3** and a table of available historic data sessions.
- 3 Historical Session selection dialog.
- 4 All available hosts will appear here. You can only select sessions within a single host; selecting sessions in one host, then clicking to another host will deselect any selected sessions in the first host.
- 5 Sessions available for the selected host appear here. Click to select a session, then hold the shift key and click to select multiple sessions. Holding cmd (Mac) or ctrl (Windows) will allow discontinuous selection. Holding shift and clicking a selected session will deselect it.
- 6 Toggles the display to either show only selected sessions, or all sessions (currently illustrated here).
- 7 Deselects all selected sessions.
- 8 Sessions can be filtered by entering any string in the table view's filter input.
- 9 Click to apply your selections and exit the dialog.



CONNECTING TO DATA

Changing the Session or Discontinuing Historical Data Filtering

- 1 When a historical data source is being filtered by one or more sessions, the indicator will display in green. If the status area isn't expanded, hover over it to display its menu and options.
- 2 The current historical sessions that data is being filtered by.
- 3 Clicking the "Change" button will display the Historical Session selection dialog, allowing you to select a different historic session. For more, see "Filtering By Historical Data Session" on page 34.
- 4 Clicking the "Clear" button will remove any session filtering. VISTA will resume its default behavior and use data from all available historic sessions.

The screenshot shows the VISTA interface with several panels:

- Left Sidebar:** Shows 'My Items' with sections like Test Data Set, Channels, Channel Alarms, Header Channels, EVRs, Dictionaries, Data Products, Packets, Command Events, Packet Summary Events, Messages, Frame Summary Events, Frame Events, and Alarm Message Stream.
- Top Center:** A 'SYSTEMS' panel with buttons for HZM (green), MTJ (red), and TXW.
- Central Area:**
 - HZM Channel Table:** Shows a table with columns Name, SCET, ERT, ID, EU, DN, Enum, DSS ID, and two rows of data.
 - MTJ Channel Table:** Shows a table with columns Name, SCET, ERT, ID, EU, DN, Enum, DSS ID, and three rows of data.
 - Hardware Commands:** Shows a table with columns Event Time, Session Id, Session Host, Request Id, Status, Command Str, Scmf File, Original File, Fail Reason, Checksum, and Total Citus, containing many rows of data.
- Status Bar:** Shows Local UTC, SCET, and a timeline from 00:01:00 to 00:00:00.
- Callout Box:** A box labeled 'HISTORICAL QUERIES FILTERED BY 3 SESSIONS' with four numbered points:
 - 1: Points to the green HZM button in the top center.
 - 2: Points to the red MTJ button in the top center.
 - 3: Points to the 'CHANGE' button in the callout box.
 - 4: Points to the 'CLEAR' button in the callout box.

CONNECTING TO DATA

Clearing Data

Historic data can temporarily be cleared from select views in the application. This allows past data from a session to be flushed out of a display, allowing new real-time data to be viewed in isolation. Note that this has no effect on the historic data store - this action is not deleting data.

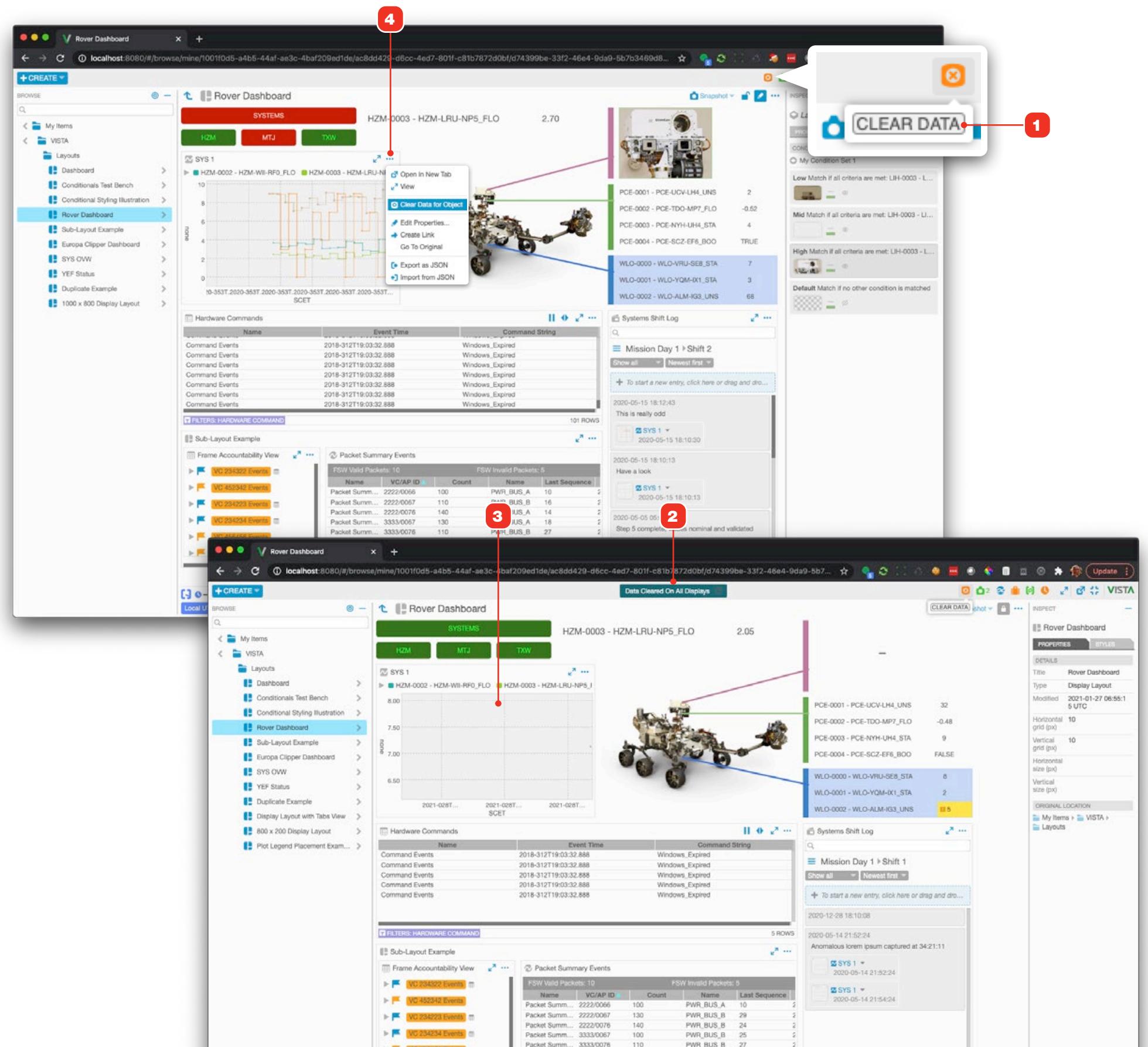
The use case for this feature: using a single view to monitor a series of real-time test sessions, in which it's important to view each session's data in isolation from the previous. Navigating to another view or refreshing the browser in the current view will trigger VISTA's historic data backfill functionality, which will query for historic data within the timeframe defined by the Time Conductor and restore the cleared data.

A configurable option also now allows data to automatically be cleared from displays at the beginning and end of subscribed real-time sessions.

- 1 Clicking this button of the Clear Data indicator will clear out all historic data from the objects that support it in the current view. See below for details.
- 2 When data is cleared, a banner confirmation message will be briefly displayed.
- 3 Once cleared, supporting view objects will not display data until new real-time data streams into the application.
- 4 Individual frame elements in a Display Layout support clearing their views independently via their "More Options" menus.

SUPPORTING VIEW OBJECTS

	Clear Data from Status Indicator	Clear Individually in Layouts
BUILT-IN DATA VIEWS		
Channel Dictionary		
Channel Enumeration Dictionary		
Channel EVR Dictionary		
Channel Plot Views	✓	N/A
Channel Tabular Views	✓	N/A
Channel Alarm Views (Red, Yellow, Any)	✓	
EVRs	✓	
Data Products		
Command Events	✓	
Packets	✓	✓
Packet Summary Events		✓
Messages	✓	✓
Frame Summary Events	✓	✓
COMPOSABLE VIEWS		
Overlay and Stacked Plots	✓	✓
Telemetry Tables	✓	✓
Channel Tables	✓	✓
Frame Watch View	✓	✓

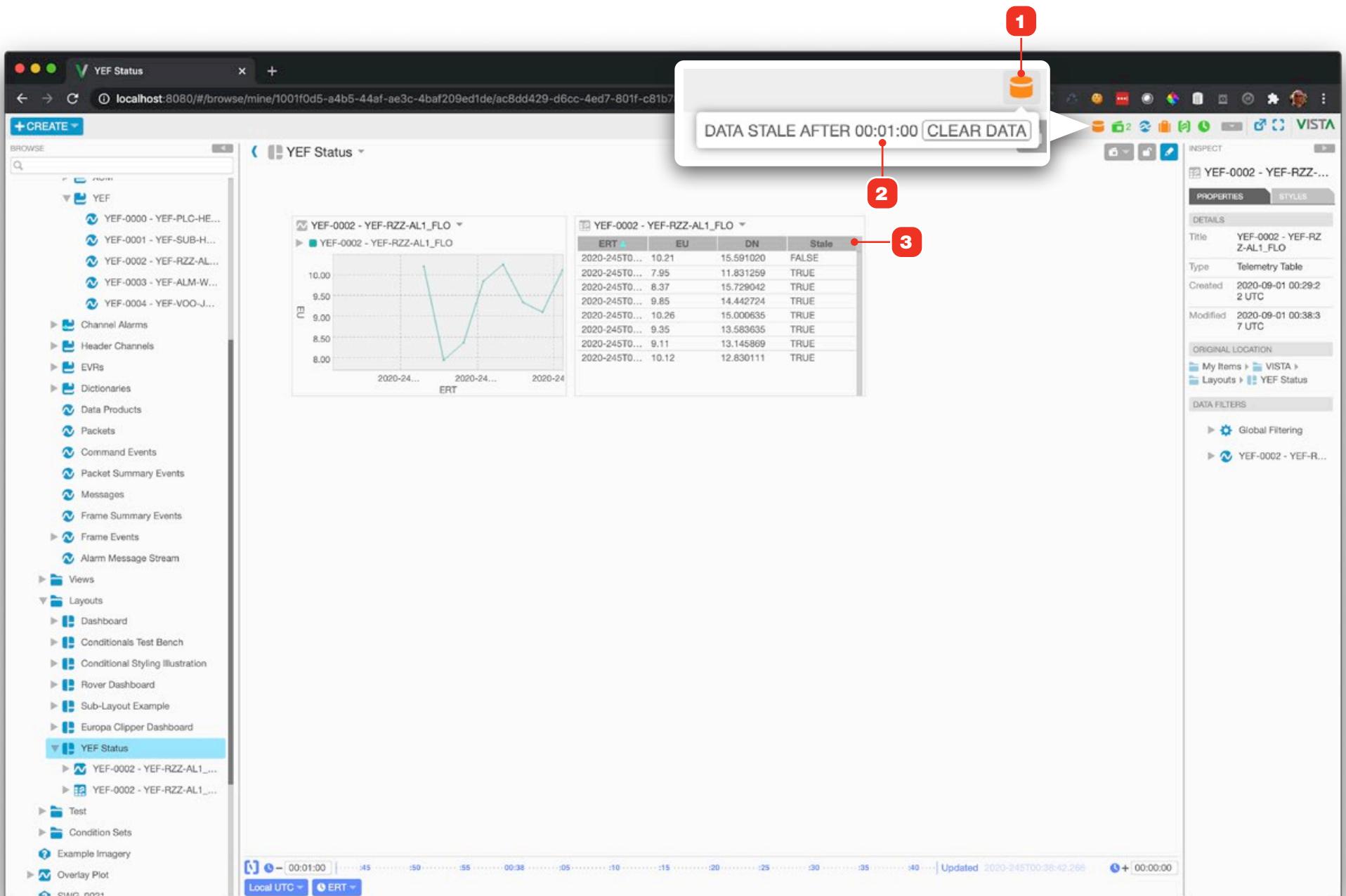


CONNECTING TO DATA

Data Staleness

Your deployment of VISTA may be configured to mark data as stale when new values have not been received for a period of time during real-time data streaming. This period applies to all channel data. In addition, a Condition Set allows the definition of criteria that evaluates staleness on a per-channel basis. See "Working With Condition Criteria" on page 122.

- 1 If a staleness interval has been configured, you can see what it is **2** by hovering over the "data" icon in the Status Area.
- 3 When staleness is configured, all data will include a "Stale" column in Table views that display a boolean value of whether the data is currently stale or not.



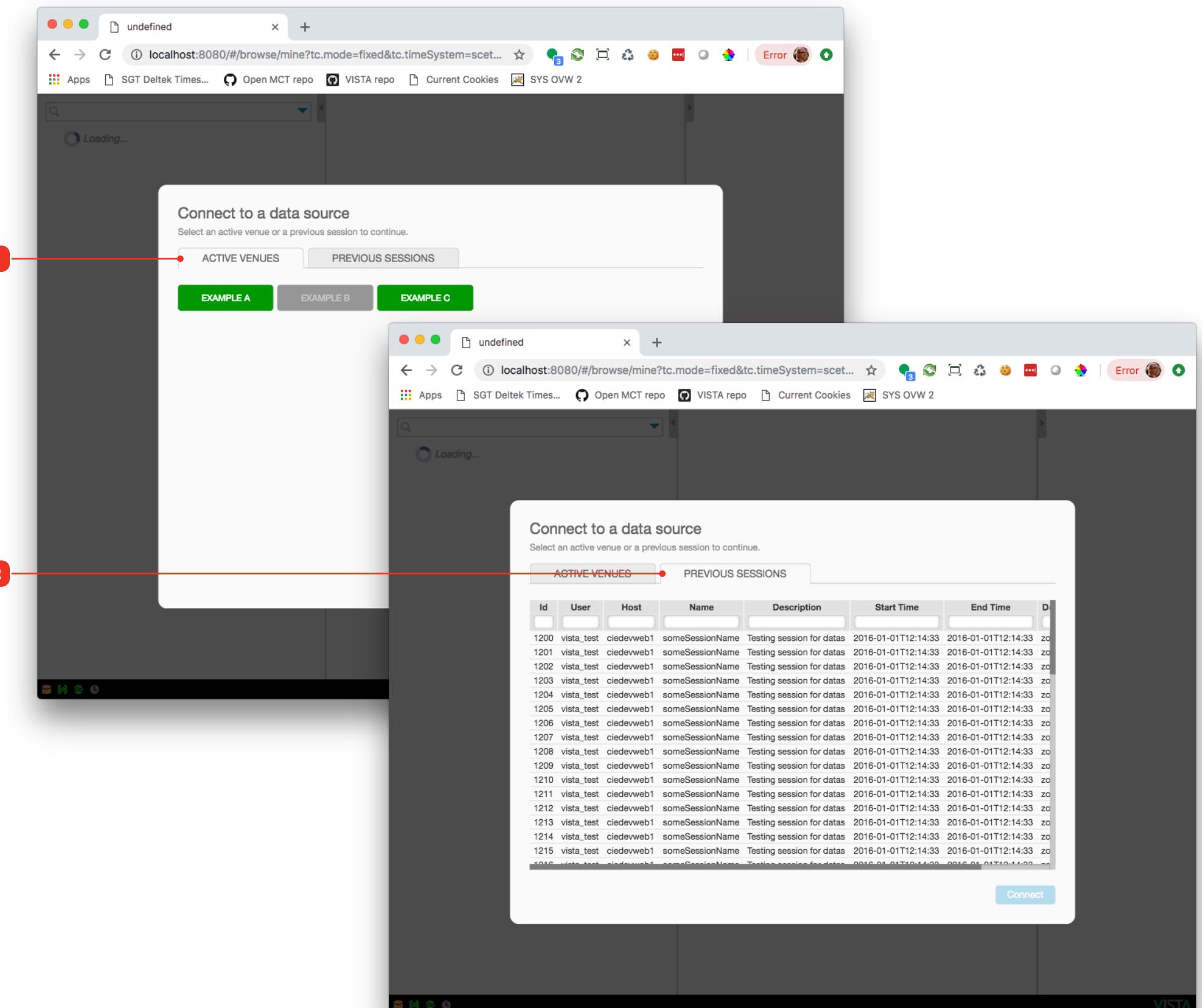
CONNECTING TO DATA

Connecting to Data Using Venue Awareness

If your VISTA deployment is configured to use the Venue Awareness interface, the following pages will guide you through those options.

VISTA must be connected to a data source to operate usefully. When you first start up VISTA, you'll be prompted to connect to a data source. You can choose from amongst active live venues streaming data, or connecting to a historical data session.

- 1 The Active Venues tab displays venues configured for your deployment of VISTA.
- 2 The Previous Sessions tab displays previous recorded data sessions.

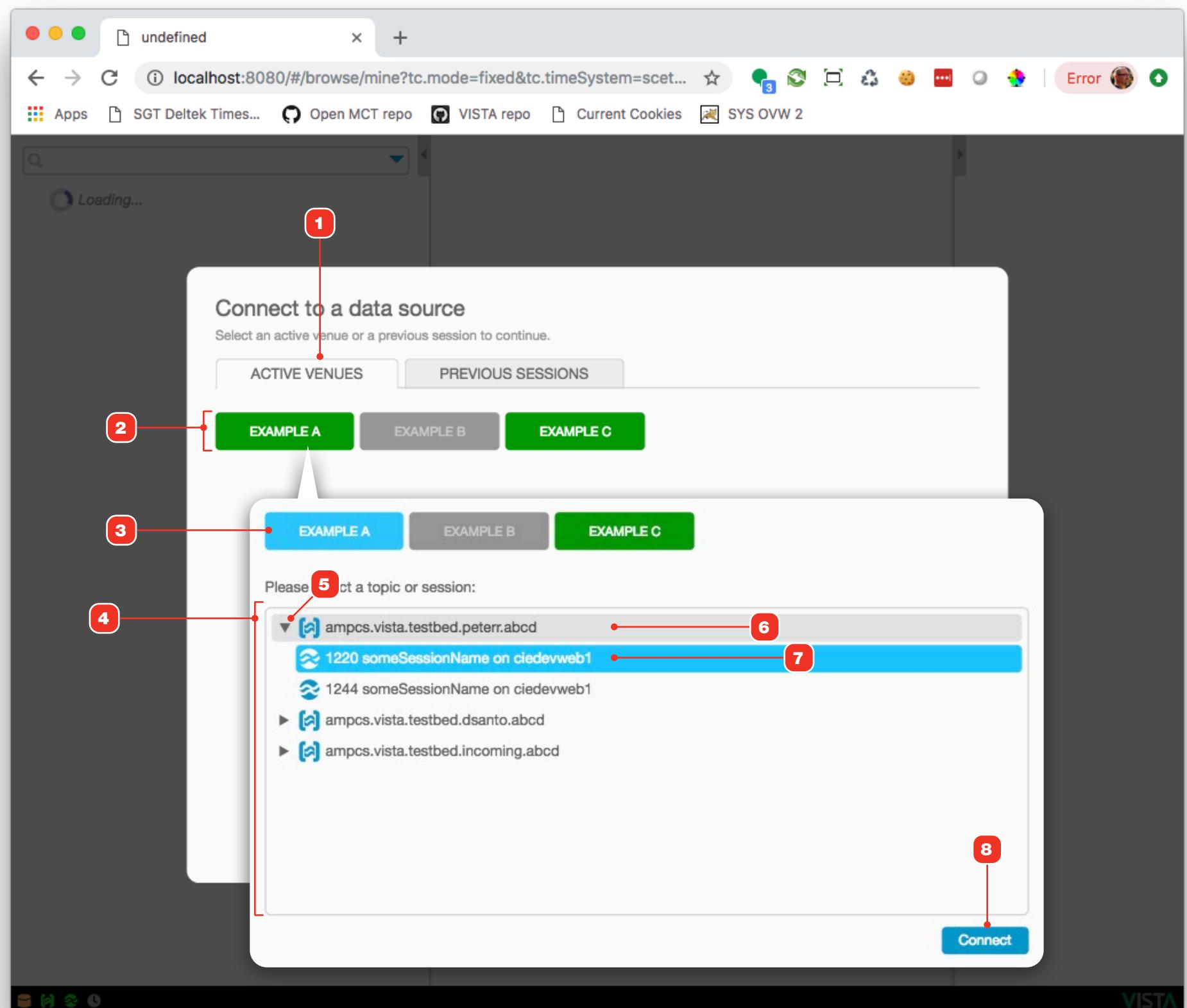


CONNECTING TO DATA

Connecting to an Active Venue

This screen displays when VISTA is initially started.

- 1 The Active Venues tab displays venues configured for your deployment of VISTA.
- 2 Venues that currently have actively streaming topics and sessions will appear green; venues that don't currently have actively streaming topics and sessions will appear gray and disabled. Non-active venues cannot be selected.
- 3 Selecting an active venue turns it blue and display the topics and sessions currently active in it **4**.
- 5 Expanding a topic by clicking its disclosure arrow will display the sessions currently running in it.
- 6 Clicking a topic to select it will connect to that topic and all sessions now and in the future that become available for it.
- 7 Clicking a session within a topic will limit data to that session alone; data will cease when the session ends.
- 8 Once you've made the required selections, the Connect button will enable - click it to continue.

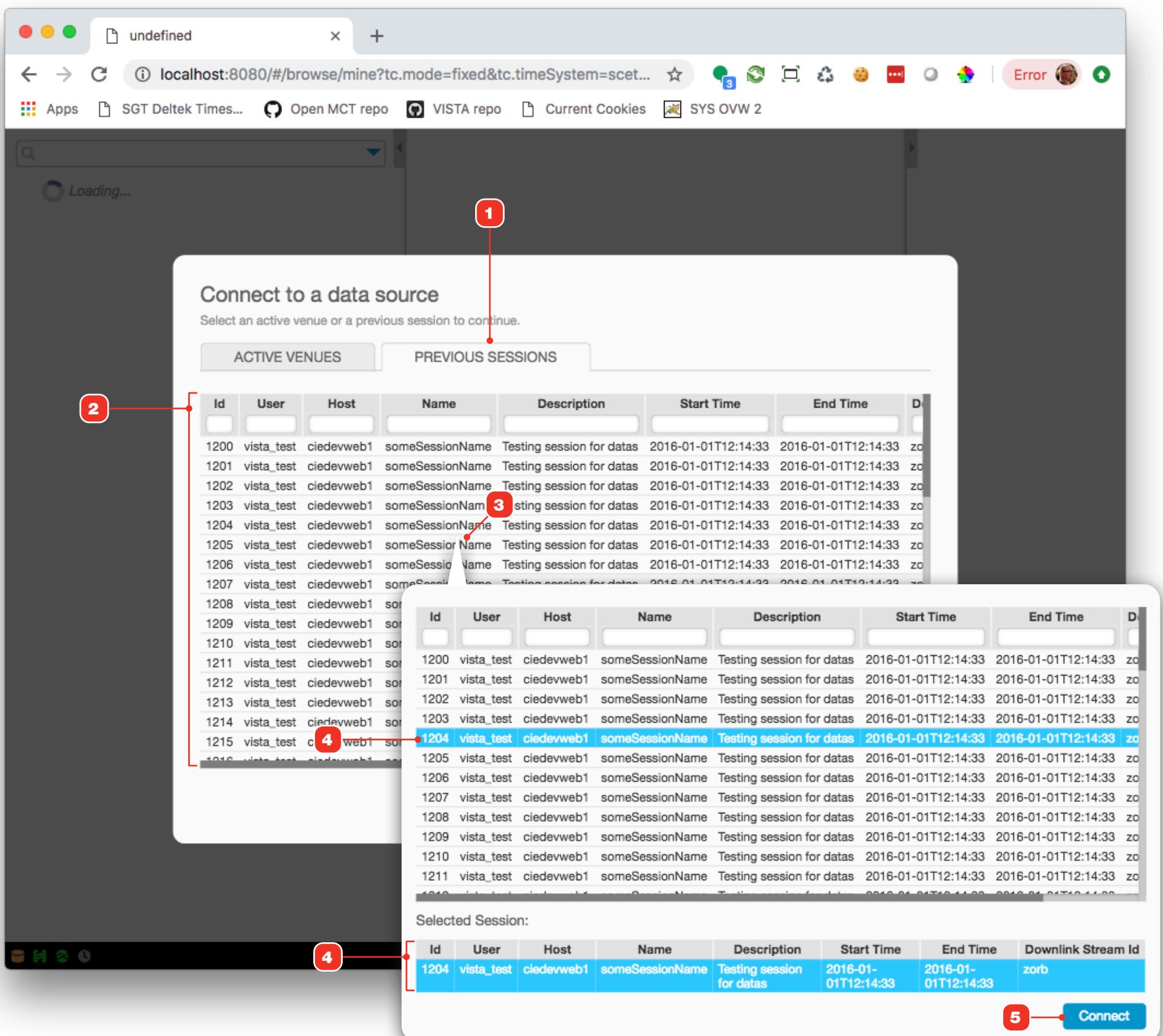


CONNECTING TO DATA

Connecting to a Previous Data Session

This screen displays when VISTA is initially started.

- 1 The Previous Sessions tab displays previous recorded data sessions.
- 2 All available previously recorded data sessions are displayed in this table. The table can be sorted and filtered.
- 3 Click a row in the table to select that session.
- 4 Selecting a session hilites it, and displays it in the lower part of the interface as well.
- 5 Once you've selected a previous session, the Connect button will become enabled. Click it to continue.



VIEWING DATA

Using Plot View

PLOTTING HISTORIC DATA

When viewing historic data, all data will be plotted for the datetime range selected in the Time Conductor. Note that if there are more data points than there are available pixels, a min-max approach will be used to avoid pulling down more data than can be displayed. Zooming or panning the plot will automatically query the data as needed, returning more detailed data if available.

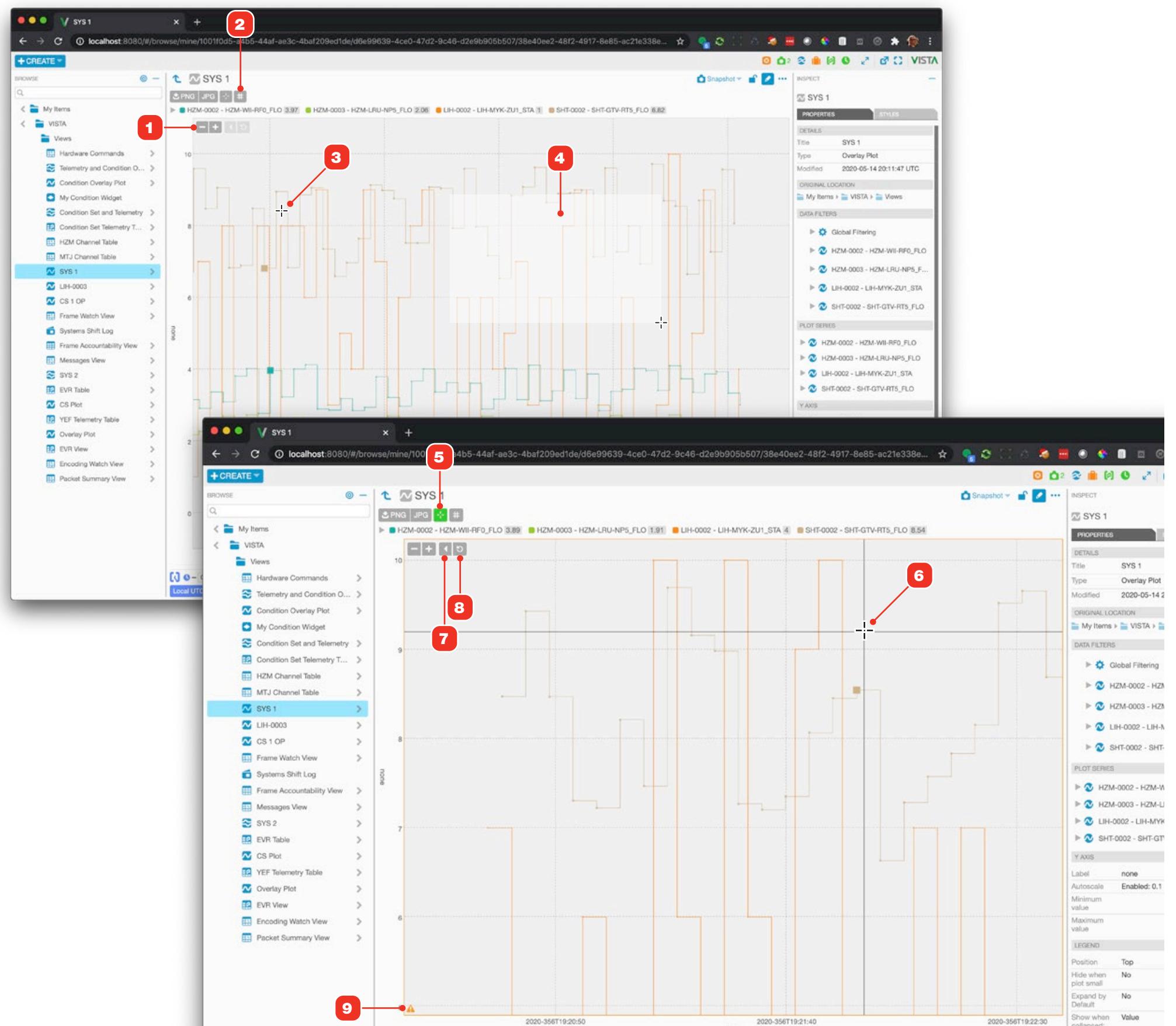
PLOTTING REAL-TIME DATA

When real-time data is connected to and the Time Conductor is in a "real-time" mode, plots will initially display in a time window in which "now" is on the right-hand edge of the plot with the left edge a trailing length of time into the past. As time progresses, the view automatically pans to the left to keep "now" at the right edge of the plot area.

ZOOMING AND PANNING

Zooming can be accomplished via the mouse wheel, a marquee, or zoom buttons. Once zoomed, the display area is frozen and will not scale or shift to accommodate new streaming real-time data, although data will continue to be loaded in the background. You can continue to zoom in or pan the view in this manner as much as you'd like.

- 1 Click these buttons to zoom in or out.
- 2 To pan the plot, hold the Option key (Mac) or Alt key (Windows) and drag anywhere within the plot area.
- 3 To zoom by drawing a marquee, click in a region of the plot and drag to draw a rectangular marquee area **4**. When the mouse button is released, the marqued data of the plot will be expanded to fill the available view area, with both X and Y axes scaling accordingly. Additional data may be queried to provide greater detail.
- 5 Cursor guides can be toggled on or off by clicking this button.
- 6 Activated cursor guides.
- 7 To step back through successive zooms or pans that you've made (just like using the Back button in a browser), click this button. Once you've stepped back through your entire zoom history, this button will no longer appear until you zoom or pan again.
- 8 When the plot has been zoomed or panned, to view all available data and restore the streaming display of real-time data, click this button. Once you've reset the view, this button will no longer be available until you zoom or pan again.
- 9 When a plot view is zoomed or panned such that real-time data is no longer being displayed, an orange border and alert icon will be displayed indicating that you may not be seeing the most recent data. Resetting the plot using the reset control **8** will remove this indication.



VIEWING DATA

Using Plot View, Plot Legend

Plot legends can be viewed in a space-saving "collapsed" view **1**, or an expanded tabular format **2** that offers more information. For overlay plots, legends can be configured per object to display on top, below, or to either side of the plot display area when collapsed. Legends always appear above or below an overlay plot's display area when expanded.

For more on configuring legends in plots, see "Edit an Overlay Plot, Y Axis and Legend Options" on page 80.

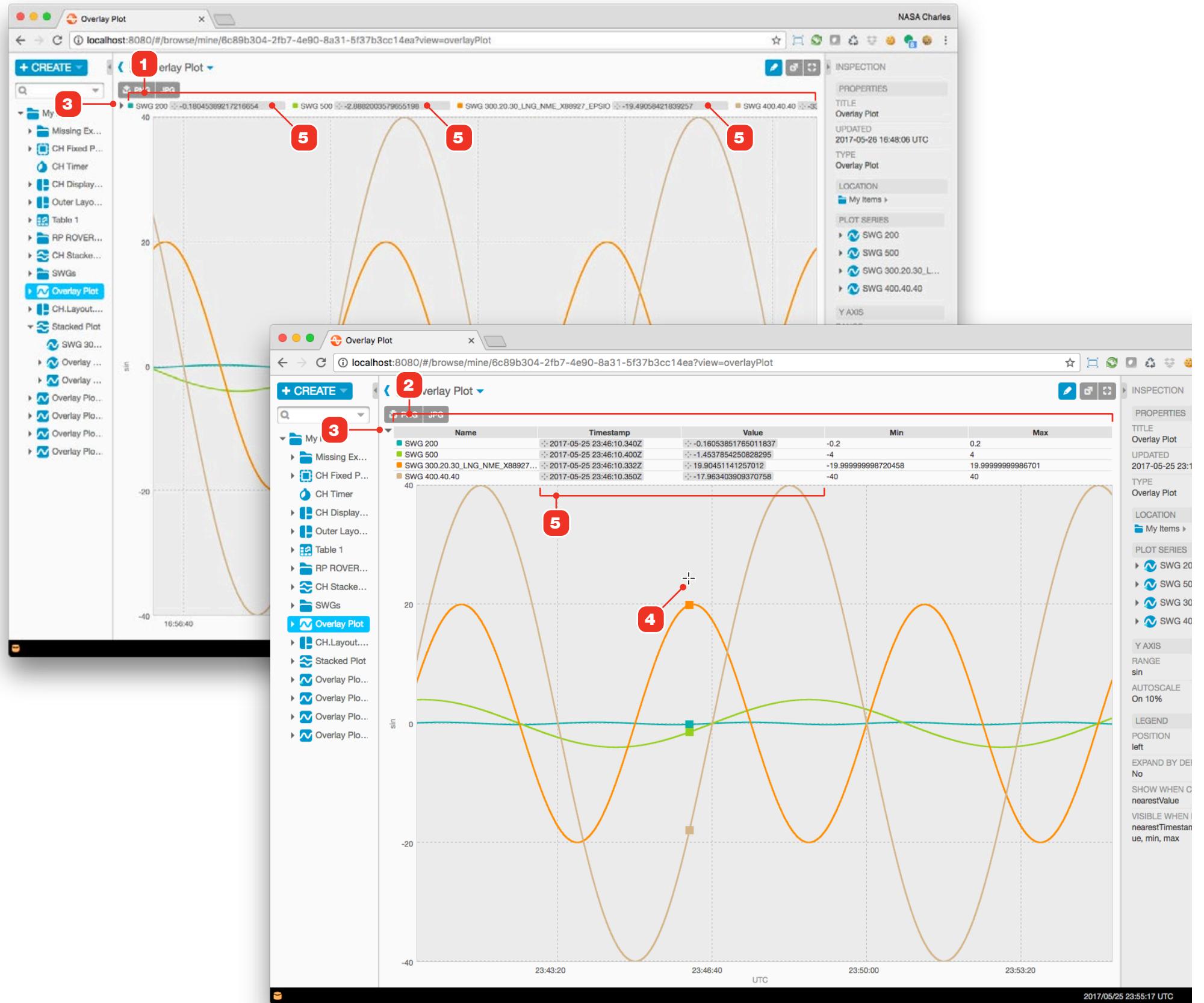
- 1** The collapsed legend displays a single row of legend items, including color, name and (optionally) the value of a hilited point of each series while hovering. Note that not all of the legend items may display in the collapsed state - to see all legend items, expand the legend by clicking its view toggle arrow **3**.

- 2** The expanded legend displays more information about the plot data:

Timestamp	The timestamp of a hilited point while hovering.
Value	The value of a hilited point while hovering.
Min and Max	The minimum and maximum value for each series within the current data's timebounds as set by the Time Conductor. Note that these values are not affected by hovering or zooming.

- 3** To toggle the legend from collapsed to expanded or vice versa, click its expansion toggle arrow.

- 4** Hovering over the plot display area will display the values of the points nearest to the current X axis position of the cursor for all series in the plot. Depending on how the plot has been configured, hover-based values **5** appear in both collapsed and expanded legend modes.



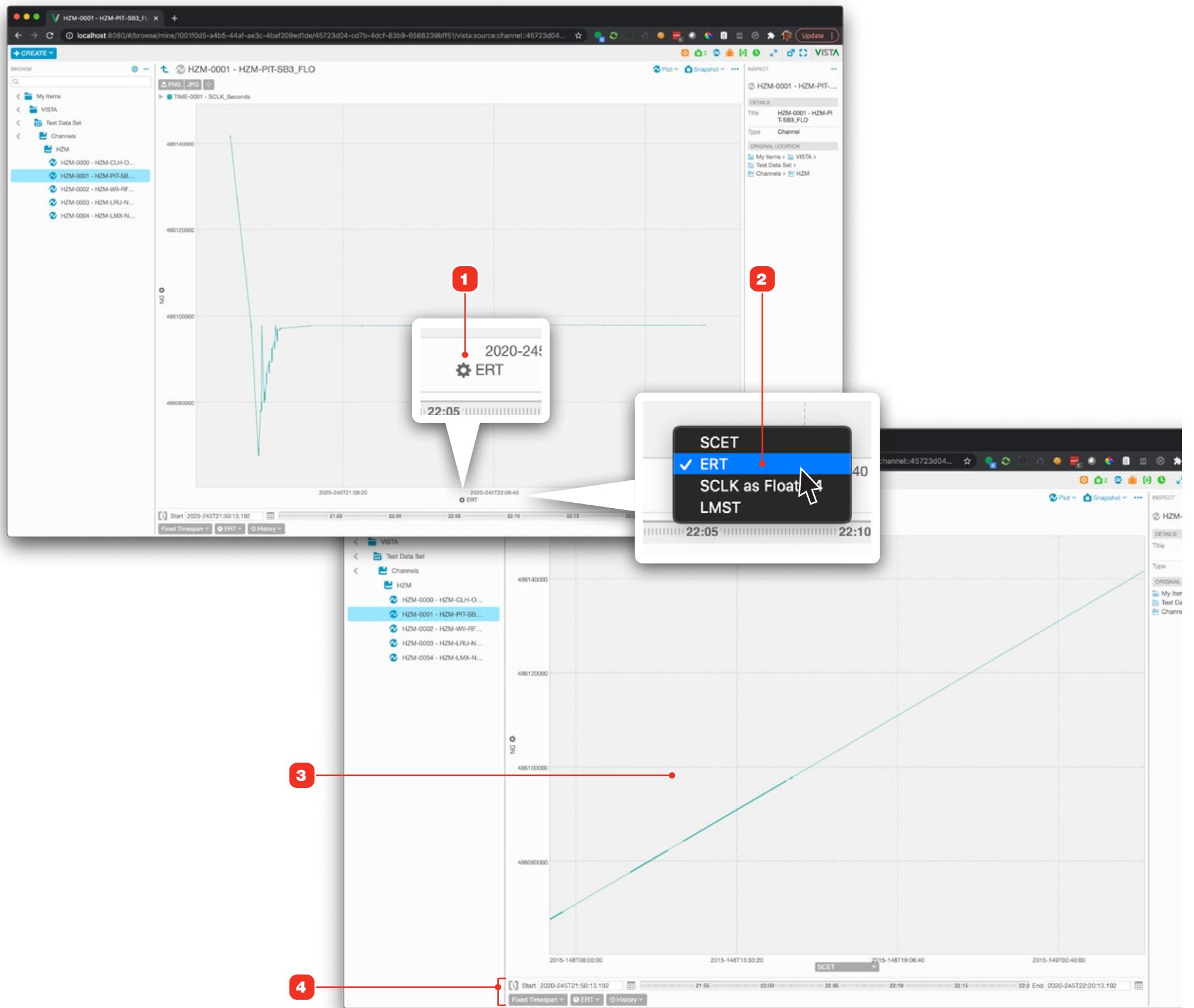
VIEWING DATA

Using Plot View, Changing the X Axis

Data currently loaded into a channel's plot can be viewed in a different time system than that currently in use in the Time Conductor. When used, this feature will reorder all the datapoints currently in the plot by the selected time system, then re-render the plot. No additional queries will be made to the server.

This feature is only available in the Time Conductor's "Fixed Timespan" mode, and is only available for the built-in plot view of telemetry channels.

- 1 When available, the plot view's X axis label will display a gear icon.
- 2 Hovering over the label will display a clickable menu element with choices of time system.
- 3 Selecting a different time system will replot all datapoints currently in the plot by that system. The new view can be panned and zoomed as normal.
- 4 To "resync" the plot view with the Time Conductor, change any settings in the Time Conductor, such as the Start and End bounds, or the time system.



VIEWING DATA

Table Views

Table views are provided for a number of telemetry types, including channels, packets, frames, commands and more. Table views can additionally be created, giving you the ability to customize the content and display of the view. Data displayed in a Table object can be filtered and sorted as well as exported as a CSV file - see "Exporting a Table View's Data" on page 62 for more. Table views can be embedded in Display Layouts. Tables can display up to a maximum of 10,000 rows.

Table views display all the data available within the Start and End datetimes defined by the Time Conductor. If a real-time connection is enabled and the End datetime of the Time Conductor is in the future, the table will append incoming streaming real-time data as it is received. Note that this action doesn't involve a requery of the historic data provider.

When the Time Conductor is in a real-time mode (Local UTC, Latest ERT, etc.) the table will show both historic and real-time data that fits within the Time Conductor's Start and End bounds. As new data comes in, it will continue to be added to the view, and as old data no longer fits within the Time Conductors bounds it is removed from the view.

- 1 Rows can be sorted by clicking a column header to cycle through sorting options. Only a single column at a time can be used for sorting. When a column is controlling the sort, a marker indicator appears as shown - this example shows the view being sorted by ERT ascending. If no marker is displayed on any column, rows are displayed in the order they were received from the server.

No marker	The default; rows are displayed in the order received from the server. Not supported in all table views.
▲	Sort by this column in ascending order.
▼	Sort by this column in descending order.

- 2 When viewing real-time data and sorted by any time system ascending, scrolling to the bottom of the window will keep the scrollbar softly locked in that position so that new incoming data always appears in view at the bottom of the window.
- 3 The number of rows in the table's dataset is displayed here.
- 4 Currently visible data can be filtered by entering any full or partial word or numbers into a column's filter input. Filtering occurs as you type, and multiple columns may be used to filter. Note that when you are filtering, the number of rows indicator **3** will change to indicate how many rows are currently matching your filter settings.
- 5 Clicking a input's Regex toggle button allows you to enter a regex expression to be used for filtering.

VIEWING DATA

Pausing and Marking Rows in Table Views

Rows in most scrolling table views can be marked, simply to visually identify a row as it's moving, or to select one or more rows to export their data.

PAUSE/PLAY

- If the Time Conductor is in real-time mode, scrolling tables can be paused by clicking this button. Pausing a table will stop incoming real-time data from being appended to the table and halt scrolling.
- When paused, an orange border is displayed around the table, and the Pause button toggles to Play. Clicking this button will remove marks from all rows and cause the view to requery for any new data that may have become available while the view was paused. Real-time data scrolling will resume if the Time Conductor is in that mode.

MARKING ROWS

- Single rows can be marked by clicking them. To mark multiple rows, click once, hold the shift key, and click again. All rows between the first and last clicks will be marked. When one or more rows are marked, the view is automatically paused. The number of marked rows will be **5** displayed next to the number of rows in the table.
- To mark discontinuous rows, hold the Cmd key (Mac) or Ctrl key (Windows) and click rows. Use the same keyboard modifier to unmark an already marked row.
- When one or more rows are marked, Export Marked Rows will export just the data associated with those rows. See "Exporting a Table View's Data" on page 62 for more.
- Unmarking All Rows will remove marks from all rows and has the same effect as clicking the Play button **2**.

The screenshots illustrate the process of marking rows in a VISTA table view. In the top screenshot, a red box labeled **1** highlights the pause/play button at the top of the browser window. The table below shows 252 rows with 13 marked (indicated by a red box). In the bottom screenshot, the pause/play button is highlighted with a red box labeled **2**. A context menu is open on the right side of the table, listing various options. Red boxes labeled **3** through **7** point to specific items in the menu: **3** View Attributes, **4** Export Historical Data, **5** Export Table Data, **6** Export Marked Rows, **7** Unmark All Rows, and **8** Play.

VIEWING DATA

Viewing a Table Row's Data

It may be useful to see all the data for a row of a table, in cases where the information is not visible due to scrolling or hidden table columns.

- 1 To view all the data for a given row in a table, context click the row and select "View Full Datum" from the resulting menu.
- 2 All the row's data will be displayed in an overlay. Click the Close button **3** to dismiss the overlay and return to the table view.

The screenshot shows the VISTA software interface with a table view of channel data and an overlaid 'View Full Datum' dialog.

Table View:

- Title Bar:** HZM-0000 - HZM-CLH-OP0_STA
- Toolbar:** Includes 'CREATE', 'BROWSE', and various search/filter buttons.
- Table Headers:** Name, SCET, ERT, SCLK as Float 64, LMST, ID, DN, DN ALARM STATE, DSS ID, Module, Realtime, Stale.
- Data Rows:** Numerous rows of channel data, with the 51st row highlighted in blue and circled by a red box labeled **1**.
- Actions:** A context menu is open over the highlighted row, with the option 'View Full Datum' highlighted.

View Full Datum Dialog:

- Title Bar:** HZM-0000 - HZM-CLH-OP0_STA
- Content:** A table listing the full data for the selected row, including record_type, session_id, session_host, vcid, realtime, scet, ert, sclk, channel_id, name, type, dn, eu, dn_alarm_state, eu_alarm_state, dss_id, module, and recorded.
- Buttons:** Close button (circled by a red box labeled **3**) and a 'View Full Datum' button.
- Bottom Status:** 252 ROWS 1 MARKED

DATA SET VIEWS

Data Set and Data Views

For the details on creating and configuring a Data Set, see "Configuring a Data Set" on page 137.

A Data Set collects a variety of data resource types via URLs into a single, accessible data object that exposes data collections as objects to the rest of the application. Most likely, you'll be using a pre-configured installation of VISTA with a Data Set that an administrator has already setup for you.

- 1 Expand a Data Set to gain access to its channels, EVRs, dictionaries and Data Views.
- 2 Clicking on a node in the Data Set will display a view of its telemetry.

The screenshot shows the VISTA Data Products interface. On the left, a sidebar titled 'BROWSE' contains a tree view of data resources. A red circle labeled '1' points to the 'Test Data Set' node under 'My Items'. A red circle labeled '2' points to the 'Data Products' node under 'Data Products'. The main pane displays a table titled 'Data Products' with columns: Dvt SCET, ERT, Dvt SCLK as F, LMST, Download .DA, Download .EN, Preview .EMD, Download .TX, Creation Time, # Received, and # Parts. The table lists several entries, each with download and view links. At the bottom, there is a timeline and search bar.

Dvt SCET	ERT	Dvt SCLK as F	LMST	Download .DA	Download .EN	Preview .EMD	Download .TX	Creation Time	# Received	# Parts
2020-119T2...				Download	Download	View	Download	2018-312T1...	5	5
2020-119T2...				Download	Download	View	Download	2018-312T1...	4	4
2020-119T2...								2018-312T1...	--	5

DATA SET VIEWS

Telemetry Channels

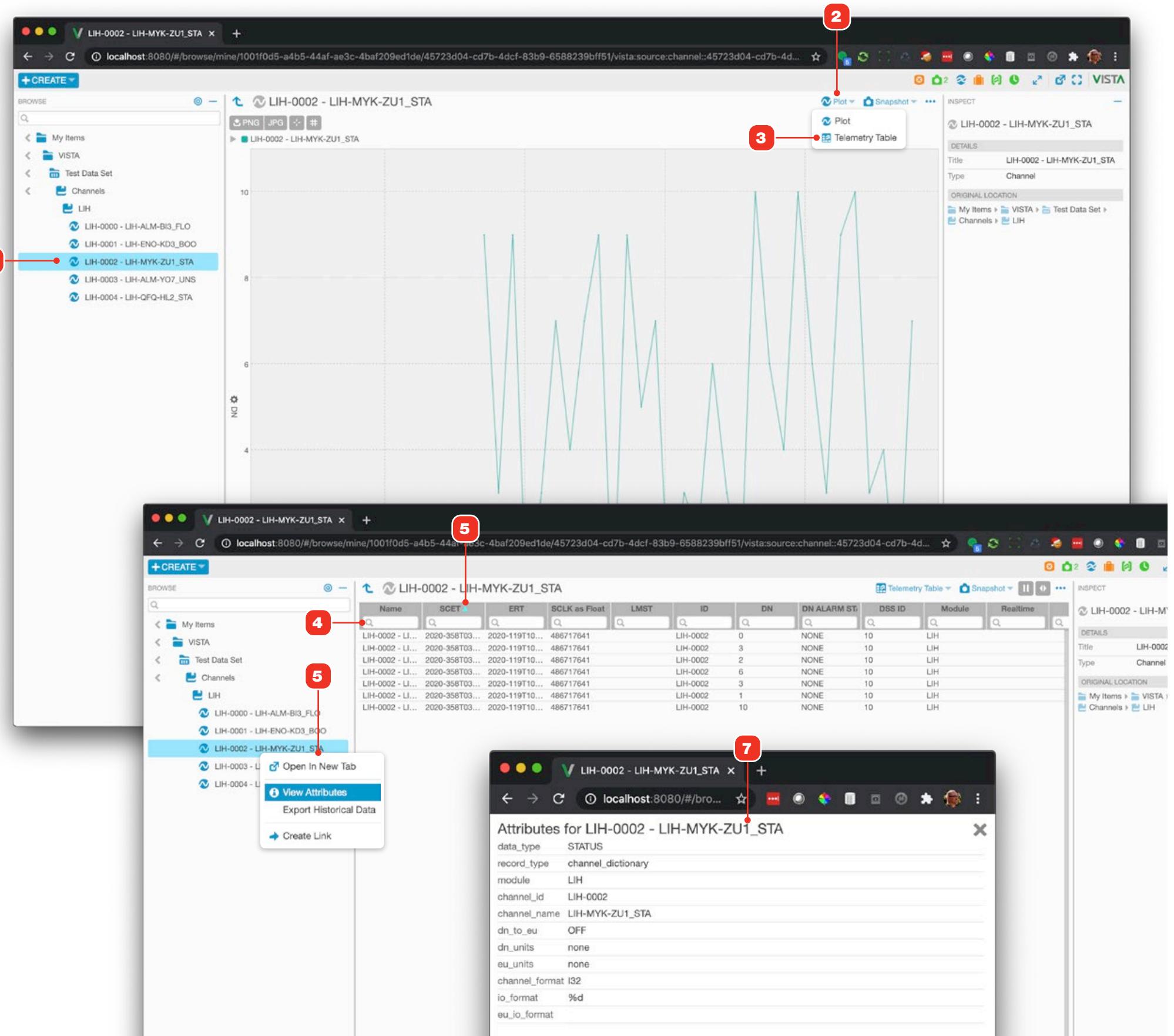
Telemetry Channels are individual telemetry elements. A Telemetry Channel can alternately be viewed as a plot or as tabular data. In contrast to the Plot view, which will display only the number of data points needed to properly show a plot, table views will show as much data as possible, up to 10,000 data points. Data displayed is always based on the current datetime range and time system as specified in the Time Conductor. See "Time Conductor Overview" on page 28 for more.

The channel's view can be switched from plot to table, here's how:

- 1 Click on a Channel to navigate to it. By default, the channel will initially display in plot view.
- 2 Change the view selector from "Plot" to "Telemetry Table" **3**. Note that zooming or panning operations in the plot view will be lost, and won't apply to data displayed in the table.
- 4 The table view can be filtered and sorted **5**.
- 6 To view dictionary metadata attributes for a channel, context-click it to display its context menu and select "View Attributes". Available metadata will be displayed in a dialog view **7**.

RELATED

- "Filtering By Historical Data Session" on page 34
- "Edit a Stacked Plot" on page 84
- "Time Conductor Overview" on page 28



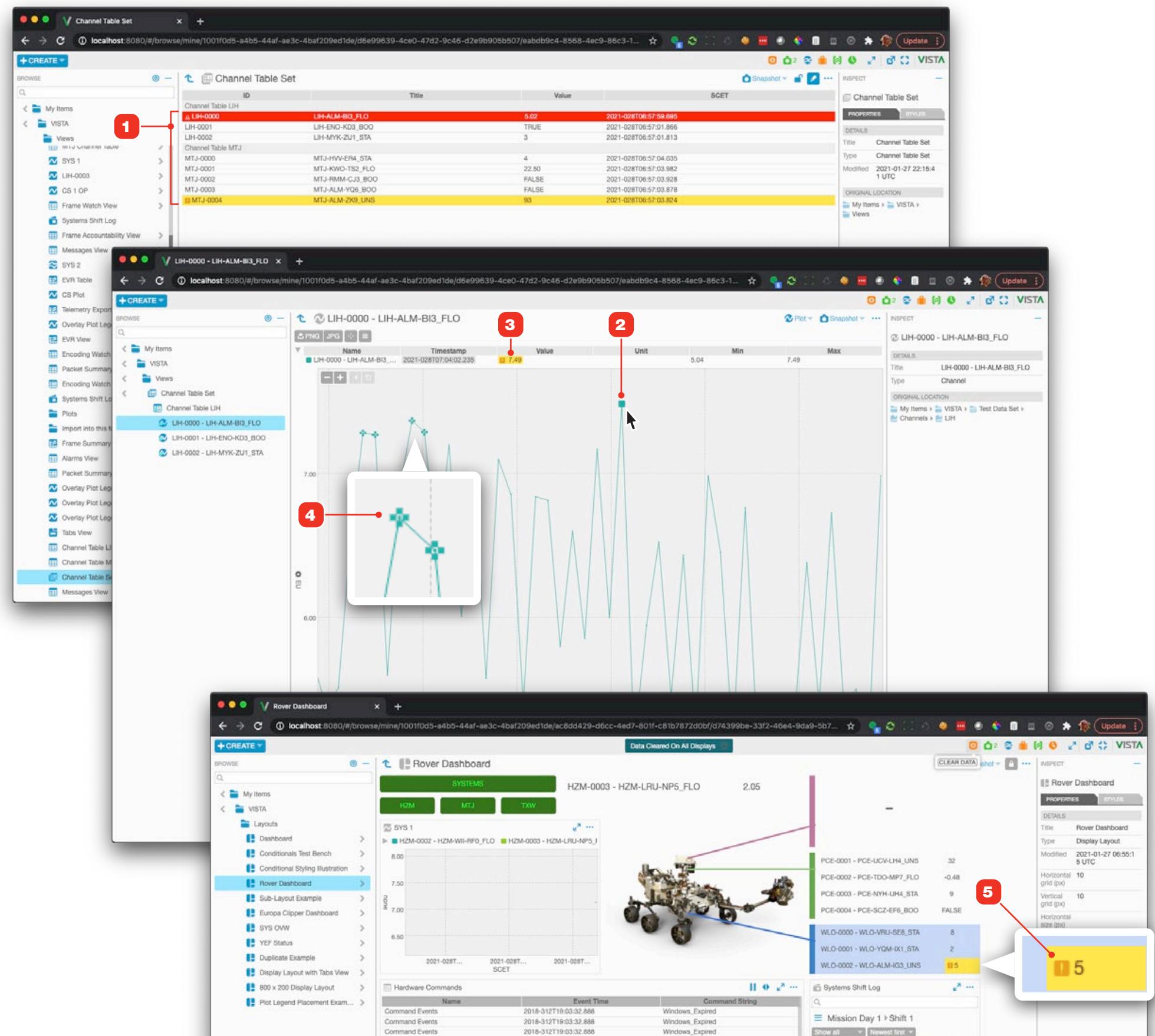
DATA SET VIEWS

Telemetry Channel Limits

The application displays telemetry limit violations in a variety of views. Limit violations display for the time in which telemetry has exceeded the limit - once a limit is no longer being violated, the limit violation indicator is not displayed.

Limits are included in the telemetry itself, and cannot currently be defined by the user. Currently, MCWS supports yellow and red limits. Note that examples included here are for illustrative purposes only.

- 1 Yellow and Red limit violations in a Tabular view.
- 2 When hovering over a point that is in violation, its value in the legend will also be rendered with violation indicators 3.
- 4 In plot views, data points that are violation are drawn in a distinct manner.
- 5 Yellow limit violation in a Display Layout.



DATA SET VIEWS

Dictionaries

- 1 If your VISTA configuration includes the required URLs for dictionaries, you'll have access to them within that Data Set. See "Data Set URL Fields Reference" on page 138 for more. Note that dictionary data is not time-based and is not affected by the Time Conductor's settings.
- 2 The Channel Enumeration Dictionary provides a reference to all enumeration values for all channels. To see values relating a particular channel, filter the table view by the "channel_id" column.

The image consists of two vertically stacked screenshots of the VISTA web interface, showing different data sets. Both screenshots have a header bar with browser controls, a title bar, and a sidebar on the left.

Top Screenshot: Channel Dictionary

The title is "Channel Dictionary". The URL is "localhost:8080/#/browse/mine/1001f0d5-a4b5-44af-ae3c-4baf209ed1de/45723d04-cd7b-4dcf-83b9-6588239bff51/vista:source:dictionary::45723d0...". The sidebar shows "Test Data Set" expanded, with "Dictionaries" selected. A red box labeled "1" highlights the "Channel Dictionary" item under "Dictionaries".

The main content is a table titled "Channel Dictionary" with the following columns:

data_type	record_type	module	channel_id	channel_name	din_to_eu	din_units	eu_units	channel_format	io_format	eu_io_format
STATUS	channel_dictio...	HZM	HZM-0000	HZM-CLH-OP...	OFF	none	none	I32	%d	
FLOAT	channel_dictio...	HZM	HZM-0001	HZM-PIT-SB3...	ON	percentage	none	F64	.6f	.2f
FLOAT	channel_dictio...	HZM	HZM-0002	HZM-WII-RF0...	ON	percentage	none	F64	.6f	.2f
FLOAT	channel_dictio...	HZM	HZM-0003	HZM-LRU-NP...	ON	percentage	none	F64	.6f	.2f
UNSIGNED_INT	channel_dictio...	HZM	HZM-0004	HZM-LMX-NJ...	OFF	counts	none	U32		
FLOAT	channel_dictio...	LIH	LIH-0000	LIH-ALM-BI3...	ON	percentage	none	F64	.6f	.2f
BOOLEAN	channel_dictio...	LIH	LIH-0001	LIH-ENO-KD3...	OFF	none	none	BOOLEAN		
STATUS	channel_dictio...	LIH	LIH-0002	LIH-MYK-ZU1...	OFF	none	none	I32	%d	
UNSIGNED_INT	channel_dictio...	LIH	LIH-0003	LIH-ALM-YO7...	OFF	counts	none	U32		
STATUS	channel_dictio...	LIH	LIH-0004	LIH-QFQ-HL2...	OFF	none	none	I32	%d	
FLOAT	channel_dictio...	LTT	LTT-0000	LTT-CMH-XB9...	ON	percentage	none	F64	.6f	.2f
BOOLEAN	channel_dictio...	LTT	LTT-0001	LTT-ALM-KJ5...	OFF	none	none	BOOLEAN		
STATUS	channel_dictio...	LTT	LTT-0002	LTT-WDM-QX4...	OFF	none	none	I32	%d	
UNSIGNED_INT	channel_dictio...	LTT	LTT-0003	LTT-XRK-UY8...	OFF	counts	none	U32		
FLOAT	channel_dictio...	LTT	LTT-0004	LTT-OOR-TC2...	ON	percentage	none	F64	.6f	.2f
STATUS	channel_dictio...	MTJ	MTJ-0000	MTJ-HVV-ER4...	OFF	none	none	I32	%d	
FLOAT	channel_dictio...	MTJ	MTJ-0001	MTJ-KWO-TS...	ON	percentage	none	F64	.6f	.2f
BOOLEAN	channel_dictio...	MTJ	MTJ-0002	MTJ-RMM-CJ...	OFF	none	none	BOOLEAN		
BOOLEAN	channel_dictio...	MTJ	MTJ-0003	MTJ-ALM-YQ6...	OFF	none	none	BOOLEAN		
UNSIGNED_INT	channel_dictio...	MTJ	MTJ-0004	MTJ-ALM-ZK9...	OFF	counts	none	U32		
BOOLEAN	channel_dictio...	PCE	PCE-0000	PCE-ZVP-KY2...	OFF	none	none	BOOLEAN		
UNSIGNED_INT	channel_dictio...	PCE	PCE-0001	PCE-UCV-LH4...	OFF	counts	none	U32		
FLOAT	channel_dictio...	PCE	PCE-0002	PCE-TDO-MP...	ON	percentage	none	F64	.6f	.2f
STATUS	channel_dictio...	PCE	PCE-0003	PCE-NYH-UH...	OFF	none	none	I32	%d	
BOOLEAN	channel_dictio...	PCE	PCE-0004	PCE-SCZ-EF6...	OFF	none	none	BOOLEAN		
FLOAT	channel_dictio...	SHT	SHT-0000	SHT-ALM-IK6...	ON	percentage	none	F64	.6f	.2f
UNSIGNED_INT	channel_dictio...	SHT	SHT-0001	SHT-URO-VF2...	OFF	counts	none	U32		
FLOAT	channel_dictio...	SHT	SHT-0002	SHT-GTV-RT5...	ON	percentage	none	F64	.6f	.2f
UNSIGNED_INT	channel_dictio...	SHT	SHT-0003	SHT-UOX-PN3...	OFF	counts	none	U32		
UNSIGNED_INT	channel_dictio...	SHT	SHT-0004	SHT-LLV-VM1...	OFF	counts	none	U32		
FLOAT	channel_dictio...	TXW	TXW-0000	TXW-WDK-WT...	ON	percentage	none	F64	.6f	.2f
FLOAT	channel_dictio...	TXW	TXW-0001	TXW-EZJ-TV7...	ON	percentage	none	F64	.6f	.2f
BOOLEAN	channel_dictio...	TXW	TXW-0002	TXW-KSM-YC...	OFF	none	none	BOOLEAN		
STATUS	channel_dictio...	TXW	TXW-0003	TXW-ALM-NW...	OFF	none	none	I32	%d	
FLOAT	channel_dictio...	TXW	TXW-0004	TXW-EEV-GK8...	ON	percentage	none	F64	.6f	.2f
STATUS	channel_dictio...	WLO	WLO-0000	WLO-VRU-SE...	OFF	none	none	I32	%d	
STATUS	channel_dictio...	WLO	WLO-0001	WLO-YQM-IX1...	OFF	none	none	I32	%d	
UNSIGNED_INT	channel_dictio...	WLO	WLO-0002	WLO-ALM-IG3...	OFF	counts	none	U32		
BOOLEAN	channel_dictio...	WLO	WLO-0003	WLO-FLU-ID0...	OFF	none	none	BOOLEAN		

Bottom Screenshot: Channel Enumeration Dictionary

The title is "Channel Enumeration Dictionary". The URL is "localhost:8080/#/browse/mine/1001f0d5-a4b5-44af-ae3c-4baf209ed1de/45723d04-cd7b-4dcf-83b9-6588239bff51/vista:source:dictionary::45723d0...". The sidebar shows "Test Data Set" expanded, with "Dictionaries" selected. A red box labeled "2" highlights the "Channel Enumeration Dictionary" item under "Dictionaries".

The main content is a table titled "Channel Enumeration Dictionary" with the following columns:

channel_id	channel_type	channel_format	enum_value	enum_string
E-0051	ENUM	I8	0	UNINITIALIZED
E-0051	ENUM	I8	1	RECV_ONLY_STATE
E-0051	ENUM	I8	2	ACTIVE_WINDOW
E-0051	ENUM	I8	3	CONTINGENCY_STATE

DATA SET VIEWS

Data Products

- 1 If your VISTA configuration includes (or you created) a Data Set that defines a URL for Data Products, you'll have access to this object within that Data Set. See "Data Set URL Fields Reference" on page 138 for more.
- 2 Products are color-coded based on their status. In this example, Completed products show in green, and Partial (visible toward the bottom of the view in this example) are colored blue.
- 3 Changing the timeframe in the Time Conductor will refresh the view and show you products within that timeframe.
- 4 Completed and partially completed products can be cleared from the view by accessing the view's "More Options" menu and selecting either "Clear Completed" or "Clear Partially Completed". Cleared products are only removed from the view, not from the server. Navigating away from this view and then back again, or refreshing the browser, will cause cleared products to reappear.
- 5 Product data and information can be downloaded by clicking the appropriate link for the product you're interested in.
- 6 The product's EMD file can be viewed by clicking this link.

The screenshot shows the VISTA Data Products view. The left sidebar contains a 'BROWSE' section with categories like 'My Items' and 'VISTA'. Under 'VISTA', 'Data Products' is selected and highlighted in blue. A context menu is open over a row in the main table, with several options visible, including 'Clear Completed' and 'Clear Partially Completed'. The main table lists 'Data Products' entries with columns for Name, Dvt SCET, ERT, Dvt SCLK as Float 64, LMST, Download .DAT, Download .EMD, Preview .EMD, Download .TXT, Creation Time, and # Received. Rows are color-coded: green for completed products and blue for partially completed ones. At the bottom, a 'Time Conductor' displays a timeline from 00:30 to 00:40, with a note indicating it was updated at 2020-364T00:41:02.907. The status bar at the bottom right shows 'PG 51'.

DATA SET VIEWS

Packets

- 1 If your VISTA configuration includes (or you created) a Data Set that defines a URL for Packets you'll have access to this object within that Data Set. See "Data Set URL Fields Reference" on page 138 for more.
- 2 The Packets view shows the status of packets within the timeframe defined in the Time Conductor.
- 3 To get access to a more advanced search interface, select "Packet Query" from the view selector control.

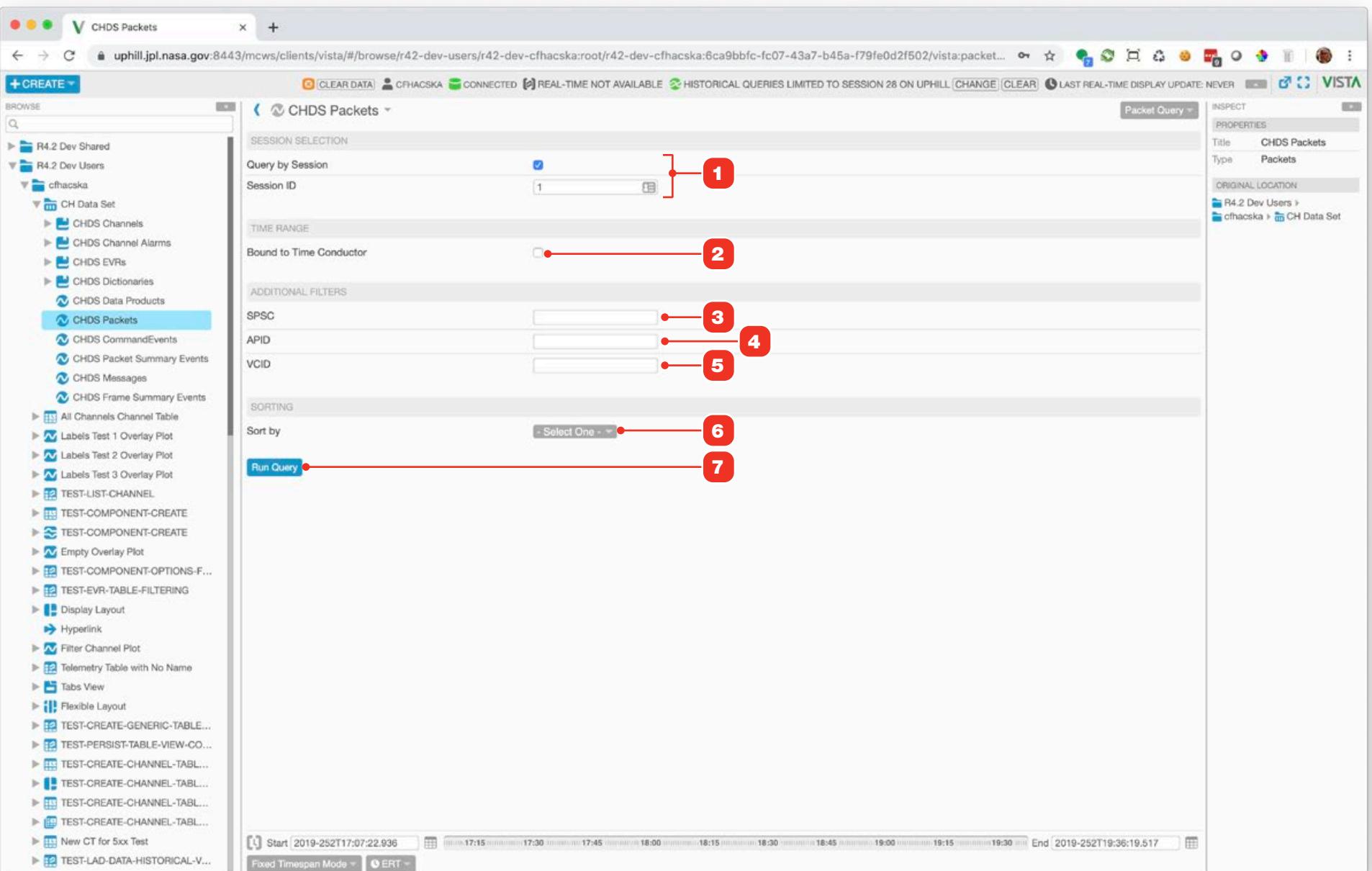
The screenshot shows the CHDS Packets view in VISTA. The left sidebar displays a tree structure of data sets and components. The 'CHDS Packets' item is highlighted with a red circle labeled 1. The main area is a table showing a list of packets. The table has columns: SCET, ERT, SCLK as Float 64, Record Type, Session Id, Session Host, Vcid, Dss Id, Apid, Apid Name, From See, and two search icons. A red circle labeled 2 points to the bottom of the table, specifically to the 'Start' and 'End' time selection fields. A red circle labeled 3 points to the top right corner of the interface, specifically to the 'Telemetry Table' dropdown menu.

DATA SET VIEWS

Packets, Packet Query View

The Packet Query view allows you to query for and download a data file with packet status information utilizing a variety of search filters. Your Data Set must contain a URL for Packets Query URL to enable this view. See "Packets, Packet Query View" on page 53 for more.

- 1 To query by session ID, check this "Query by Session" and enter a session ID in the Session ID input. Note that you must search by either Session ID or the Time Conductor timeframe **2**.
- 2 To limit your query to the timeframe defined in the Time Conductor, check this box. If left unchecked, the query will return all records available for the entered Session ID. Note that you must search by either Session ID **1** or the Time Conductor timeframe.
- 3 Enter a spacecraft ID in this input to filter for that value.
- 4 Enter a application ID in this input to filter for that value.
- 5 Enter a source packet sequence counter value in this input to filter for that.
- 6 Select a sorting method to apply to your results.
- 7 When ready, click "Run Query". When the server completes your query, a downloadable file will be sent to your browser; follow browser and system prompts from there to download your results file.



DATA SET VIEWS

Packet Summary Events

- 1 If your VISTA configuration includes the required URL for Packet Summary Event Stream URL and you are connected to a real-time Topic or session, you'll have access to them within that Data Set. See "Data Set URL Fields Reference" on page 138 for more.
- 2 In addition to a table view of events, this view also provides summary information.

The screenshot shows the VISTA web interface with the following details:

- Left Sidebar (BROWSE):** Shows a tree structure with categories like My Items, VISTA, Test Data Set, Channels, Channel Alarms, Header Channels, EVRs, Dictionaries, Data Products, Packets, Command Events, and several sub-items under 'Packet Summary Events' (Messages, Frame Summary Events, Frame Events, Alarm Message Stream). The 'Packet Summary Events' item is highlighted with a red box and the number 1.
- Top Bar:** Includes a search bar with a magnifying glass icon, a refresh button, and a 'Packet Summary View' dropdown menu.
- Main Content Area:** Titled 'Packet Summary Events'. It displays three tables:
 - FSW Valid Packets: 10**: Shows 10 entries for 'Packet Summary Events' with columns: Name, VC/AP ID, Count. Examples include 'Packet Summary Events 2222/0066' with Count 100 and 'Packet Summary Events 2222/0067' with Count 110.
 - FSW Invalid Packets: 5**: Shows 5 entries for 'PWR_BUS_A' and 'PWR_BUS_B' with columns: Name, Last Sequence ID, Last ERT, Last SCLK, Last SCET, Last LST. Examples include 'PWR_BUS_A' with Last Sequence ID 10 and Last ERT 2018-312T19:03:30.925.
 - FSW Fill Packets: 0**: Shows 0 entries.
- Bottom Navigation:** Includes buttons for Local UTC, SCET, History, and a timestamp Updated 2021-02-27T00:46:43.451.

DATA SET VIEWS

Messages

- 1 If your VISTA configuration includes the required URL for the real-time Messages stream and you are connected to a real-time Topic or session, you'll have access to them within that Data Set. See "Data Set URL Fields Reference" on page 138 for more. Messages are real-time only and are not provided when using historical queries.

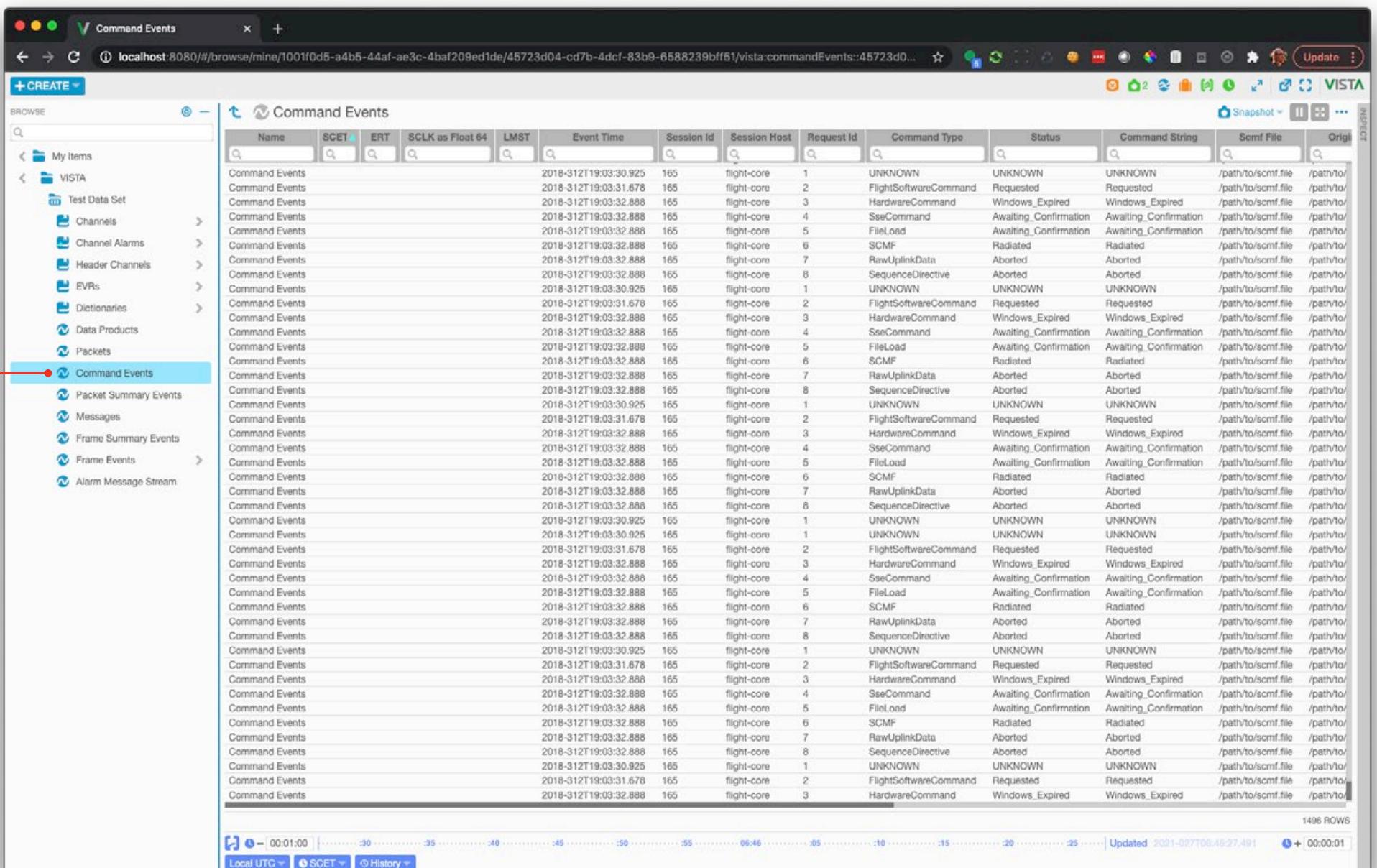
The screenshot shows the VISTA web interface with the following details:

- Left Sidebar:** Shows a tree view of data sets and events. The 'Messages' item under 'Test Data Set' is highlighted with a red circle and a number '1'.
- Main Content Area:** A table titled 'Messages' with three columns: 'Name', 'Event Time', and 'Message Type'. The table lists many entries, each with a timestamp and a message type like 'PacketExtractSum', 'HardwareCommand', etc.
- Bottom Navigation:** Includes a timeline from '00:01:00' to '06:49:00', a 'Local UTC' dropdown, a 'SCET' button, and a 'History' button.
- Header:** Shows the URL 'localhost:8080/#/browse/mine/1001f0d5-a4b5-44af-ae3c-4ba1209ed1de/45723d04-cd7b-4dcf-83b9-6588239bff61/vista:message::45723d04-cd7b...' and various browser icons.

DATA SET VIEWS

Command Events

- 1 If your VISTA configuration includes the required URLs for Command Events, you'll have access to the Command Events module within that Data Set. See "Data Set URL Fields Reference" on page 138 for more. If you need to create a filtered view of this data, see "Creating a Custom Command Events View" on page 94.



The screenshot shows the VISTA Command Events module interface. On the left, there is a sidebar titled 'BROWSE' with a search bar and a tree view of items under 'VISTA'. The 'Command Events' item is highlighted with a red box and the number 1. The main area is a table titled 'Command Events' with columns: Name, SCET, ERT, SCLK as Float 64, LMST, Event Time, Session Id, Session Host, Request Id, Command Type, Status, Command String, Scm File, and Origin. The table contains numerous rows of data, each representing a command event with details like timestamp, session information, and command type. At the bottom of the table, it says '1496 ROWS'. Below the table are various navigation and filter buttons.

DATA SET VIEWS

Frame Summary Events

- 1 If your VISTA configuration includes the required URLs for Frame Summary Events, you'll have access to the Frame Summary Events module and its view **2** within that Data Set. See "Data Set URL Fields Reference" on page 138 for more.
- 2 This view displays active frame events and summarizes current stats.

The screenshot shows the VISTA application window with the title 'Frame Summary Events'. A red circle labeled '1' points to the 'Frame Summary Events' item in the 'BROWSE' sidebar under the 'R4.1 Data Set 2' section. Another red circle labeled '2' points to the main content area, which displays a table of frame summary statistics. The table has four columns: 'VC/Encoding Type', 'Frame Count', 'Last Sequence ID', and 'Last ERT'. The data is as follows:

VC/Encoding Type	Frame Count	Last Sequence ID	Last ERT
12/SHORT_RS	12	14	2018-312T19:03:57.262
54/LONG_UE	14	1233	2018-312T19:03:30.925
23/LONG_TURBO_1_6	13	24	2018-312T19:03:31.678
13/SHORT_RS	14	26	2018-312T19:03:32.888
22/LONG_UE	12	7	2018-312T19:03:32.888

The right side of the screen shows the 'INSPECT' and 'PROPERTIES' panes for the 'Frame Summary Events' view, and the bottom features a timeline and various navigation controls.

DATA SET VIEWS

Event Records

- 1 If your VISTA configuration includes the required URLs for event records, you'll have access to this object within that Data Set. See "Data Set URL Fields Reference" on page 138 for more. Clicking the root container (as illustrated at right) or any module **2** will display a tabular view of that data within the time bounds of the Time Conductor.
- 2 Expanding the group container reveals EVRs collected by level and sub-system.
- 3 To view dictionary metadata attributes for an EVR, context-click it to display its context menu and select "View Attributes". Available metadata will be displayed in a dialog view **5**.
- 4 If your application deployment supports it, EVRs have the capability to be color coded by level. Note that coloring may vary from the example shown at right.

The screenshot illustrates the VISTA Event Records interface. At the top, a browser window shows a URL starting with `localhost:8080/#/browse/mine/1001f0d5-a4b5-44af-ae3c-4ba1209ed1de/45723d04-cd7b-4dcf-83b9-6588239bff51/vista:source:evr:45723d04-cd7b-4dcf-83b9-6588239bff51`. Below the browser is a main interface area divided into two sections:

- Left Panel (Tree View):** Shows a hierarchical tree of EVRs. A node labeled "ACMGR" is selected and highlighted in blue. A context menu is open over this node, with the "View Attributes" option highlighted. Number **3** points to this menu item. Number **2** points to the "ACMGR" node in the tree. Number **1** points to the left navigation bar.
- Right Panel (Table View):** Displays a large table of event record data. The columns include: EVR Name, SCET, ERT, SCLK as Float, LMST, Record Type, Module, Level, Message, Metadata Value, Metadata key, Event ID, DSS ID, Realtime?, and Se. A red arrow **4** points to the top right corner of this table area. The table has 5638 rows.

A small modal dialog box titled "Attributes for MCPSTART_MESSAGE" is open in the bottom right corner. It lists the following attributes:

Attribute	Value
record_type	evr_dictionary
evr_id	1
evr_name	MCPStart_message
level	DIAGNOSTIC
module	ACMGR
ops_cat	
nargs	0
format	MCPStart occurred

Number **5** points to the "Attributes for MCPSTART_MESSAGE" dialog box.

DATA SET VIEWS

Frame Events

A more useful view of this data can be created using a Frame Accountability view.

See "Creating a Frame Accountability View" on page 98.

1 If your VISTA configuration includes the required URLs for Frame Events, you'll have access to the Frame Events node and its view 2 within that Data Set. See "Data Set URL Fields Reference" on page 138 for more.

2 This view displays a scrolling table of frame events.

The screenshot shows the VISTA interface with the following details:

- Left Sidebar:** Shows a tree view of items under "My Items". The "Frame Events" node is expanded, highlighted with a blue background and a red circle labeled "1". Its children include "Bad Telemetry Frame", "In Sync.", "Loss of Sync.", "Frame Sequence Anomaly", "Out Of Sync. Data", and "Alarm Message Stream".
- Top Bar:** Displays the title "Frame Events" and the URL "localhost:8080/#/browse/mine/ddad1364-fa5a-4b08-9904-07ed42905d81/vista:frame-event::ddad1364-fa5a-4b08-9904-07ed42905d81?v_rt=ampcs.vista.te...".
- Main Content Area:** A table titled "Frame Events" with columns: Event Time, Message Type, Summary, and VCID. The table lists numerous entries, each with a timestamp like "2018-312T19:05:49.057" and a message type like "BadTelemetryFrame". Red circles labeled "2" point to the table header and the first few rows of data.
- Bottom Status Bar:** Shows the start time as "Start 2020-126T00:00:00.000" and the end time as "End 2020-126T23:59:59.999".
- Right Panel:** Titled "INSPECT", it shows the "Frame Events" item with "Title: Frame Events" and "Type: Frame Events". It also has a "ORIGINAL LOCATION" section and a breadcrumb trail "My Items > Test Data Set".

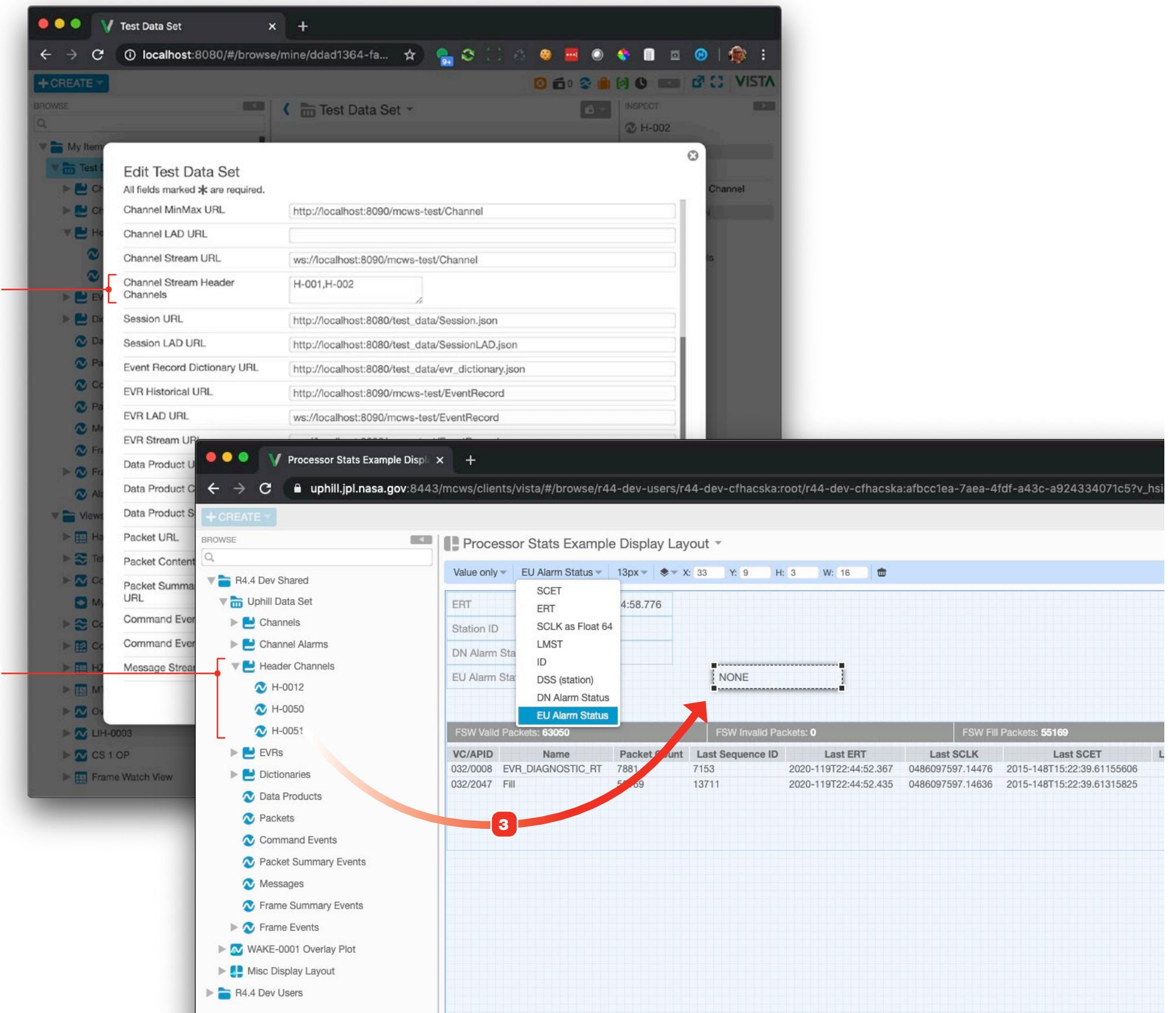
DATA SET VIEWS

Header Channels

Header channels can be used with other Data Set nodes to create a comprehensive view of current processor stats. See "Create a Processor Statistics Layout" on page 15.

For more information on working with Data Sets, see "Configuring a Data Set" on page 137.

- 1 In your Data Set, enter header channel IDs separated by commas. Header channel names must begin with "H-". Save changes to the Data Set.
- 2 Once configured, your Data Set will now contain a Header Channels group containing the configured header channels as telemetry channels.
- 3 Drag a Header channel into a Display Layout or other view, as you would with any telemetry.



EXPORTING AND IMPORTING

Exporting an Object's Historical Data

Almost all data objects in VISTA support exporting their historical data via a context menu action. In this case, the Time bounds of the Time Conductor are used to control the scope of data that is exported; it doesn't matter if the Time Conductor is in Fixed or a real-time mode.

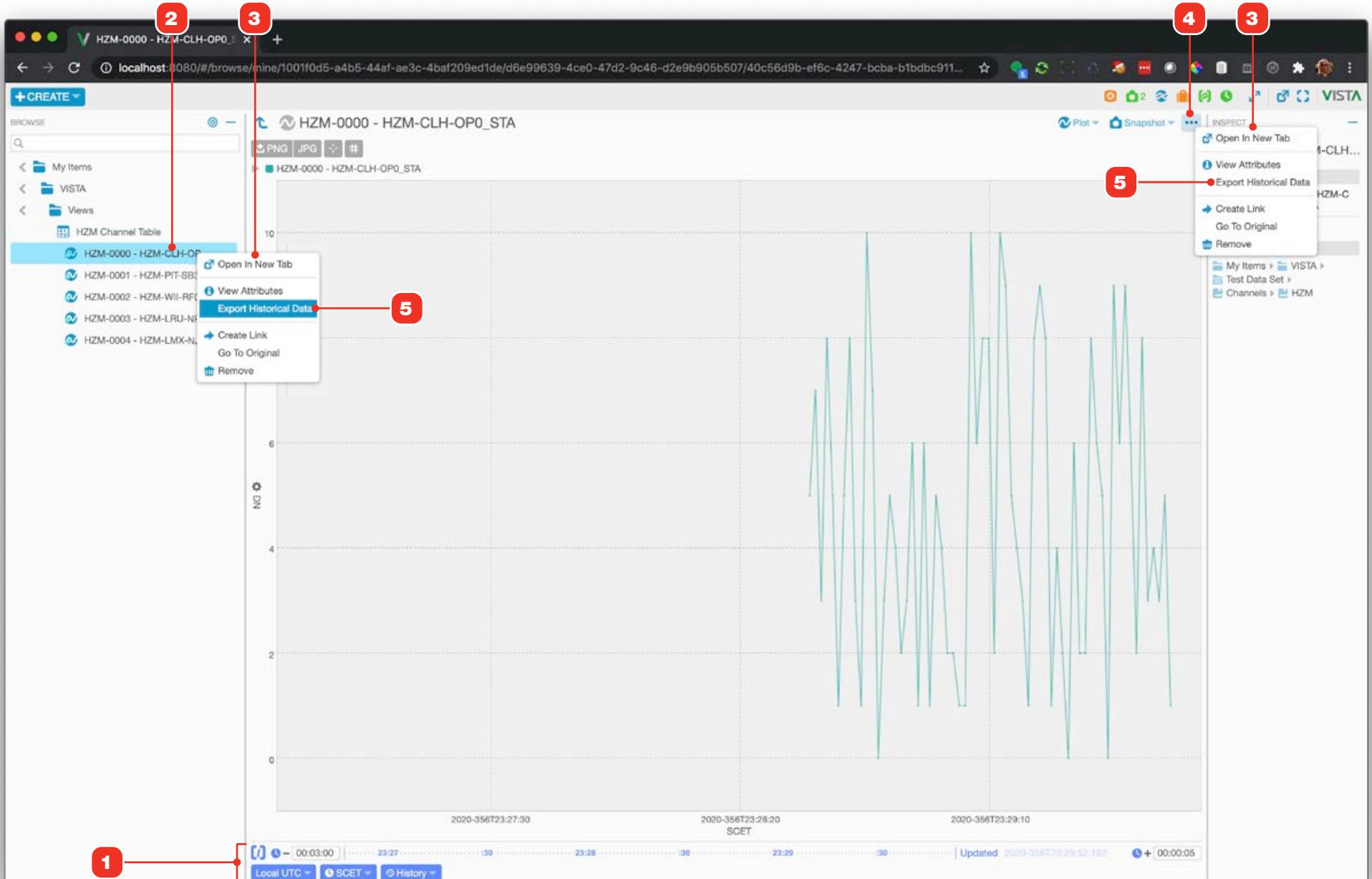
- When invoked on a single channel, EVR module, Command Event table, etc. the data will be limited to that object. If invoked from a Telemetry Table with more than one channel in it, data from all channels will be included.
- This export method doesn't pay any attention to whatever the main view is doing - if you've filtered or sorted in a table, that won't affect the export.
- There is not a constraint on the number of rows exported: even if you are looking at a table that is limited to 10,000 rows, an export of data from that object will include *all* the rows for that object that fall within the Time Conductor's bounds.

IMPORTANT NOTE: This method ONLY supports the export of historical data. To export a current Table view's data with historic or real-time data, see "Exporting a Table View's Data" on page 62.

STEPS

- Set the Time Conductor to the mode and timesystem of your choosing.
- Access the object's context menu **3** from the tree, or from the main view's "More Options" button **4**.
- Click the view's "More Options" button to display the options menu **4**.
- Select "Export Historical Data" from the context menu.

If your browser is set to ask you where to save your file, you'll be able to name the file. Otherwise, a file named "export.csv" will be created and saved.



EXPORTING AND IMPORTING

Exporting a Table View's Data

Table views in VISTA, either the table view available to many objects in VISTA, or that of a Telemetry Table object, allow you to export all the data from their current view. This export method applies table filtering and sorting to its export.

IMPORTANT NOTE: This method exports both historic and real-time data, but ONLY exports the data in the current view. Even if all filtering is removed, table views are limited to 10,000 rows. To export all of an object's historical data within a timeframe, see "Exporting an Object's Historical Data" on page 61.

STEPS

- 1 Set the Time Conductor to the mode and timesystem of your choosing.
- 2 Filter and sort the table as needed.
- 3 Click the view's "More Options" button to display the options menu **4**.
- 5 To export all of a table's data, click "Export Table Data".
- 6 To export a selection of rows, select the rows you wish to export and click "Export Marked Rows". See "Pausing and Marking Rows in Table Views" on page 45 details on selecting rows in table views.

If your browser is set to ask you where to save your file, you'll be able to name the file.

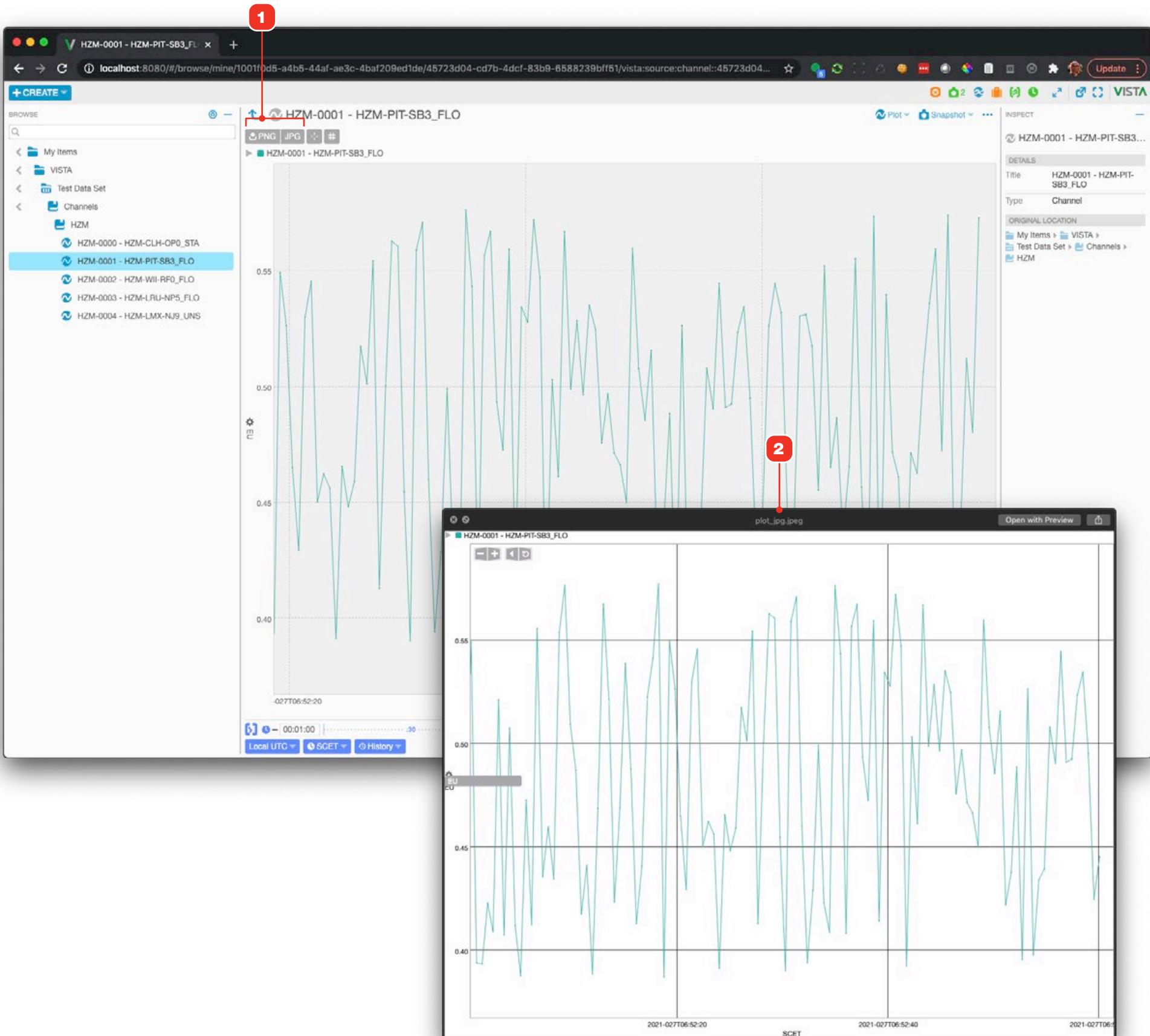
Otherwise, a file named "export.csv" will be created and saved.

EXPORTING AND IMPORTING

Exporting a Plot as an Image File

Plots can be exported as PNG or JPG files. The resulting file will include the plot, its axes, and legend. Any zoom or pan operations will be included - what you see at time of export is what you get. The legend will be as you see it when the Export action is invoked: if expanded it will appear in your exported image that way.

- 1 Click the either the PNG or JPG export button. If your browser is set to ask you where to save your file, you'll be able to name the file. Otherwise, a file named "plot_png.png" or "plot_jpg.jpg" will be created and saved.
- 2 An example of an exported plot.



EXPORTING AND IMPORTING

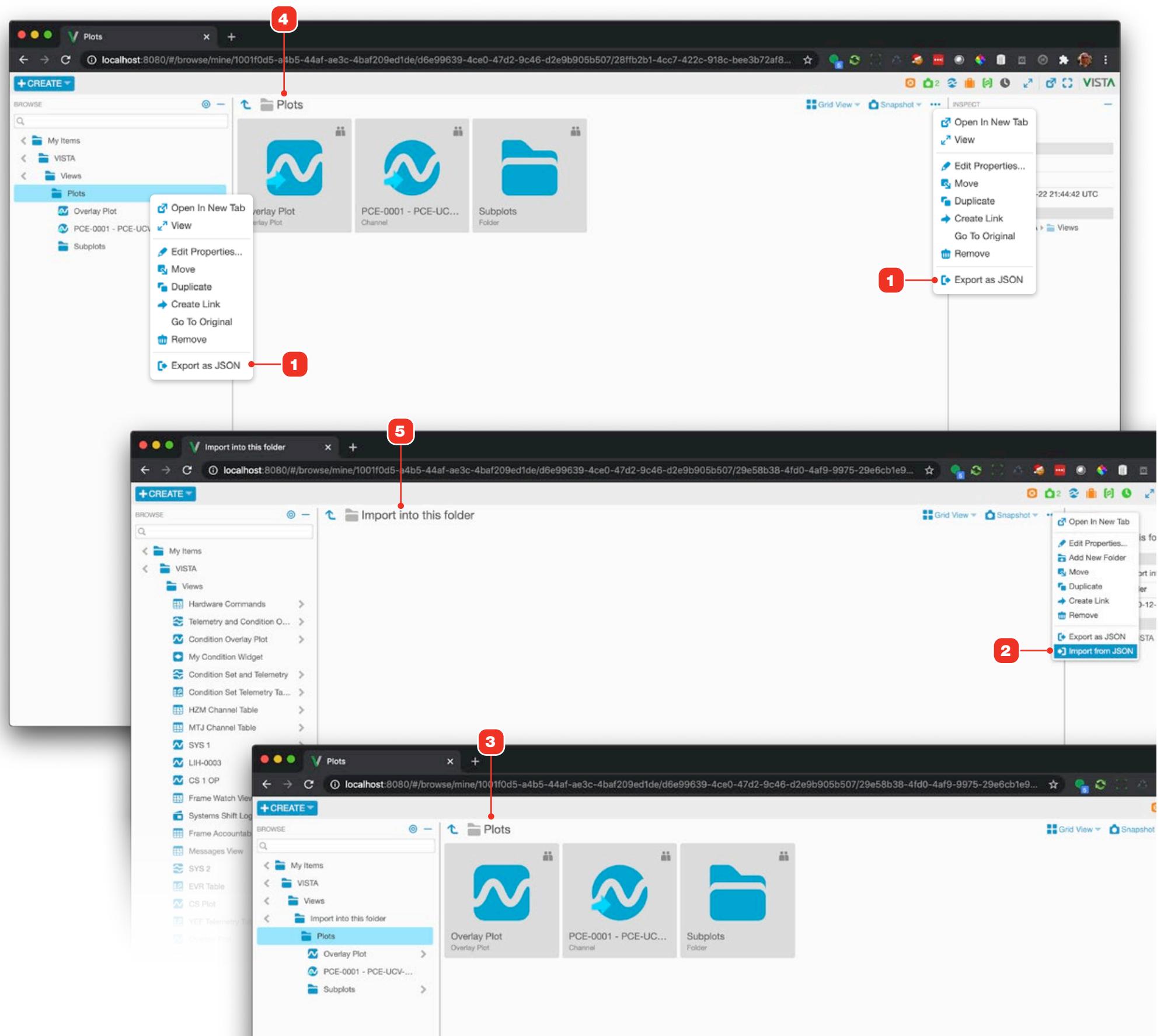
Exporting and Importing Object Configurations

Any creatable object can be exported as a text file, then re-imported into the application in another location, or even another deployment running the same version of VISTA. The resulting export will include the selected object as well as all of its children, recursively.

This example shows exporting the folder "Plots" **4** and importing that file into a folder named "Import into this Folder" **5**.

STEPS

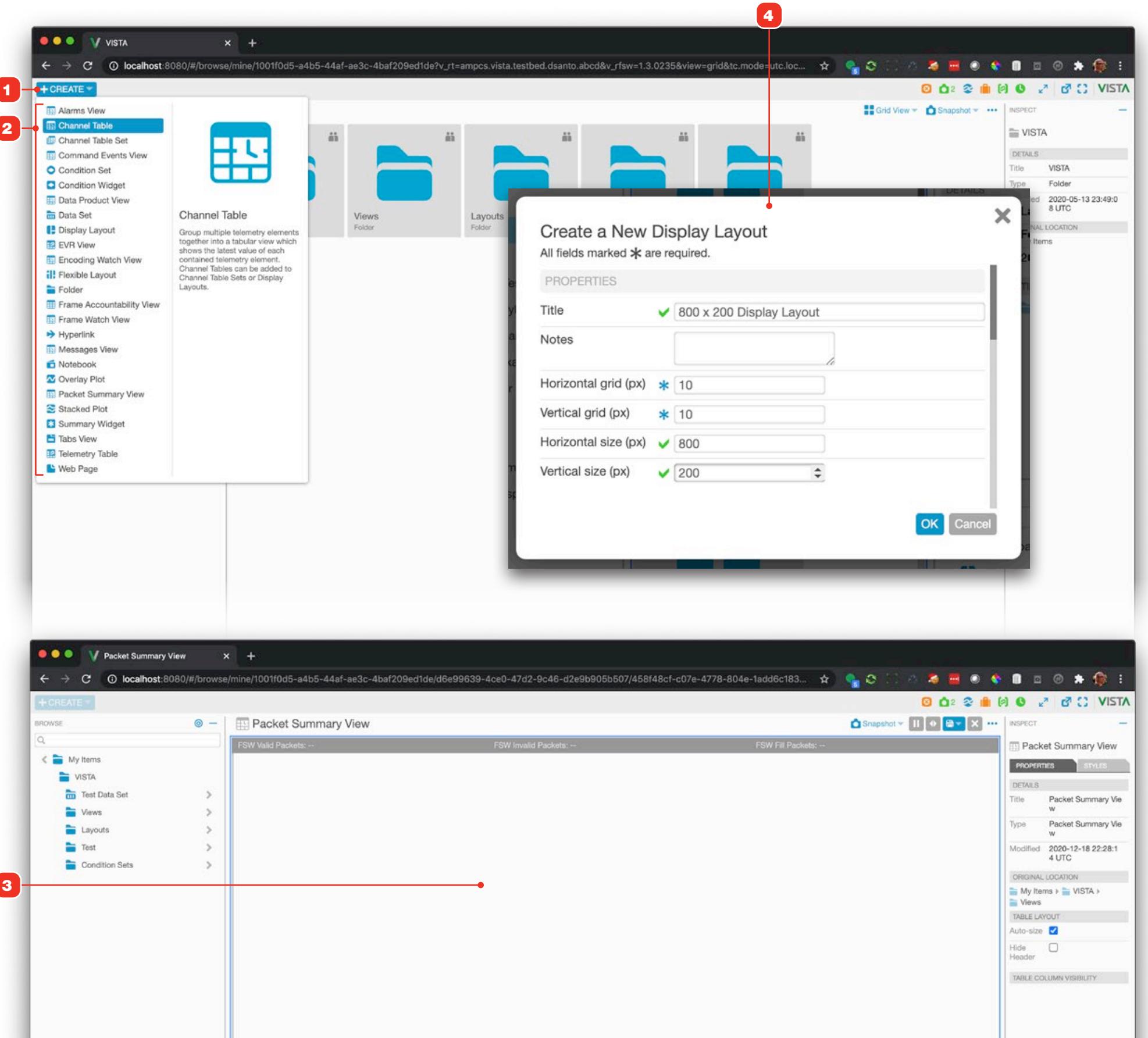
- 1 Context click any object in the tree, or access the currently navigated object's "More Options" menu and select "Export as JSON" from its menu. Your browser will prompt you to save a JSON file on your computer.
- 2 To import an exported object, select the new location in the tree and context click it, or navigate to the desired location and access its "More Options" menu. Choose "Import from JSON" from its context menu.
- 3 The result: the outermost container plus all of its children (and their children recursively) is imported into the selected location.



CREATING AND EDITING OBJECTS

Creating A New Object

- 1 Click the Create button to display the Create Menu.
- 2 Select the type of object you'd like to Create.
- 3 Depending on the type of object you're making, you'll be taken either to a new blank workspace **3** for that object type, or a properties dialog screen **4** will be presented.

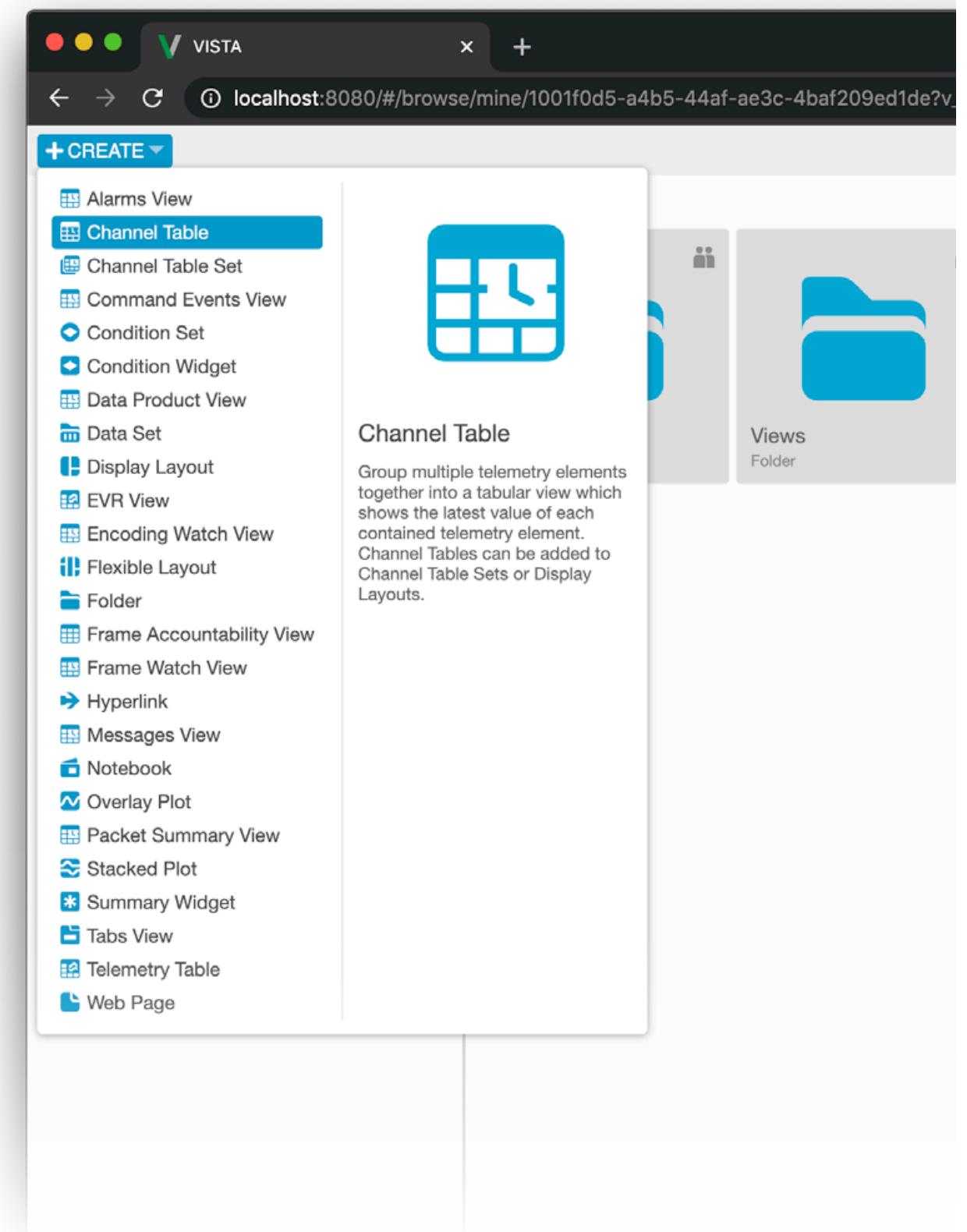


CREATING AND EDITING OBJECTS

Overview of Creatable Object Types

A summary of all the object views that can be created via the Create menu.

View	Description	Page
Alarms View	Create a customizable version of the Channel Alarms built-in view.	93
Channel Table	A tabular view for telemetry channels. Each row of the table is a channel, columns are fields of the channel. Current values are displayed as alphanumerics.	87
Channel Table Set	Collect Channel Tables together in a single object view. Each table is sub-headed with its name.	87
Command Events View	Create an editable, filterable view of the Command Events data stream.	56
Condition Set	Create related conditions that monitor and evaluate telemetry values in real-time with a wide variety of criteria. Use to control the styling for a wide variety of other views, or use as its own telemetry output.	119
Condition Widget	A button element that can be styled using Condition Sets. Will eventually replace Summary Widgets.	126
Data Product View	Allows creation of a customized version of the Data Products built-in view.	95
Data Set	A Data Set collects a variety of data resource types via URLs into a single, accessible data object that exposes data collections as objects to the rest of the application.	137
Display Layout	A Display Layout allows you to create, save and share screens that organize almost any other type of object that has a view.	105
EVR View	Customize the built-in EVR data view.	99
Encoding Watch View	Create an Encoding Watch view based on the Frame Summary Events built-in data view.	96
Flexible Layout	Another way to organize and display multiple types of different views, Flexible Layouts use a fluid, dynamic sizing approach to displaying contained elements.	117
Folder	Store and access items in a categorized filesystem-like hierarchy.	76
Frame Accountability View	Allows creation of a "Frame Accountability" view, utilizing Frame Events data.	98
Frame Watch View	Create a customizable version of the Frame Summary Events built-in data view.	97
Messages View	Create a custom version of the built-in Messages data view.	100
Notebook	A flexible way to save notes or create shift logs. Entries are automatically time-stamped and can include annotated screenshots of any view in the application.	128
Overlay Plot	Visualize one or more Telemetry Channels plotted together with a common Y axis.	78
Packet Summary View	Create a custom version of the built-in Packet Summary Events data view.	
Stacked Plot	A plot view that displays each channel with its own independent Y axis while maintaining synchronization of the X (time) axis.	78
Summary Widget	Button-like objects that dynamically assess and display status for one or more contained telemetry channels based on an evaluation of their current values in real-time.	
Tabs View	Displays contained objects as clickable tabs, giving you the ability to collect together a group of objects and rapidly navigate between them.	77
Telemetry Table	A tabular view for telemetry channels. Each row of the table is a value for one or more channels, columns are fields of constituent channels.	85
Web Page	View and embed a Web page via its URL. Web Page view objects can be added to layouts and Tab Views.	135

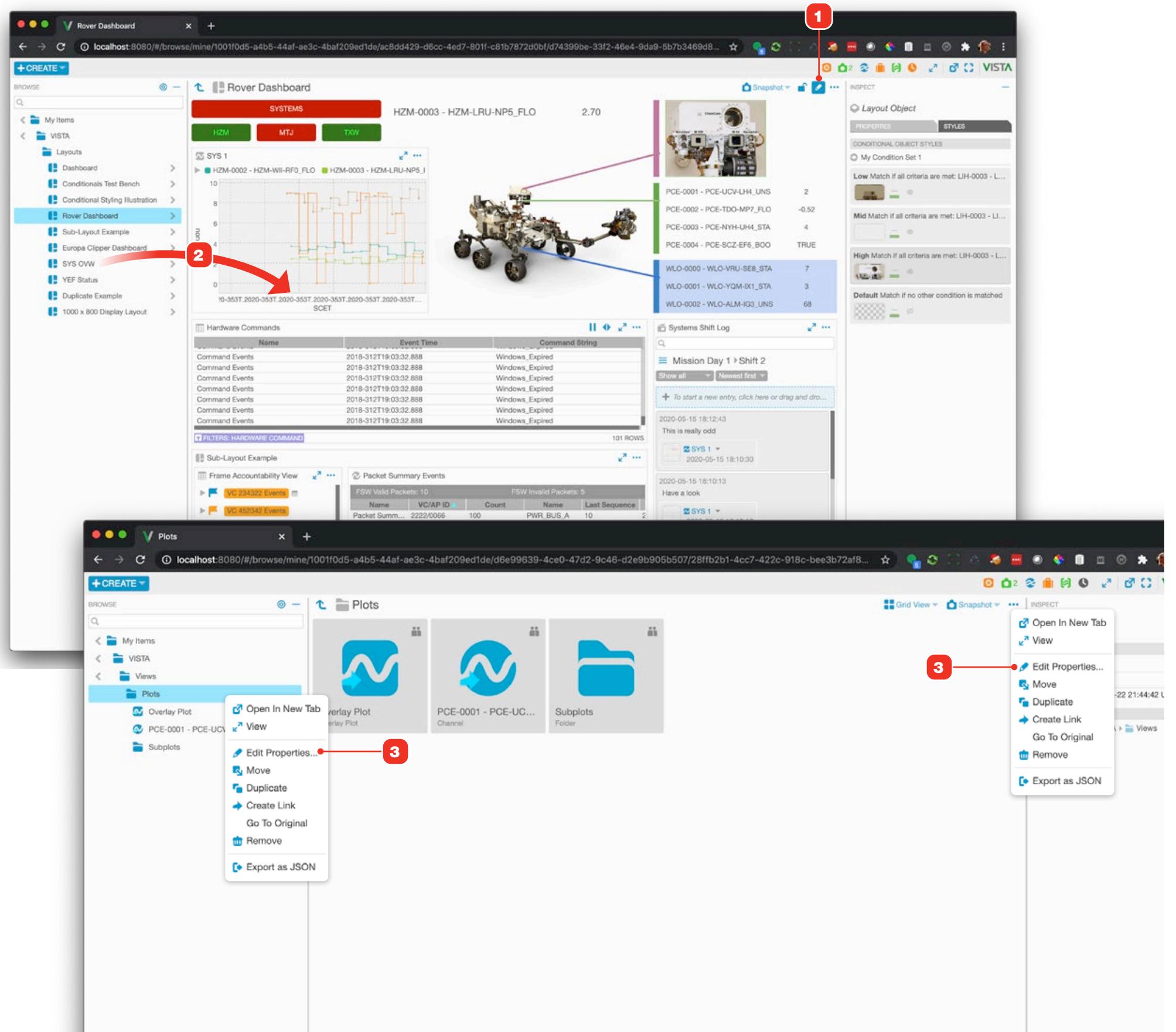


CREATING AND EDITING OBJECTS

Starting To Edit

There are two ways to begin editing an object:

- 1 To start editing a navigated to object, click its Edit button.
- 2 Drag and drop objects from the Object Tree into its view. If the current object cannot contain the object you are dragging it won't allow the drop.
- 3 Some object types only have editable properties and don't have an edit interface in the UI, such as Folders. To edit this type of object's properties, clicks its disclosure arrow in the main view, or context-click it in the tree **4**. See "Editing Object Properties" on page 69 for more information.

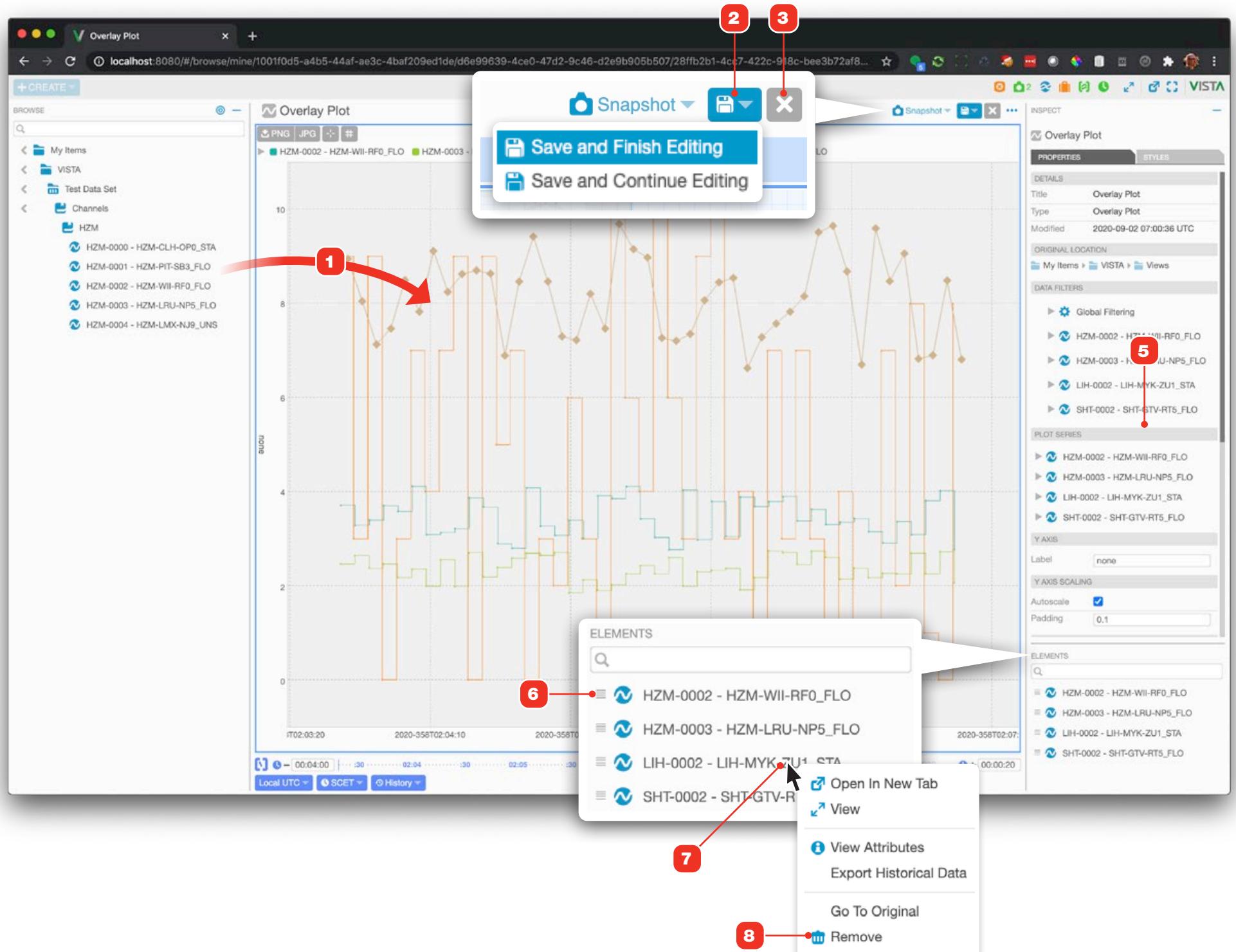


CREATING AND EDITING OBJECTS

Editing An Object

Different types of objects have varied ways in which they can be edited, but adding and removing elements is the same.

- 1 **Adding Objects:** Objects are added to the workspace by dragging them from the Object Tree. Once an element is added, it appears in the Elements pool 5 and the main view area.
- 2 **Saving:** Clicking the Save button will present a dropdown menu of options. Clicking "Save and Finish Editing" will save all work and exit Edit mode, while choosing "Save and Continue Editing" will also save but allow you to keep working in Edit mode.
- 3 **Cancelling:** The "X" Cancel button will exit Edit mode without committing any changes.
- 4 **Inspector Tabs:** Many objects have both editable properties for their elements as well as styling options - click the appropriate tab here to access the desired interface. For more information on styling objects, start with "Styling an Object with Static Styles" on page 70.
- 5 **Elements Pool:** While editing, this area shows the items that have been added to the current object.
- 6 **Rearranging Order:** For a number of views such as Stacked Plots and Channel Tables, the order of elements in the main display is controlled by their order in the Elements pool 5. To rearrange the order of elements in the view, drag an element by its handle up or down in the Elements pool to move it to a new position. The main display will update as soon as you make a change while editing.
- 7 **Removing Objects:** To remove an object, context-click it in the Elements pool and select "Remove" 8 from its context menu.

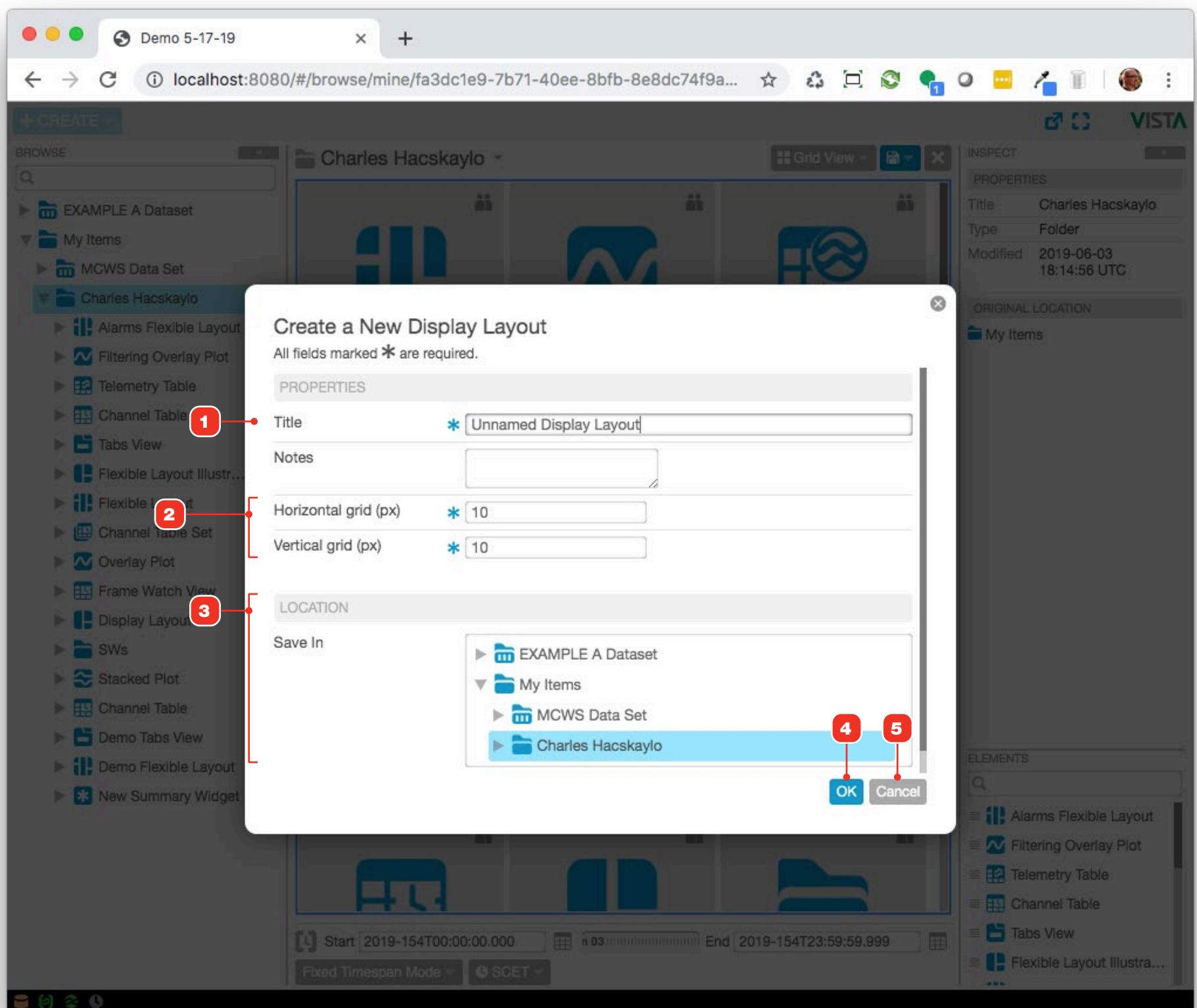


CREATING AND EDITING OBJECTS

Editing Object Properties

When saving a newly created object for the first time, you'll be prompted to name it and decide where to save it. You also use this dialog when editing the object properties of an existing object.

- 1 Enter a title for the object you are creating. The object's title is easily edited later by editing that object's properties.
- 2 Some objects have optional properties that can be set and saved with the object.
- 3 Select the location to save your new object. All objects can be saved into a folder; some object types can be saved directly into objects other than folders, depending on the type that you're creating. You won't be able to select an invalid object type to save your new object into. Objects can be moved later by selecting the "Move" command from that object's context menu - see "Context Menus" on page 22.
- 4 Click "Ok" to save your object.
- 5 "Cancel" will take you back to editing your new object.



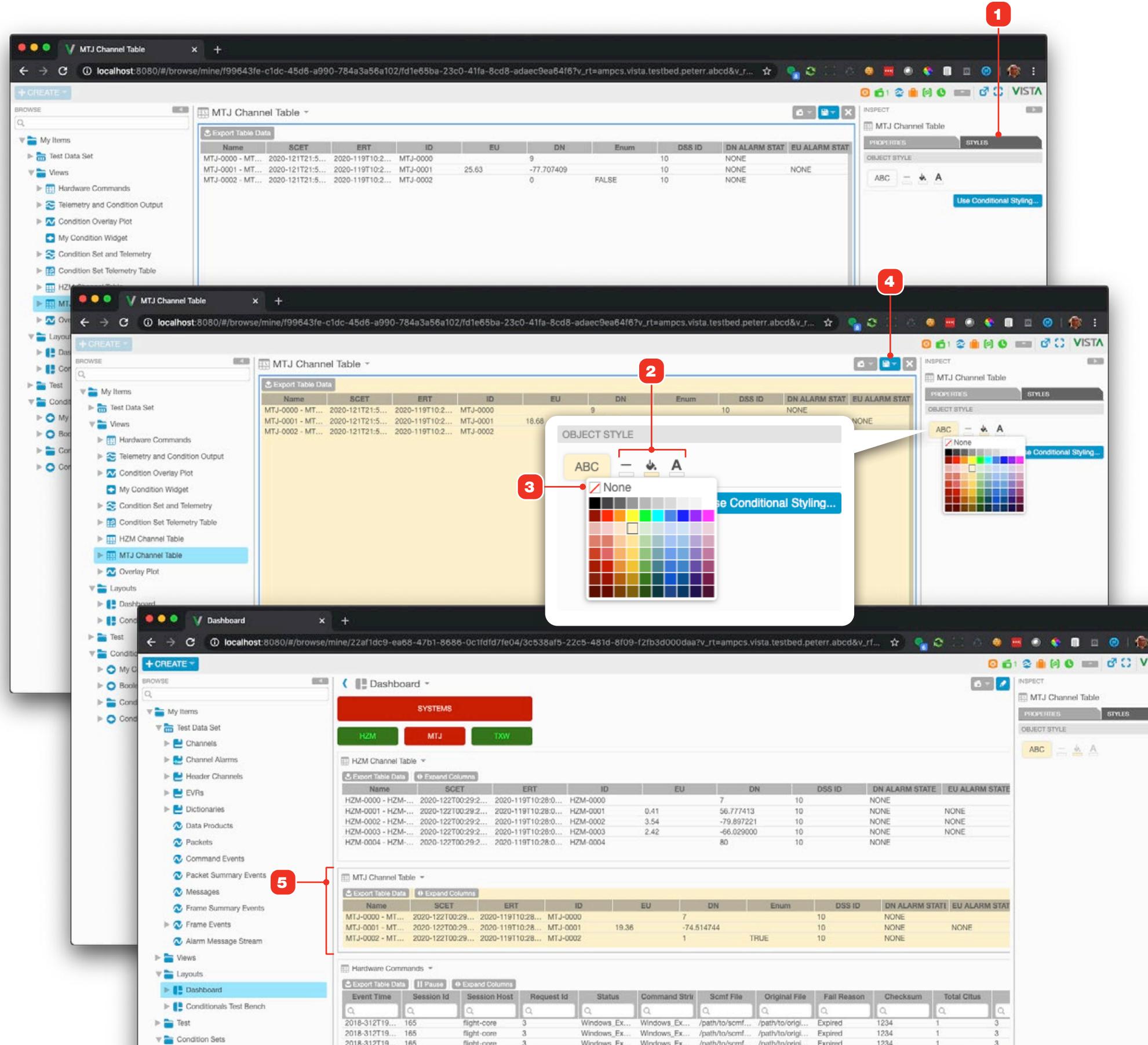
CREATING AND EDITING OBJECTS

Styling an Object with Static Styles

Many objects in the application allow styling to be applied to them. Styles set in this way are saved with the object and appear wherever that object is used, such as within a Display Layout. Display Layouts have special considerations for styling, see "Editing Domain Objects From Within a Display Layout" on page 110.

You can apply and save static styles, or use Condition Sets to conditionally style an object based on real-time telemetry values . For more on this, see "Condition Sets Overview" on page 119 and "Styling An Object With Conditional Styling" on page 71.

- 1 To statically style an object while editing, click the Styles tab.
- 2 Choose border color, background color and text color options as desired. When "None" 3 is selected, the object uses the application's default colors.
- 4 Save your changes.
- 5 Wherever your styled object appears, its styles are applied.



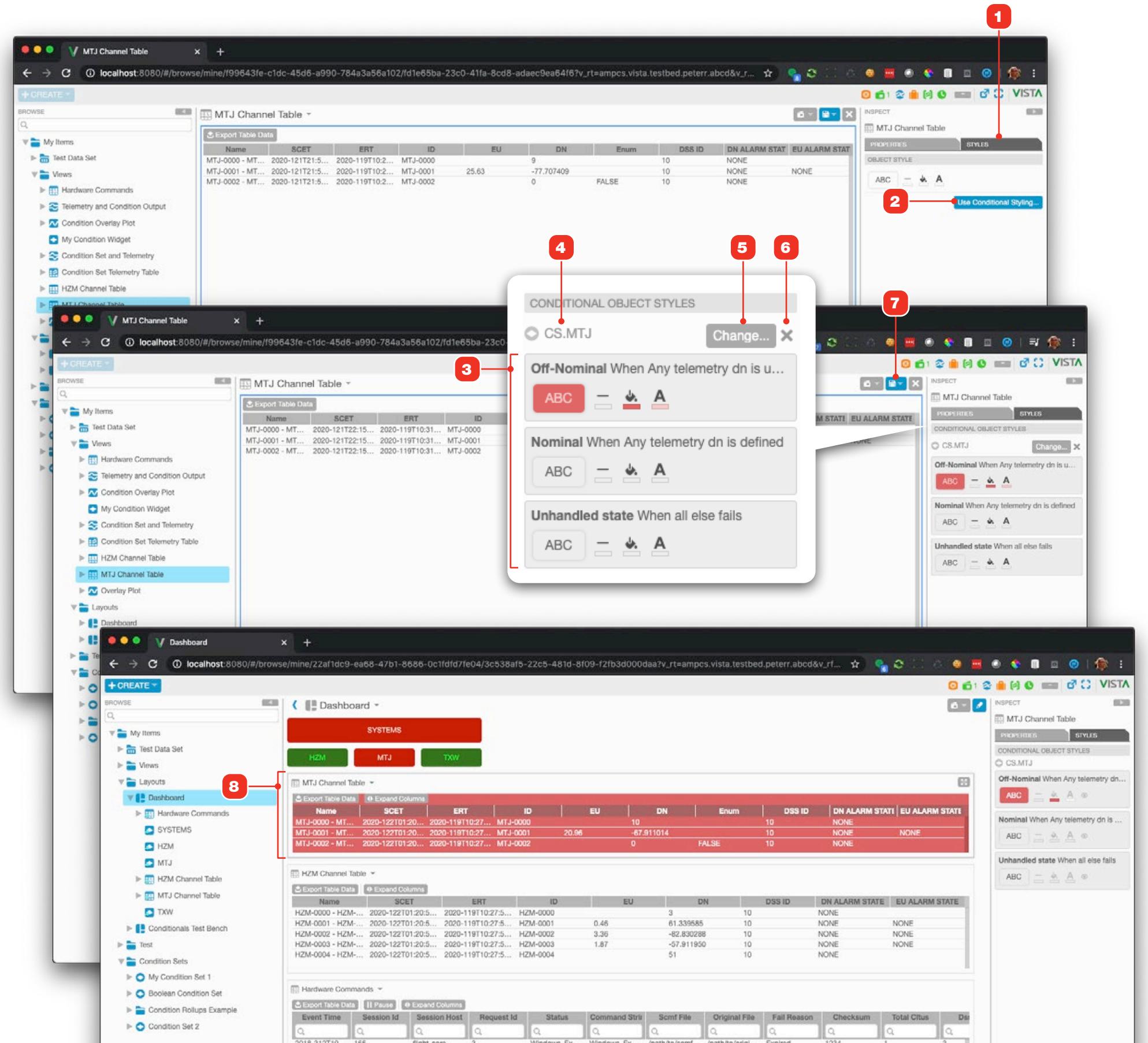
CREATING AND EDITING OBJECTS

Styling An Object With Conditional Styling

Condition Sets give you a powerful way to dynamically style many objects in the application based on a real-time evaluation of telemetry values. For example, you could set the background color of an object like a plot, table or Condition Widget to a warning color when a value exceeds a limit or is within a range, or when a value is not defined.

For more on Condition Sets, see "Condition Sets Overview" on page 119.

- To conditionally style an object while editing, click the Styles tab, then click "Use Conditional Styles..." 2. A dialog will appear and prompt you to select a previously created Condition Set.
- Styling options for each condition within the selected Condition Set allow you to set border color, background color and text color options that will be applied when that condition is matched.
- The name of the currently selected Condition Set. Can be clicked during editing for a summary view of the set and its condition definitions.
- Select another Condition Set.
- Remove the currently selected Condition Set and revert to static styling.
- Save your changes.
- Wherever your styled object appears, its styles are dynamically applied as telemetry is evaluated in real-time.

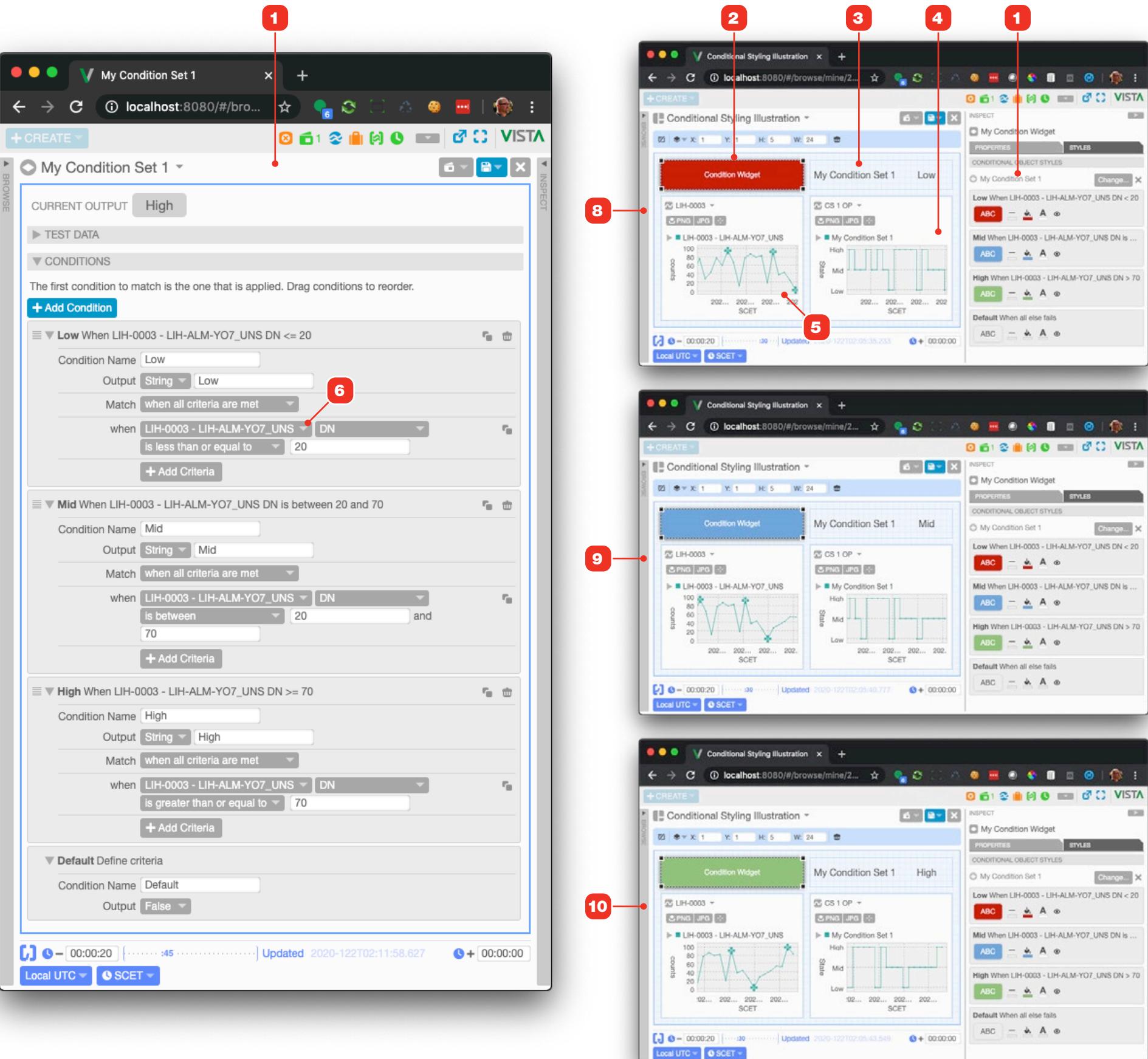


CREATING AND EDITING OBJECTS

Conditional Styling Relationships

An illustration of the relationship between telemetry, a Condition Set that evaluates it, and a Condition Widget that uses that set for conditional styling. A Display Layout including all the elements is shown in three instances close in time as the value of the channel is evaluated and subsequently drives the conditional styling of the Condition Widget.

- 1 The Condition Set uses three conditions that evaluate the value of channel LIH-0003. While not required, the defined conditions are collectively exhaustive and the Default condition is never matched.
 - "Low" captures all values less than or equal to 20
 - "Mid" captures all values between 20 and 70
 - "High" captures all values greater than or equal to 70
- 2 The Condition Widget.
- 3 The Condition Set placed in the layout as an alphanumeric telemetry element shows its current output.
- 4 A plot of the Condition Set shows its output over time.
- 5 A plot of the telemetry 6 used by the Condition Set for evaluation.
- 8 LIH-0003 has a value close to 0 and is matched by the "Low" condition, which applies a red background to the Condition Widget.
- 9 LIH-0003 has a value close to 50 and is matched by the "Mid" condition, which applies a blue background to the Condition Widget.
- 10 LIH-0003 has a value close to 80 and is matched by the "High" condition, which applies a green background to the Condition Widget.

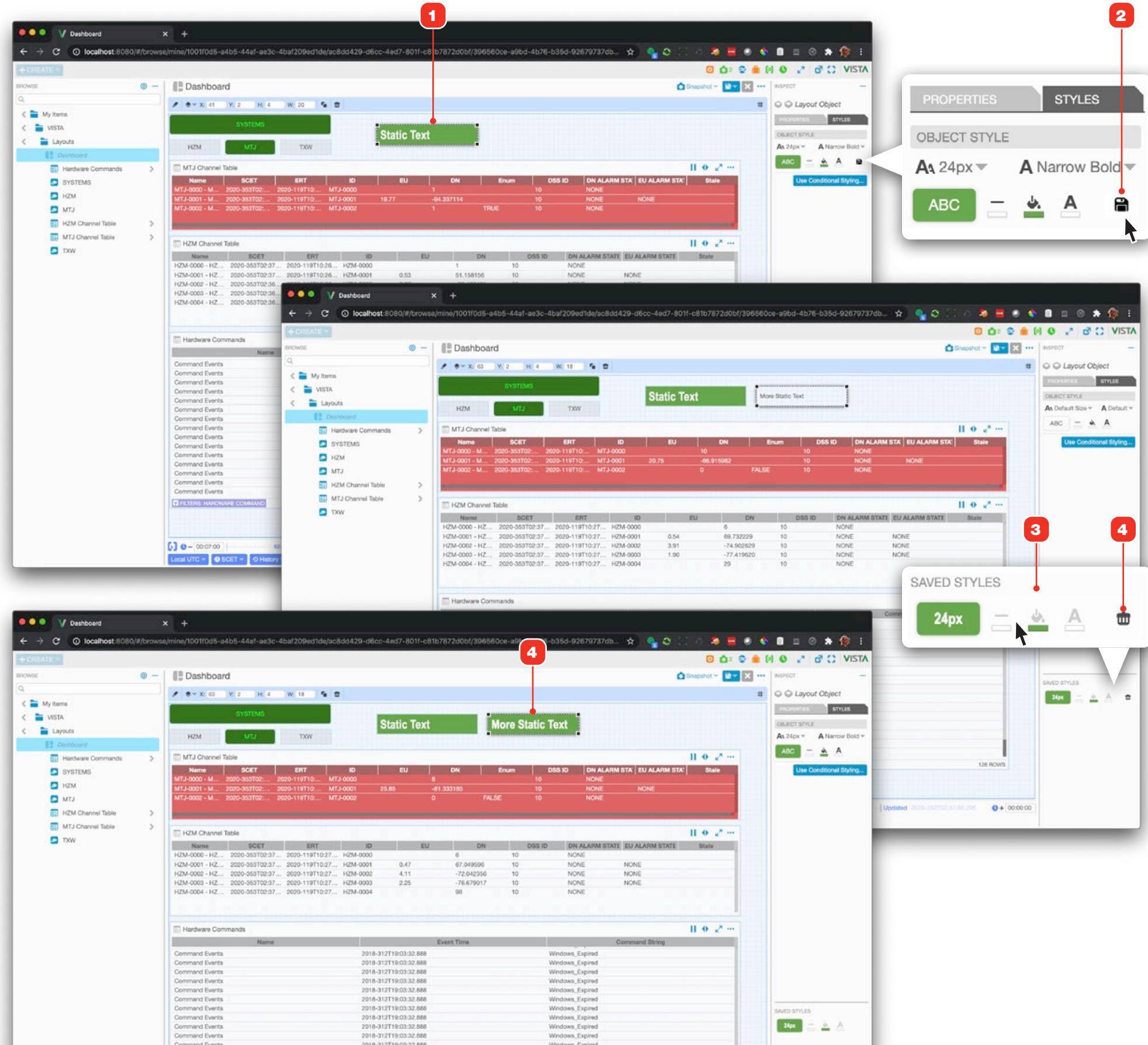


CREATING AND EDITING OBJECTS

Saving and Applying Saved Styles

Styles can be saved and applied to other objects. Saved Styles created while styling any type of object can be reused and applied to any other object, and Saved Styles can be used for both static and Conditional styling. Here's how:

- 1 Select an object and style it as desired.
- 2 When mousing over the style controls, a "Save" icon will appear. Click this to save the style.
- 3 Saved styles appear in the "Saved Styles" section of the Inspector pane.
- 4 Saved styles can be deleted by mousing over the style and clicking the associated Delete icon. Note that deleting a saved style will have no affect on any elements that had that style applied to them.
- 5 Selecting an element and clicking a saved style will apply all applicable settings of that style to that element.

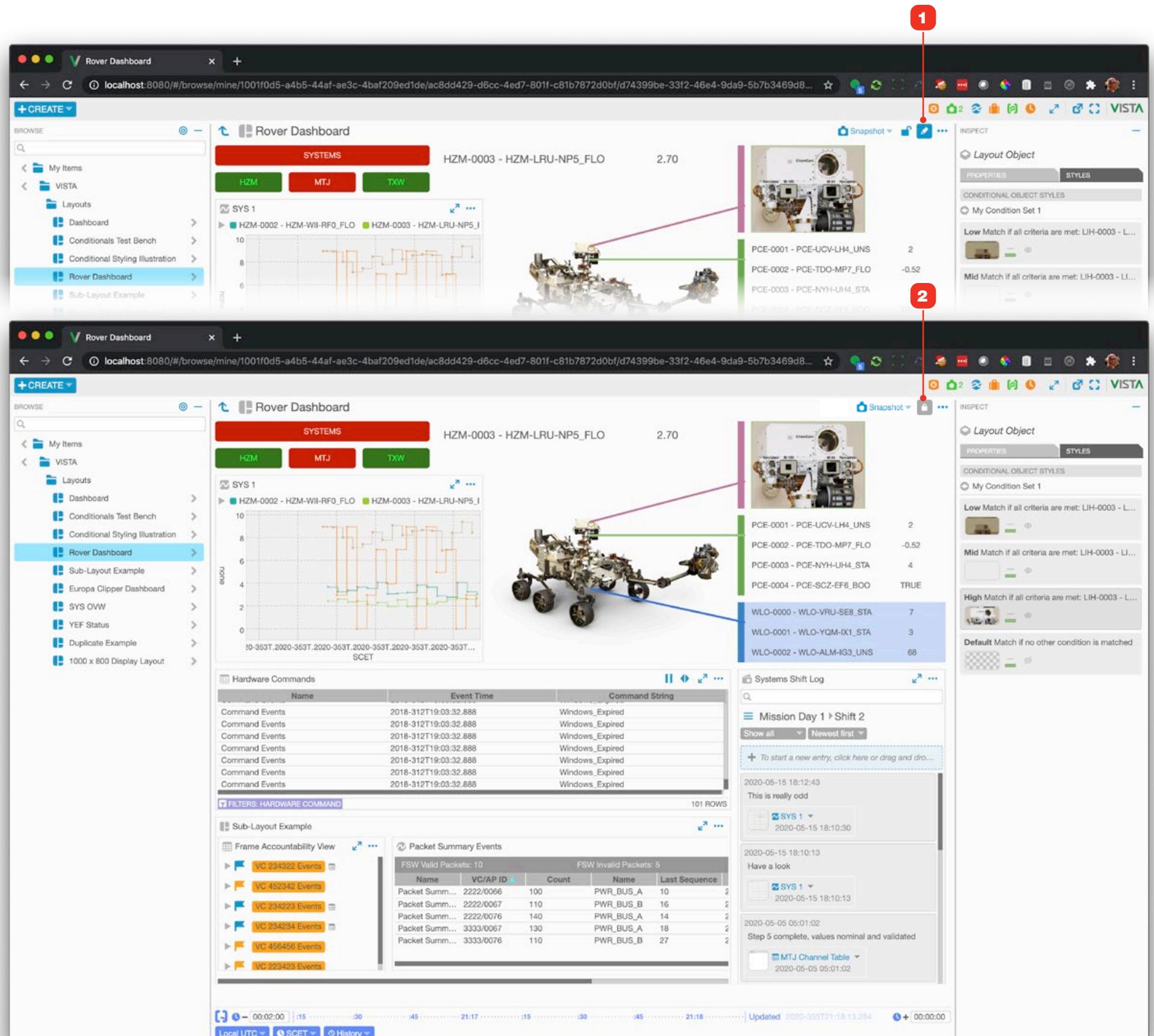


CREATING AND EDITING OBJECTS

Locking Objects

Composed objects can be flagged as "locked" to indicate to other users they should not be edited. This feature will not prevent you or anyone else from editing an object; it is intended as a light-duty "think twice" action prior to being able to edit an object.

- 1 In Browse mode, click an object's Lock icon to lock the object.
- 2 When an object has been locked, the Edit button is not displayed, and the lock icon appears as illustrated. To unlock the object and enable editing, click the Lock icon again.

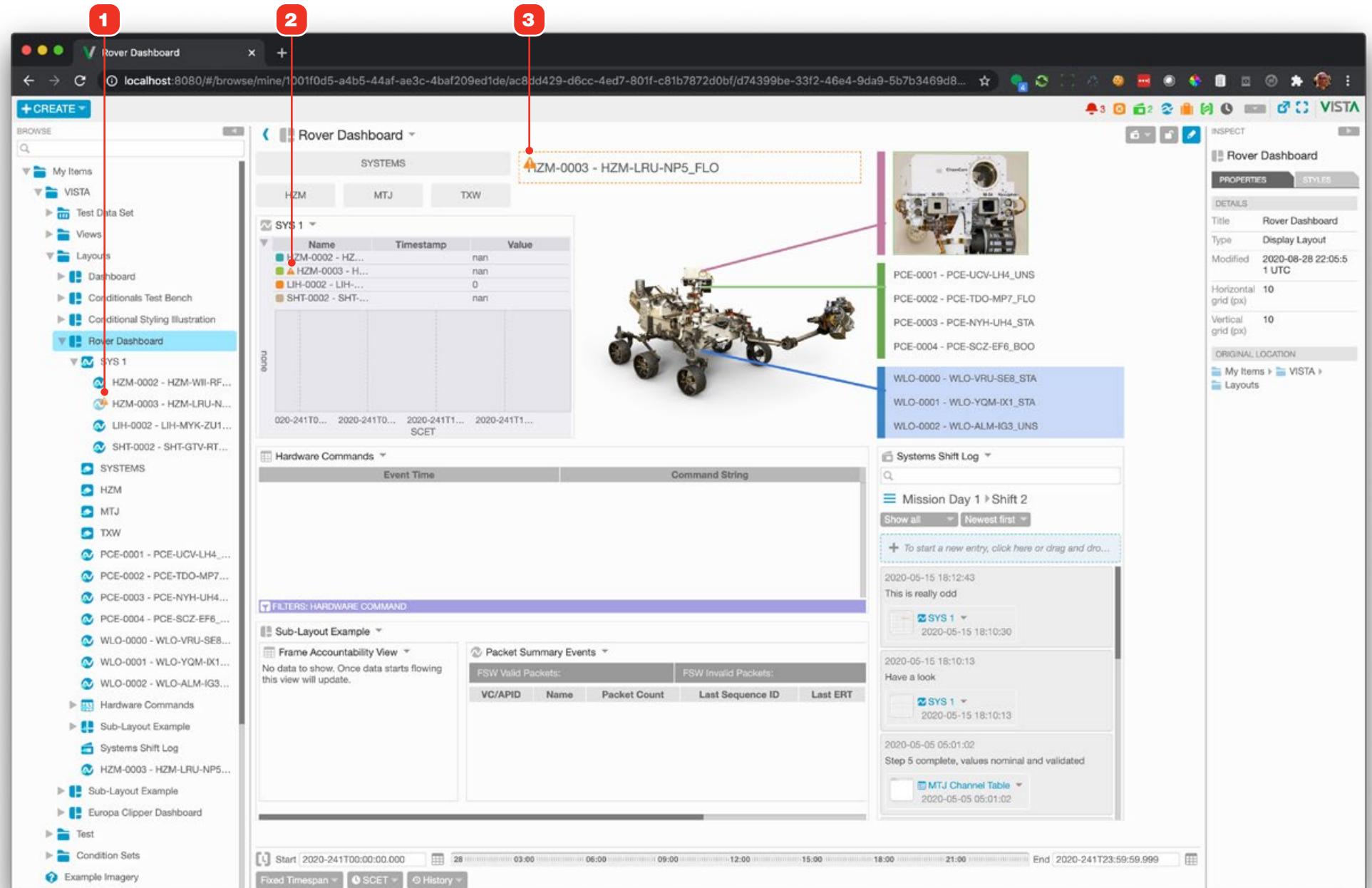


CREATING AND EDITING OBJECTS

Missing Objects

When an object that was used in a composed view is no longer available (for example, due to an update to the mission dictionary) that object is considered "missing" and will be visually identified as such. An orange warning icon will be added to the object in various parts of the application as shown here.

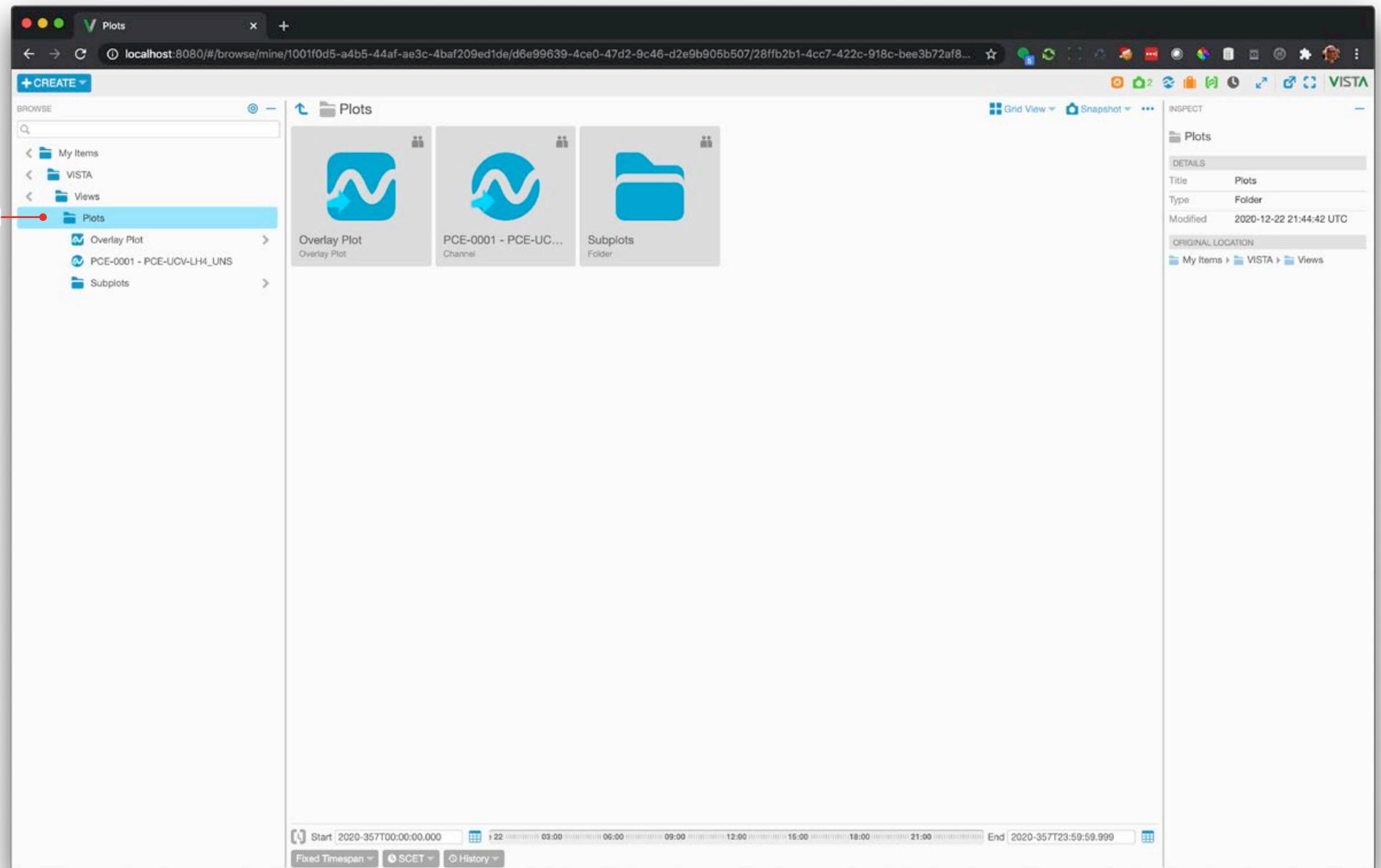
- 1 Missing object in the navigation tree.
- 2 A missing object in a plot view.
- 3 A missing object added as an alphanumeric in a Display Layout.



ORGANIZING

Folders

- 1 Very much like using a computer's desktop or filesystem explorer, folders allow you to store and access items in a categorized place.



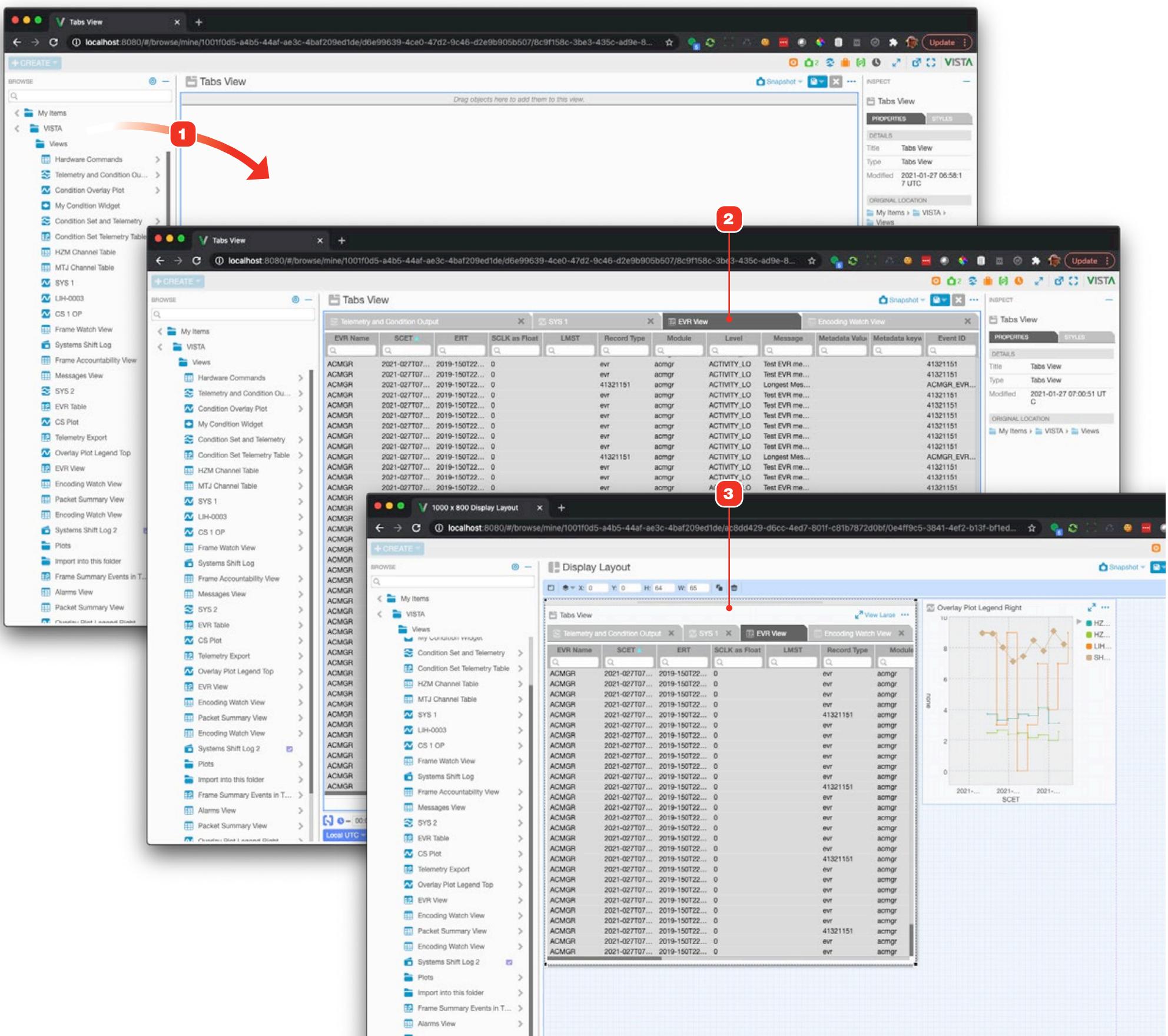
ORGANIZING

Tabs View

For information on editing objects in general, see "Creating A New Object" on page 65.

A Tabs View displays contained objects as clickable tabs, giving you the ability to collect together a group of objects and rapidly navigate between them.

- 1 Drag an object from the tree into the view area to add an object and its tab.
- 2 Click a tab to see its view.
- 3 A Tabs View can be added to a Display Layout.

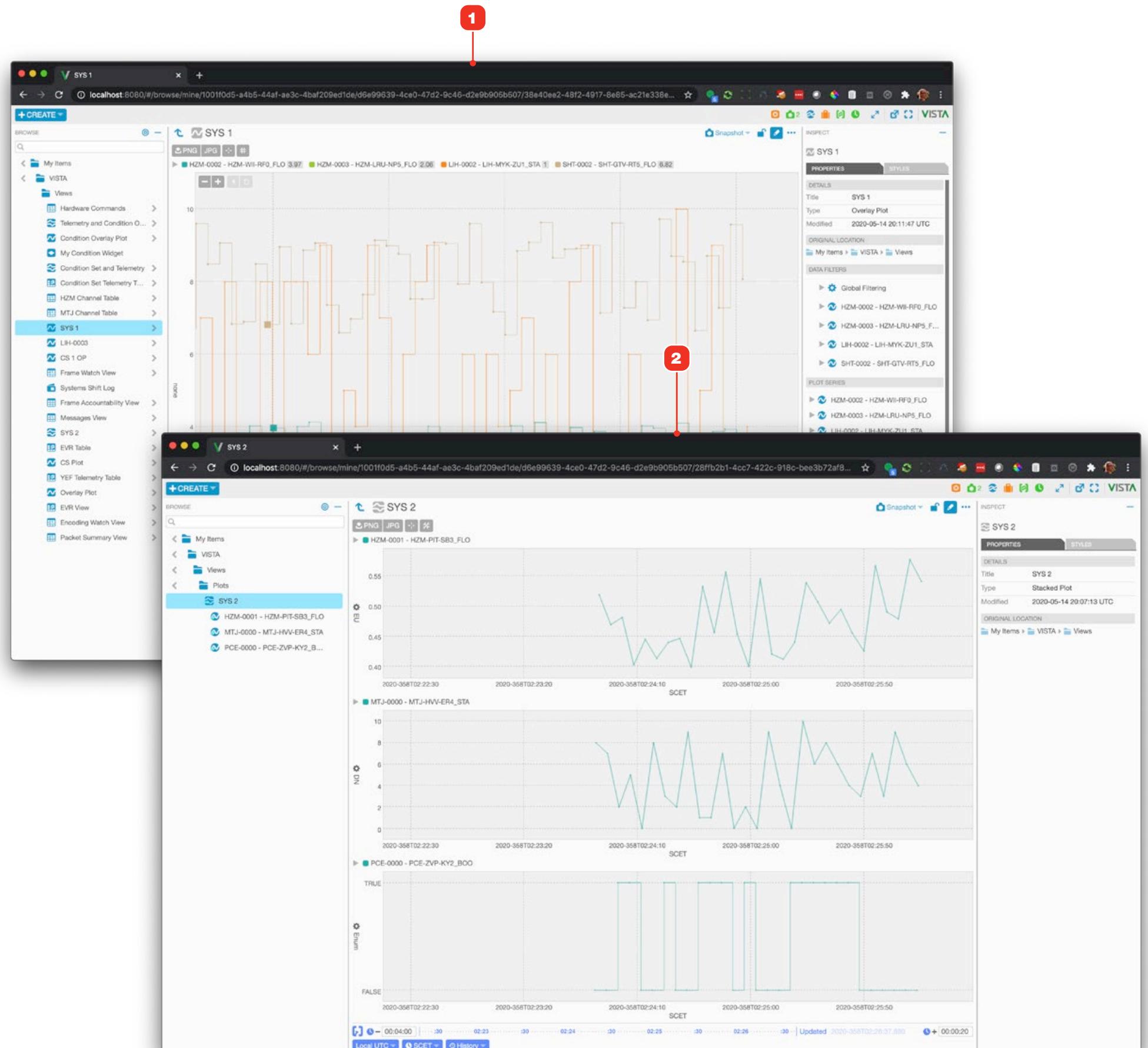


PLOTTING

Overlay and Stacked Plots Overview

You can collect together, plot and save Telemetry Channels by creating either a Overlay or Stacked plot object. Both types can be added to Display Layouts.

- 1 An Overlay Plot allows you to visualize one or more Telemetry Channels overlaid together with a common Y axis.
- 2 A Stacked Plot displays each channel with its own independent Y axis while maintaining synchronization of the X (time) axis.

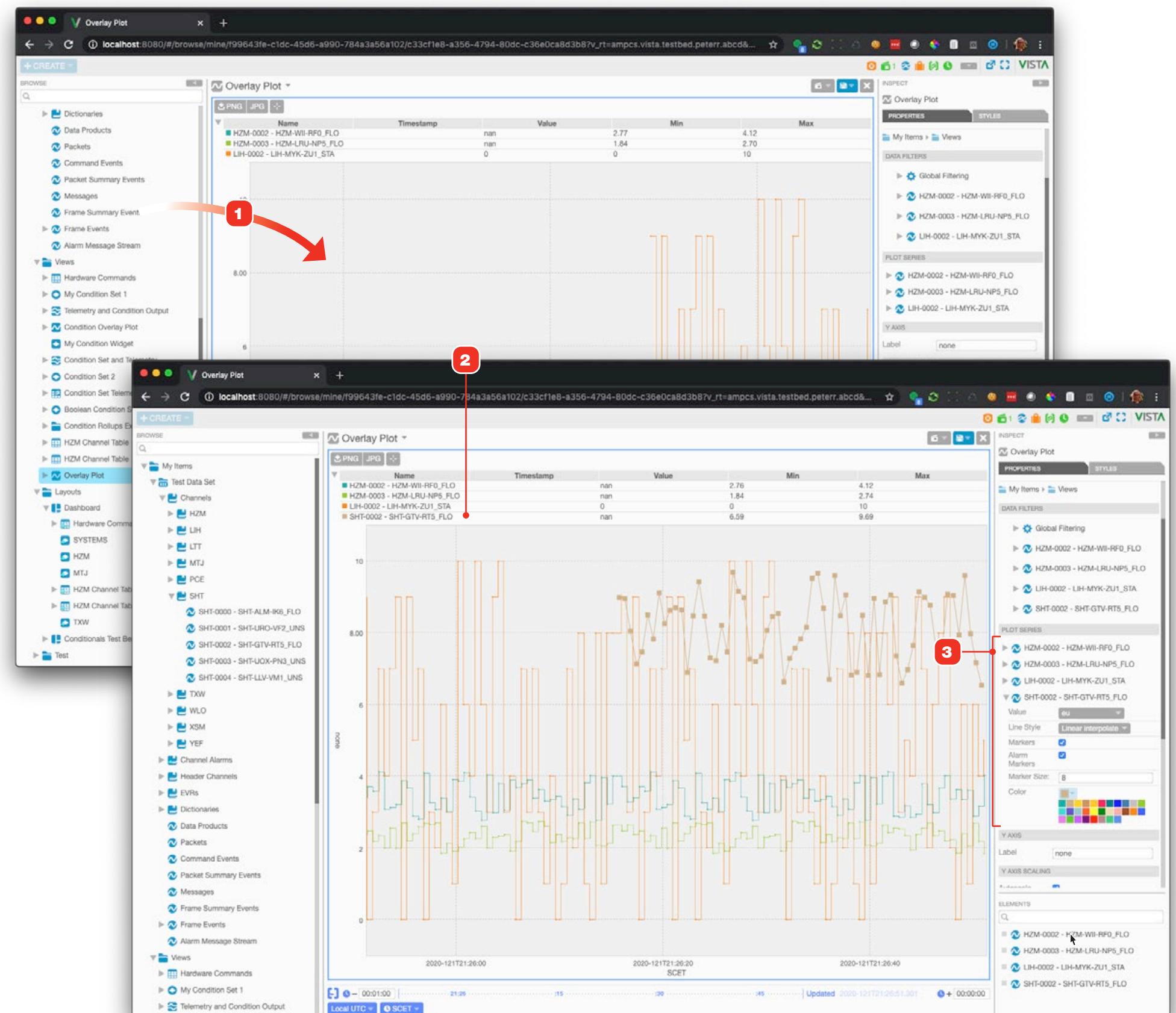


PLOTTING

Edit an Overlay Plot

For information on editing objects in general, see "Creating A New Object" on page 65.

- 1 Add objects to your plot by dragging from the Object Tree.
- 2 Channels added to a Overlay Plot will add their legend. If data is available for the channel, it will be plotted immediately and the Y scale of the plot will be adjusted to accommodate the new range of values.
- 3 Plot rendering style can be set and saved with this Overlay Plot. Follow instructions as noted in "Edit an Overlay Plot, Plot Series Options" on page 82.



PLOTTING

Edit an Overlay Plot, Y Axis and Legend Options

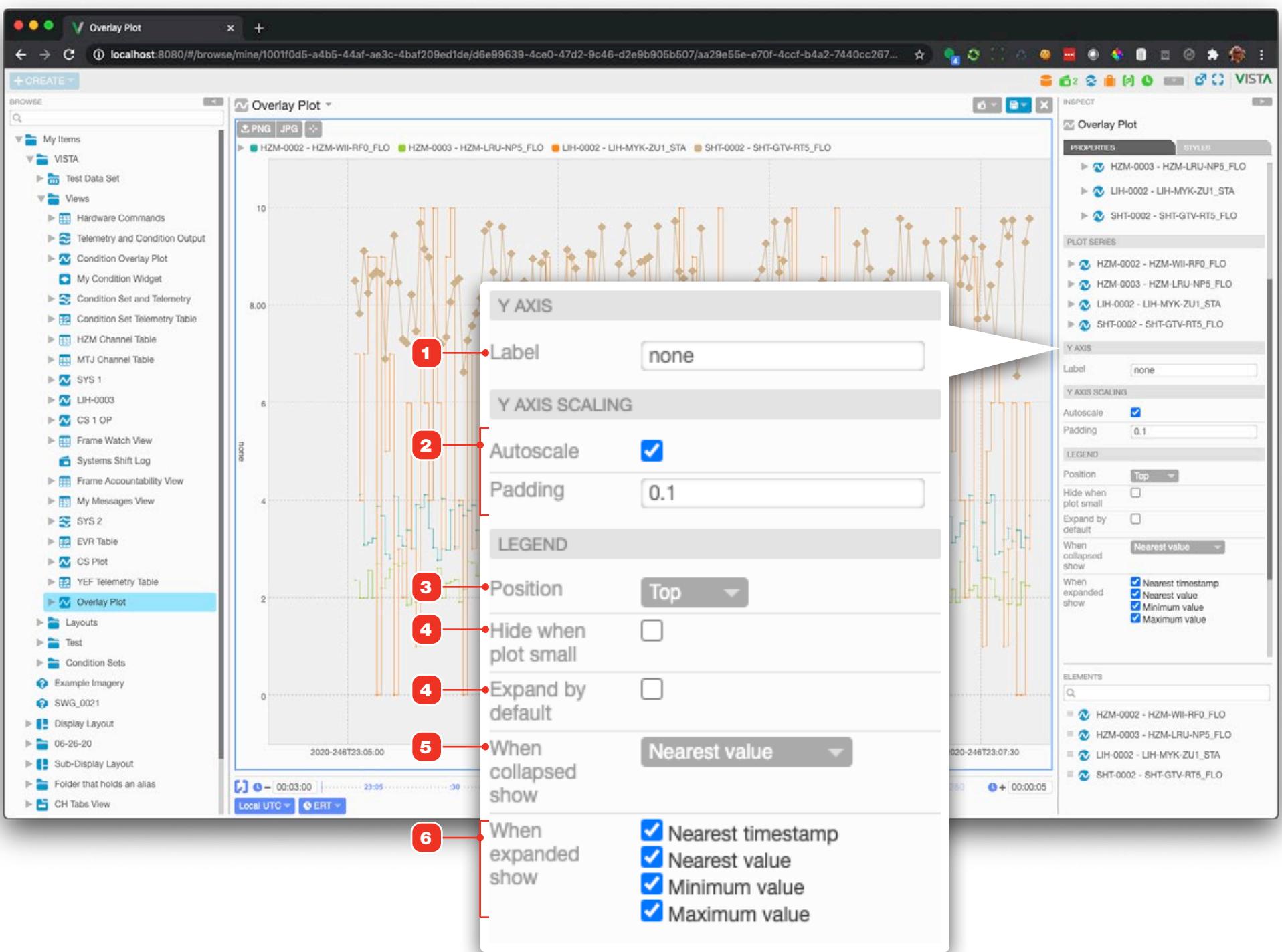
Y AXIS OPTIONS

To change the display options for an overlay plot, first make sure the Inspection pane is expanded. See "Inspection Pane" on page 24 for more.

- 1 You can manually enter a desired label for the Y axis in this input.
- 2 Checking "Autoscale" will automatically scale the Y axis based on the queried data, using the Padding value to automatically add a percentage of padding space to the upper and lower bounds of the plot. To manually control the minimum and maximum Y axis values, uncheck this box and enter values in the appropriate inputs.

LEGEND OPTIONS

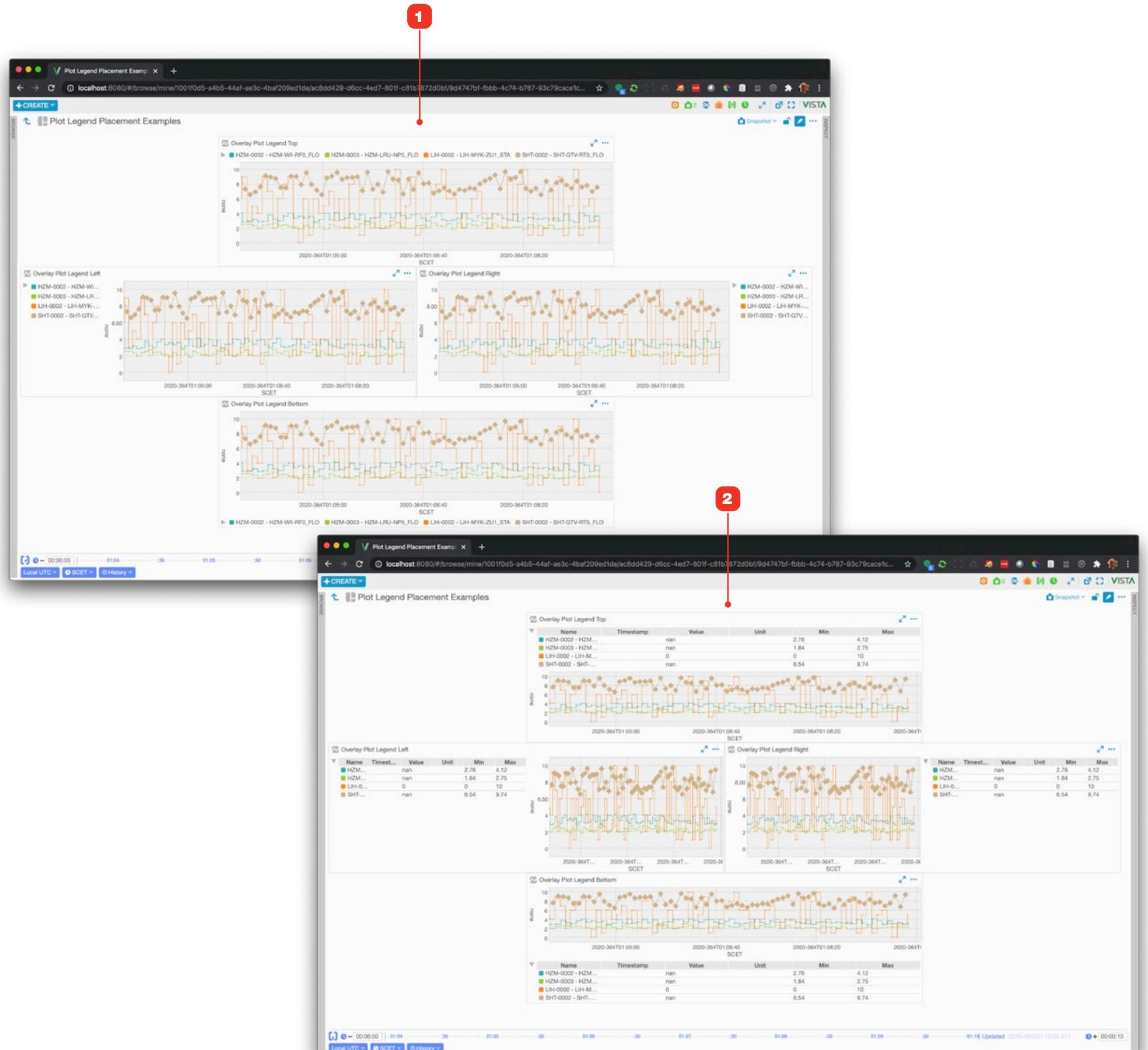
- 3 Selections here allow you to control the position of the collapsed plot legend relative to the plot display area. To hide the legend entirely, select "Hidden". See "Edit an Overlay Plot, Legend Placement Examples" on page 81 for more on the results of legend positioning.
- 4 Checking "Hide when plot small" will hide the legend when this plot is placed and sized small in a Display Layout. "Small" is under 600 x 600 pixels. The legend is always displayed in the main view and the "View Large" overlay regardless of this setting.
- 5 To always expand the legend for this object by default, check this box.
- 6 When the legend is collapsed, hovering the cursor over the plot can display a value, controlled by the selection made here. To not display any value when hovering, select "None".
- 7 When the legend is expanded, the columns to be displayed can be controlled here.



PLOTTING

Edit an Overlay Plot, Legend Placement Examples

- 1 Plot legends can be placed above, below or to either side of the plot display area.
- 2 Expanding a plot's legend will shrink the plot data display area accordingly.



PLOTTING

Edit an Overlay Plot, Plot Series Options

Each series in a plot view can be styled independently. To change the way that a series is rendered, first make sure the Inspection pane is expanded. See "Inspection Pane" on page 24 for more.

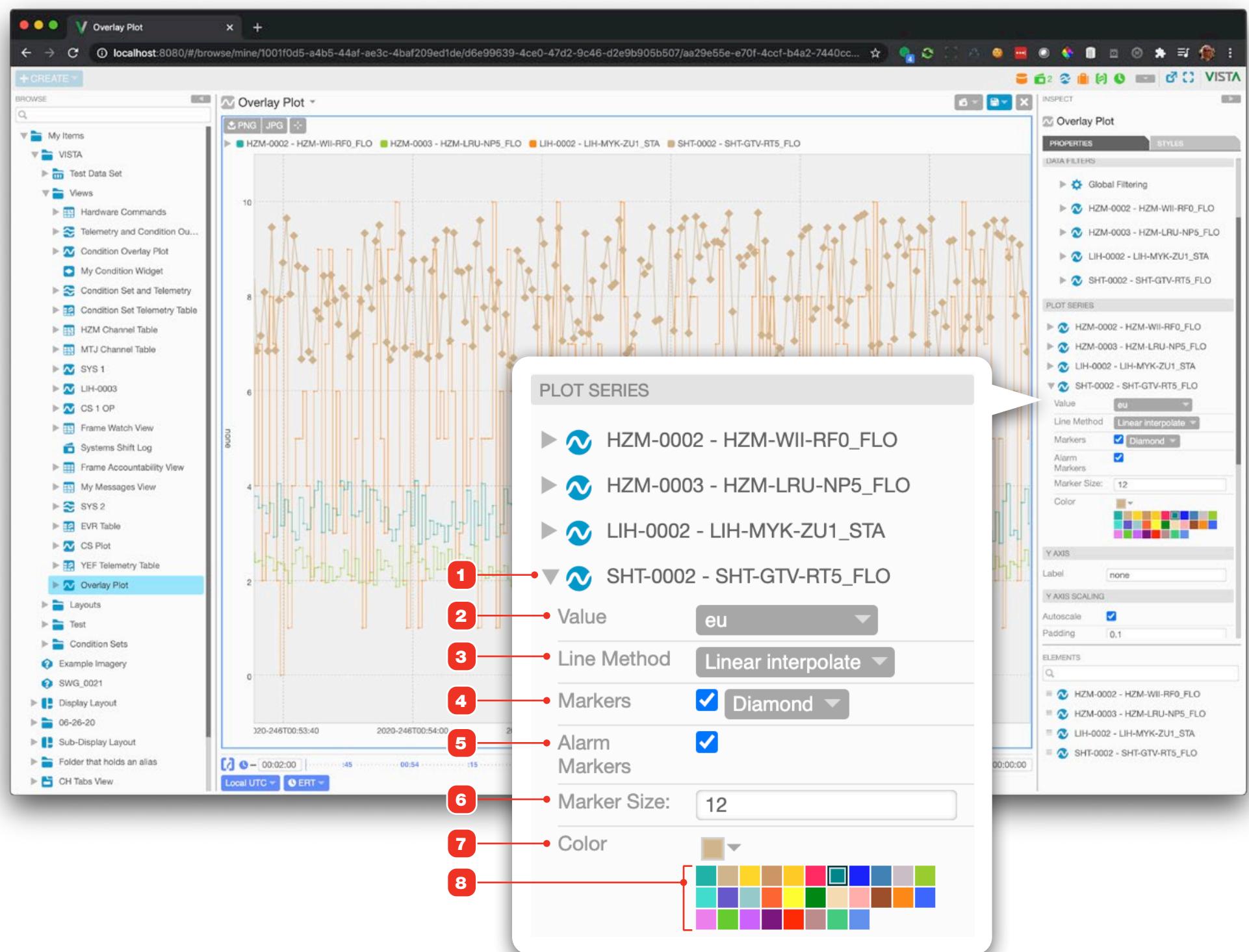
- 1 Expand a channel series to view its options by clicking its expand toggle arrow.
- 2 "Value" for this series controls what field of this channel will be plotted as the range.

IMPORTANT NOTE: The setting for the first channel in the plot series sets the range for the entire overlay plot.

- 3 Line styles control how lines are interpolated and rendered:

No Line	No line will be drawn. Note that choosing this option and disabling "Show Markers" will cause that series to not be rendered.
Step Line	Discrete data points are connected with vertical and horizontal lines. When a data point is plotted, a horizontal line is continually drawn until a new data point is plotted, at which time a vertical line connects to the new point.
Linear Line	Direct lines are drawn between discrete data points.

- 4 When "Markers" is checked, a marker will be drawn for each discrete data point available for that plot. You can select the shape of marker in the associated menu option.
- 5 Enabling "Show Alarm Markers" will render plot points in a visually distinct manner when a value for the selected series is in alarm.
- 6 The size of the marker can be set by entering a value here.
- 7 Color can be manually set for each element in the plot. Click the associated color swatch to display a palette of color choices 8.



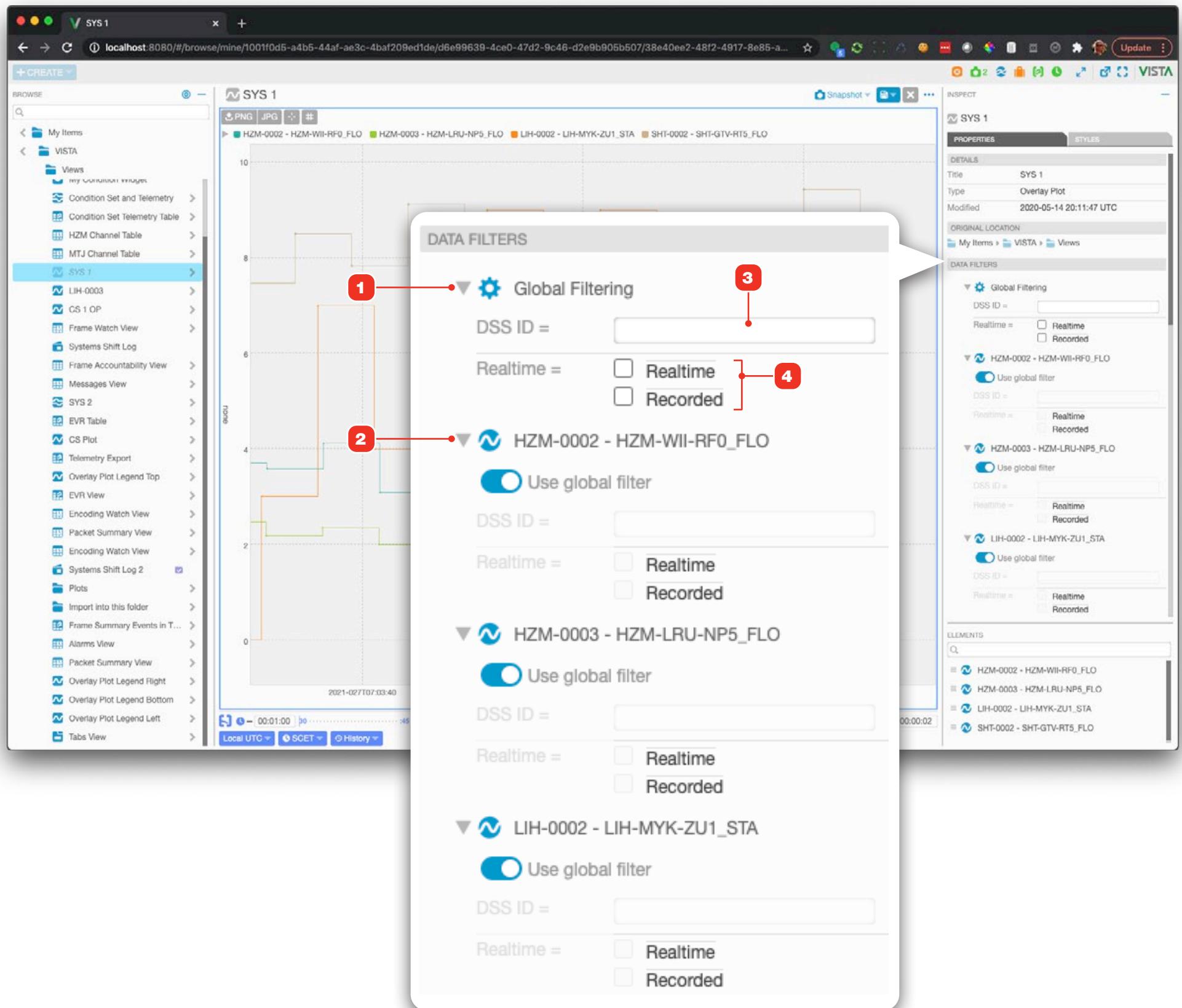
PLOTTING

Edit an Overlay Plot, Filtering

Overlay Plots allow value filtering by equality. Once set, only values that meet the filter's value will be plotted. Filtering parameters entered here are saved with this particular Overlay Plot, and will be imposed on that plot wherever it is viewed.

For more details on filtering data in Overlay Plots and table views, see "Filtering Telemetry" on page 102.

- 1 Expand the Global Filtering node, or an individual channel's series **2** to view its filter input options by clicking its expand toggle arrow.
- 3 Enter values in the inputs or select values from available checkboxes **4**.

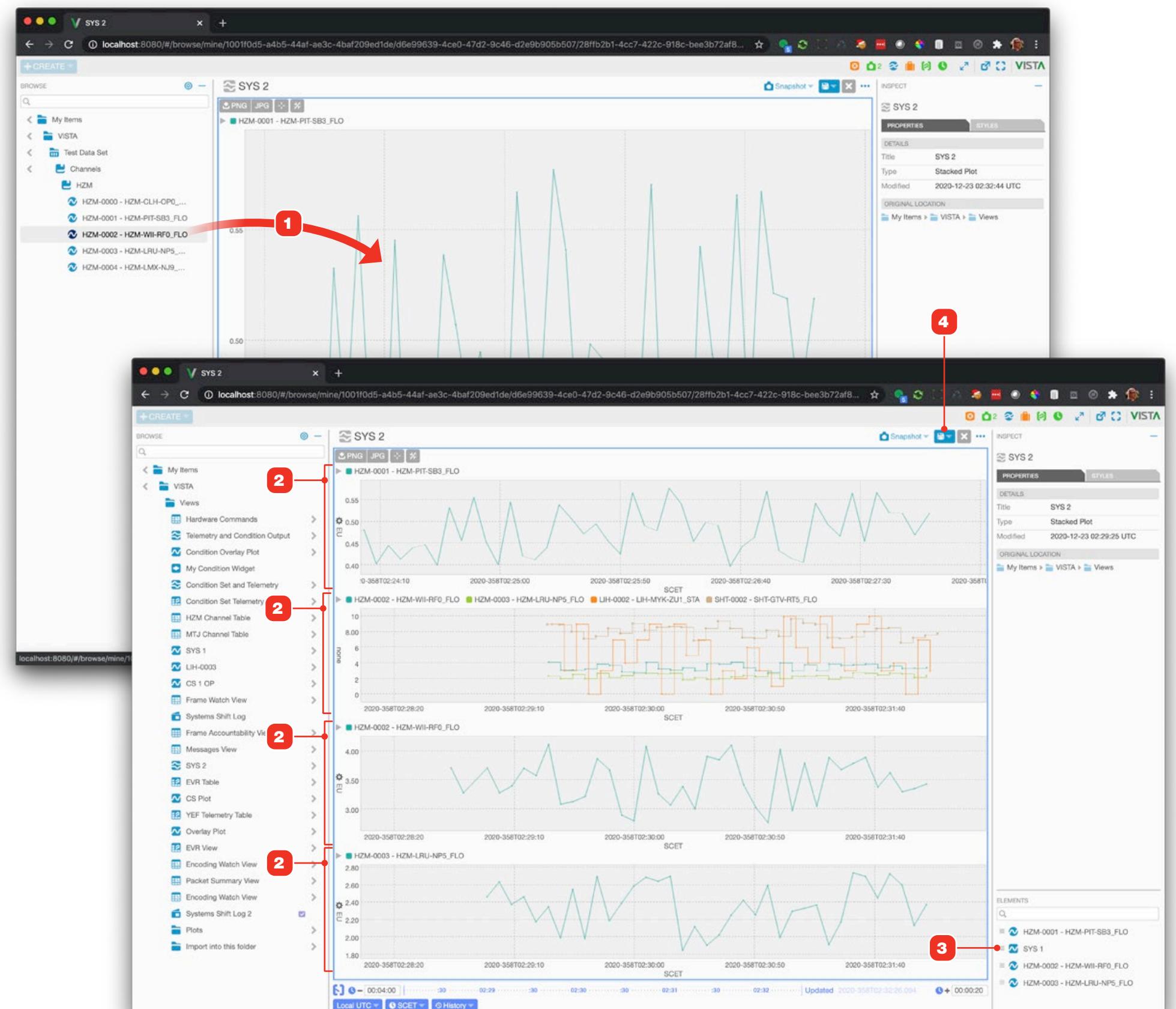


PLOTTING

Edit a Stacked Plot

For information on editing objects in general, see "Creating A New Object" on page 65.

- 1 Add objects to your plot by dragging from the Object Tree. You add telemetry channels and Overlay Plots to a Stacked Plot. To include an Overlay Plot in your stacked plot, first create the Overlay Plot before building the Stacked Plot. See "Edit an Overlay Plot" on page 79 for more.
- 2 Each channel or Overlay Plot added to a Stacked Plot will be added as a stack element. If data is available for the channel, it will be plotted immediately. The height of the stack element is automatically set.
- 3 To rearrange the order of items in the stack, drag an element by its handle up or down in the Elements pool to move it to a new position. The main display will update as soon as you make a change while editing. To remove an element from your plot, context-click it in the Elements pool and choose "Remove" from the available context menu.
- 4 Choose a save option to retain your changes.

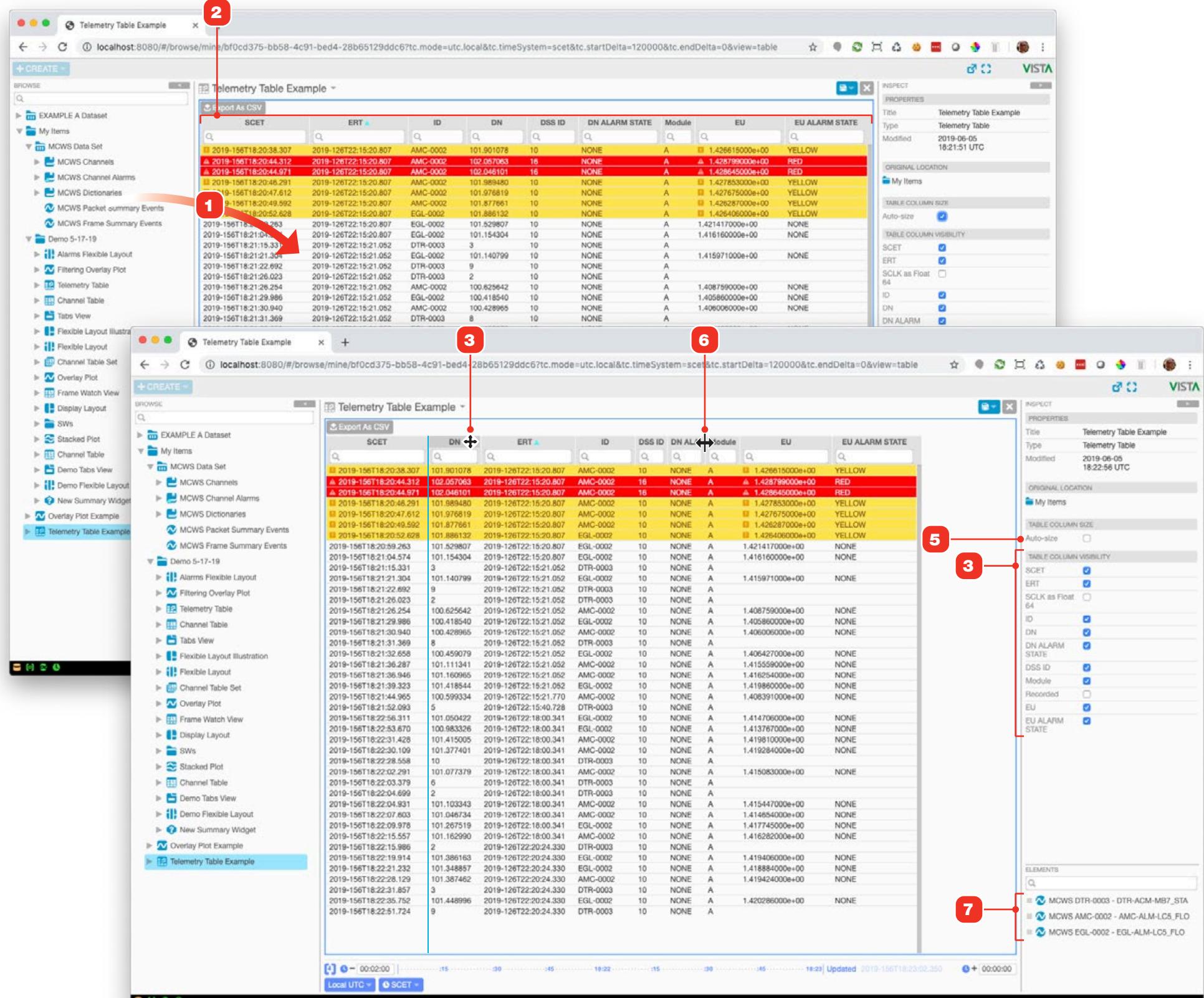


TABLES

Telemetry Tables

For information on editing objects in general, see "Creating A New Object" on page 65.

- 1 Add objects to your Telemetry Table by dragging from the Object Tree. You may only add Telemetry Channels to a Telemetry Table.
- 2 As you add Channels, columns will be automatically added as necessary in the view area. To hide columns, see 3.
- 3 Telemetry Tables allow you to include data that might have different fields, and handles that by displaying the superset of all fields by default. To hide a column, uncheck it here.
- 4 Columns can be re-ordered by clicking and dragging their headers to a new location in the table.
- 5 By default, tables use an "Auto-sizing" strategy: their total widths automatically expand or collapse to fill whatever view they're placed into. To disable this behavior and force a table view to always be a set fixed width, uncheck this control.
- 6 Column widths can modified by clicking and dragging on the edge of any table header cell. Modifying a table column's width will cause the table's "Auto-size" feature to be disabled and put the table into a fixed width display mode.
- 7 Remove added channels by right-clicking them in the Elements pool and selecting "Remove" from the context menu.

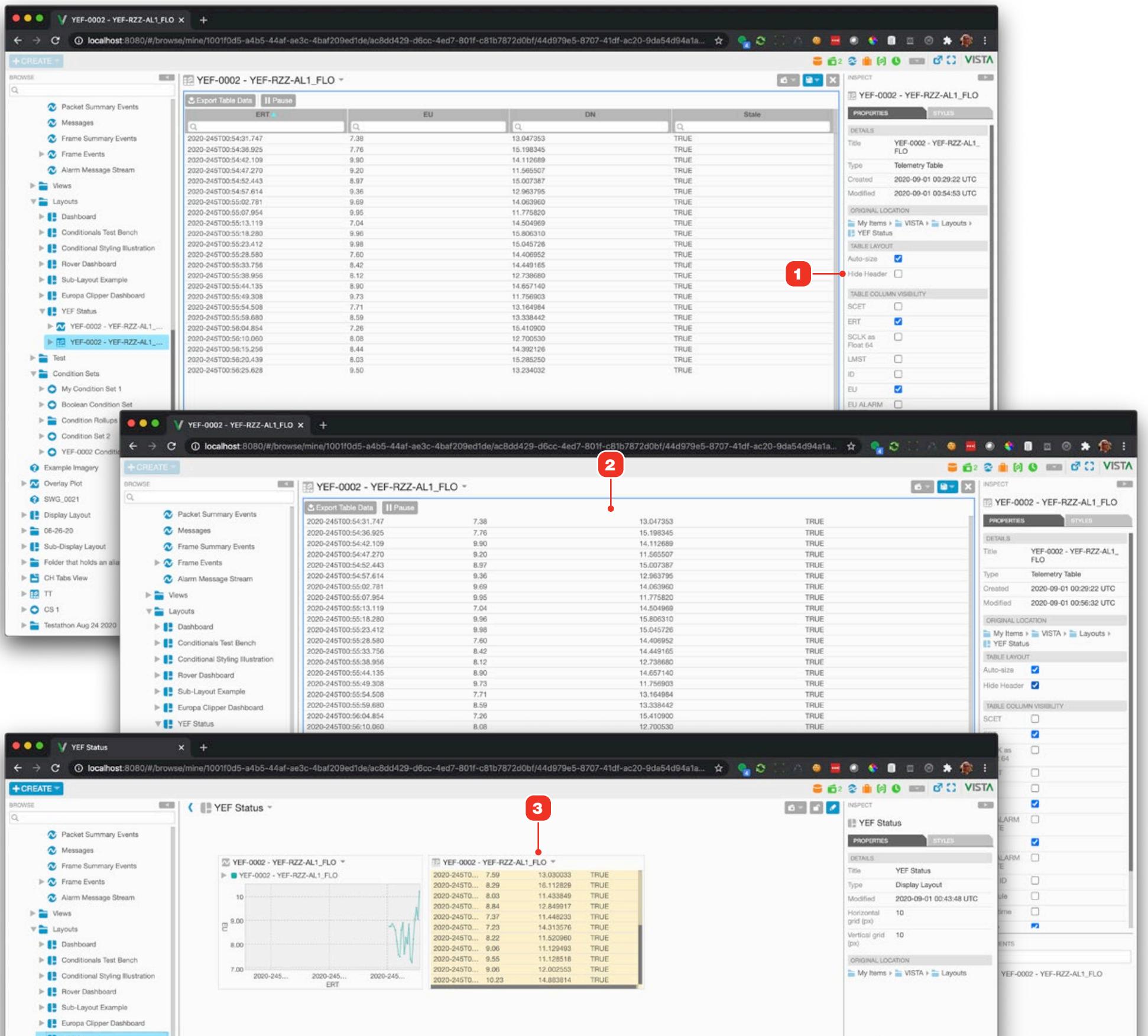


TABLES

Telemetry Tables, Hiding Headers

You can hide the header labels and search inputs of Telemetry Tables to make them as compact as possible.

- 1 Edit the Telemetry Table, and check the "Hide Header" checkbox in the Properties tab.
- 2 The table's headers will be hidden.
- 3 Wherever that table is used (as shown here, in a Display Layout), it's headers will be hidden.



TABLES

Channel Tables and Channel Table Sets

Channel Tables are a type of table display that allow you to quickly assemble a grid of telemetry channels with their current values. Channel Tables and Channel Table Sets can be added to Display Layouts. Channel Tables and Sets are not controlled by the Time Conductor, and always display the latest available data for each channel that comprises them.

- 1 A Channel Table is a collection of Telemetry Channels. Each channel is represented once in a row of the table, and always displays its latest available data. For more, see "Edit a Channel Table" on page 89.
- 2 A Channel Table Set is a collection of Channel Tables. Each Channel Table **3** in a set appears with its title as a sub-header. More info available at "Edit a Channel Table Set" on page 91.

The screenshot shows the VISTA user interface with two main windows:

- Channel Table**: This window displays a grid of telemetry channels. The columns include: Name, SCET, ERT, SCLK as Ftc, LMST, ID, EU, EU ALARM, DN, DN ALARM, DSS ID, Module, Realtime, and State. The data for 'Channel Table LIH' is shown, with rows for LIH-0001 through LIH-0004. A red number 1 points to the top-left corner of this window.
- Channel Table Set**: This window lists the Channel Tables contained within a set. It includes a tree view of items and a table view. The table view shows the following data for 'Channel Table LIH':

ID	Title	Value	SCET
LIH-0000	LIH-ALM-BI3_FLO	5.06	2021-027T22:15:37.850
LIH-0001	LIH-ENO-KD3_BO0	TRUE	2021-027T22:15:37.796
LIH-0002	LIH-MYK-ZU1_STA	9	2021-027T22:15:37.741

Below this, another table for 'Channel Table MTJ' is shown:

ID	Title	Value	SCET
MTJ-0000	MTJ-HVV-ER4_STA	8	2021-027T22:15:37.302
MTJ-0001	MTJ-KWO-TS2_FLO	19.70	2021-027T22:15:37.249
MTJ-0002	MTJ-RMM-CJ3_BO0	FALSE	2021-027T22:15:37.195
MTJ-0003	MTJ-ALM-YQ6_BO0	TRUE	2021-027T22:15:37.141
MTJ-0004	MTJ-ALM-ZK9_UN0	35	2021-027T22:15:37.087

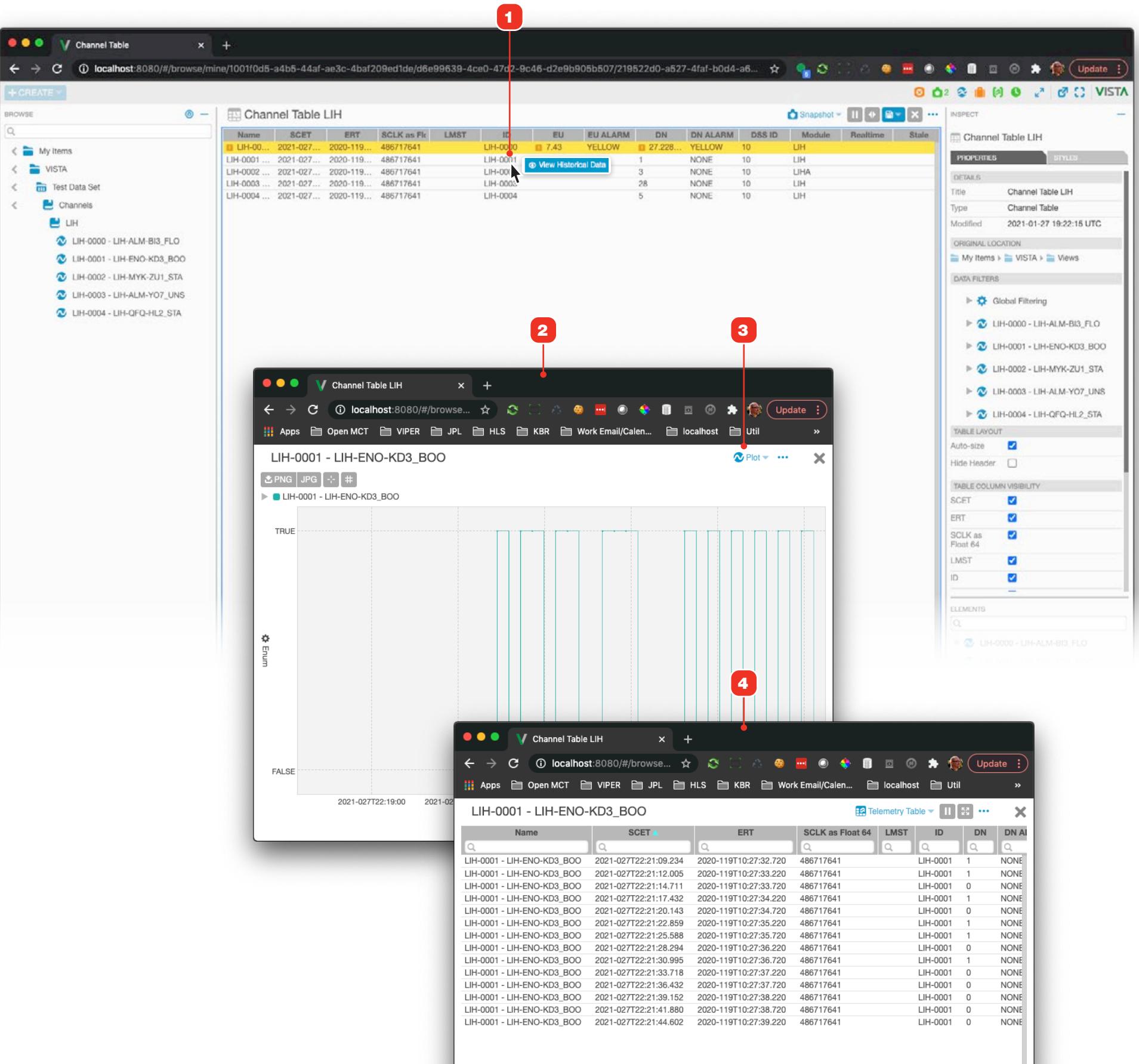
A red number 2 points to the bottom-right corner of the 'Channel Table Set' window, and a red number 3 points to the 'Channel Table LIH' entry in the tree view.

TABLES

View Historic Data from a Channel Table

Channel Tables allow you to view the historic data for a selected field of a channel in a Channel Table. Data is displayed in an overlay dialog, and the scope of the historic data will be based on the Time Conductor's current settings.

- 1 Context-click a value cell of a Channel Table to display its context menu item "View Historical Data".
- 2 By default, historic data for the selected field and channel is displayed as a plot.
- 3 To switch to a tabular view **4**, select "Telemetry Table" from the view's switcher menu.



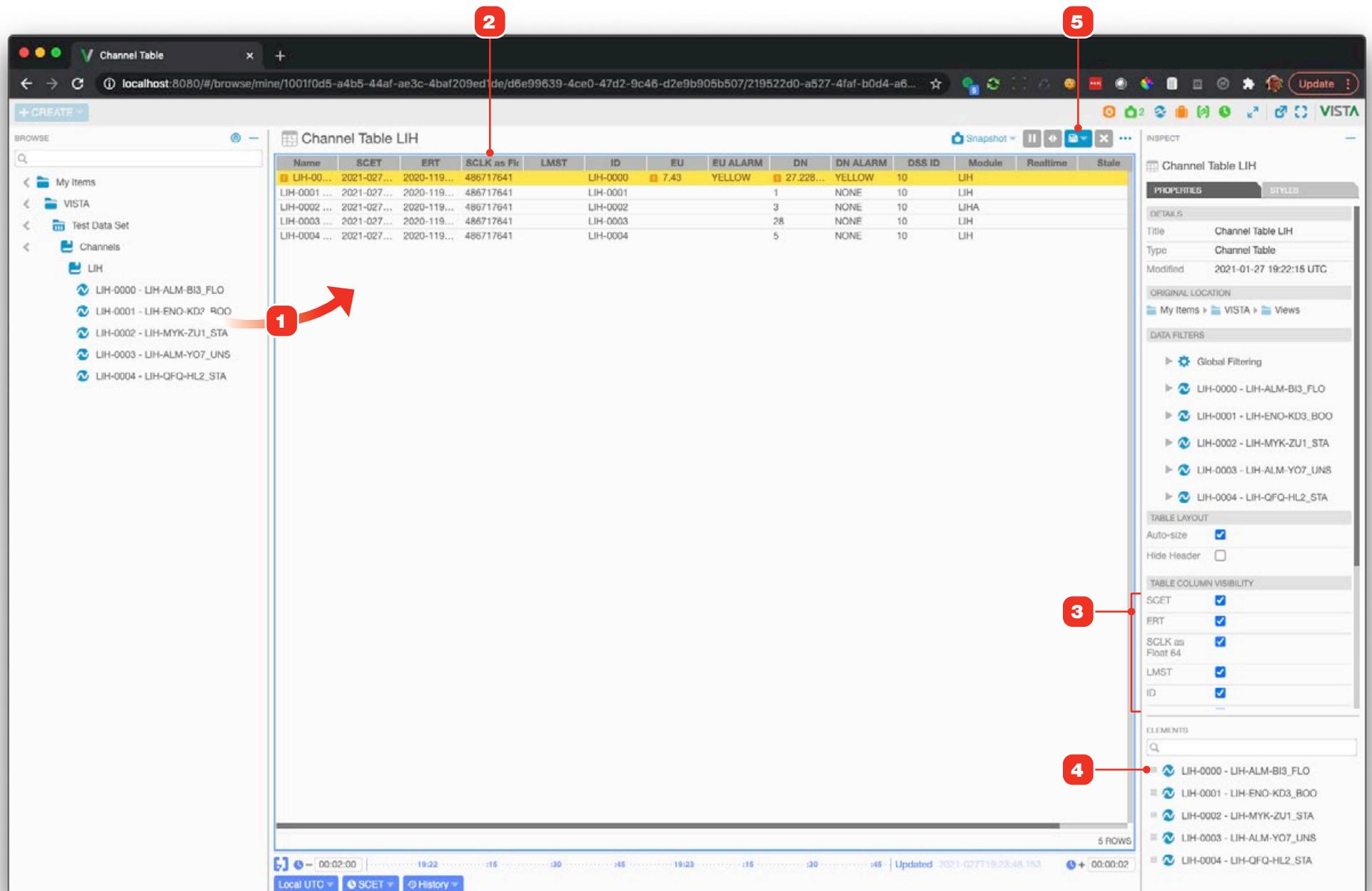
TABLES

Edit a Channel Table

For information on editing objects in general, see "Creating A New Object" on page 65.

For column visibility, reordering and resizing, see "Telemetry Tables" on page 85.

- 1 Add objects to your Channel Table in the order you'd like them to appear by dragging from the Object Tree . You may only add Telemetry Channels to a Channel Table.
- 2 Columns can be reorganized by clicking and dragging their headers, and resized by dragging the header edge. See "Telemetry Tables" on page 85 for more.
- 3 Columns can be hidden by unchecking them in the Table Column Visibility section of the Inspector. See "Telemetry Tables" on page 85.
- 4 To rearrange the order of rows in the table, drag an element by its handle up or down in the Elements pool to move it to a new position. The main display will update as soon as you make a change while editing. See "Telemetry Tables" on page 85. Remove a channel by context-clicking it in the Elements pool and selecting "Remove" from the context menu.
- 5 Click "Save" when you're done editing.



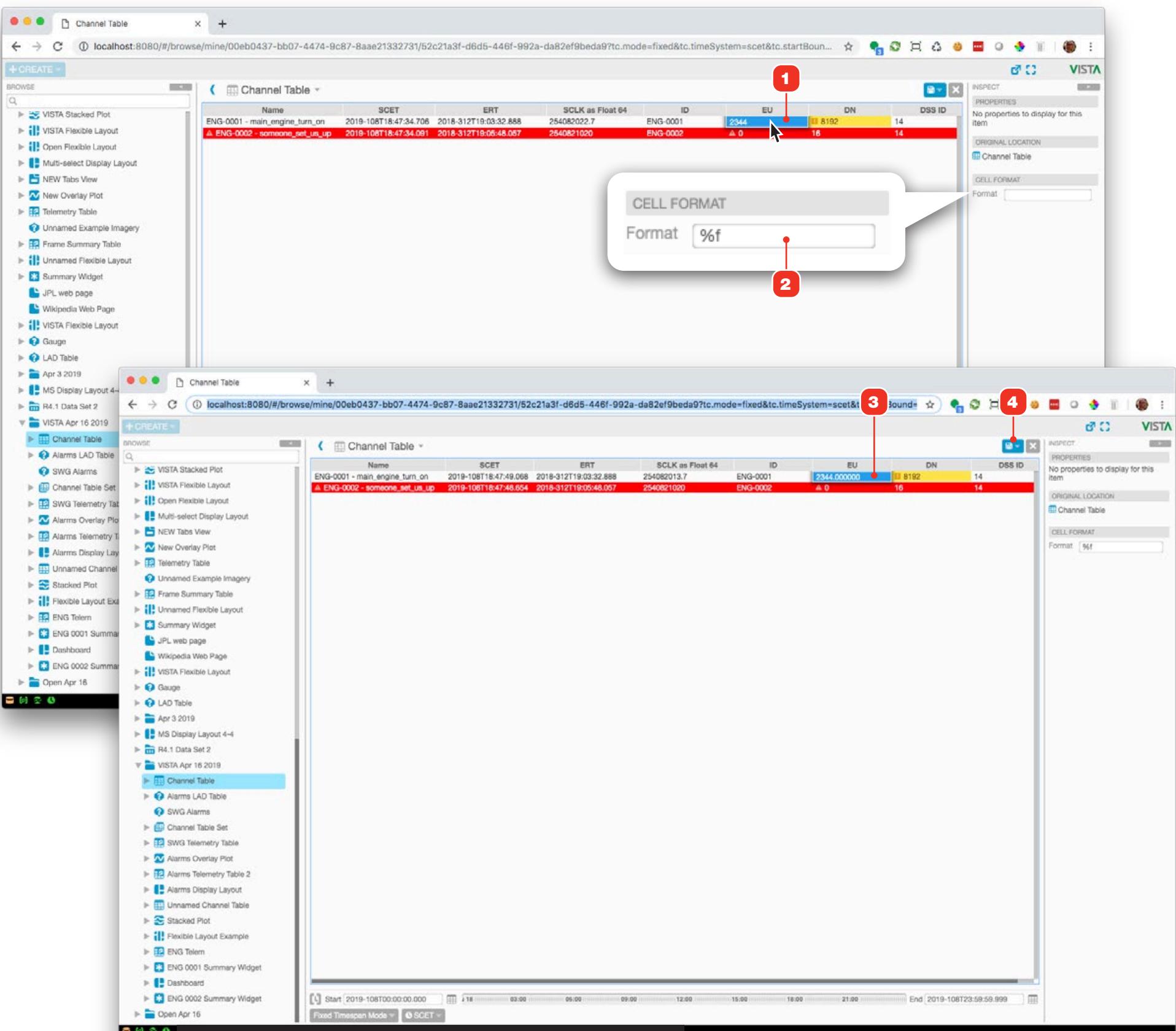
TABLES

Apply Cell Formatting in a Channel Table

For information on editing objects in general, see "Creating A New Object" on page 65.

Cells in a Channel Table allow you to apply printf format strings to control their formatting. A reference for supported printf strings can be found at <https://www.npmjs.com/package/print#conversion-specifier-quick-reference-table>.

- 1 Edit a Channel Table, then click the cell you want to format.
- 2 Enter a printf format string.
- 3 Tab out of the input to see the format applied to the cell.
- 4 Choose a save option to retain your changes.



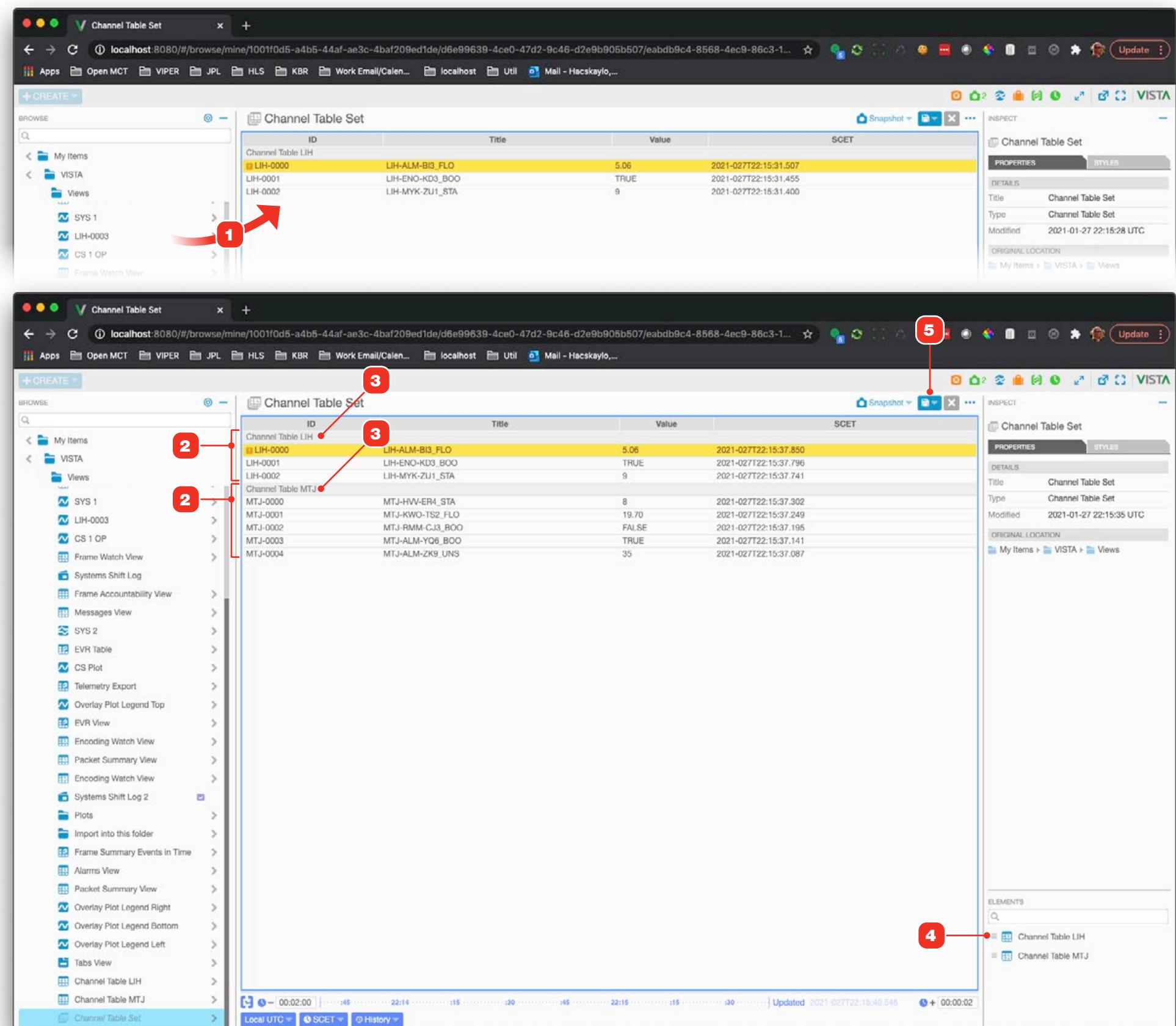
TABLES

Edit a Channel Table Set

For information on editing objects in general, see "Creating A New Object" on page 65.

For more on creating Channel Tables, see "Edit a Channel Table" on page 89.

- 1 Add objects to your Channel Table Set by dragging from the Object Tree. You may only add Channel Tables to a Channel Table Set.
- 2 As you add Channel Tables, they are added to the set's view. Each table will appear with a sub-header **3** based on its title.
- 4 Channel Tables are arranged in the order that they were added. To rearrange their order, drag a Channel Table by its handle up or down in the Elements pool to move it to a new position. The main display will update as soon as you make a change while editing. Remove a Channel Table by context-clicking it in the Elements pool and selecting "Remove" from its context menu.
- 5 Click "Save" when you're done editing.



CUSTOM DATA VIEWS

Creating Custom Data Views

Many of VISTA's built-in data views can be customized, allowing you to save and persist a table's layout, hiding unwanted columns, and in some cases providing additional functionality.

- **Alarms View:** "Creating a Custom Alarms View" on page 93.
- **Command Events View:** "Creating a Custom Command Events View" on page 94.
- **Data Product View:** "Creating a Custom Data Products View" on page 95.
- **EVR View:** "Creating a Custom Event Records View" on page 99.
- **Encoding Watch View:** "Creating an Encoding Watch View From the Frame Summary Events Node" on page 96.
- **Frame Watch View:** "Creating a Frame Accountability View" on page 98 and "Creating Custom Frame Events Table Views" on page 97.
- **Messages View:** "Creating a Custom Messages View" on page 100.
- **Packet Summary View:** "Creating a Custom Packet Summary View" on page 101.

The screenshot shows the VISTA web interface with two windows open. The top window is titled 'Encoding Watch View' and displays a table of FSW Valid Frames with 463 entries. The bottom window is titled 'VISTA' and shows a list of available data views under the '+CREATE' dropdown. The 'Channel Table' option is selected and highlighted in blue. A tooltip for 'Channel Table' provides a description: 'Group multiple telemetry elements together into a tabular view which shows the latest value of each contained telemetry element. Channel Tables can be added to Channel Table Sets or Display Layouts.' Other options listed include Alarms View, Data Product View, and Telemetry Table.

CUSTOM DATA VIEWS

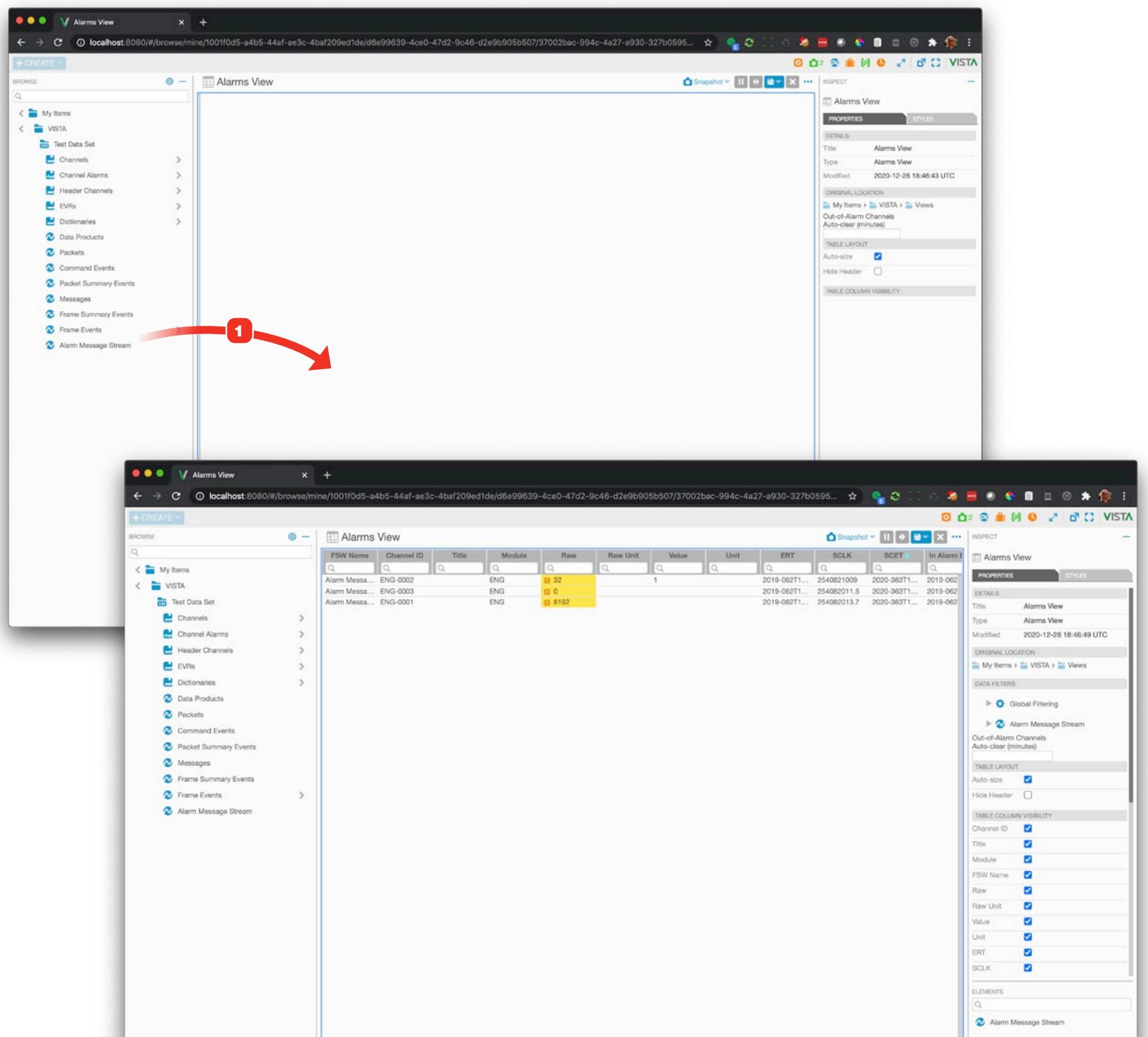
Creating a Custom Alarms View

You can create a custom version of the Alarms views by creating a new Alarms View, and dragging your Data Set's Alarms node into it. You can hide unwanted columns, and rearrange them.

For information on editing objects in general, see "Creating A New Object" on page 65.

For details on table editing including rearranging columns, changing widths, and hiding columns, see "Telemetry Tables" on page 85.

- 1 Choose "Alarms View" from the Create menu, then drag an Alarms node from the desired Data Set into the edit area.



CUSTOM DATA VIEWS

Creating a Custom Command Events View

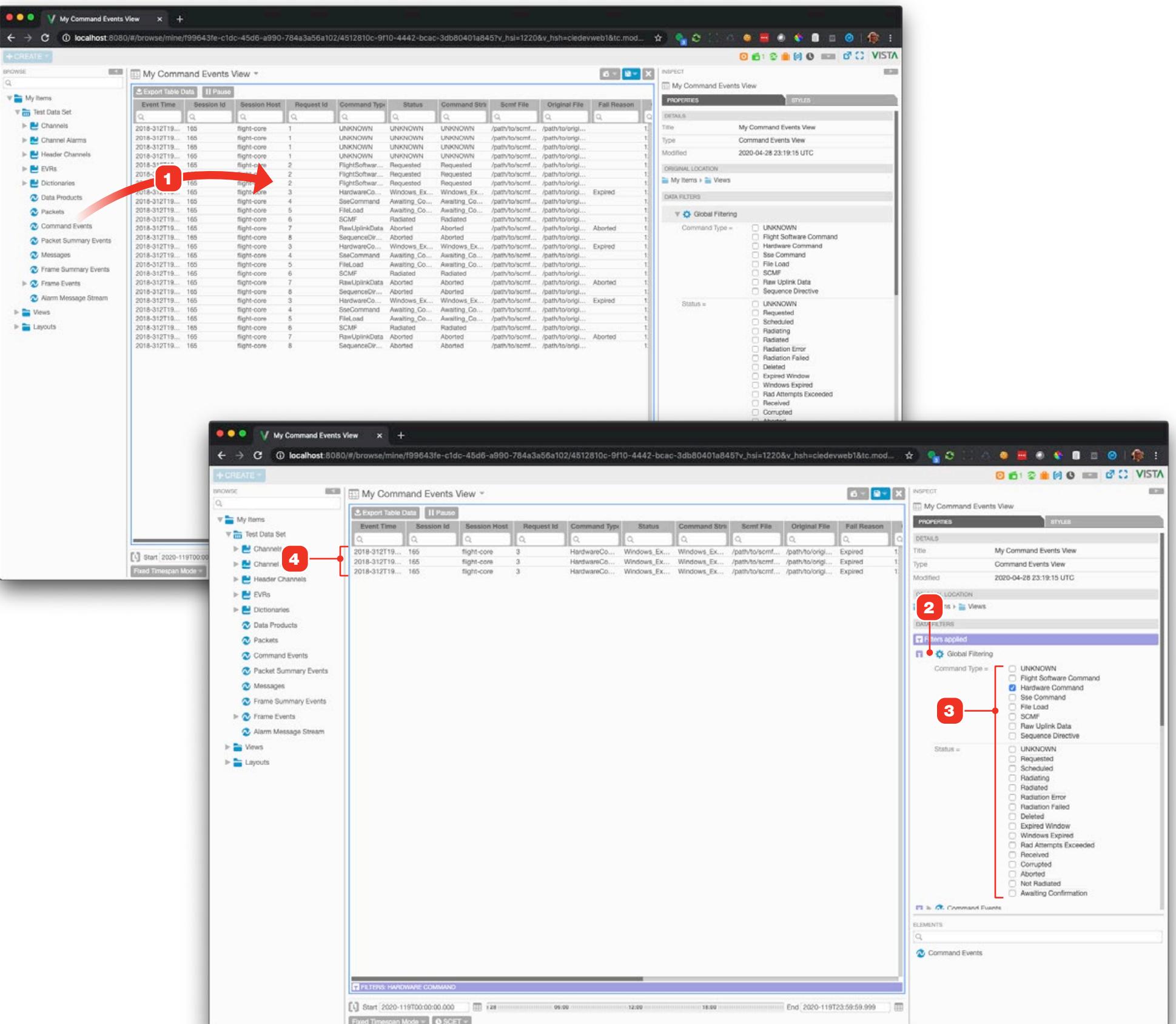
You can create a custom version of the Command Events view by creating a new Command Event View, and dragging your Data Set's Command Events node into it. In addition to hiding and rearranging columns, you can also filter the view by specific command message types.

For information on editing objects in general, see "Creating A New Object" on page 65.

For details on table editing including rearranging columns, changing widths, and hiding columns, see "Telemetry Tables" on page 85.

For details on filtering views, see "Filtering Telemetry" on page 102.

- 1 Choose "Create Command Events View" from the Create menu, then drag a Command Events node from the desired Data Set into the edit area.
- 2 Expand the Filters area of the Properties tab in the Inspector.
- 3 Select the command types and/or statuses you want to include in the view. The table will be filtered as a result.
- 4 When done editing, save your work. Your filter settings will be saved with the view.
- 5 You can add your filtered Command Events View to a Display or Flexible Layout.



CUSTOM DATA VIEWS

Creating a Custom Data Products View

You can create a custom version of the Data Products view by creating a new Data Product View, and dragging your Data Set's Data Products node into it. You can hide unwanted columns, and rearrange them. You can also set the view to automatically clear completed products after a number of minutes.

For information on editing objects in general, see "Creating A New Object" on page 65.

For details on table editing including rearranging columns, changing widths, and hiding columns, see "Telemetry Tables" on page 85.

- 1 Choose "Create Data Products View" from the Create menu, then drag a Data Products node from the desired Data Set into the edit area.
- 2 Entering a value here will cause completed products to be removed from the view after a number of minutes past their Created timestamp. Leaving this setting blank means that completed products will never be automatically removed.

The screenshot illustrates the process of creating a custom Data Products View in the VISTA interface. It consists of two windows:

- Top Window:** Shows the 'New Data Products View' creation dialog. On the left, a 'BROWSE' tree view lists various data sets and components, including 'MSTB Dataset', 'R4.2 Dev Shared', 'R4.2 Dev Users', and 'cfhacska' (which is expanded to show 'CH Data Set', 'CHDS Channels', etc.). A red arrow labeled '1' points from the text above to the 'CH Data Set' node. On the right, the 'PROPERTIES' panel shows the 'Title' as 'New Data Products View', 'Type' as 'Data Products View', and a 'Modified' timestamp. Below these are sections for 'ORIGINAL LOCATION' (set to 'R4.2 Dev Users > cfhacska'), 'AUTO-CLEAR COMPLETED PRODUCTS' (with a 'Clear after minutes' input field), 'TABLE COLUMN SIZE' (with an 'Auto-size' checkbox), and 'TABLE COLUMN VISIBILITY'.
- Bottom Window:** Shows the resulting 'New Data Products View' table. The table has columns: Dvt SCET, ERT, Dvt SCLK as Float 64, Status, Download .DAT, Download .EMD, Creation Time, and # Received. The data grid contains numerous rows of telemetry data. To the right of the table is the same 'INSPECT' panel as the top window, with the 'CLEAR' checkbox highlighted. A red arrow labeled '2' points from the text above to the 'CLEAR' checkbox in the 'INSPECT' panel.

CUSTOM DATA VIEWS

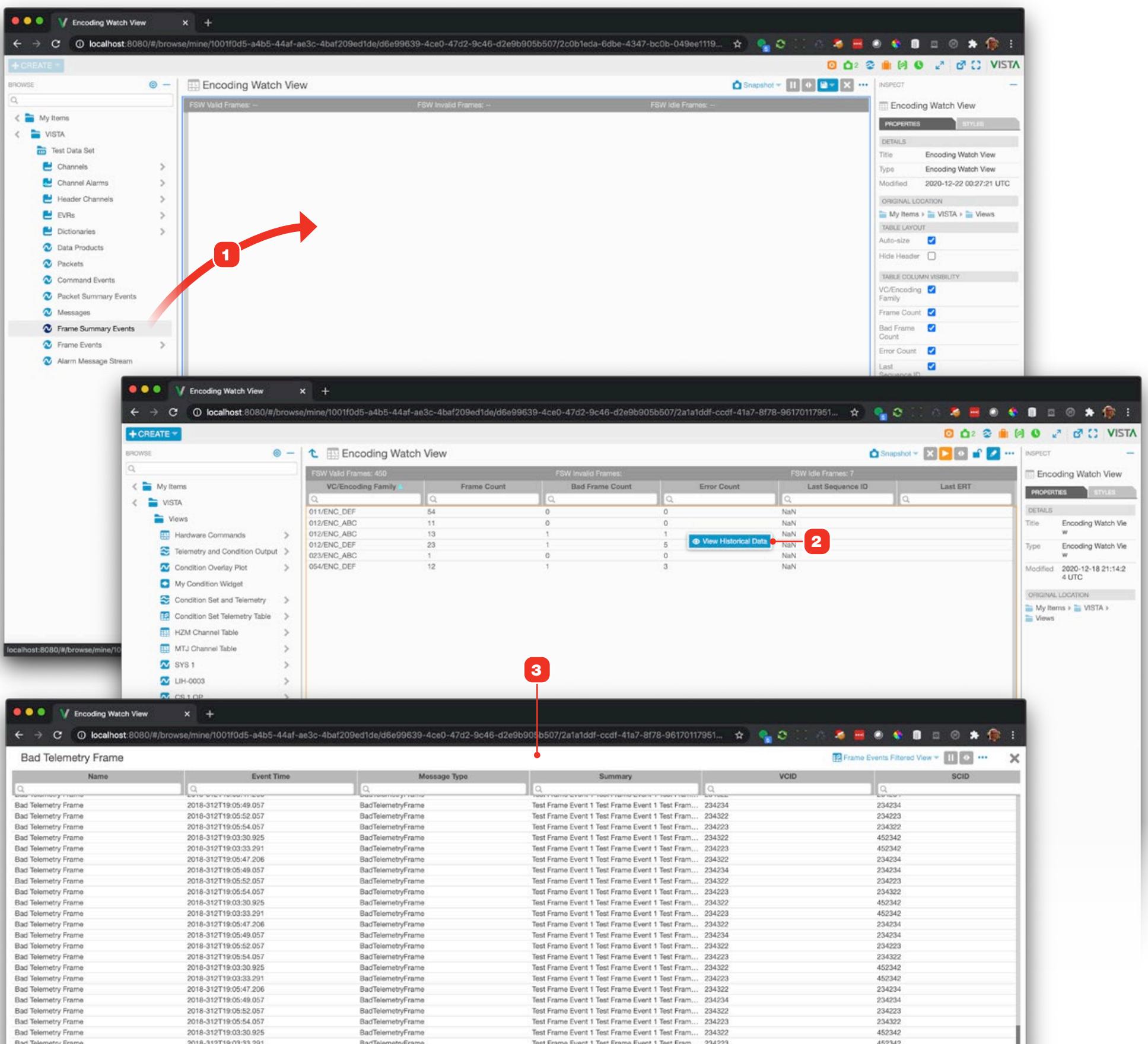
Creating an Encoding Watch View From the Frame Summary Events Node

You can create an Encoding Watch view from the Frame Summary view. You can hide unwanted columns, and rearrange them. The Encoding Watch View also provides a way to view bad telemetry frames for virtual channels.

For information on editing objects in general, see "Creating A New Object" on page 65.

For details on table editing including rearranging columns, changing widths, and hiding columns, see "Telemetry Tables" on page 85.

- 1 Drag a Frame Summary Events node from the desired Data Set into the edit area of your created Encoding Watch View.
- 2 Context-clicking a row in an Encoding Watch View will display an associated table of bad frames 3.



CUSTOM DATA VIEWS

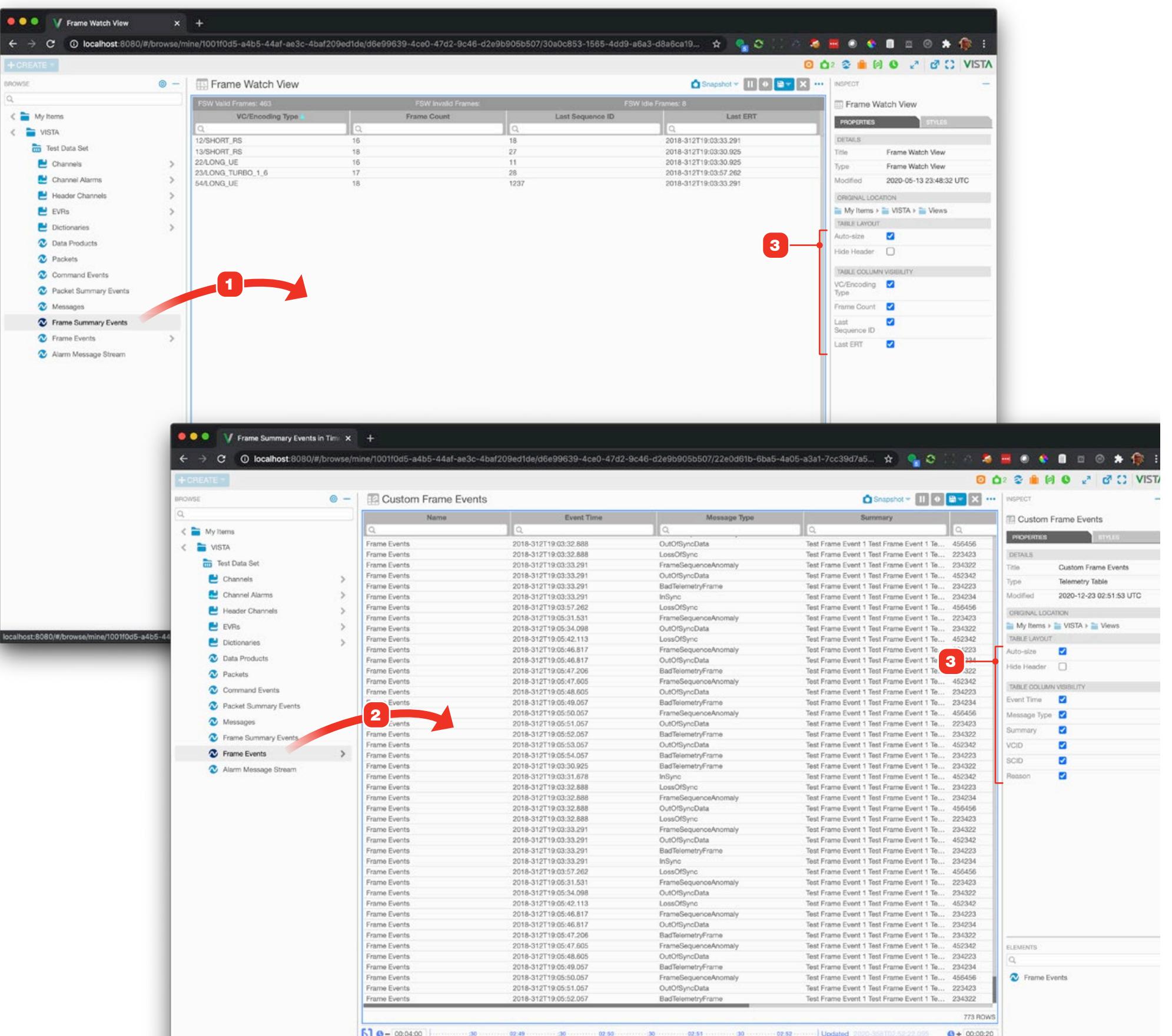
Creating Custom Frame Events Table Views

For information on editing objects in general, see "Creating A New Object" on page 65.

For prerequisites for accessing Frame Summary Events, see "Frame Summary Events" on page 57.

You can create customizable versions of the Frame Summary Events and Frame Events nodes. In both cases, table columns can be resized, reorganized and hidden 3. See "Telemetry Tables" on page 85 for more on this.

- 1 To create a custom version of the built-in Frame Summary Events view, create a new Frame Watch View, then drag in a Frame Summary Events node. This view displays active frame events and summarizes current stats.
- 2 To create a custom version of the built-in Frame Events view, create a new Telemetry Table, then drag in a Frame Events node.



CUSTOM DATA VIEWS

Creating a Frame Accountability View

You can create a more useful visualization of the Frame Events node by creating a new Frame Accountability View, and dragging your Data Set's Frame Events node into it.

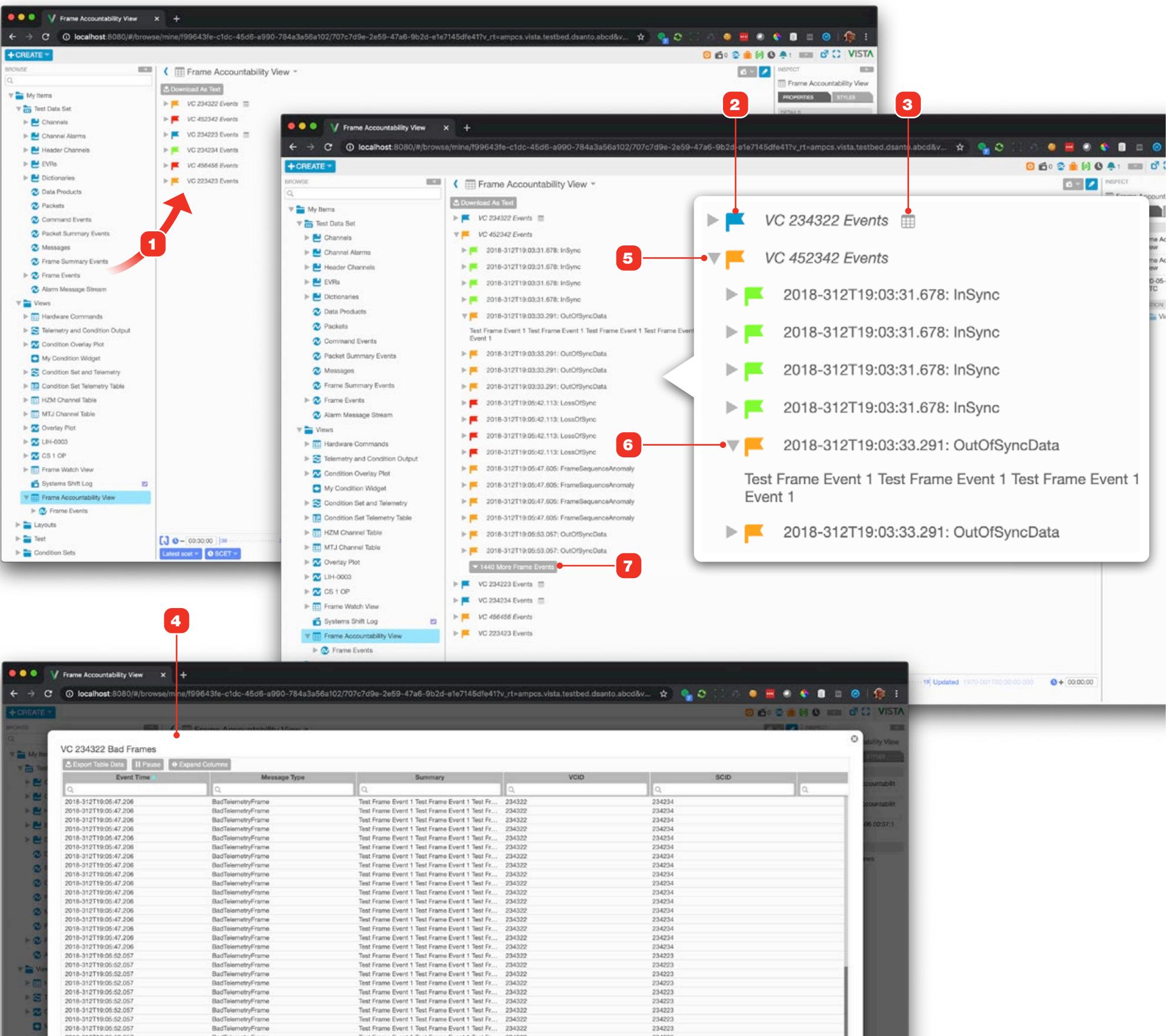
For information on editing objects in general, see "Creating A New Object" on page 65.

For details on table editing including rearranging columns, changing widths, and hiding columns, see "Telemetry Tables" on page 85.

- 1 Choose "Create Frame Accountability View" from the Create menu, then drag the Frame Events node from the desired Data Set into the edit area.
- 2 Frame nodes are color-coded to articulate status. The coloring at any level is based on the "worst" condition of that level's contained events or messages.

Color	Meaning
Default	VC event message doesn't match configured states
Green	Received data in sync or frame lock achieved
Orange	Received data out of sync or frame sequence anomaly
Red	Frame lock lost

- 3 If bad frames exist within a node, this icon is displayed. Clicking it displays a Bad Frames table view in an overlay dialog 4.
- 5 Expanding a VC node displays its frame events.
- 6 Expanding an event displays the command messages that comprise it.
- 7 For performance, the display will automatically limit the number of frame events that are displayed within an expanded node. To see more, click this button.



CUSTOM DATA VIEWS

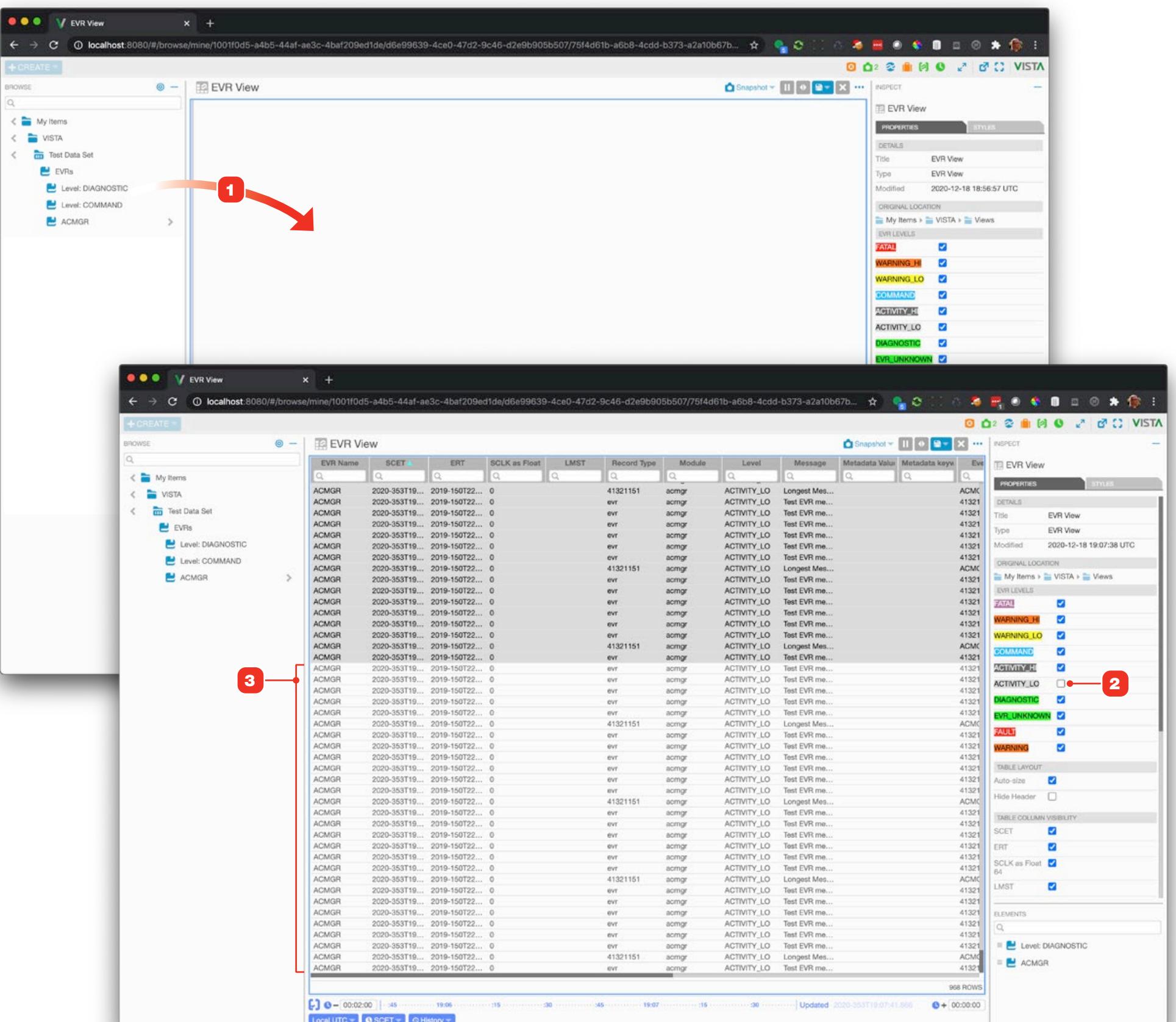
Creating a Custom Event Records View

You can create a custom version of the Event Records view by creating a new EVR View, and dragging your Data Set's EVRs node into it. You can hide unwanted columns, and rearrange them. You can also customize which event levels should display with color-coding. Note that the colors used for EVR levels are set during deployment and cannot be changed in the application.

For information on editing objects in general, see "Creating A New Object" on page 65.

For details on table editing including rearranging columns, changing widths, and hiding columns, see "Telemetry Tables" on page 85.

- 1 Choose "EVR View" from the Create menu, then drag a EVR node from the desired Data Set into the edit area.
- 2 Unchecking an item in the "EVR Levels" area of the Inspector will not apply color coding 3 to that level in this view.



CUSTOM DATA VIEWS

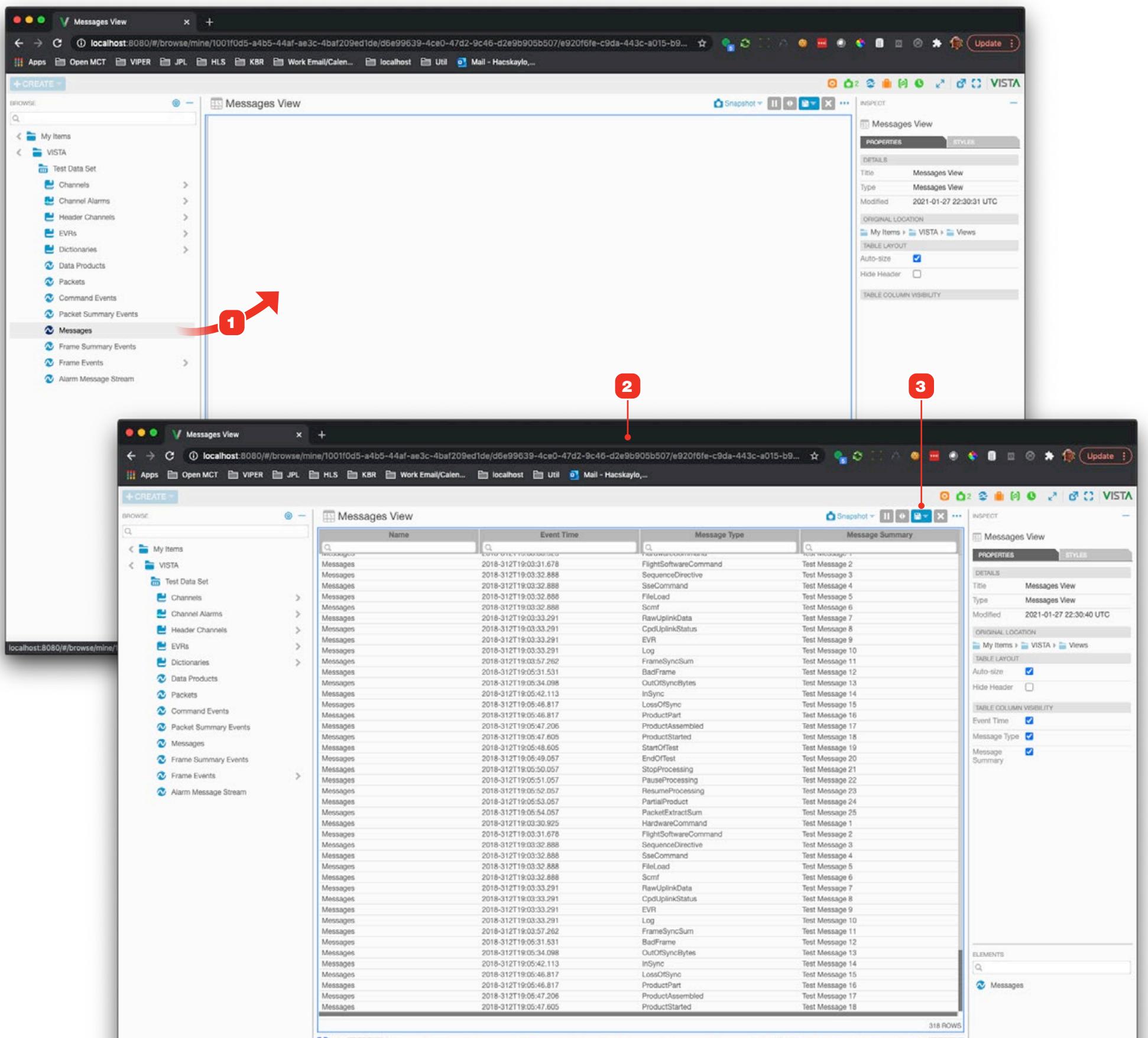
Creating a Custom Messages View

You can create a custom version of the Messages view allowing you to hide, rearrange columns, and hide unwanted ones.

For information on editing objects in general, see "Creating A New Object" on page 65.

For details on table editing including rearranging columns, changing widths, and hiding columns, see "Telemetry Tables" on page 85.

- 1 Choose "Messages View" from the Create menu and drag the Messages node from the desired Data Set into the edit area.
- 2 The resulting custom view.
- 3 Click "Save" when you're done editing.



CUSTOM DATA VIEWS

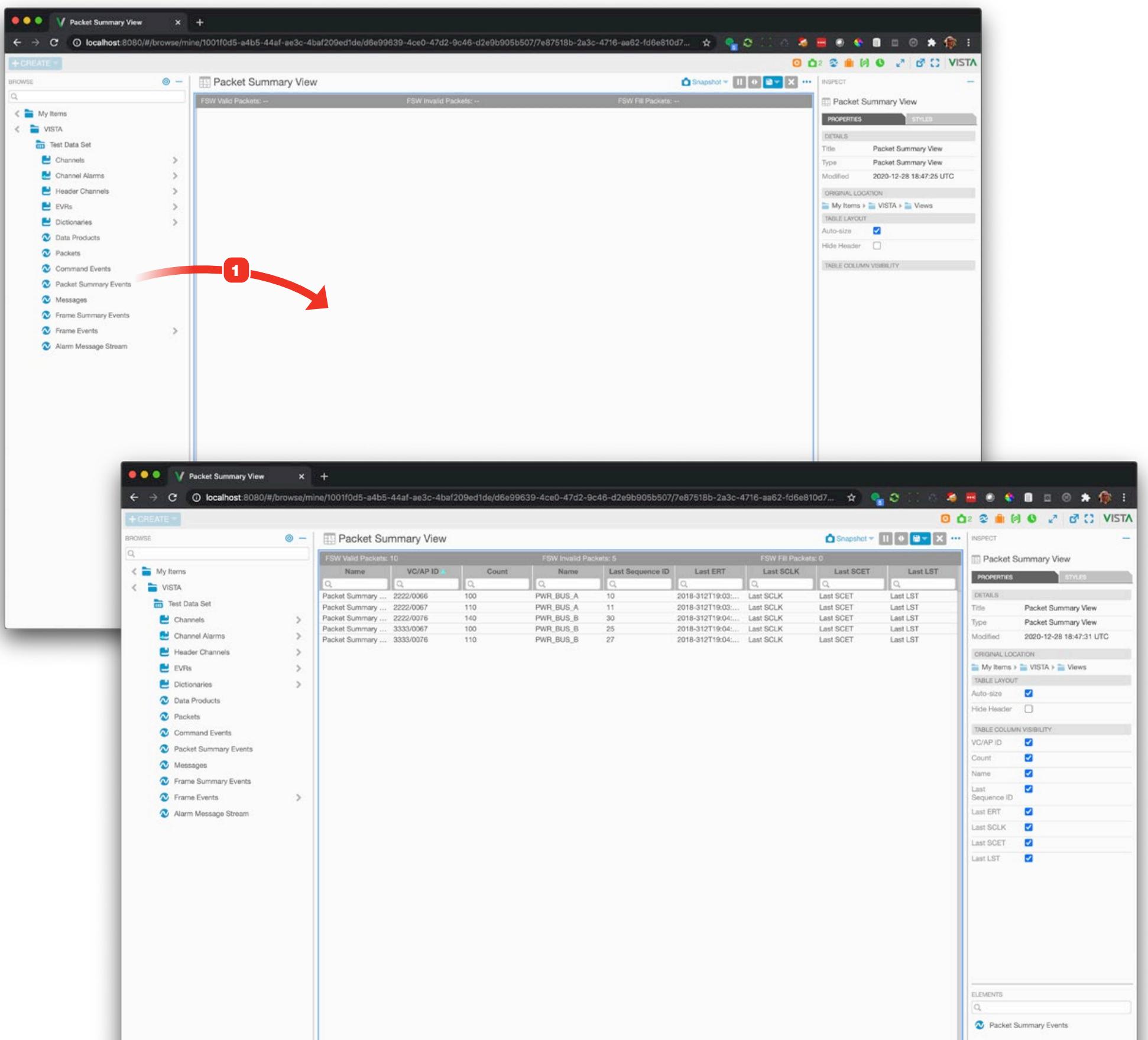
Creating a Custom Packet Summary View

You can create a custom version of the Packet Summary view by creating a new Packet Summary View, and dragging your Data Set's Packet Summary node into it. You can hide unwanted columns, and rearrange them.

For information on editing objects in general, see "Creating A New Object" on page 65.

For details on table editing including rearranging columns, changing widths, and hiding columns, see "Telemetry Tables" on page 85.

- 1 Choose "Packet Summary View" from the Create menu, then drag the Packet Summary Events node from the desired Data Set into the edit area.



FILTERING TELEMETRY

Filtering Telemetry

Overlay Plots, Channel Tables, Telemetry Tables and Command Event Views now allow server-based persistent filtering to be applied to them. For details on using the filtering interface, see "Filtering Details" on page 103.

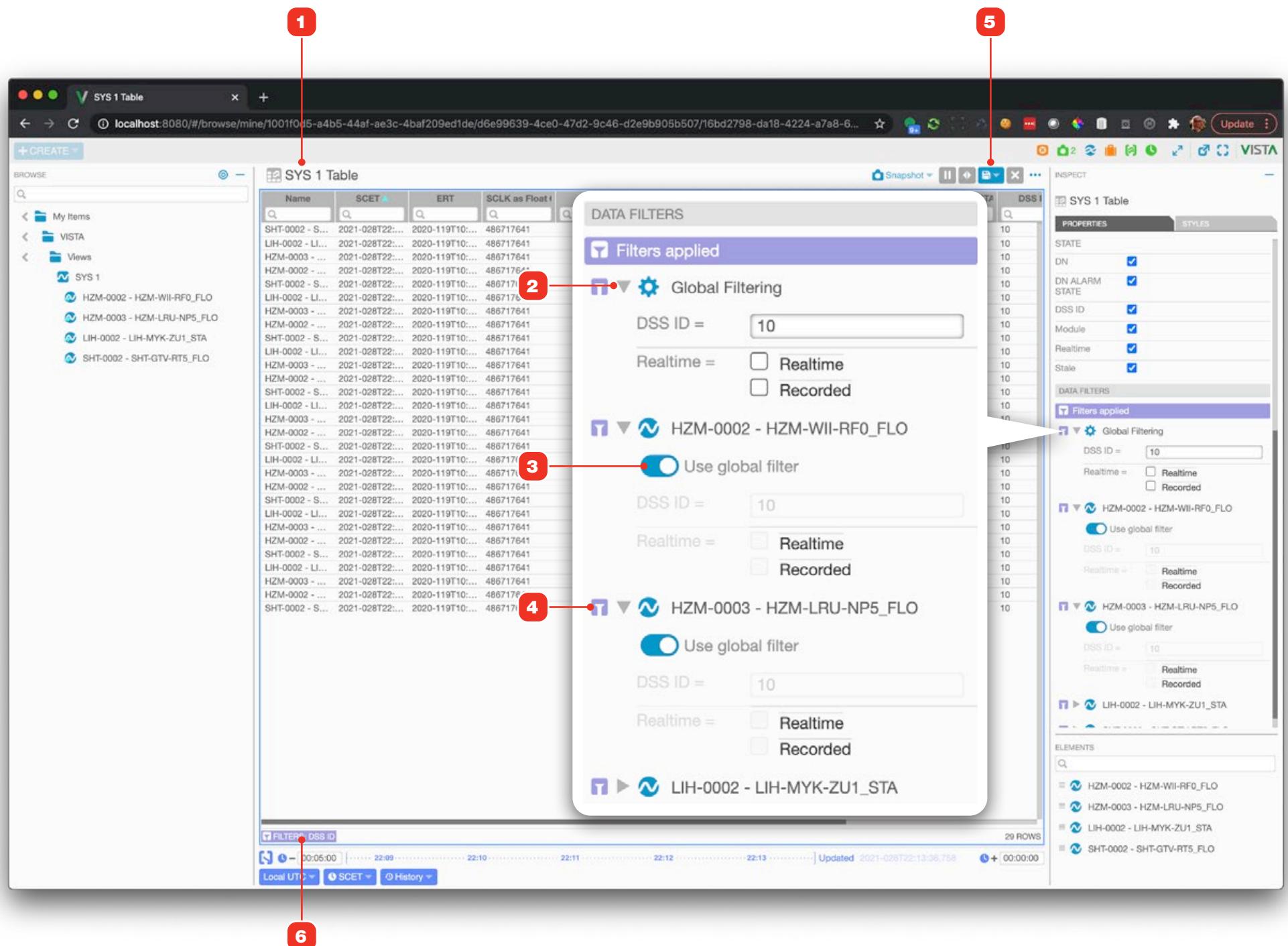
- 1 Create or edit an Overlay Plot, Channel Table or Telemetry Table.
- 2 Expand nodes within the "DATA FILTERS" section of the Inspector as needed. Values entered in the "Global Filtering" section will apply to all channels that have "Use global filter" enabled ③. Filtering is applied in real-time as you enter values and move from field to field.
- 4 As values are entered, the interface updates to indicate which channels are being affected by any filtering.
- 5 When done editing, save your changes. All filter settings will be saved with the object you were editing.
- 6 Telemetry Tables will display a small indicator denoting that filtering is being applied.

VISTA CONFIGURATION CONSIDERATIONS

Filtering in VISTA actually takes place on the server, not in the VISTA front-end. Therefore, your deployed configuration has an effect on how filtering works in VISTA; specifically, min max queries in plots and the channel LAD database.

Min max is an optimization scheme for plots that allows the server to only send the number of data points necessary for a plot of a given size, and no more. Because it's an interpolation technique, it's fundamentally at odds with filtering. So, if the Data Set for a given channel in an Overlay Plot includes a value for the Channel MinMax URL, filters will not be applied to that data. If you wish to avoid this, remove the value for the Channel MinMax URL from your Data Set, or create a new Data Set and leave that field blank. See "Configuring a Data Set" on page 137 for more info.

For Channel Tables only, if the current Data Set's Channel LAD URL is configured, Channel Tables are first populated by unfiltered data from the Channel LAD URL, which is then replaced by incoming filtered real-time data as it becomes available. To work around this, remove the value from the Channel LAD URL from your Data Set, or create a new Data Set and leave that field blank. See "Configuring a Data Set" on page 137 for more info. Telemetry Tables do not use the channel LAD database and are not affected in this way.

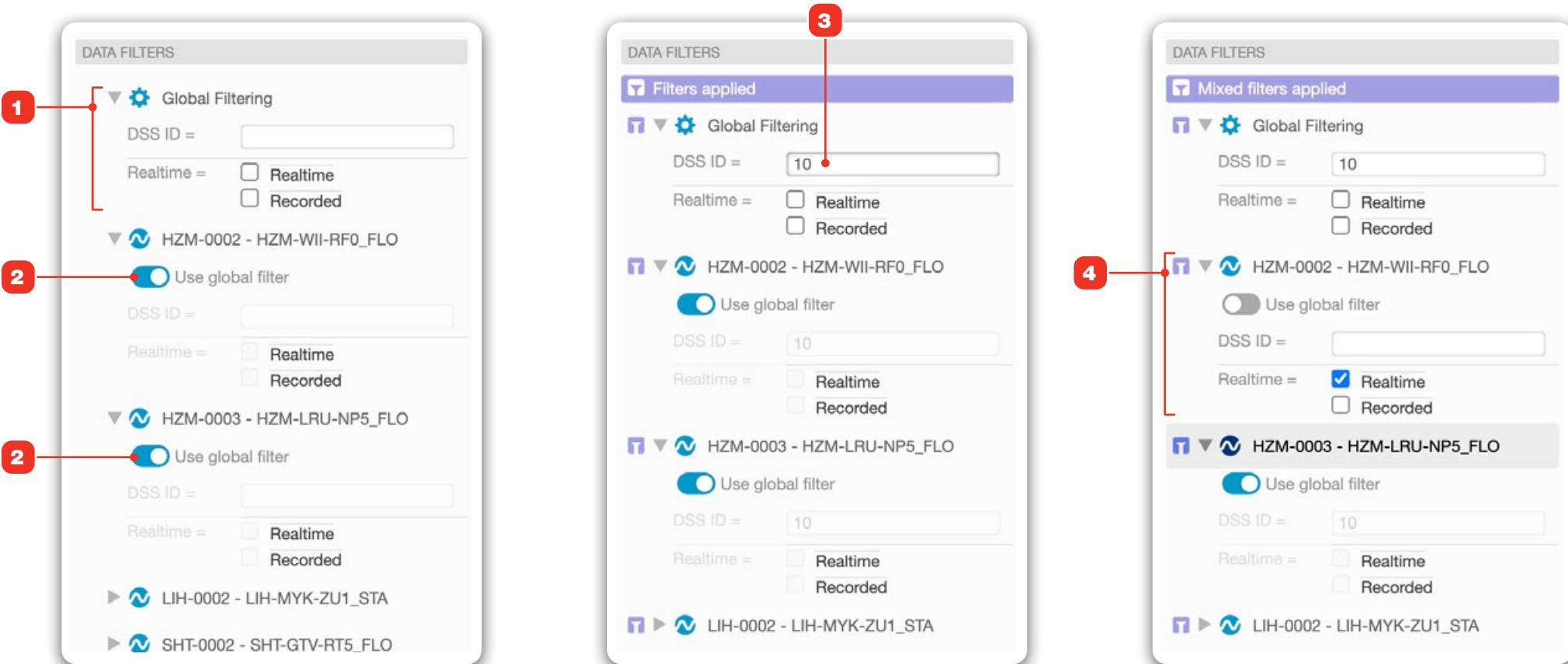


FILTERING TELEMETRY

Filtering Details

The filtering interface provides a way to easily define filtering criteria that apply to all channels that are part of a given Overlay Plot, Telemetry Table or Channel Table. You can also specify filtering criteria per channel as well.

- 1 By default, all channels added to an object are set to use the global filter: entering a value in "Global Filtering" will apply that filter to all channels. When using the global filter, inputs for a given channel are disabled.
- 2 To enable filtering per channel, click this toggle button allow individual filtering parameters to be entered for that channel.
- 2 In this example, DSS ID is being filtered for the value 10 in Global Filtering. All channels are set to use the global filter, and will also be filtered the same.
- 3 This channel has disabled its usage of the global filter, and "Realtime" has been checked. All channels except for HZM-0002 will be filtered for DSS ID; HZM-0002 will *not* be filtered for any DSS ID, but will be filtered for realtime.



DISPLAY AND FLEXIBLE LAYOUTS

Layouts Overview

In VISTA, there are two types of layouts that allow you to compose and organize view objects: Display Layouts and Flexible Layouts. Here's a comparison of the two.

DISPLAY LAYOUTS

A Display Layout organizes and contains elements in a fixed two-dimensional canvas area. Items always retain their position and size despite how the layout itself is sized. Use a Display Layout when you want precise control of the dimensions and positions of contained elements.

For more, see "Display Layouts" on page 105.

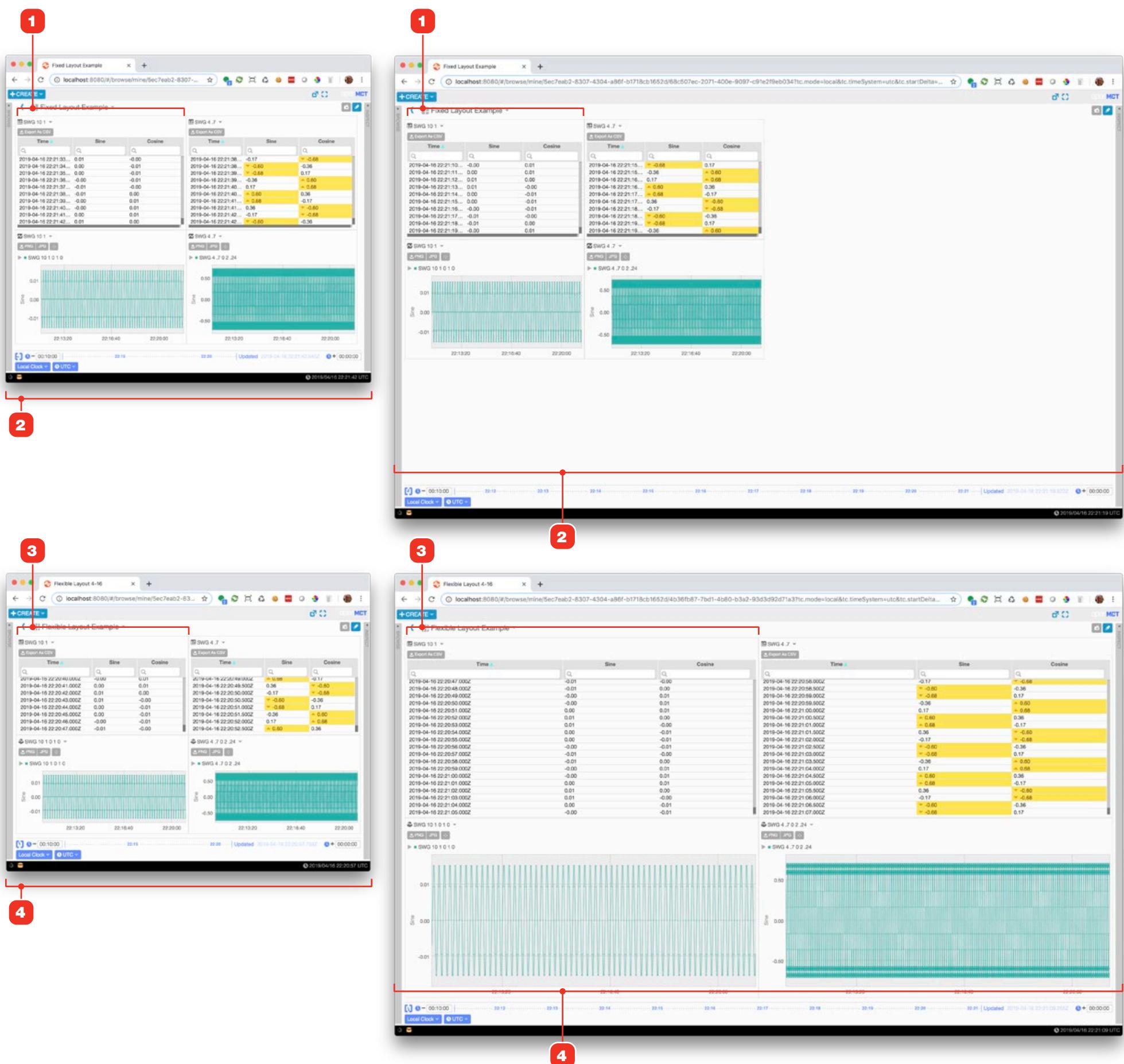
- 1 Elements in a Display Layout retain their position and size regardless of how the layout itself is sized 2.

FLEXIBLE LAYOUTS

A Flexible Layout uses a fluid columns or rows approach to displaying contained elements. Items always resize dynamically as the layout itself resizes to fill all available display space. Flexible Layouts are ideal for displays that will be viewed in a variety of sizes, for example, in a desktop environment and mobile.

For more, see "Flexible Layouts" on page 117.

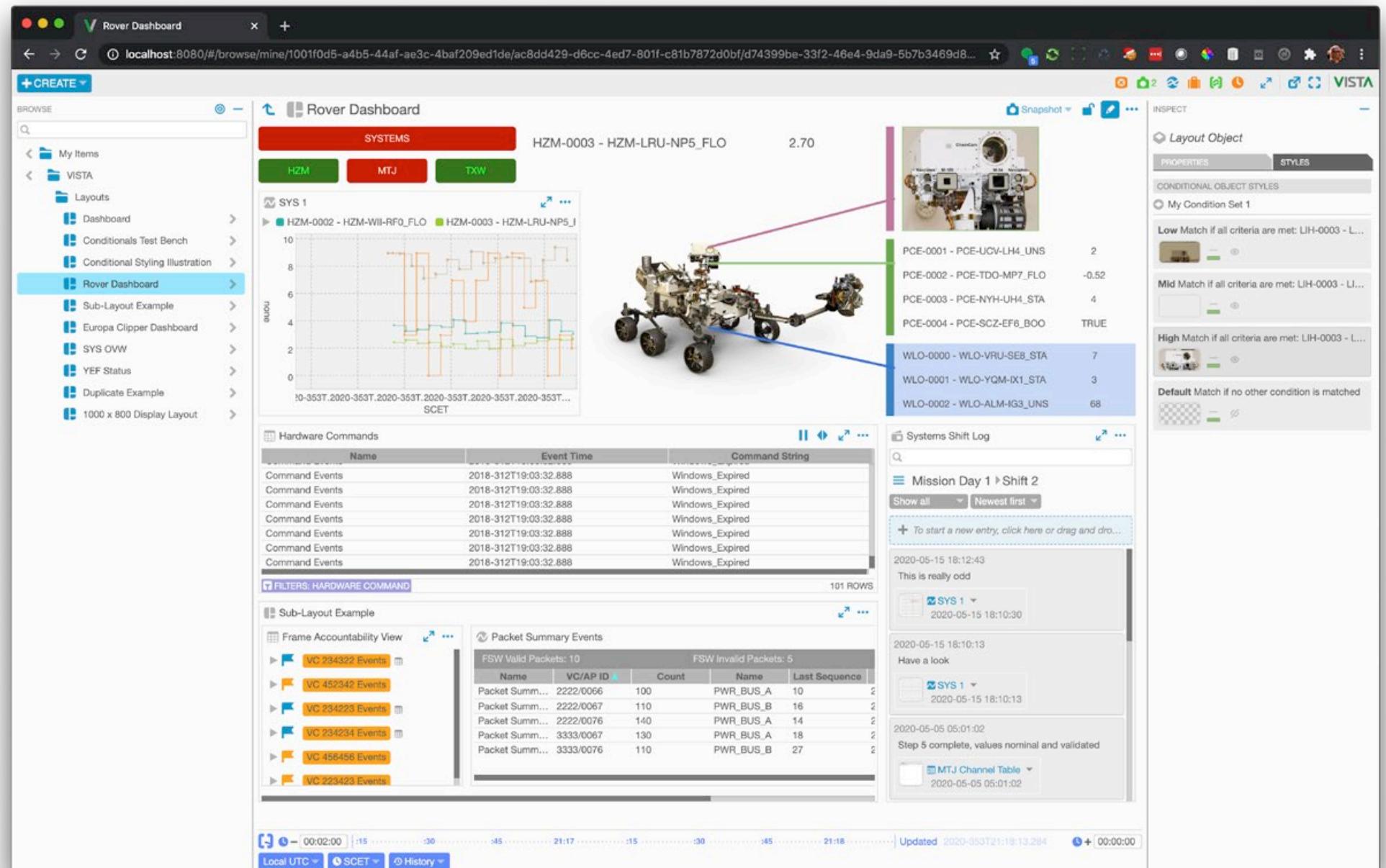
- 3 Elements in a Flexible Layout scale their size proportionally to how the layout itself is sized 4.



LAYOUTS

Display Layouts

A Display Layout allows you to create, save and share screens that organize almost any other type of object that has a view. Other Telemetry Channels, Plots, Tables and more can be positioned and resized in a two-dimensional space. All Time Conductor-aware objects in a Display Layout synchronize their display with the Time Conductor's settings. See "Time Conductor Overview" on page 28 for more.

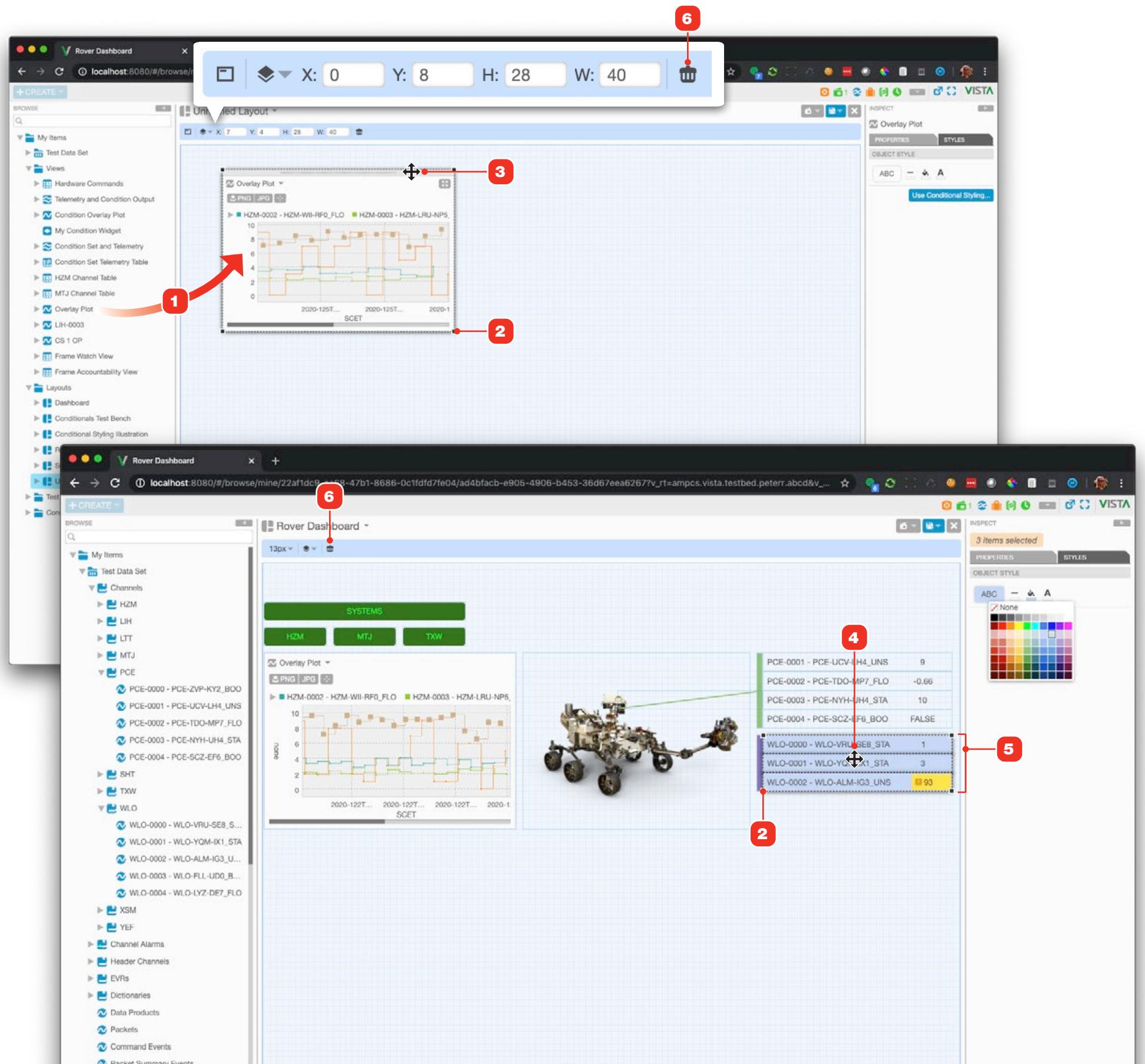


LAYOUTS

Edit a Display Layout

For information on editing objects in general, see "Creating A New Object" on page 65.

- 1 Add objects to a Layout by dragging from the Object Tree.
- 2 Selected objects are bounded by a dashed-border edit marquee. Click and drag any corner to resize the object.
- 3 To position a domain object (which typically contains complex content) hover over it until its move bar appears, then click and drag that.
- 4 Other object types like telemetry or drawing objects can be moved by clicking and dragging them anywhere.
- 5 Multiple objects can be selected, then moved, resized and formatted. To select multiple objects, hold the shift key while clicking. Shift-clicking a selected object will de-select it. Click and drag anywhere in the selected objects to move them.
- 6 Remove objects by clicking their "Remove" button in the toolbar.

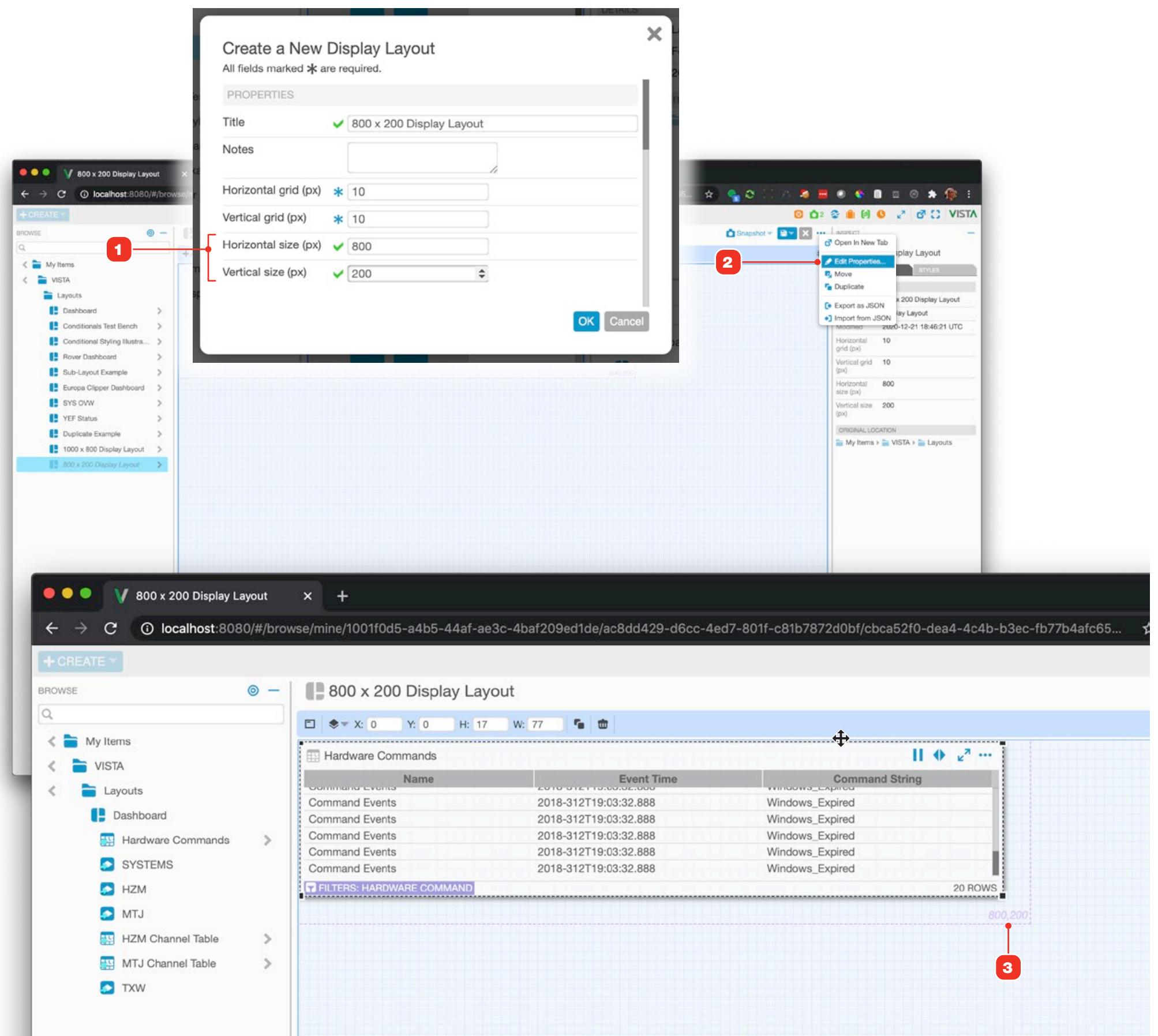


LAYOUTS

Display Layout Sizing

If you need a Display Layout to be an exact pixel size, you can use the layout's size property to display a visual aid within the layout's canvas area.

- 1 You can set the desired dimensions for a Display Layout either when creating it, or afterwards by editing its properties 2.
- 3 If size dimensions have been set, a visual aid with the lines and the size dimensions settings appears in the layout's canvas area.

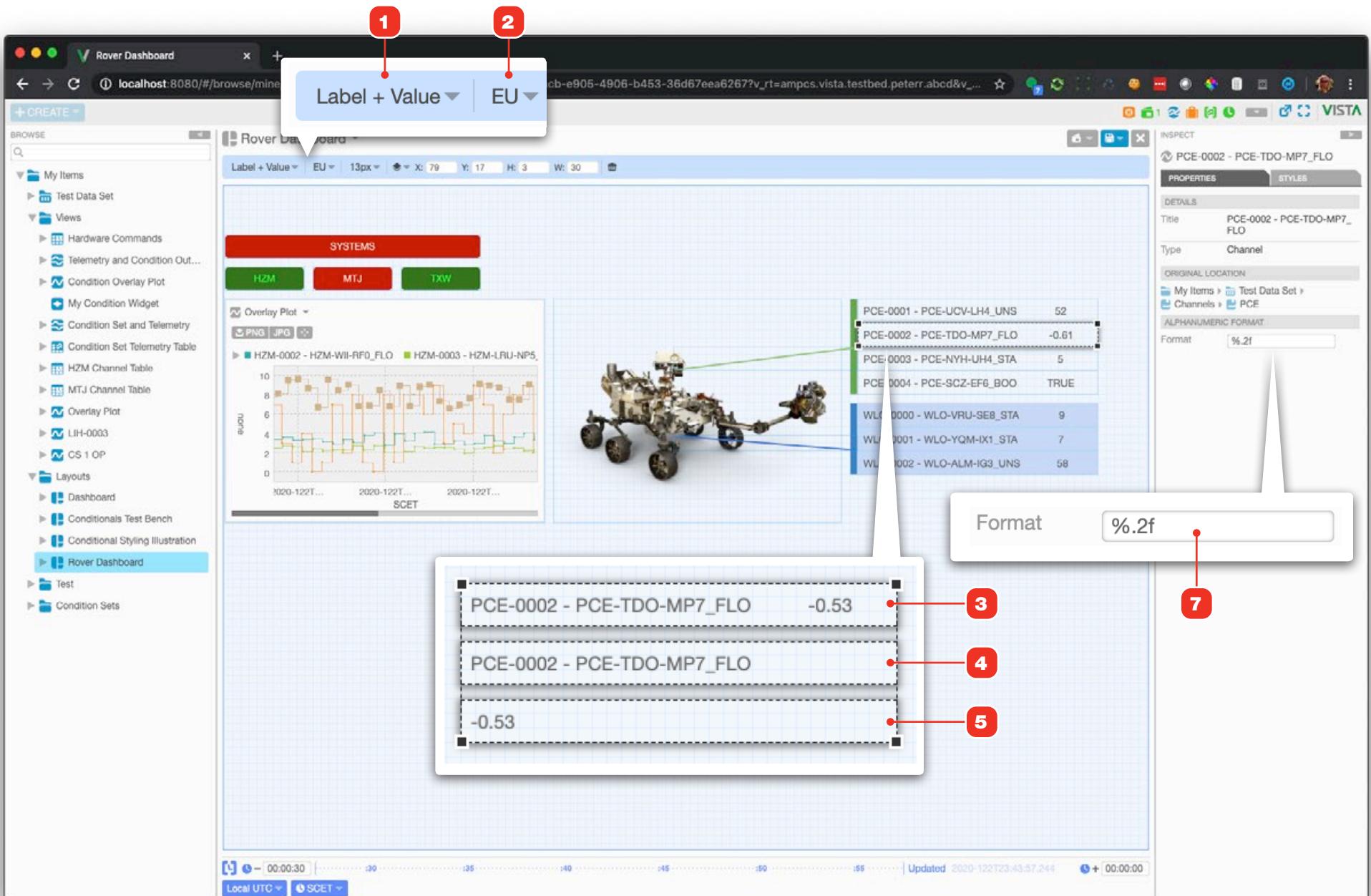


LAYOUTS

Telemetry Placed in a Display Layout as Alphanumerics

Placing telemetry in a Layout as an alphanumeric has configuration options. Property configurations or styles applied to these view types in a Layout are only applied and saved to their instances within a given Layout and don't affect the original object.

- 1 By default, telemetry elements display a label (their name) and a current value **3**. You can alternately choose to display only the label **4**, or only the value **5**.
- 2 Choose the field to display as the element's value via this menu. The menu here will automatically populate based on the valid fields available for the selected telemetry element.
- 6 Printf-style formatting can be applied to the value portion **7** of telemetry placed in a Display Layout by entering a printf format string in the Inspector input available when selecting it in the layout. A reference for the standard supported printf strings can be found at <https://www.npmjs.com/package/printj#conversion-specifier-quick-reference-table>. Note that your deployment may have been configured to also include custom formatting strings; contact your system administrator for more information on this.

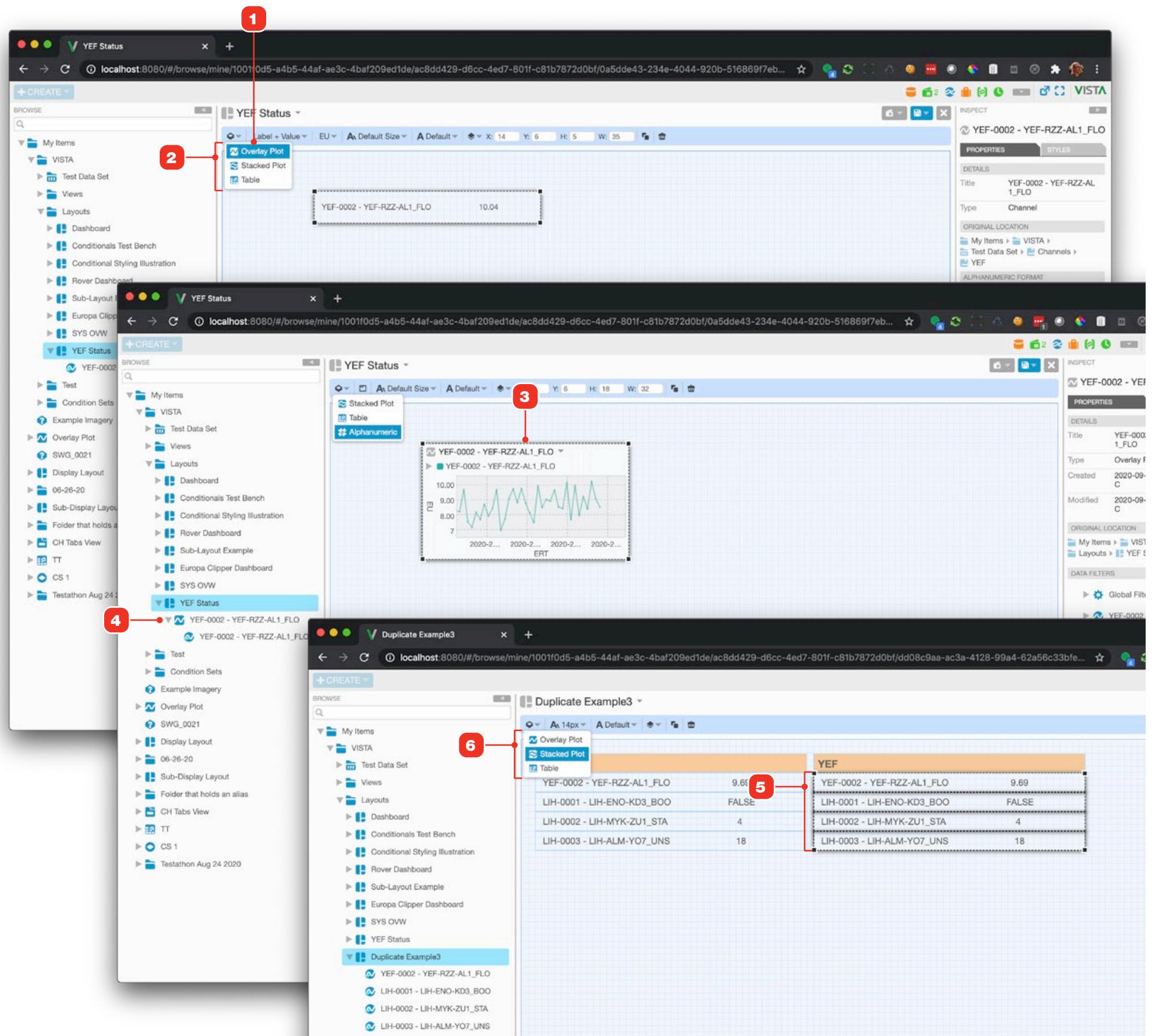


LAYOUTS

Changing the Display Format of Telemetry Placed in a Display Layout

By default, telemetry is placed in a Display Layout as an alphanumeric. However, you can easily change that to a plot or a table, or convert a plot or table back to an alphanumeric. Here's how.

- 1 With the alphanumeric selected, access the Object View selector menu from the toolbar.
- 2 From the menu, select the view type you'd like to convert to. This example converts the alphanumeric to an Overlay Plot.
- 3 The converted result. Note that this will actually create a new Overlay Plot view object **4** as a child of the current Display Layout. That plot can further be edited and reused in the same way as an Overlay Plot created from the Create menu.
- 5 Selecting multiple alphanumerics and converting them to any other view **6** will merge them together into a single instance of that view. In this example, the four selected alphanumerics would be brought together into a single new Stacked Plot view.

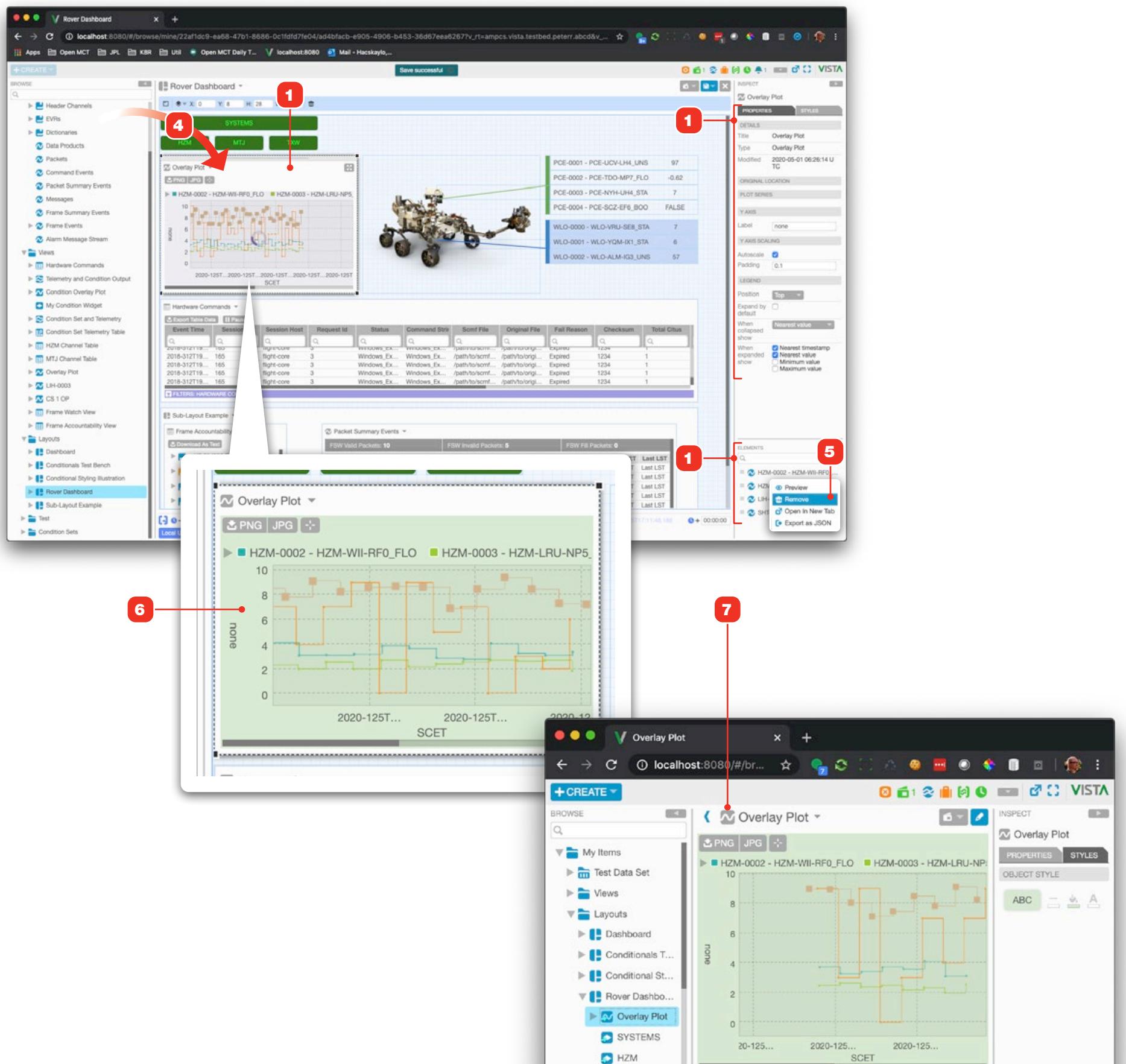


LAYOUTS

Editing Domain Objects From Within a Display Layout

You can edit and alter the properties of many editable objects like Overlay and Stacked Plots, other Layouts, Tables and more directly while working within a Display Layout. Editing this type of object in a Layout also edits its original version: editing the contents, configuring properties or applying styles also changes the original.

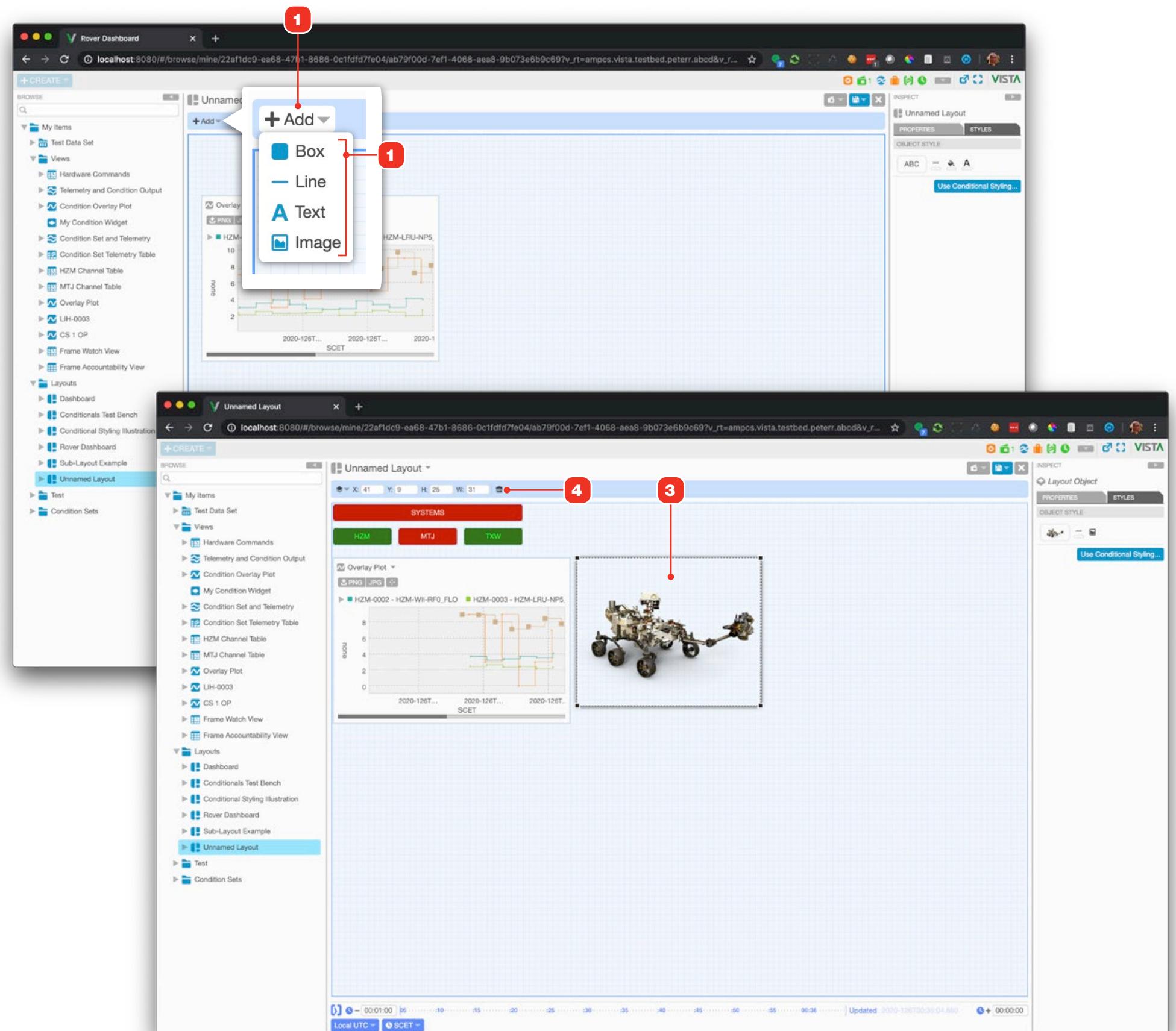
- 1 Select a single object.
- 2 The Inspector will the display the name, properties and style options 2 and the elements 3 of the item that you've selected.
- 4 You can add elements as you normally would by dragging and dropping them into the area of the selected item. For example, you could drag and add a telemetry channel to the selected Overlay Plot view.
- 5 Items can be removed from selected objects by context clicking one of their elements in the Elements pool and choosing "Remove".
- 6 Apply styles to a composable domain object in a Layout also changes the original version of the object 7, affecting it everywhere that it appears.



LAYOUTS

Adding Drawing Objects

- 1 To add boxes, lines or images to a Display Layout, click the "Add" button in the toolbar. Note that the button is only visible when no other objects are selected.
- 2 Select the type of drawing object from the menu.
- 3 Selected drawing objects can be formatted with their available buttons in the toolbar and Styles tab. See "Layout Editing and Styling Controls" on page 112.
- 4 To remove an a drawing object, click its "Remove" toolbar button.



LAYOUTS

Layout Editing and Styling Controls

The toolbar and Styles Tab allow you to apply formatting, as well as position and remove objects in your Layout. The buttons displayed depend on which and how many objects are selected.

1 Toolbar

Control	Item	Description
	Convert View Type	Allows domain objects to be converted between display formats, such as alphanumeric to overlay plot, stacked plot and table, and back again.
	Show/hide Object Frame	Allow toggling of the display of a domain object's frame.
	Edit Text Content	Allows editing of a text object's content.
	Layer Order	Controls the "stacking order" of objects; move selected items above or beneath other items.
X: 41 Y: 4	Canvas coordinates	Directly enter position and dimension coordinates for selected items.
	Duplicate	Duplicates selected items. See "Duplicating Items in a Display Layout" on page 113.
	Delete button	Deletes or removes the selected item from the Display Layout.

2 Styles Tab

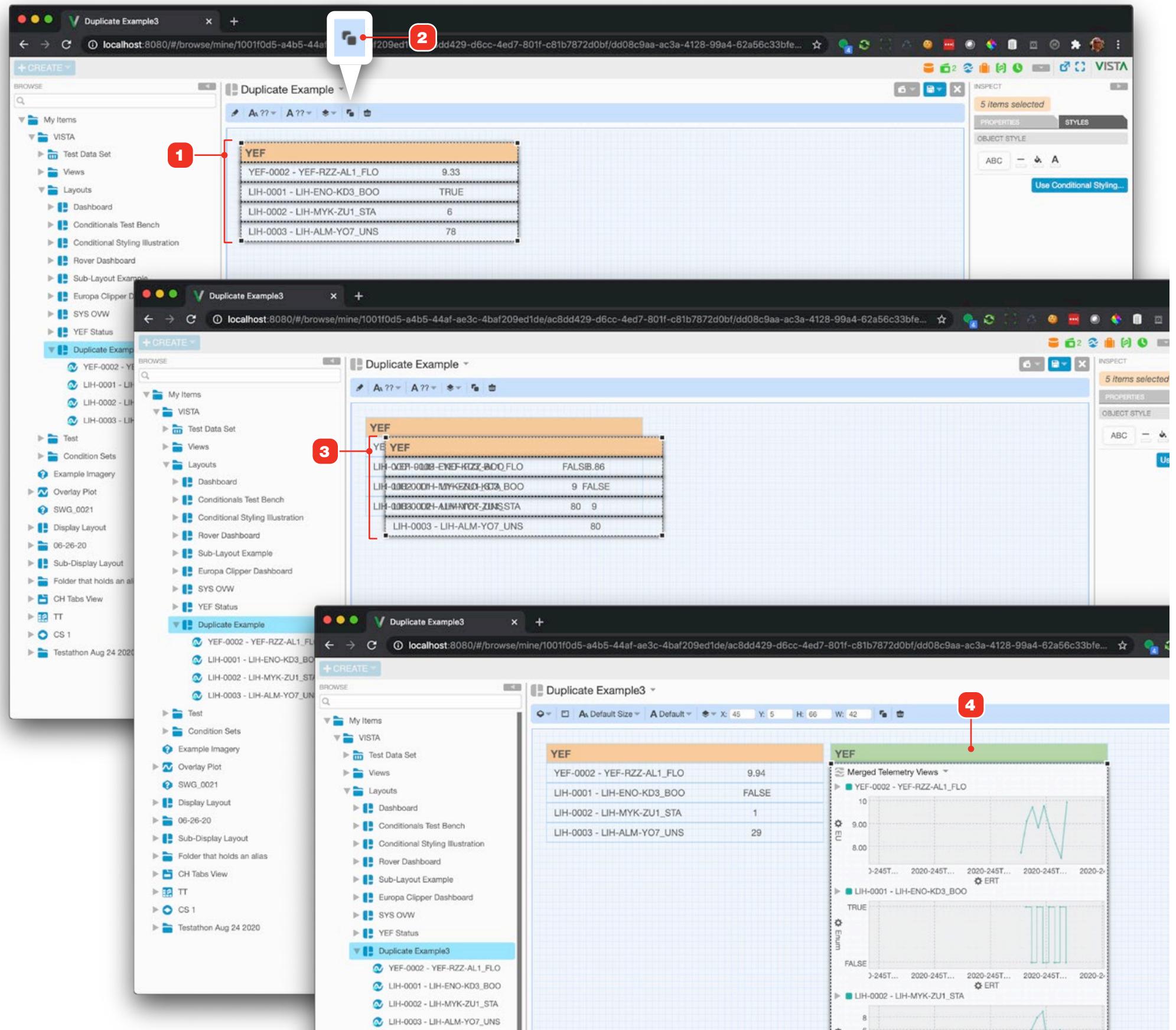
Control	Item	Description
	Font Size	Controls the text size of domain objects, text objects and telemetry alphanumeric elements.
	Font Style	Controls the font style of domain objects, text objects and telemetry alphanumeric elements.
	Style preview	Displays a visual preview of the styles applied to selected items.
	Border / line color	Applies to telemetry channels, domain objects, all drawing objects
	Fill color	Applies to telemetry channels, domain objects, box, text and line drawing objects
	Text color	Applies to telemetry channels, domain objects, text drawing objects
	Image URL	Click to edit the URL for a image drawing object
	Visibility toggle	Only available when using conditional styling. Sets the visibility of any object when the designated condition is matched.

LAYOUTS

Duplicating Items in a Display Layout

Items in a Display Layout can be duplicated with one click. Duplicated items retain the style settings for their originals, making it easier to create Layouts with multiple items that utilize consistent styles.

- 1 Select the items you want to duplicate.
- 2 Click the Duplicate button in the main toolbar.
- 3 Duplicated items will be offset from their originals.
- 4 Duplicated items can be further manipulated and edited. In this example, the four alphanumeric telemetry elements have been converted into a single Stacked Plot view.

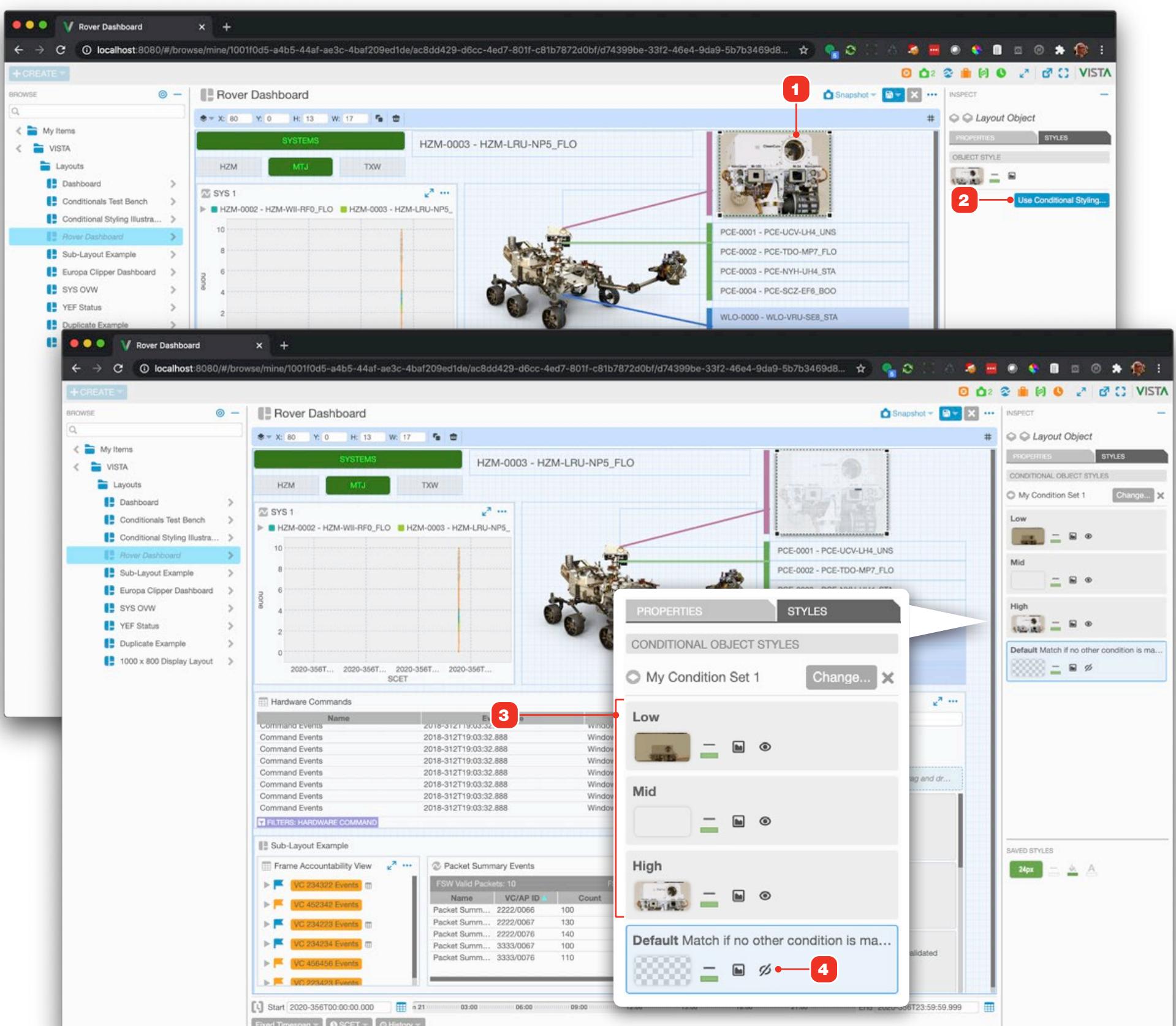


LAYOUTS

Using Conditional Styling in a Display Layout

Using a Condition Set in a Display Layout to control styles for objects in the layout has features and considerations not present elsewhere.

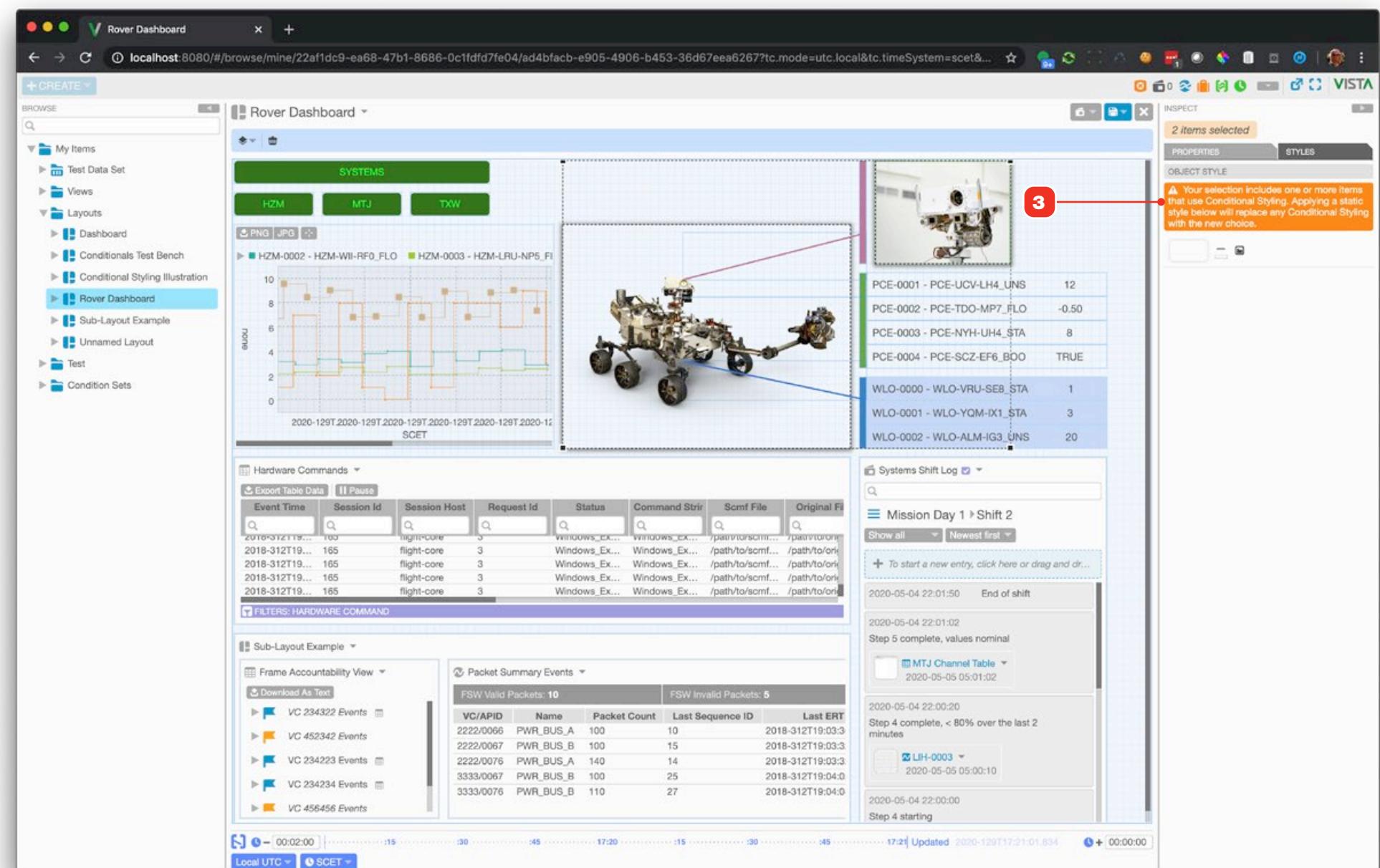
- 1 To use conditional styling, select the object you want to apply it to, then click the "Use Conditional Styling" button **2**. You'll be prompted to select a Condition Set via a dialog.
- 3 In addition to border color, image objects can dynamically assign a different image with each condition. This example shows three different images that will be displayed for the selected image, depending on which condition in the Condition Set is matched.
- 4 Visibility of any object in the layout - domain objects, telemetry and drawing objects - can be toggled on or off per condition. In this example, the image will be hidden if the Default condition is matched.



LAYOUTS

Mixed Styles and Conditional Styling in a Display Layout

- 1 If multiple objects are selected with a mix of static and/or conditional styling, this warning will display. Applying any style will remove all conditional styling currently applied to all objects in the selected set.

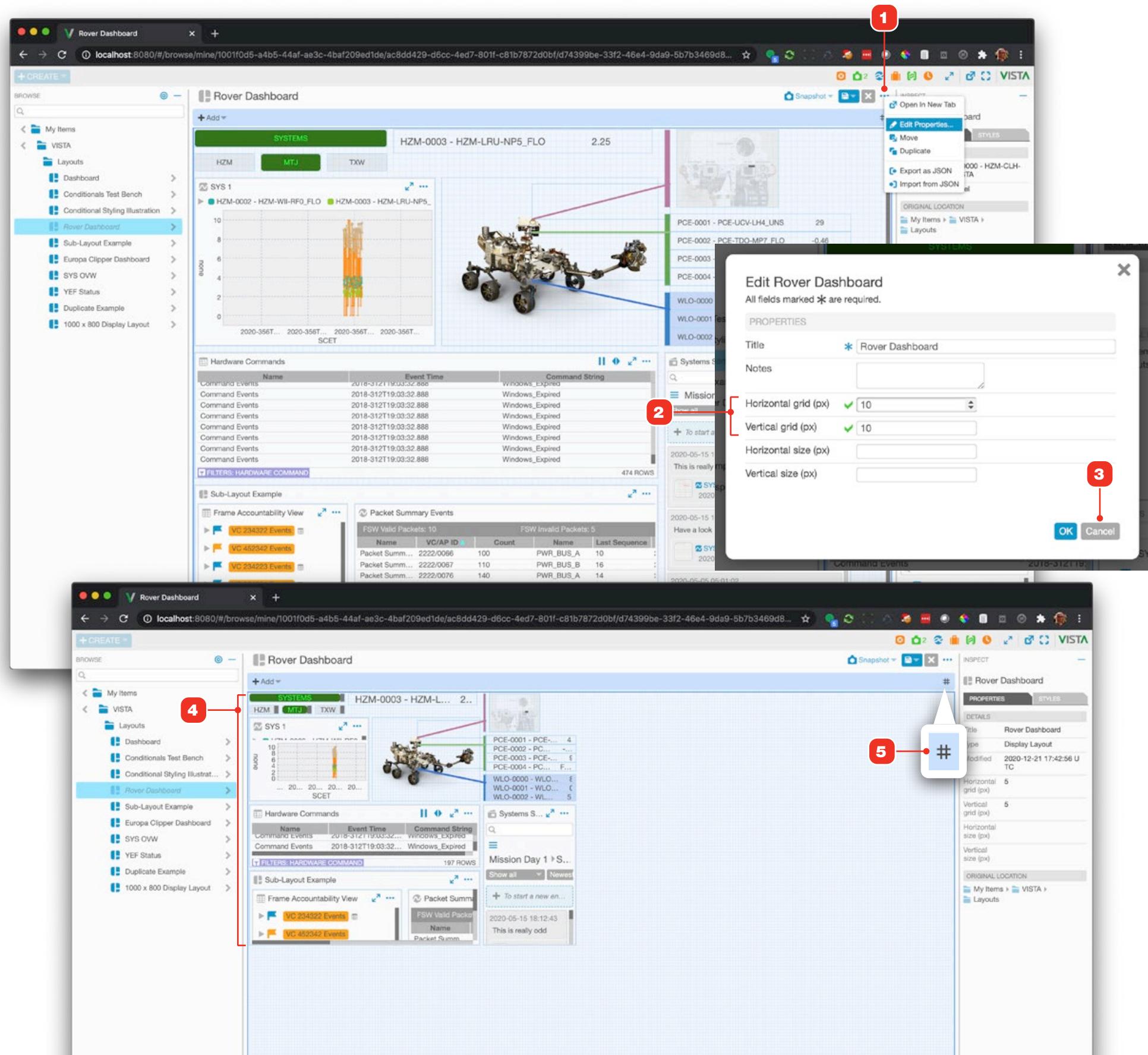


LAYOUTS

Using the Display Layout's Snapping Grid

Display Layouts use a grid that objects snap to when being repositioned and resized during editing. The grid is visible while editing, but is not displayed in browse mode. The default settings for this grid can be changed.

- 1 Right-click the Layout's context arrow and choose "Edit Properties..." from the context menu.
- 2 In the Layout Grid section of the Properties overlay, enter pixel values for the horizontal and vertical dimensions that you'd like.
- 3 Click "Ok" to save your settings.
- 4 Objects will maintain the same grid dimensions they had previously, but will scale up or down in size depending on how you changed the grid settings. In this example, a layout that was previously set to 10, 10 has now been changed to 5, 5, resulting in all objects scaling down.
- 5 You can toggle the display of the snapping grid by clicking this button. Note that snapping still functions even when the grid is hidden.



LAYOUTS

Flexible Layouts

A Flexible Layout uses a fluid sizing approach to displaying contained elements. Items placed in a Flexible Layout scale dynamically to fill the space available to them. Placed items are organized in either columns **1** or rows **2**. Flexible Layouts are ideal for displays that will be viewed in a variety of sizes, for example, in a desktop environment and mobile.

For more on Flexible Layouts versus Display Layouts, see "Layouts Overview" on page 104.

The image consists of two side-by-side screenshots of the VISTA user interface, demonstrating different flexible layout configurations.

Top Screenshot (Column Layout):

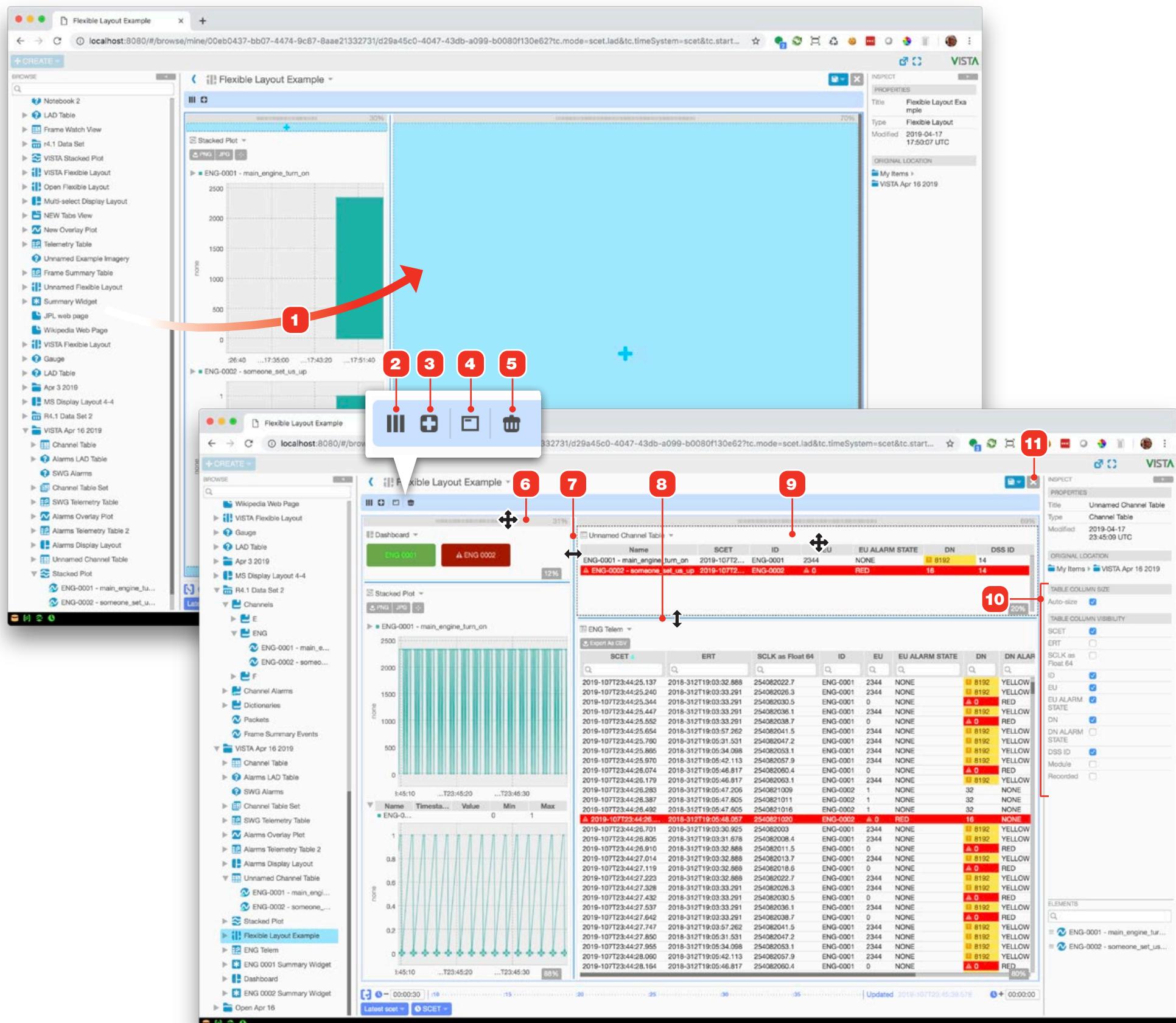
- Left Column:** Contains a sidebar with a "BROWSE" section listing various items like "Wikipedia Web Page", "VISTA Flexible Layout", "Gauge", "LAD Table", etc., and a "R4.1 Data Set 2" section with "Channels" expanded, showing categories E, ENG, F, Channel Alarms, Dictionaries, Packets, and Frame Summary Events.
- Right Column:** Contains a "Flexible Layout Example" window. It includes a "Dashboard" tab with two green buttons labeled "ENG 0001" and "ENG 0002". Below it is a "Stacked Plot" showing a signal over time. To the right is a "Table" titled "Unnamed Channel Table" with columns: Name, SCET, ID, EU, EU ALARM STATE, DN, DSS ID. It lists two entries: "ENG-0001 - main_engine_turn_on" and "ENG-0002 - someone_set_us_up". A red circle labeled **1** points to the column header "Name".
- Bottom Screenshot (Row Layout):**
- Left Column:** Same as the top screenshot's left column.
- Right Column:** Contains a "Flexible Layout Example" window. It includes a "Dashboard" tab with two buttons labeled "ENG 0001" and "▲ ENG 0002" (the latter with a red triangle icon). Below it is a "Stacked Plot" showing a signal over time. To the right is a "Table" titled "Unnamed Channel Table" with columns: Name, SCET, ID, EU, EU ALARM STATE, DN. It lists two entries: "ENG-0001 - main_engine_turn_on" and "ENG-0002 - someone_set_us_up". A red circle labeled **2** points to the row for "ENG-0002 - someone_set_us_up".

LAYOUTS

Edit a Flexible Layout

For information on editing objects in general, see "Creating A New Object" on page 65.

- 1 Add objects to a Flexible Layout by dragging from the Object Tree. When dragging an object, valid drop areas will highlight as shown in blue.
- 2 To toggle the layout from columns to rows, click this button.
- 3 To add a container, click this button.
- 4 To hide a selected item's frame, click this button. For more details on frame visibility, see "Layout Editing and Styling Controls" on page 112.
- 5 Delete a selected item or container by selecting it, then clicking this button.
- 6 To reorganize containers, click and drag its header.
- 7 The relative size of containers can be adjusted by dragging their resize handles.
- 8 The relative size of an object within a container can be adjusted by dragging its resize handle.
- 9 To move an object, click to select it, then drag it.
- 10 Properties of selected items can be edited in the Inspector panel.
- 11 Click "Save" when you're done editing.



CONDITION SETS

Condition Sets Overview

Condition Sets allow you to define one or more conditions that progressively evaluate contained telemetry channels' current values in real-time, and output a result that can be used in a variety of different ways, including dynamically styling a wide variety of objects and acting as a telemetry output point itself.

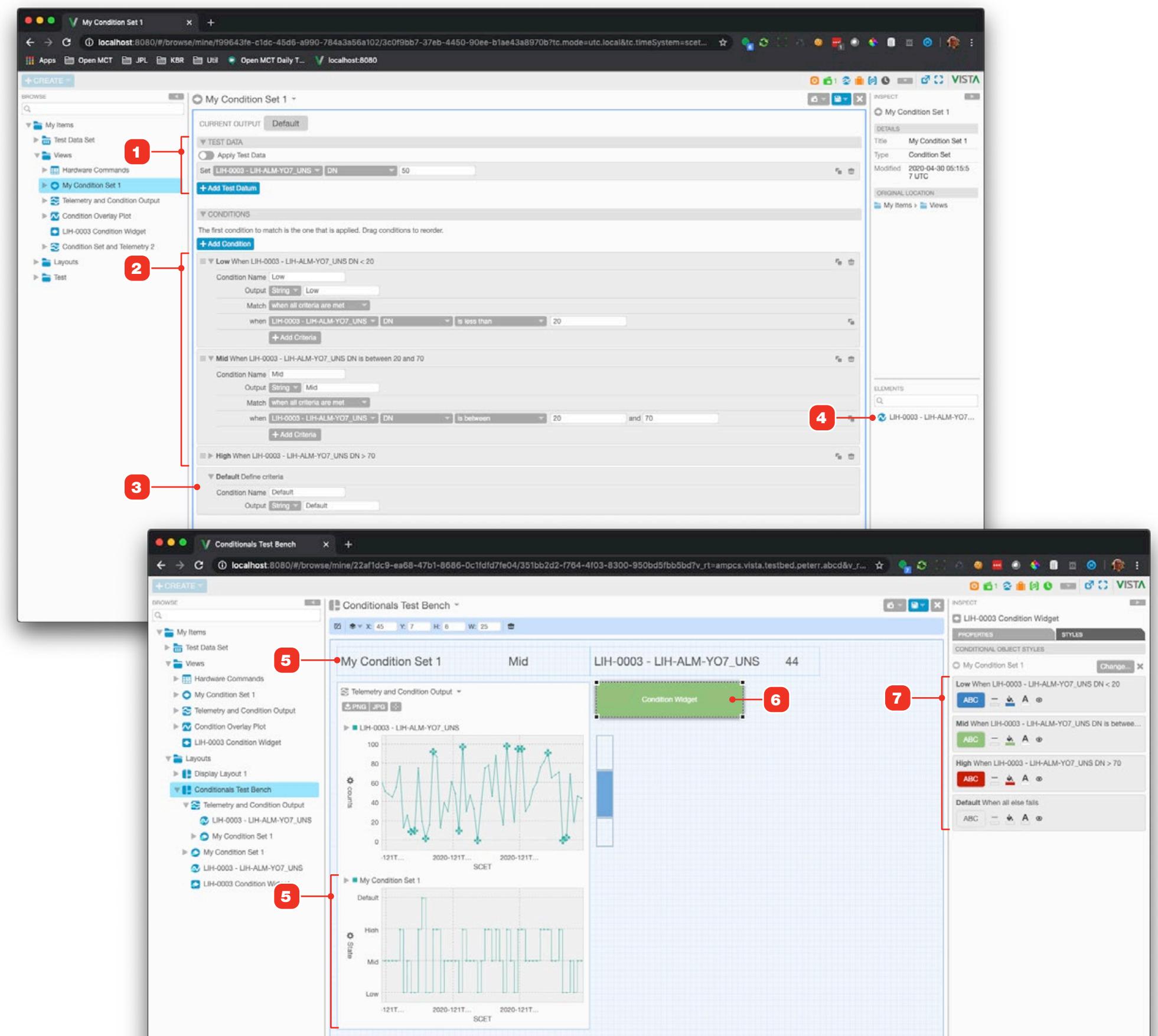
Condition Sets in concert with Condition Widgets will replace Summary Widgets; Summary Widgets will be deprecated in a future release. See "Condition Widgets" on page 126 for more information.

Examples include:

- Set the background color of an object like a plot, table or Condition Widget to a warning color when a value exceeds a limit or is within a range.
- Show a different image in a Display Layout based on the state of a telemetry element, like a switch being open or closed.
- User-created enumerated telemetry, such as evaluating a numeric telemetry element and outputting LOW, NORMAL and HIGH string values based on numeric criteria evaluations.

For more on conditional styling capabilities, see "Styling An Object With Conditional Styling" on page 71.

- 1 Test Data allows the manual forcing of telemetry data values to test condition evaluation logic.
- 2 A Condition Set includes one or more conditions that are evaluated from the top down - the first condition that matches "wins" and halts evaluation until new data is received. If no conditions match, then the bottom-most default condition 3 wins.
- 4 Condition Sets can evaluate one or more telemetry channels. Evaluations occur every time new data is received for included channels.
- 5 Condition Sets output telemetry and their values can be visualized as alphanumerics, plots and tables. Condition Sets can even be used as a telemetry input to another Condition Set.
- 6 Condition Sets can be used to dynamically style many different types of elements 7. Each defined condition can apply unique fill, border, text color, image URL and even visibility to objects.

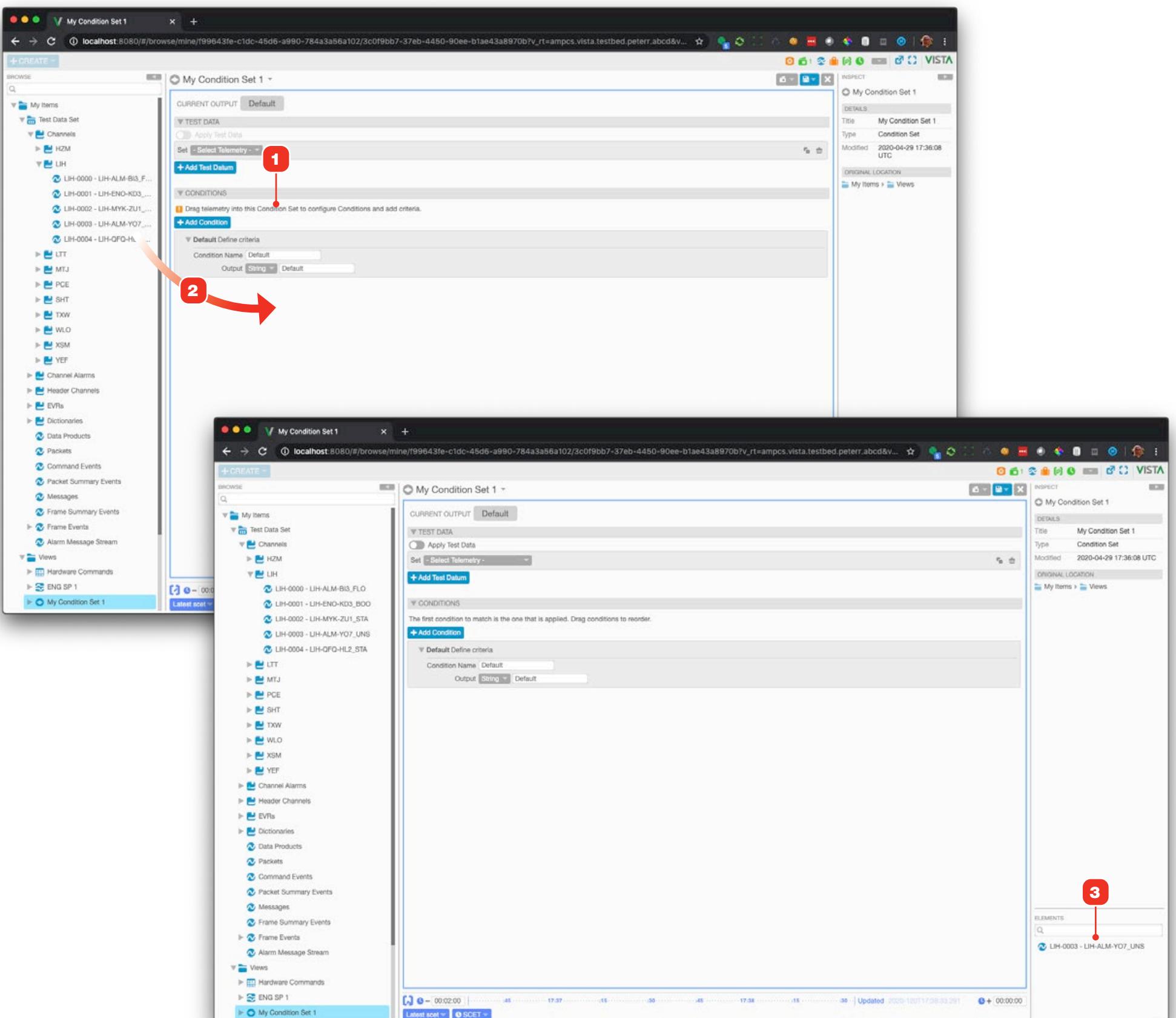


CONDITION SETS

Creating a New Condition Set

For general information on editing objects, see "Creating A New Object" on page 65.

- 1 A Condition Set must have at least one telemetry channel order to configure it.
- 2 Drag a telemetry channel from the tree anywhere into the edit interface.
- 3 Once a telemetry channel has been added, you can begin configuring the set. See "Conditions" on page 121.

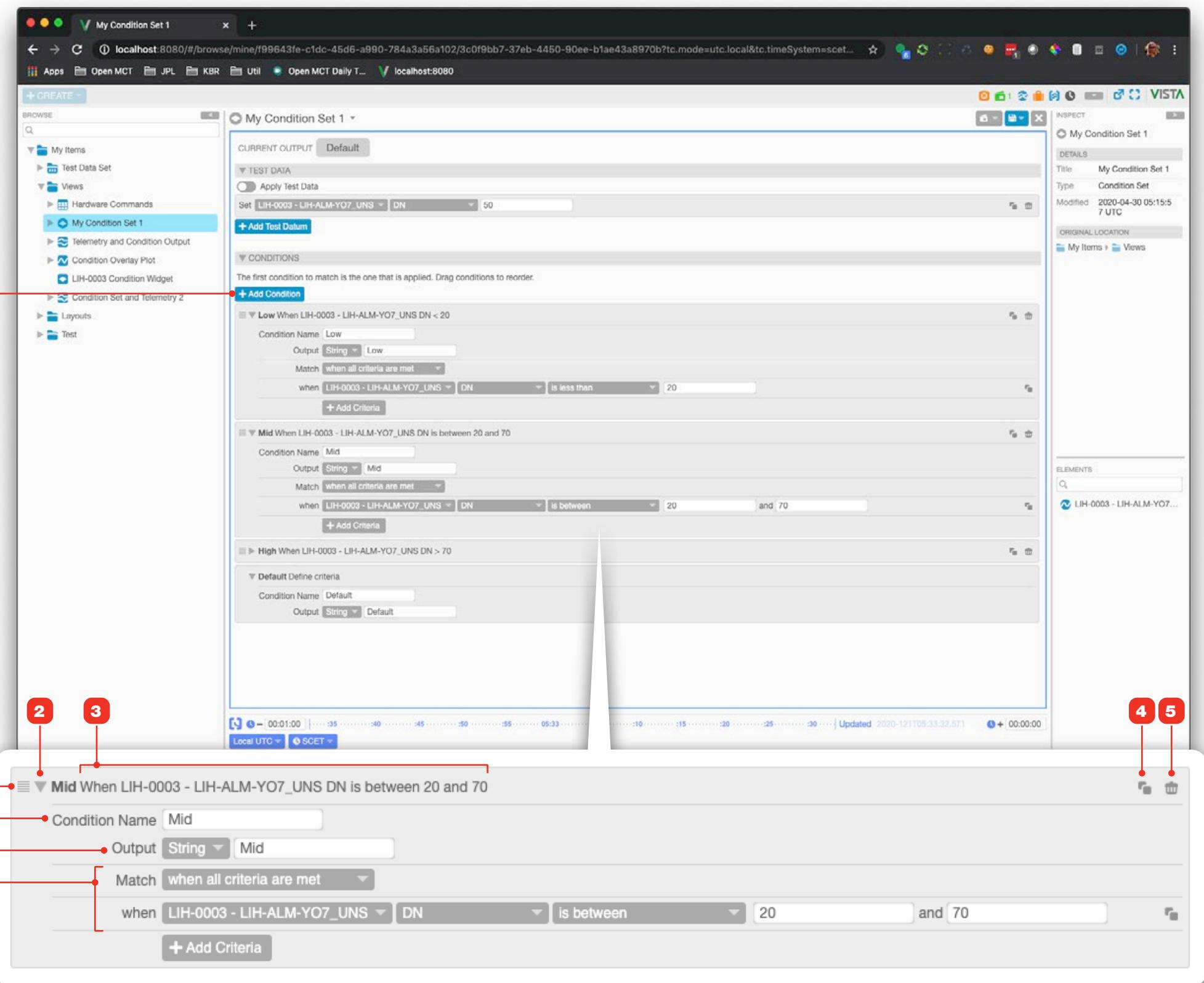


CONDITION SETS

Conditions

Each condition in a Condition Set consists of matching criteria and an output. Conditions are evaluated from the top down; the first condition that matches "wins" and the set outputs that condition's value. If no conditions match, then the default condition 9 wins.

- 1 Click "Add Condition" to add and configure more conditions. Add as many conditions as needed to create unique outputs.
- 2 Expands and collapses the associated condition to allow space to be saved when needed.
- 3 Summary of the condition's criteria. Dynamically updates as criteria are edited.
- 4 Duplicates the associated condition.
- 5 Deletes the associated condition.
- 6 Click here to drag a condition to reorder it in the list of conditions. Note that the default condition 9 must always remain last, and conditions cannot be dragged beneath it.
- 7 The name of the condition.
- 8 The Condition Set's output value when a given condition is matched. Can be boolean (true or false) or a string.
- 9 One or more criteria within a given condition. See "Working With Condition Criteria" on page 122.



CONDITION SETS

Working With Condition Criteria

Each condition has one or more criteria that you configure with a menu-based interface.

- 1** Adds a new criteria.
- 2** Duplicates the associated criteria.
- 3** Deletes the associated criteria.
- 4** **Criteria Relationship:** define the evaluation context for your criteria.

Setting	Effect
any criteria is met	Logical OR. Causes the condition to match as soon as any one criteria is met in this condition.
all criteria are met	Logical AND. All criteria must be met in this condition in order for it to match.
when no criteria are met	Logical NOT. The condition will match if none of the criteria are met; if a single criteria is met then the condition will not match.
when only one criteria is met	Logical XOR. Causes the condition to match when at least and only one of its criteria are met; if no criteria are met or more than one criteria is met, the condition will not match. When only one criteria is defined, this is functionally equivalent to "any criteria is met" and "all criteria are met".

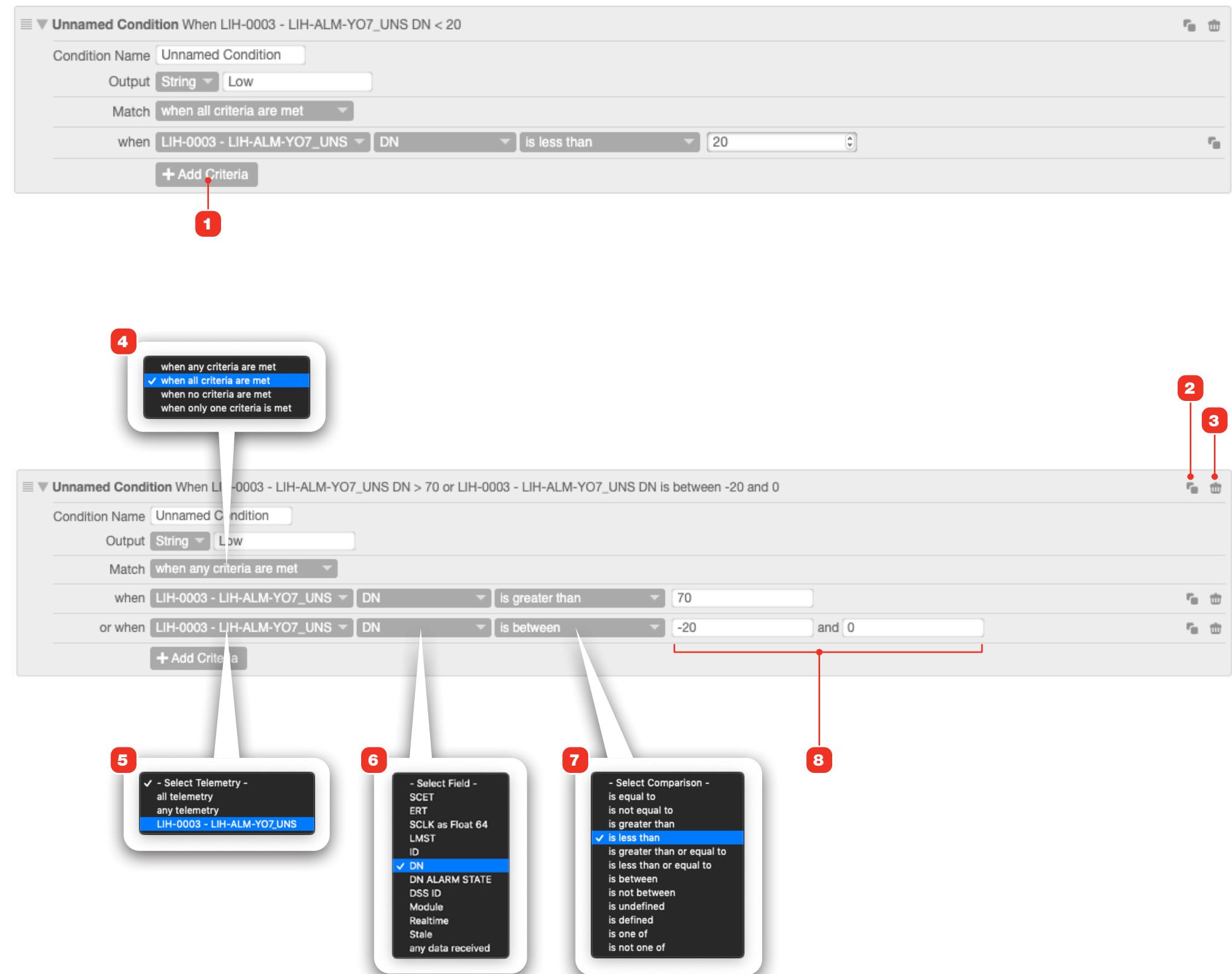
- 5** **Telemetry:** define which telemetry should be evaluated in the criterion.

Setting	Effect
all telemetry	Current values from <i>all</i> telemetry included in the Condition Set must meet the particular criterion.
any telemetry	Current values from <i>any one</i> of the telemetry included in the Condition Set must meet the particular criterion.
<specific telemetry channel>	Current values from the specified telemetry must meet the particular criterion.

- 6** **Field:** allows selection of the field to evaluate, based on the choice in **2**. If multiple telemetry is included in the Condition Set, and those telemetry have different fields, the union of fields will be presented. You can also test if any data has been received in a timeframe for the selected channel(s) from **5**.

- 7** **Comparison:** available comparisons based on the type of field chosen in **3**. Numeric, string and boolean field types all include different comparators and this menu will change accordingly.

- 8** **Comparison value fields:** inputs for matching criteria values based on the choice in **4**. Some comparisons, such as "is defined" do not require a value input; in that case fields will not be displayed here.

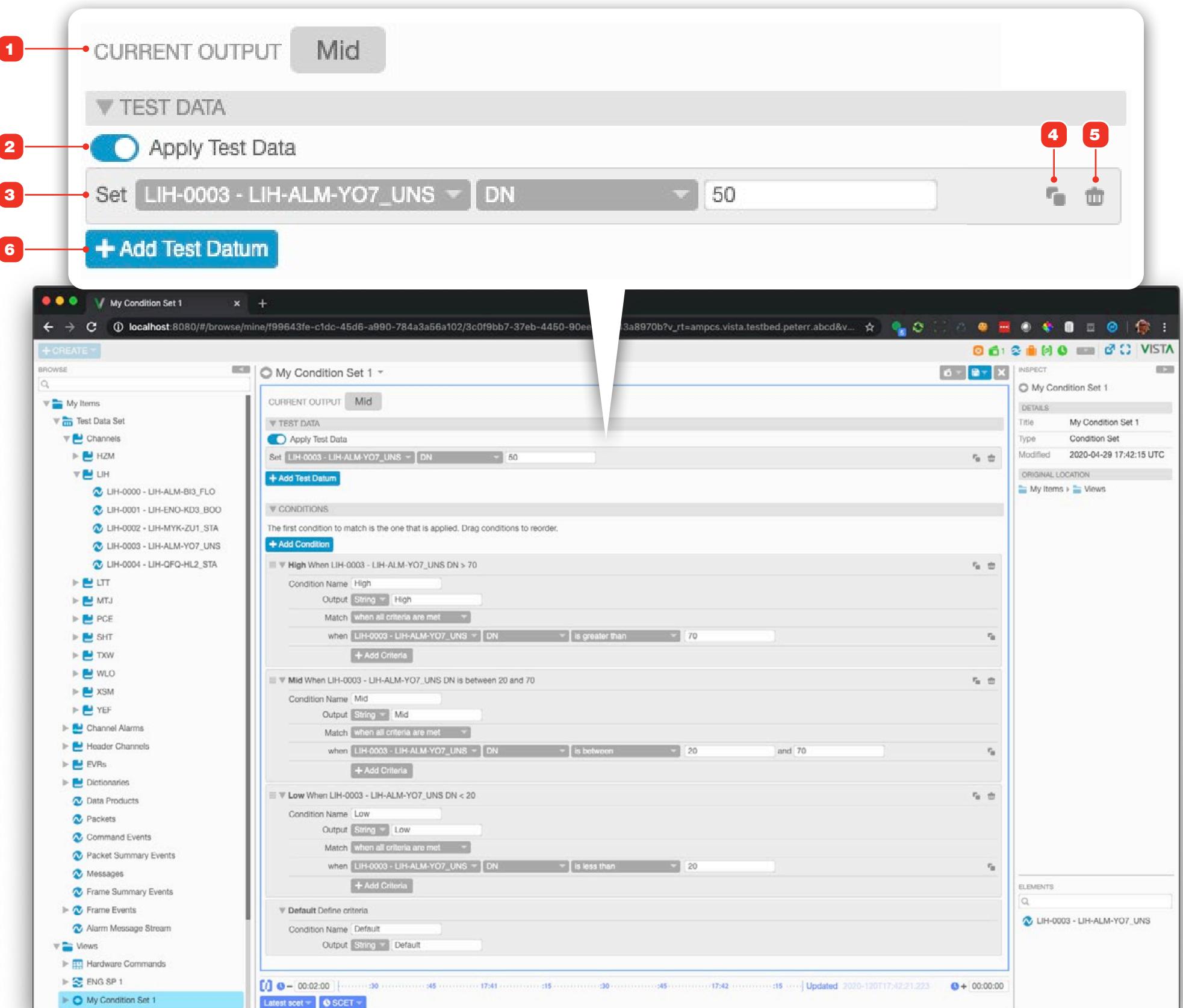


CONDITION SETS

Using the Test Data Capability In a Condition Set

By default, a Condition Set uses the current values of included telemetry to evaluate its output. You can use Test Data to manually force a value for one or more included telemetry channels in order to evaluate the configuration of your conditions. You can add multiple test datums to set values for one or more fields and telemetry channels included in the Condition Set.

- 1 The current output of the set based on the currently matching condition.
- 2 When "Apply Test Data" is enabled the Condition Set ignores the real values of included telemetry and only uses values defined in the Test Data section. Test Data is only applied while editing a Condition Set when this control is enabled.
- 3 Sets the telemetry channel, field and value to apply. The Condition Set will dynamically match against values as they are entered.
- 4 Duplicates the associated test datum.
- 5 Deletes the associated test datum.
- 6 Adds additional test datums.

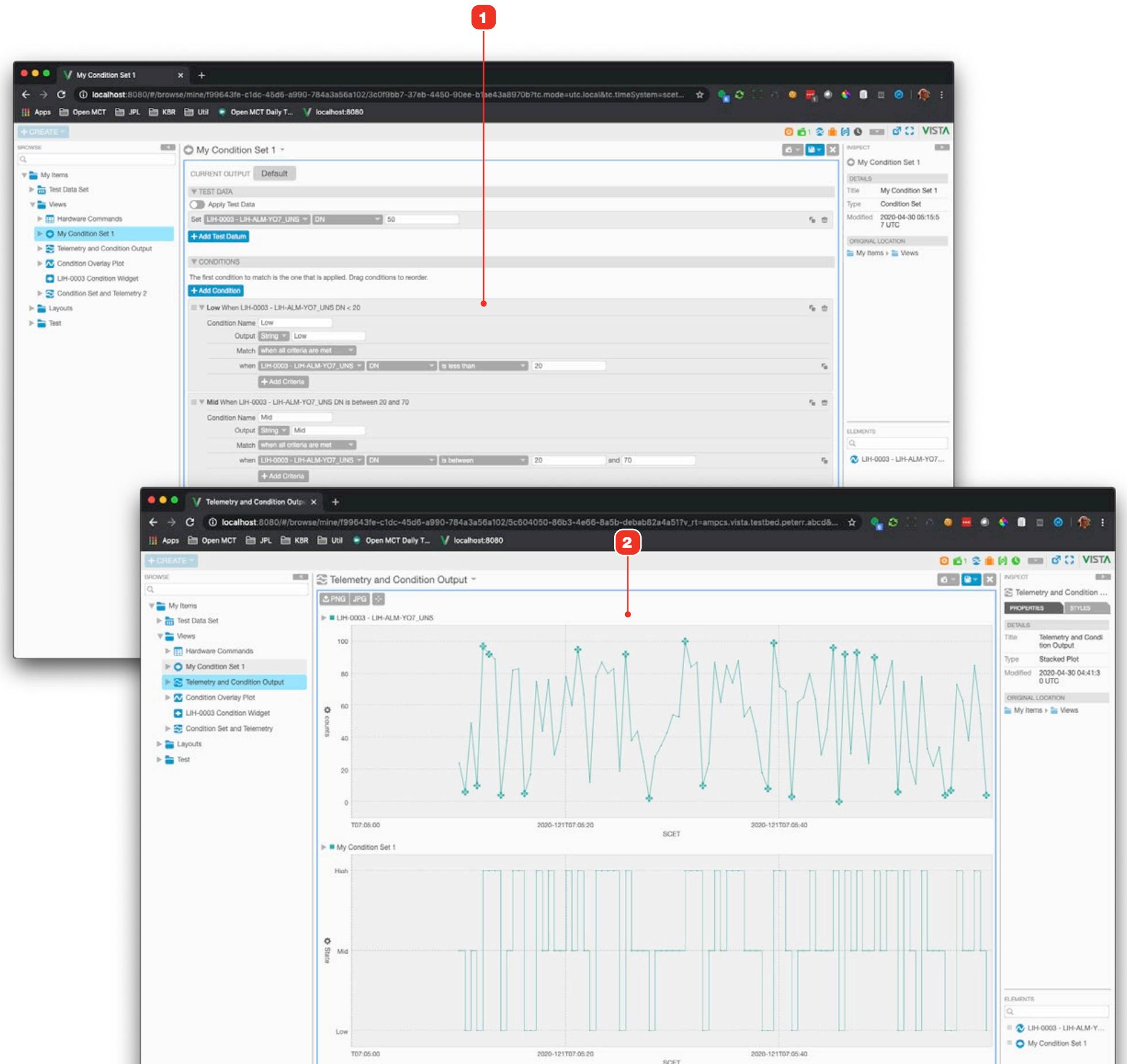


CONDITION SETS

Using a Condition Set as Telemetry

A Condition Set outputs values as a result of its condition evaluation, and can be used in the same ways that telemetry channels can. Setting evaluation criteria at the proper values would allow you to create your own enumerated telemetry.

- 1 This Condition Set has three conditions that output high, mid and low strings respectively based on numeric criteria applied to a telemetry channel.
- 2 The channel and the Condition Set plotted together in a Stacked Plot for comparison.

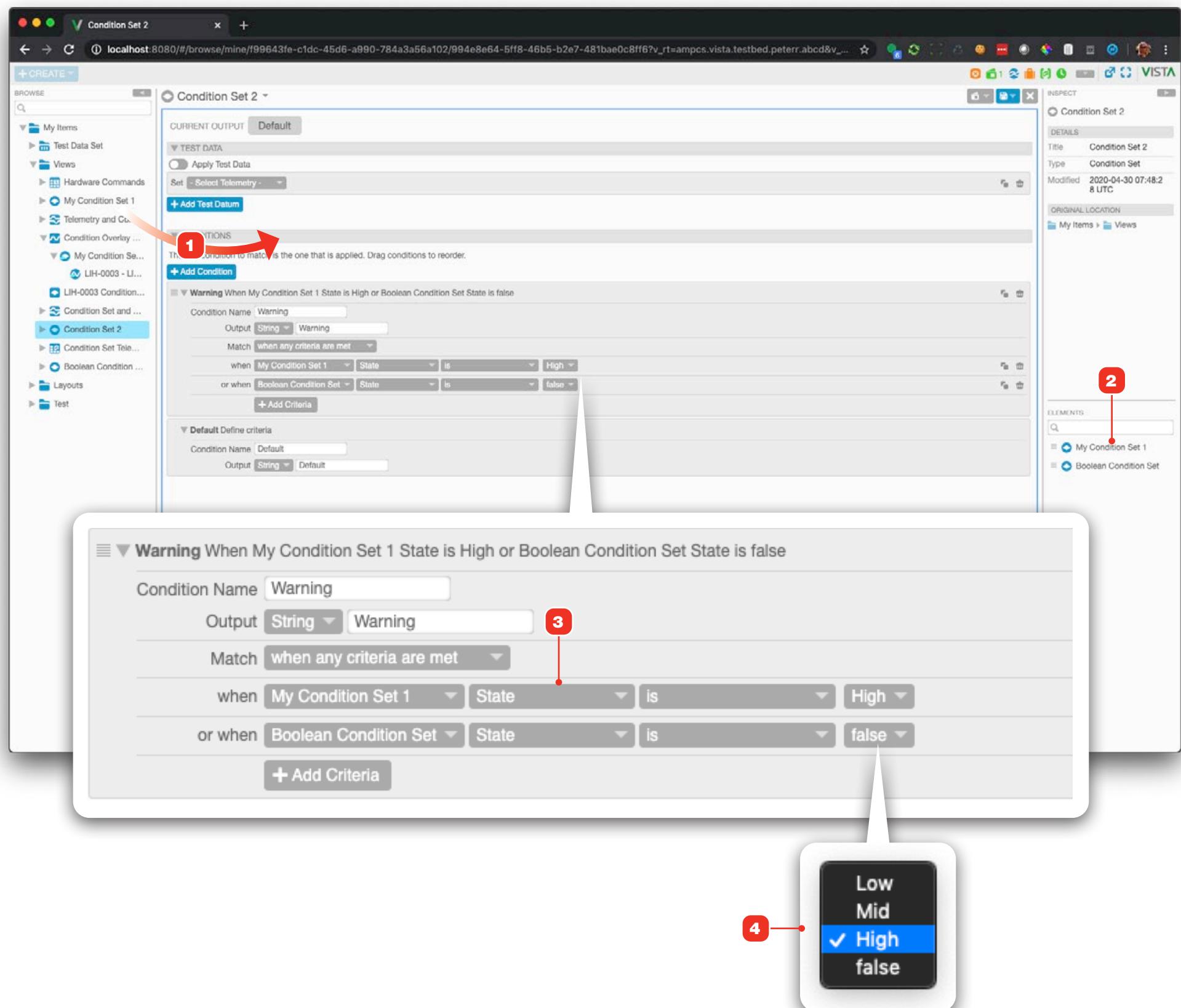


CONDITION SETS

Using a Condition Set As An Input Within Another Condition Set

Because Condition Set outputs are treated as telemetry, one Condition Set can use one or more other Condition Sets as telemetry inputs in the same ways that telemetry channels can be. Using them in this way, for example, might let you build chains of layered Condition Sets in order to do rollup assessments of hierarchical systems.

- 1 Drag a Condition Set into the edit area of the set that you're editing to add it as a telemetry input **2**.
- 3 Using the "State" field of the Condition Set allows you to see a list **4** of all available outputs for all included Condition Sets.



CONDITION WIDGETS

Condition Widgets

Condition Widgets **1** are designed to use Condition Sets and conditional styling to let you create dynamic status rollup indicators that visually change based on real-time evaluated channel values. Condition Widgets can link to any URL including other VISTA displays.

Condition Sets in concert with Condition Widgets will replace Summary Widgets; Summary Widgets will be deprecated in a future release. See "Condition Sets Overview" on page 119.

The screenshot shows the VISTA software interface with the following components:

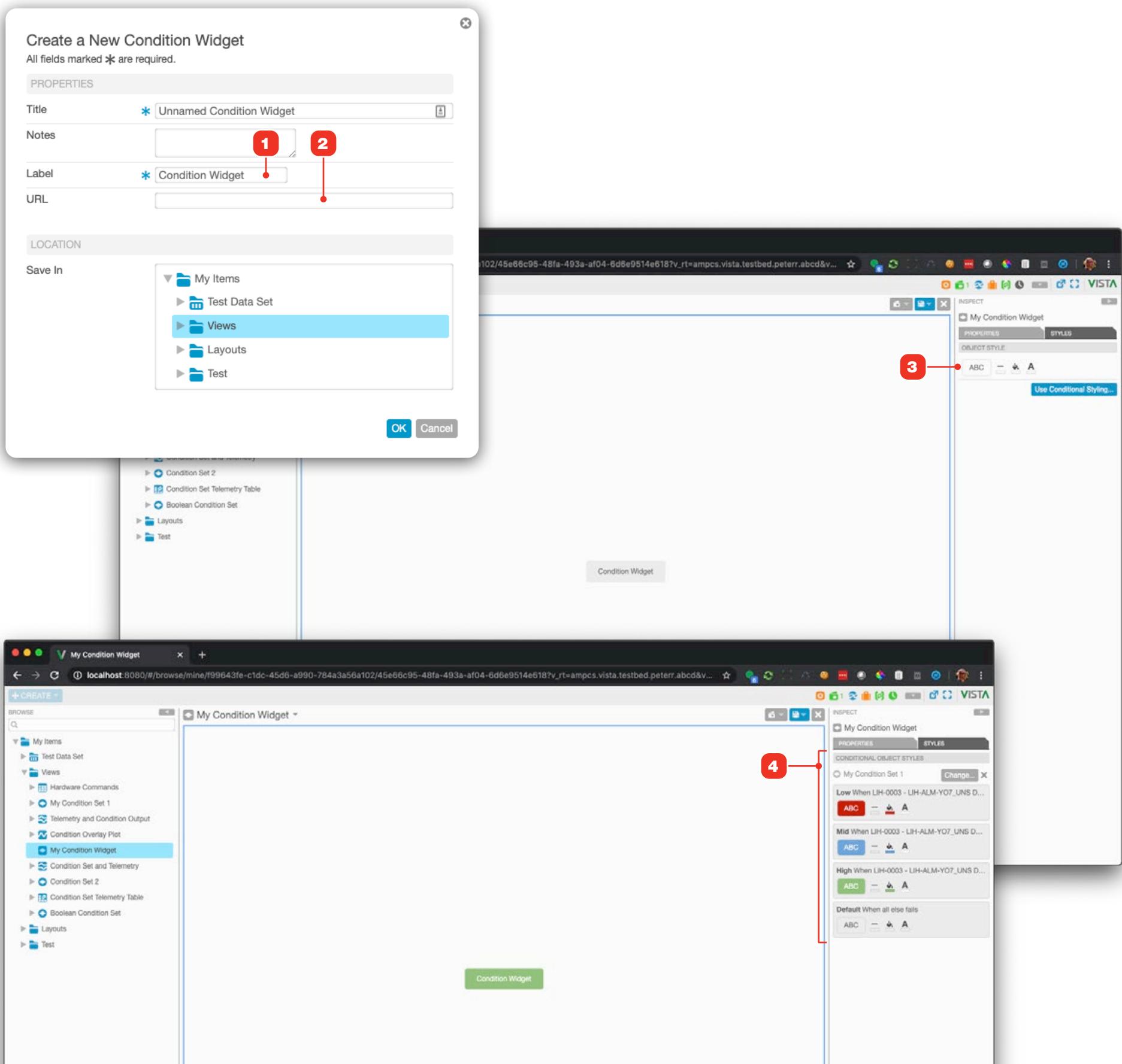
- Dashboard Browser:** On the left, a tree view titled "BROWSE" shows items like "My Items", "Test Data Set", "Views", "Hardware Commands", "My Condition Set 1", "Telemetry and Condition Output", "Condition Overlay Plot", "My Condition Widget", "Condition Set and Telemetry", "Condition Set 2", "Condition Set Telemetry Table", "Boolean Condition Set", "Condition Rollup Example", "H2M Channel Table", "H2M Channel Table", "Layouts", "Dashboard" (which is selected), "Hardware Commands", "Test", and "Conditions Test Bench". A red circle labeled "1" is drawn around the "Condition Widget" item under "My Condition Set 1".
- Data Tables:** Several data tables are displayed in the main area:
 - H2M Channel Table:** Shows rows for H2M-0000 through H2M-0004 with columns: Name, SCET, ERT, ID, EU, DN, DSS ID, DN ALARM STATE, EU ALARM STATE.
 - MTJ Channel Table:** Shows rows for MTJ-0000 through MTJ-0002 with columns: Name, SCET, ERT, ID, EU, DN, Enum, DSS ID, DN ALARM STATE, EU ALARM STATE.
 - Hardware Commands:** Shows rows for various flight-core sessions with columns: Event Time, Session Id, Session Host, Request Id, Status, Command Str, Scmf File, Original File, Fail Reason, Checksum, Total Citus, Duration.
- INSPECT Panel:** On the right, the "INSPECT" panel is open, showing "H2M" and "CS.H2M" sections. It includes "CONDITIONAL OBJECT STYLES" for "Off-Nominal When Any telemetry dn is def...", "Nominal When Any telemetry dn is def...", and "Unhandled state When all else fails".
- Time Controls:** At the bottom, there are time controls for "Local UTC" and "SCET", and a timestamp "Updated 2020-121T20:41:19.437".

CONDITION WIDGETS

Creating a Condition Widget

For general information on editing objects, see "Creating A New Object" on page 65.

- 1 Controls what is displayed in the widget itself 2.
- 2 To make the widget into a clickable button, enter any URL (including other displays within the application) here.
- 3 You can static style your widget here, or use a Condition Set to conditionally style 4 your widget. For more info, see "Condition Sets Overview" on page 119.

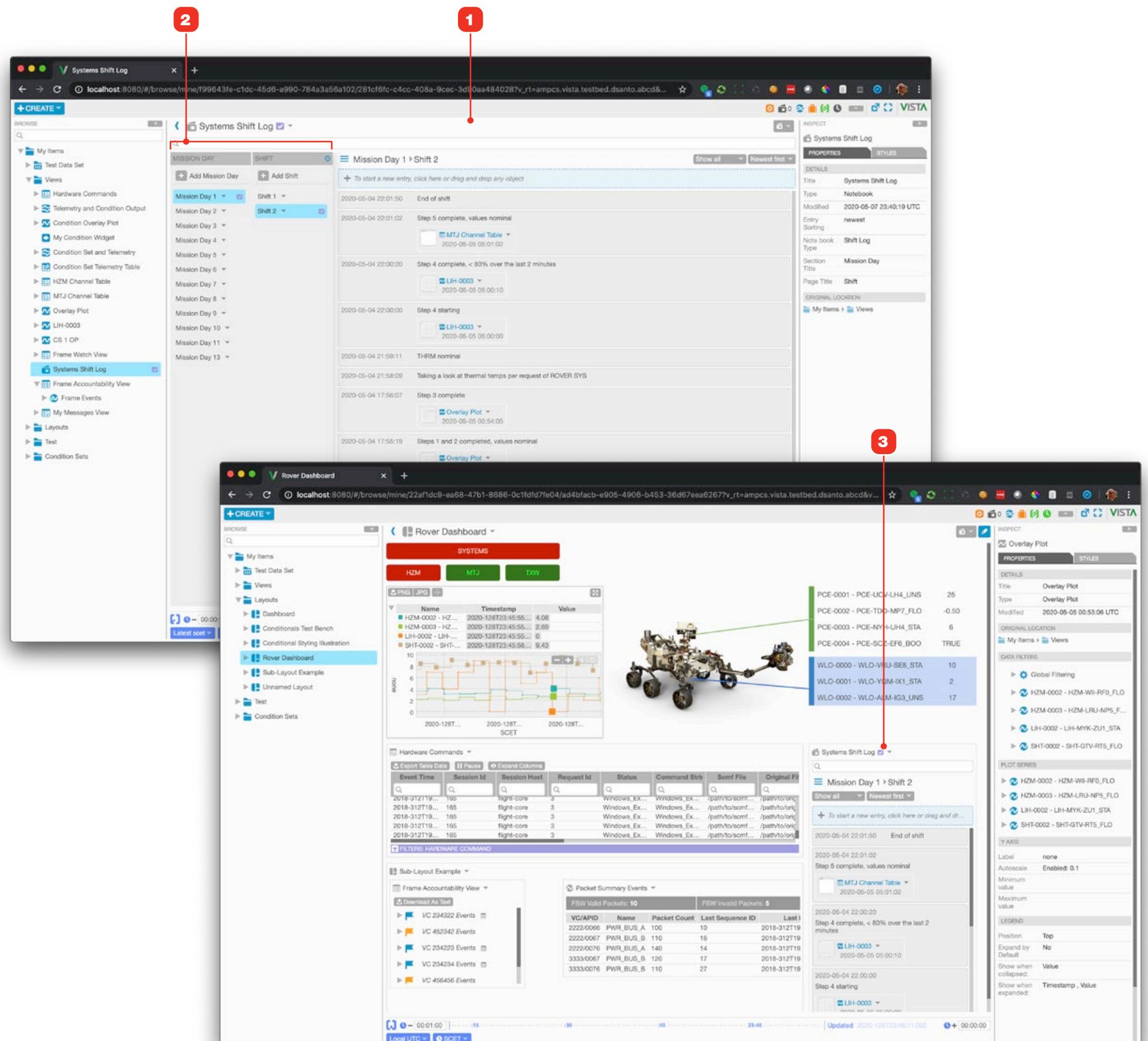


NOTEBOOK

Notebook

The Notebook provides a flexible way for you to save notes or create a shift log. Entries are automatically time-stamped and can include annotated screenshots of any view in the application. Customizable sectioning and page names let structure the Notebook to your needs.

- 1 Notebook in the main view.
- 2 Notebooks include sections and pages. The names of sections and pages can be customized, shown here as "Mission Day" and "Shift" respectively. You can add as many sections as you like, and each section can have an unlimited number of pages.
- 3 Notebook placed in a Display Layout. The Notebook is fully functional in this context: you can add new entries, add Snapshots and navigate within it.



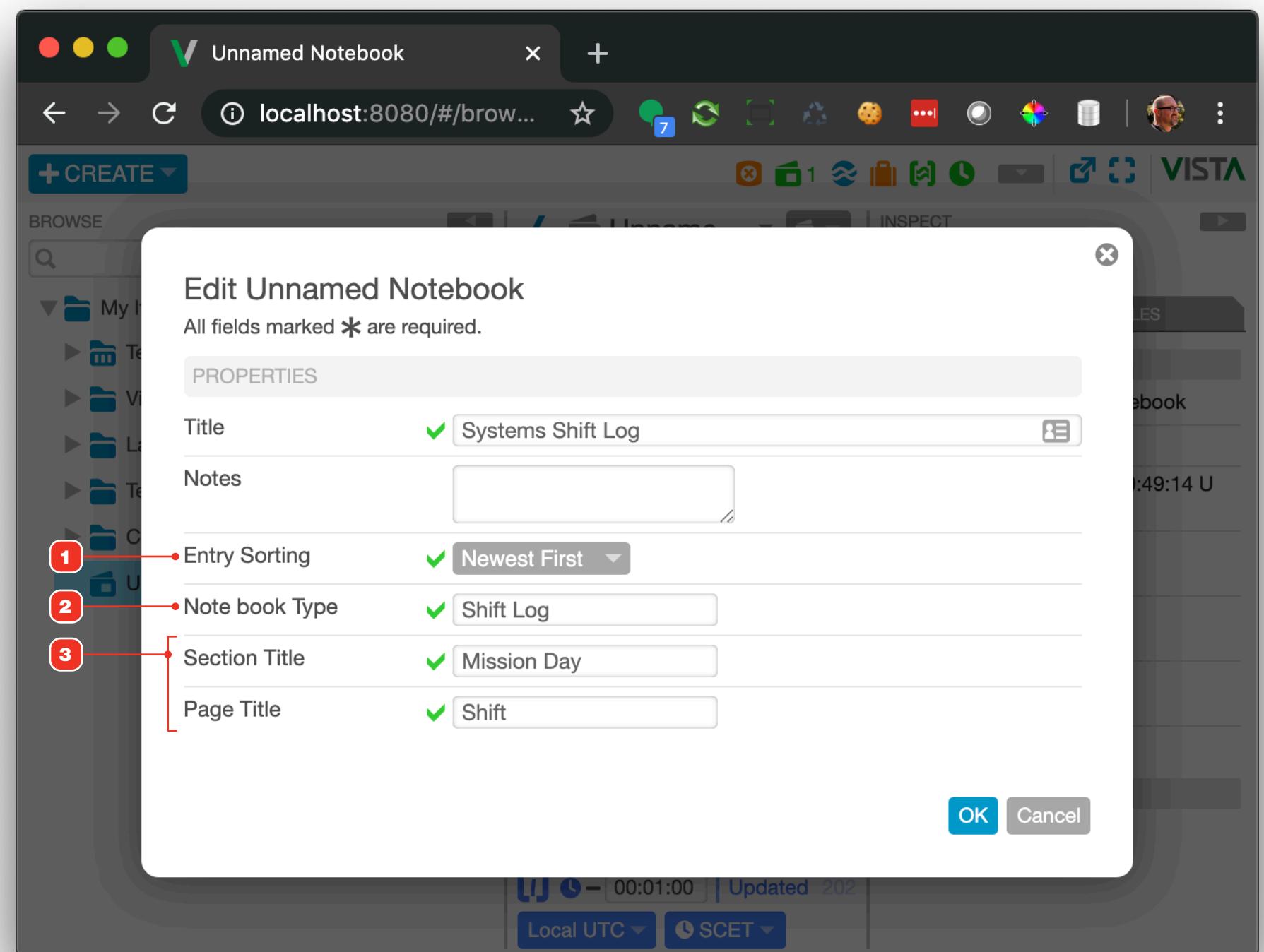
NOTEBOOK

Creating a New Notebook

For general information on editing objects, see "Creating A New Object" on page 65.

There are a number of options available to customize your Notebook:

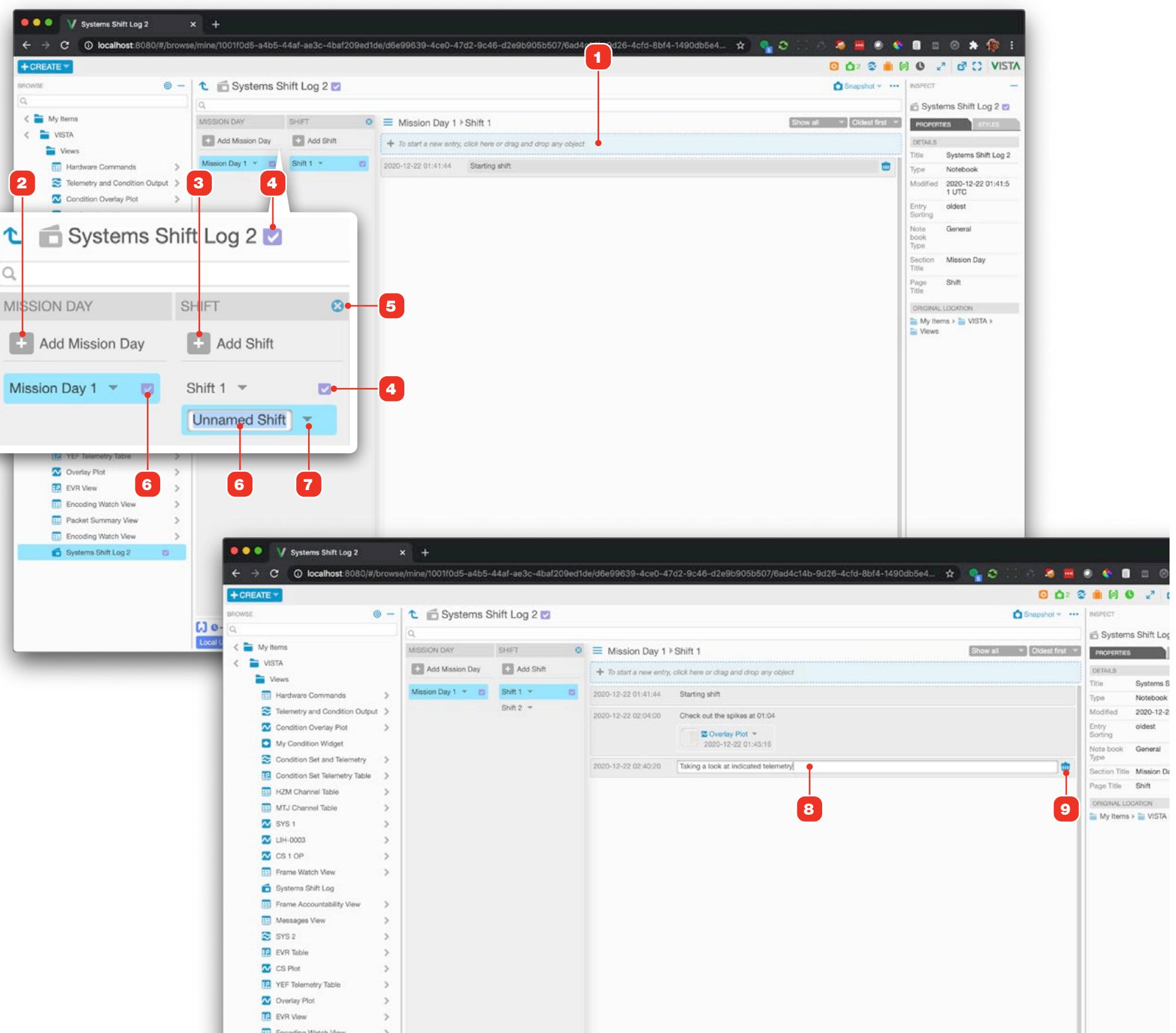
- 1 Set the default method by which entries are sorted for display.
- 2 Categorize Notebook. This information appears in metadata for the Notebook.
- 3 Customize the name of sections and pages to fully fit the Notebook to your particular usage.



NOTEBOOK

Working with the Notebook

- 1 Click the new entry area to add a new entry to this Notebook.
- 2 Click to add a new section.
- 3 Click to add a new page.
- 4 The latest page and section to receive an entry automatically becomes the designated location for new Notebook Snapshots and is marked with this icon. See "Taking and Adding Snapshots to the Notebook" on page 131.
- 5 Click to toggle the display of the navigation pane.
- 6 To rename a page or section, select it, then click it again. The name will become editable - enter a new name, then tab or click away to save the change.
- 7 Pages and sections can be deleted by clicking the associated menu arrow and selecting the Delete option from the resulting menu. Deleting a section will also delete all its pages.
- 8 Enter text for an entry, then tab or click away to save the change.
- 9 Entries can be deleted by hovering over the entry and clicking its associated trash can.

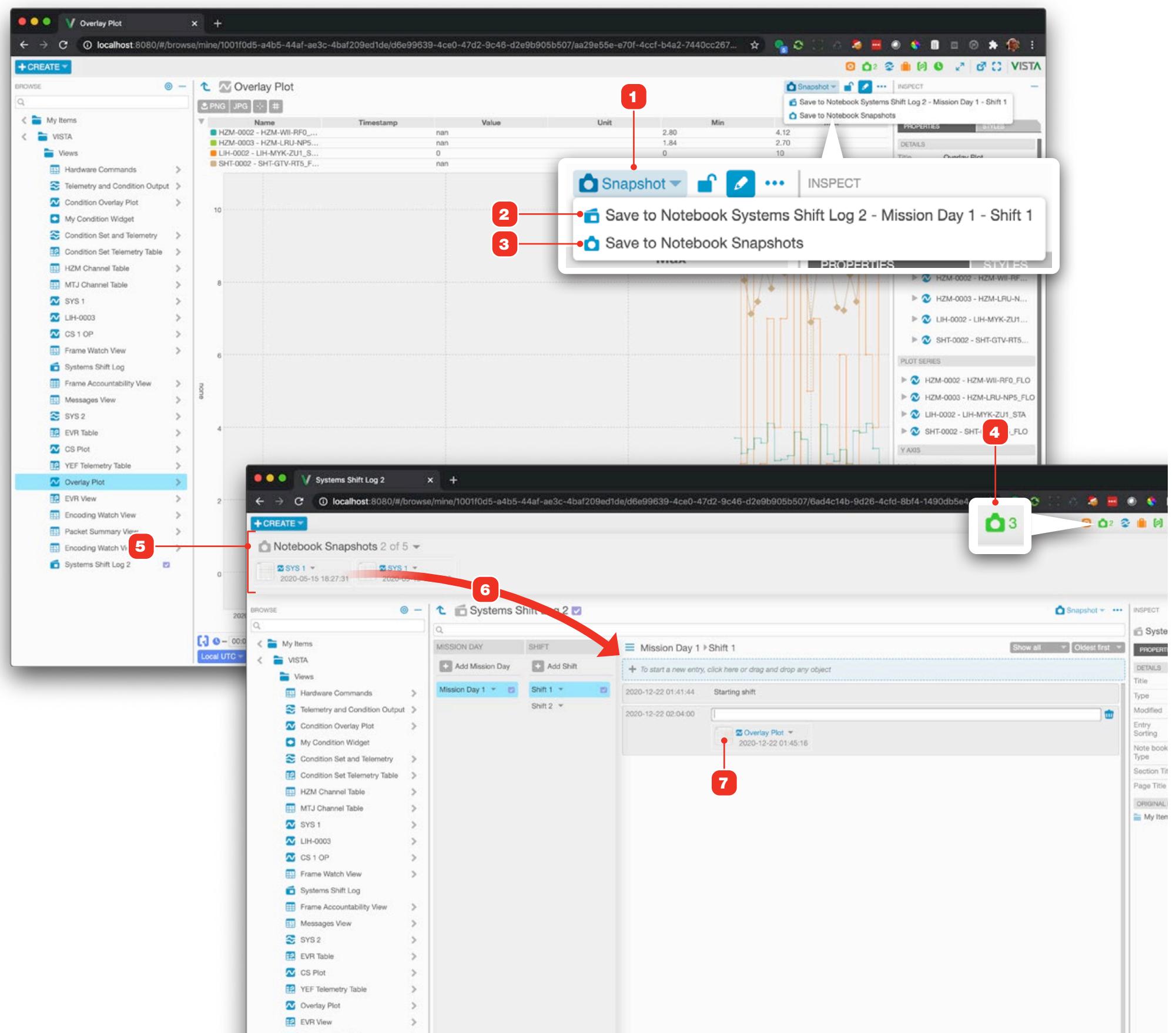


NOTEBOOK

Taking and Adding Snapshots to the Notebook

The application's Snapshot feature allows you to capture screenshots of any view and quickly save them to a Notebook or the Snapshots holding area.

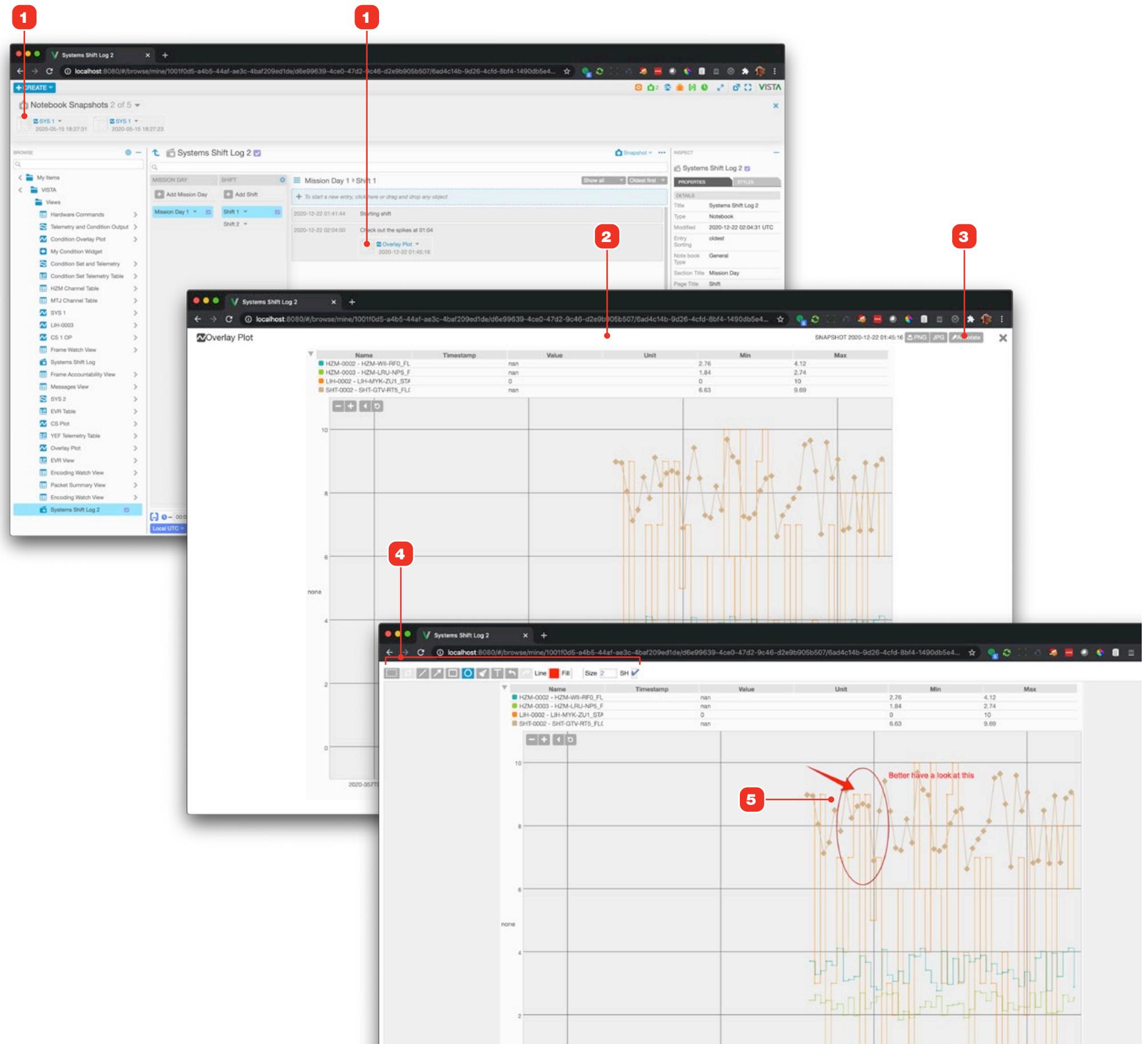
- 1 Click the view's Snapshot menu button to display the Snapshot menu.
- 2 The most recent Notebook's section and page that has had an entry made in it will be designated as the default location for new Snapshots and displayed here as an optional save location.
- 3 You can save a Snapshot to the Snapshots holder area **5**.
- 4 When the Snapshots holder area has at least one Snapshot in it, the Notebook notifier in the Status area will change color and show you the number of Snapshots it contains. Hovering over it displays a menu that allows you to show or hide the Snapshots holder **5**.
- 5 The Snapshots holder can hold up to five Snapshots.
- 6 Drag Snapshots onto a Notebook's new entry area, or any existing entry. Once a Snapshot is moved into a Notebook entry, it is removed from the Snapshot holder area.
- 7 Snapshots appear as embedded elements in Notebook entries. A Notebook entry can contain any number of embedded Snapshots.



NOTEBOOK

Working with Notebook Snapshots

- 1 Click a Snapshot thumbnail to view it expanded 2.
- 3 When viewing a Notebook Snapshot, you can annotate it by clicking the Annotate button.
- 4 Drawing tools let you add shapes and text to the Snapshot.
- 5 Annotations, once saved, are permanently added to the image.

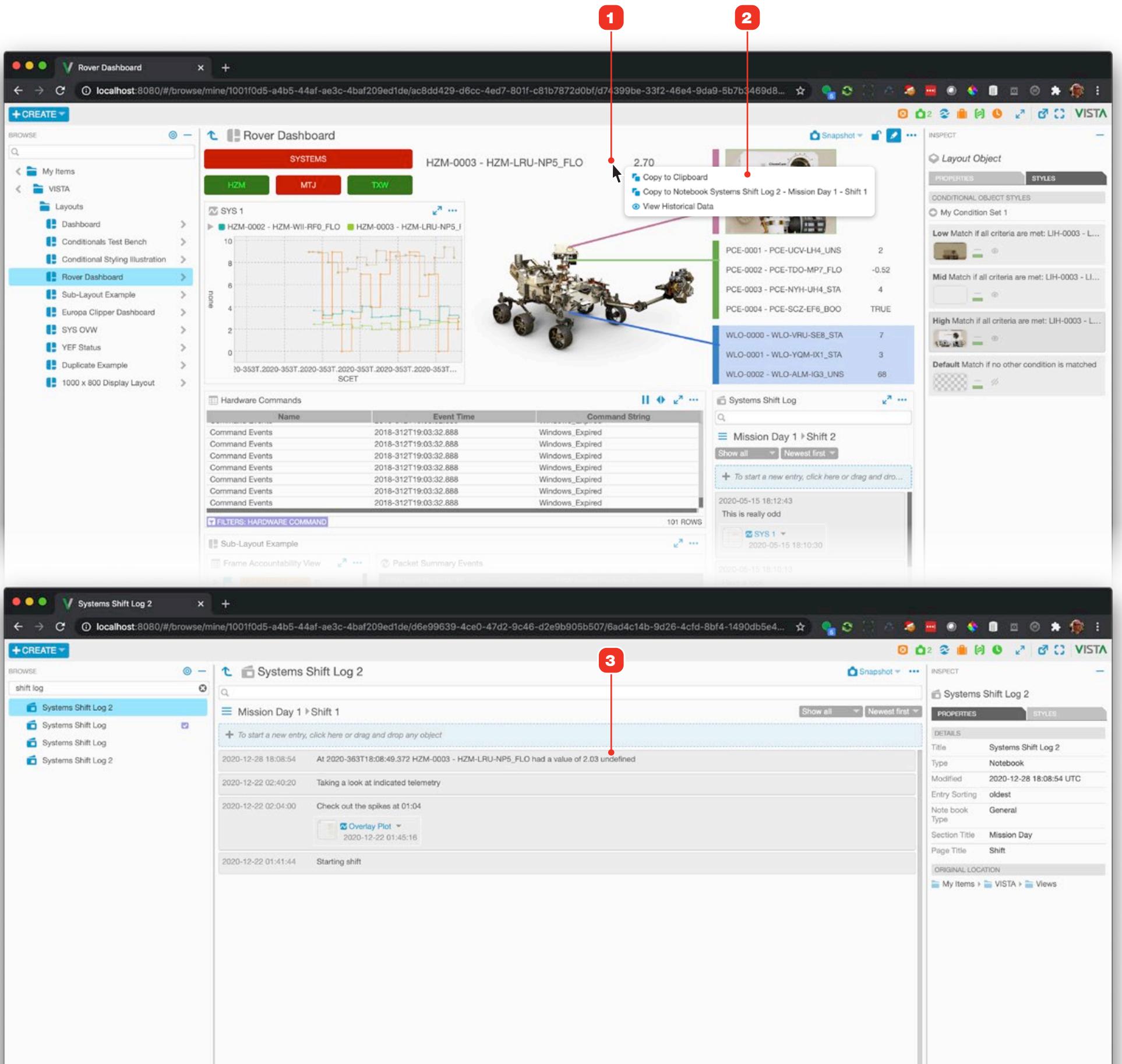


NOTEBOOK

Capturing Data Into a Notebook Entry

You can directly capture current data from a Display Layout's alphanumeric displays directly into a Notebook entry.

- 1 Context-click any alphanumeric display in a Display Layout.
- 2 From the resulting menu, you can copy the current value to the clipboard, or to the default Notebook section and page as a new entry.
- 3 Captured values are added to the Notebook with a timestamp, channel identifier, value and unit type (if available).

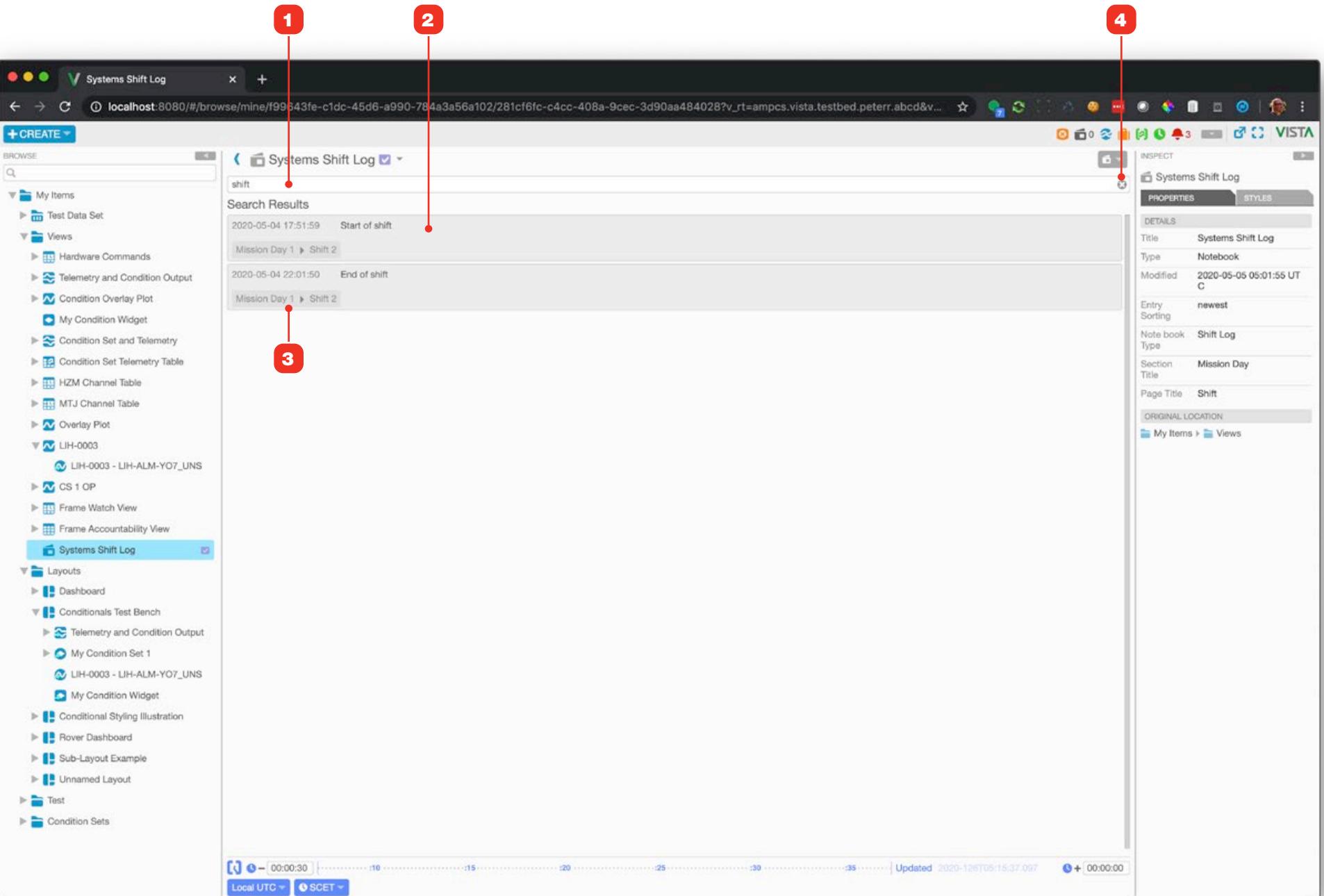


NOTEBOOK

Searching within a Notebook

Notebooks provide the ability to search within a single Notebook.

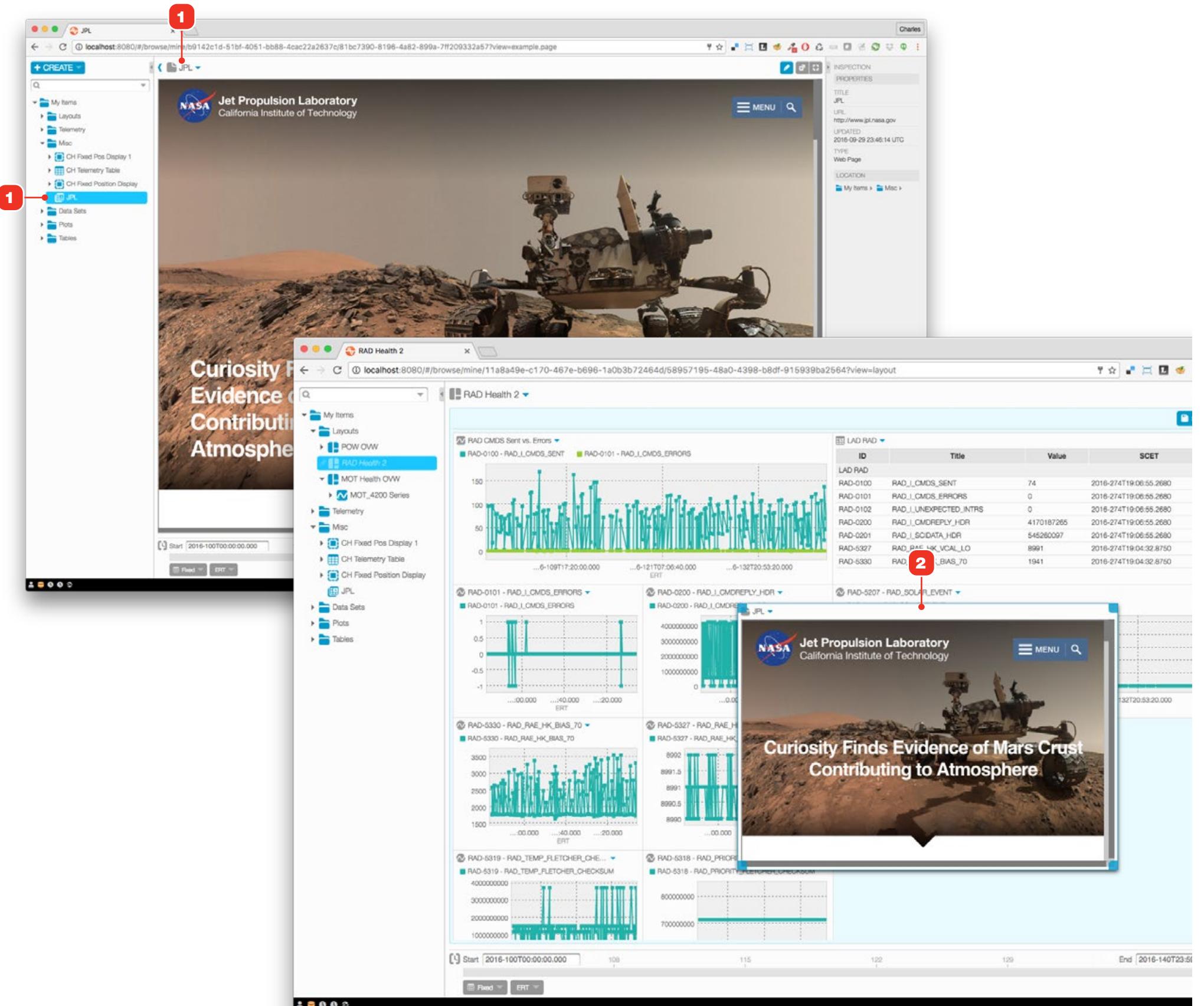
- 1 Enter a search term. Matching entries **2** will be displayed as you type.
- 3 The section and page that contain the entry will be displayed. Clicking the section or the page here will navigate to that part of the Notebook.
- 4 To exit search, clear the entry field by clicking here.



WEB PAGE

Web Page

1 A Web Page component allows you to view and embed a Web page via its URL. Web Pages can be added as a positionable, resizable component 2 to a layout.



WEB PAGE

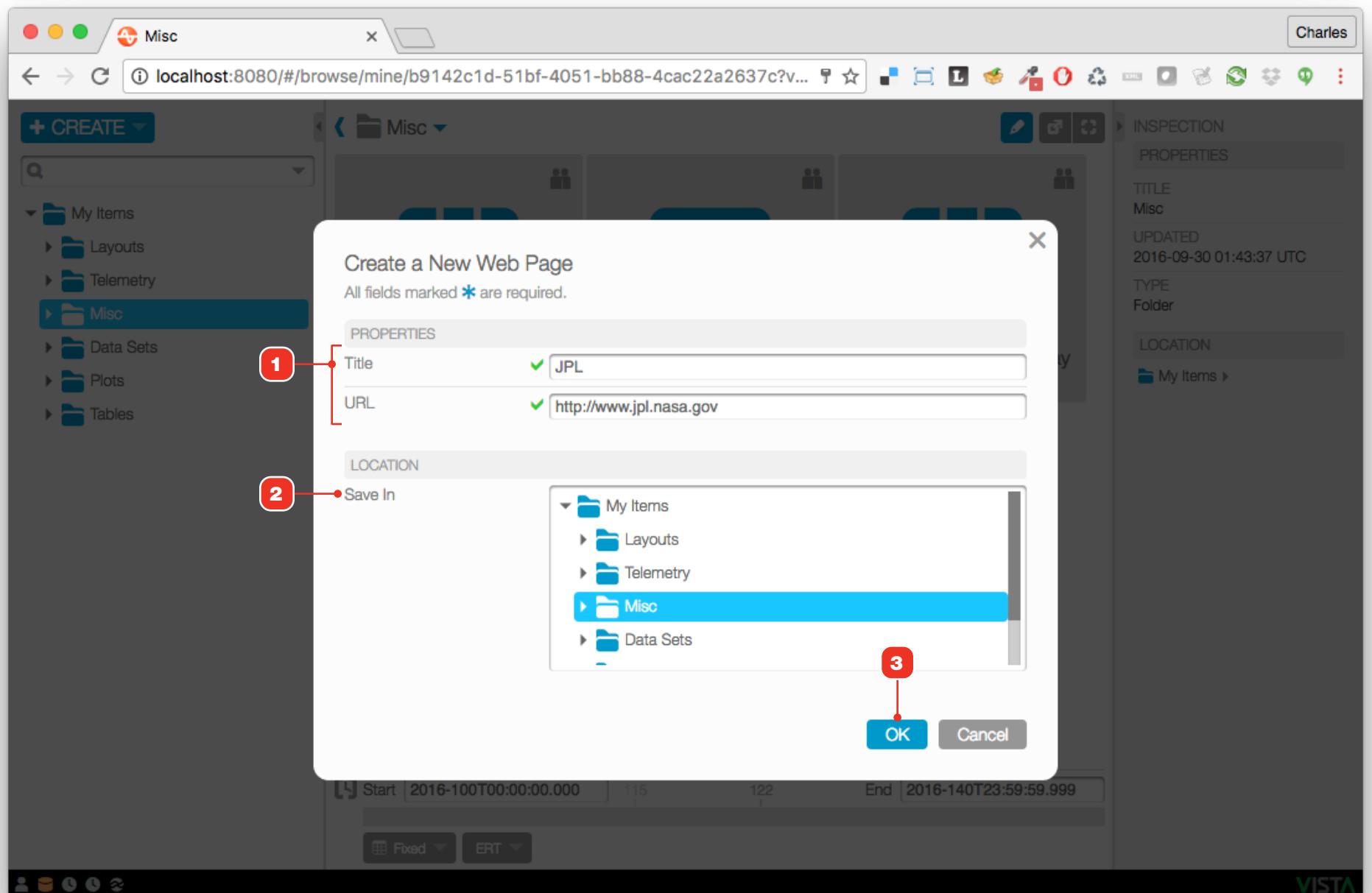
Edit a Web Page

For information on editing objects in general, see "Creating A New Object" on page 65.

- 1 Enter a title and full URL (including either http:// or https://) in the fields as shown.
- 2 Select a location to save your web page object.
- 3 Click "Ok" to save your changes.

IMPORTANT NOTE

The application displays web pages as objects using a technique known as "Iframe embedding" - some sites don't allow this. If you're sure you entered your URL correctly and your Web Page object displays a blank view, this may be why.



DATA SET CONFIGURATION

Configuring a Data Set

For information on editing objects in general, see "Creating A New Object" on page 65.

Data Sets are created via the Create menu. URLs used in a Data Set configuration take two forms:

- Non-stream URLs can be absolute (e.g. "http://" or "https://"), protocol-relative (i.e. starts with "//") or relative to the MCWS URL that was specified in the VISTA configuration when it was setup.
- Stream URLs must begin with "ws://" or "wss://".

- Enter a title for the Data Set.
- The Notes field is standard for all composed objects in VISTA, and allows you to attach notes to a particular object.
- The optional Dataset Prefix will be prepended to the title of all Telemetry Channels coming from this Data Set. This can be useful to differentiate identical channels present in multiple venues or Data Sets. For example, when a prefix is defined (such as "M20") every channel, EVR modules and nodes will appear in VISTA with "M20" prepended to its name.
- The URL to the MCWS deployment for this service. This URL is used by VISTA to determine the MCWS version and enable or disable specific features based on that version.
- See "Data Set URL Fields Reference" on page 138 for detailed information on all the URL fields of a Data Set.

Edit Test Data Set
All fields marked * are required.

PROPERTIES	
1	Title
2	Notes
3	Dataset Prefix
4	MCWS Root URL
5	Channel Dictionary URL
	http://localhost:8080/test_data/ChannelDictionary_charles.json
	Channel Enumeration Dictionary URL
	http://localhost:8080/test_data/ChannelEnumerationDictionary.json
	Channel Historical URL
	http://localhost:8090/mcws-test/Channel
	Channel MinMax URL
	http://localhost:8090/mcws-test/Channel
	Channel LAD URL
	Channel Stream URL
	ws://localhost:8090/mcws-test/Channel
	Channel Stream Header Channels
	H-0001,H-0002
	Session URL
	http://localhost:8080/test_data/Session.json
	Session LAD URL
	http://localhost:8080/test_data/SessionLAD.json
	Event Record Dictionary URL
	http://localhost:8080/test_data/evr_dictionary.json
	EVR Historical URL
	http://localhost:8090/mcws-test/EventRecord
	EVR LAD URL
	ws://localhost:8090/mcws-test/EventRecord
	EVR Stream URL
	ws://localhost:8090/mcws-test/EventRecord
	Data Product URL
	http://localhost:8090/mcws-test/DataProduct
	Data Product Content URL
	http://localhost:8090/mcws-test/DataProductContent
	Data Product Stream URL
	ws://localhost:8090/mcws-test/DataProduct
	Packet URL
	http://localhost:8090/mcws-test/Packet
	Packet Content URL
	http://localhost:8090/mcws-test/Packet
	Packet Summary Event Stream URL
	ws://localhost:8090/mcws-test/PacketSummaryEvent
	Command Event Historical URL
	http://localhost:8090/mcws-test/CommandEvents
	Command Event Stream URL
	ws://localhost:8090/mcws-test/CommandEvents
	Message Stream URL
	ws://localhost:8090/mcws-test/Message
	Frame Summary Stream URL
	ws://localhost:8090/mcws-test/FrameSummaryEvent
	Frame Event Stream URL
	ws://localhost:8090/mcws-test/FrameEvent
	Alarm Message Stream URL
	ws://localhost:8090/mcws-test/AlarmMessage

OK Cancel

DATA SET CONFIGURATION

Data Set URL Fields Reference

Data Set URL Field	Field Description	Reference	Built-in Data Views												Composable Views			Custom Data Views											
			Channel Plot Views	Channel Tabular Views	Channel Alarms	Header Channels	EVRs	Dictionaries	Data Products	Command Events	Packets	Packet Summary Events	Packet Query View	Messages	Frame Summary Events	Frame Events	Alarm Message Stream	Overlay and Stacked Plots	Telemetry Tables	Channel Tables	Channels in Display Layout	Alarms View	Command Events View	Data Product View	Encoding Watch View	EVRI View	Frame Watch View	Frame Accountability View	Messages View
CHANNELS																													
Channel Dictionary URL	Required for Channels.	"Dictionaries" on page 50																											
Channel Enumeration Dictionary URL	Provides the values used to convert a stored numeric enumeration into its human-readable string. If not provided, enumerated channels will be displayed with their numeric values.	"Dictionaries" on page 50																											
Channel Historical URL	Required for access to historical data, and essential for CSV export of historical data.																												
Channel MinMax URL	When specified with a compliant min-max provider, improves plot performance by using min-max queries.																												
Channel LAD URL	A link to an optimized data source to retrieve the latest value for channels.	"Channel Tables and Channel Table Sets" on page 87																											
Channel Stream URL	A link to a streaming real-time data source. Required to enable connection to a real-time data session.	"Connecting to Real-time Data" on page 32																											
Channel Stream Header Channels			*	*																									
SESSIONS																													
Session URL	Required to allow access to specific historic data sessions.	"Filtering By Historical Data Session" on page 34																											
Session LAD URL	Required in order to connect to real-time sessions.	"Connecting to Real-time Data" on page 32																											
EVENT RECORDS																													
Event Record Dictionary URL	Required for Event Records.	"Dictionaries" on page 50																											
EVR Historical URL	Data source for historical EVRs.	"Event Records" on page 58																											
EVR LAD URL	A link to an optimized data source to retrieve the latest values for event records.	"Event Records" on page 58																											
EVR Stream URL	Data source for real-time EVRs.	"Event Records" on page 58																											
DATA PRODUCTS																													
Data Product URL	Required to allow viewing of Data Product metadata.	"Data Products" on page 51																											
Data Product Content URL	Required to view or download individual data products.	"Data Products" on page 51																											
Data Product Stream URL	Required for access to real-time Data Product information.	"Data Products" on page 51																											
PACKETS																													
Packet URL	Required to allow viewing of Packet metadata.	"Packets" on page 52																											
Packet Content URL	Required to query and download binary packets.	"Packets, Packet Query View" on page 53																											
Packet Summary Event Stream URL	Required in order to view a summary of packets received by APID/VCID.	"Packet Summary Events" on page 54																											
COMMANDS																													
Command Event Historical URL	Required to allow viewing of historical command event data.	"Command Events" on page 56																											
Command Event Stream URL	Required to allow viewing of real-time command event data.	"Command Events" on page 56																											
MISCELLANEOUS																													
Message Stream URL	Provides views of streaming messages.	"Messages" on page 55																											
Frame Summary Stream URL	Provides real-time frame summary events.	"Frame Summary Events" on page 57																											
Frame Event Stream URL	Provides real-time stream of frame events.	"Frame Events" on page 59																											
Alarm Message Stream URL	Provides real-time stream of alarm messages.	"Creating a Custom Alarms View" on page 93																											

✓ Indicated View always uses this Data Set URL * Indicated View can use this Data Set URL depending on its contents