
NEXUS Documentation

Release 6.7.xxxxx.0

Wood Group

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DASHBOARDS

The **Dashboards** area displays the output from any report template which has been configured in the report template library and marked as a Dashboard.

When a user logs in NEXUS IC the first time, he/she will be presented with the Dashboards Page. On subsequent logins, NEXUS IC will open to screen that was active when the user logged out.

To choose which dashboard template is shown, click the **Dashboard** drop-down button on the toolbar, and choose the desired template.

Tables have a blue  ellipsis at the top right. You can view or edit the contents of a table row by clicking the row then clicking the blue ellipsis, or by double-clicking the row.

Pivot tables have a  ellipsis on each cell that contains a number. Clicking that ellipsis will show either a grid with a list of all the rows that make up the number in that cell, or a form showing the single row represented by that cell. If you have edit permission on the relevant table, you can make changes here and click **OK** to save them.

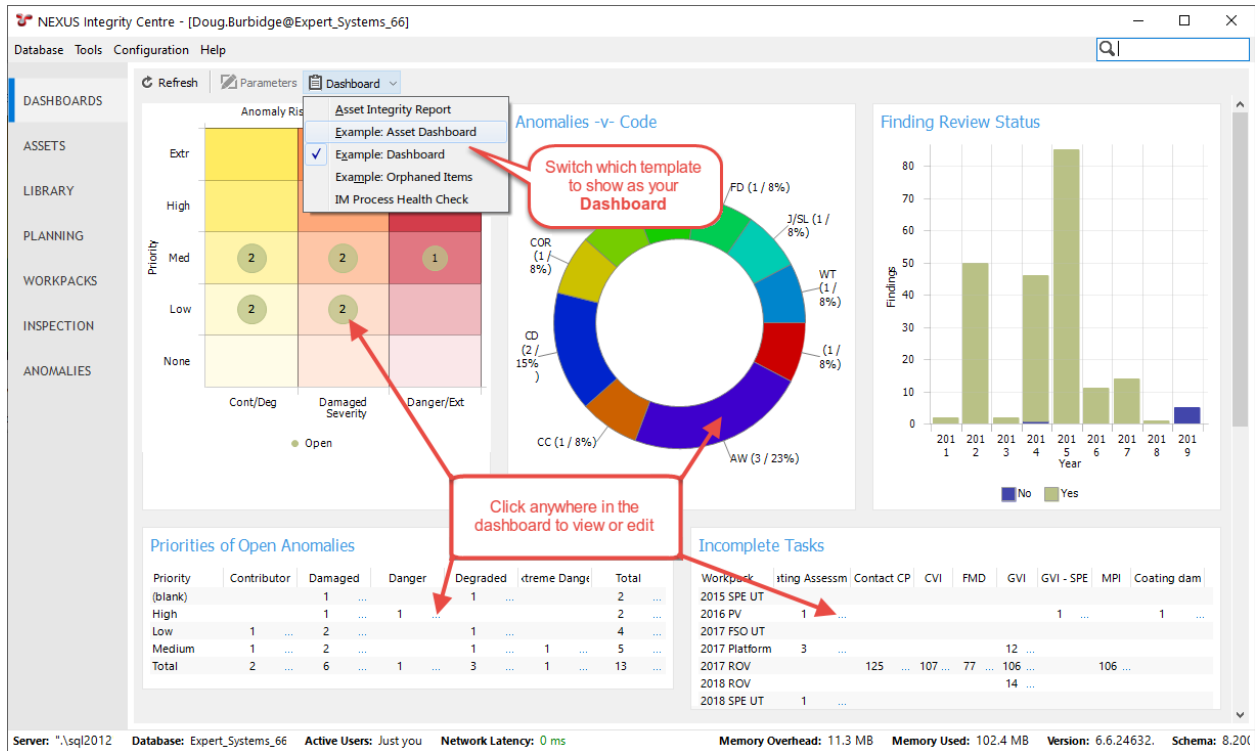
Note: If you make changes to data, the dashboard will not automatically be refreshed to show those changes. You'll need to click the **Refresh** button.

For charts (including risk charts) you can click on a data point, and you will similarly get a list of rows that make up that point, or a form showing the single row represented by that cell.

To choose which report templates are available as Dashboards, navigate to the *Configuration* → *Reports and Dashboards* → *Templates* dialog. Edit the required report template and tick **Dashboard Report**. (You can use *Multi-Edit* to edit several templates at once.)

Refer to the section *Report Templates* for detailed information on configuring report templates.

Tip: For the Dashboards Screen, choose report templates which summarise data in the database, or that show statistics on Anomalies or Risk.



2.1 Assets Toolbar

2.1.1 Assets Import

The *ASSETS* → *Import* functionality gives the user the ability to bulk update data stored in the Asset Information Groups.

The format of the Excel workbook needs to be very specific. It is recommended you generate an Excel export using the *Assets Export* functionality, to generate the workbook in the correct format for importing data.

Caution: While imports are being carried out, transactions are now committed every 50 rows from the source import sheet, so table locking will be heavily reduced from v6.7 onwards. However, this higher frequency of transaction commits may cause other users' NEXUS sessions to "refresh" the imported data, depending on the type of data other users have in their cache and the type of data being imported.

The Import Wizard

1. **Import Filename** - Navigate to the file which has been prepared for import. Compatible filetypes include .zip, .xlsx (Excel), .csv, and .txt. Zip files will contain the xlsx/csv/txt file plus any additional files, eg. multimedia images or electronic documents for importing into the library. You can tick the checkbox next to **Skip Blank Cells** to stop the importer from overwriting existing data with empty cell data. If it is left unchecked, and the import document contains fields with empty cells, those fields in the database will be overwritten with empty or null data, or be given a default value determined by NEXUS IC.

Tip

For very large imports, saving your Excel file as a .csv and then importing from the .csv may be faster.

2. **Configure Import** - If you would like to make changes to the Destination fields or elect to ignore some fields, then click on the column heading titled **Field:** and choose from the options presented in the pop up menu. Finally, ensure that the correct Asset View is selected from the **Required Fields** selection box and that the number of **Header Rows** and worksheet are correct (by default this will be 1 or 2 rows). Note that if the field type is set to change for an existing field, the import will abort as data loss may occur.

3. **Test Import** - A test is run on the selected file, testing the import for errors. If the test is successful, you may proceed to submit the import job. If the test produced errors, you must rectify the errors in the import file and start the import wizard again. There are some niche edge cases where errors will not be reported during the test, however, generally the test import provides a good indication of whether the import will succeed.

Note

When importing inspection event data, anomaly triggers are checked during the import and findings created automatically from data which falls outside the data bounds.

4. **Submission** - If using a SaaS client, the import job is offloaded to the SaaS server and is started remotely. It is then possible to close the current NEXUS IC session while the active import job continues. If using a non-SaaS client, the import job is executed in the current NEXUS IC session and you may continue using NEXUS IC. Closing the current NEXUS IC session will cancel the active import job. In both cases, the UI will refresh intermittently throughout the import, and there will be delays between the import finishing and final refresh as NEXUS IC does not directly monitor changes. Jobs are visible in the *Job Management Console*, which records the status and history of all import jobs.

5. **Import Details** - The import job banner at the bottom of the window will contain a dropdown menu with the option to dismiss or show details. Clicking 'Details' will show a window that summarises the import, advising the user how many rows have been added to various forms/tables. It is important that you scrutinise this summary to ensure that the import has performed the actions that you expected. What is important to take note of is the total rows for a specific item; i.e. add together the number added and updated and make sure that is equal to the number you expect. If you have multiple rows in your import sheet that update the same row, these rows will be counted by the test import individually, whereas the final import statistics will only show 1 updated row. There is the option to save the summary to file.

Tip: If the importer encounters a completely blank row in an Excel file, it will stop importing at that point, even if there are non-blank rows further down. This can provide an easy way to test an import sheet: set it up, and then after just one or two rows of data, insert a blank. Run the import to see if it's doing what you expect, and if so, delete the blank and run again. Similarly, if the importer encounters a blank column in an Excel file, columns to the right of this will not be imported.

Tip: You can have one 'Asset Location.Full Location' column, with levels in the asset hierarchy separated by space slash space, like 'My Field / My Platform / My Member', or many 'Asset Location.Full Location' columns, with one asset hierarchy level in each. (But you can't mix the two, with one containing 'My Field / My Platform' and a second containing 'My Member'.)

Sub-rows

Sometimes a single "master" row will have several "detail" rows. For example, an asset information row might have several sub-AIG rows; or an event might have several findings or several multimedia images or both. When this occurs, you should repeat the row, with different "detail" values in each.

For example, if you have several multimedia images to import against a single event, your Excel sheet should have several rows that are identical except for the `Multimedia.Name` and `Multimedia.Image` columns. If you have specified an event number, and you use the same event number on each row, NEXUS will only create the event once, but will create several multimedia items. (If you do not specify an event number, NEXUS will instead create several different events with one multimedia item each.)

Tip

You can find the next available event number for a given event type by creating an event of that type using [Add Event](#), noting the event number, then deleting that event. If you want next available event numbers for several event types, create a report template with a Simple Source on table Event and a Pivot Table with a pivot row on Event Type and a value field on Event Number with aggregate Max. Then add 1.

It is also acceptable to leave event fields blank for all except the last row — under the hood, NEXUS is importing each Excel row into the event, and only the last Excel row imported will “stick”. Note that if your event has a finding, you should *not* repeat the finding data on each event row — if you do, NEXUS will create one finding for each Excel row that has finding data filled in.

In some cases you *do* want multiple findings on one event, and in that case you should fill in several rows as appropriate. Similarly for sub-event data or sub-AIG data: if you want several different sub-events or sub-AIG rows imported, you should repeat the event row or AIG row with different sub-event or sub-AIG data in each case. If you are repeating an Excel row for another reason and you do *not* want several sub-event or sub-AIG rows imported, you should fill in sub-event or sub-AIG data in only one of the Excel rows.

Excel

During an import, we communicate with Excel “behind the scenes”: we command Excel to open the file you want to import, and ask Excel what’s in each cell. An upshot of this is that if you use Excel to modify the file while we’re importing it, even if you don’t hit Save, you may confuse the import process. Similarly if you take a variety of other actions: using Save As, closing Excel, etc. If you see error text “Call was rejected by callee”, this is what’s happened: Excel has stopped answering our calls.

Note: It is possible to create new Asset Hierarchies by importing Assets with hierarchy structures that don’t already exist. In doing so, new Parent Assets will be created. In case this is not the desired result, the **Test Import** will throw a warning, for example:

Line x: Parent Asset “Example Parent” will be created for the location “Wood / Example Parent / 00C-2401A”

“xx new Parent Asset(s) will be added.”

2.1.2 Assets Export

The `ASSETS` → `Custom Export` functionality gives the user the ability to choose a subset of assets and associated AIG forms to export to Excel.

The format in which the data is exported to Excel is the same format in which the data can be reimported, see [Assets Import](#) for more detail on importing data from Excel.

Hint: Use the “Custom Export” wizard to export the operating properties of a Process Stream. Update the operating temperature and pressure in the Excel sheet, then reimport the data using the [Assets Import](#) functionality

The Asset Export Wizard

1. **Export Filename** - Either use the default folder and filename that NEXUS IC proposes, or use the ellipsis button to navigate to an alternate Windows folder and edit the default filename.
2. **Export Options** - Select options here.
 - If you set **Columns** to User Selected, you will be shown a page later in the wizard to select those columns. If you set it to All Visible Columns, columns that have Visible Grid or Visible Form ticked will be exported. Workflow rules affecting field visibility will not be run.
 - **Asset Location** can be shown in a Single Column, like “Field / Asset / Elevation / Member / Anode”, or as Multiple Columns, with one tree level per column.
 - You can choose to export or not export **Calculated fields** and **Sub Asset Information**.
 - Extra sheets are exported for each **Lookup List** used in the forms. You can choose to hide these.
 - You can control **Formatting** for **Date** and **Time**. You can also control **Cell formatting** — if you select this, cells with invalid values will be shown in red, cells not relevant to this asset information group or event form will be greyed out, etc.
3. **Asset Selection** - Choose the Asset View and check which subset of assets to include in the export. **Note** use the **Select Children** and **Unselect Children** toolbar buttons to include and exclude the visible and non-visible child assets. Simply checking an asset at the top level will not automatically check all the child assets beneath it.
4. **Asset Information Groups** - Check which Asset Information Groups to include in the exported document.

Hint: Column order within the exported sheet is determined by the grid column order set within each form in *Configuration* → *Assets* → *Asset Information*.

Hint: The exported Excel sheet will contain a Legend tab, which shows the meaning of various cell and row colours.

2.1.3 Asset Views

The **Asset Views** functionality can be used to isolate asset hierarchies from one another, or to view only a filtered list of assets, or to arrange assets differently.

Tip: Create an asset view titled “Subsea” which contains all subsea assets and a second view titled “SPE” which contains all topside Static Pressure Equipment assets.

Tip: Create an asset view titled “Pressure Relief Devices” which contains only the PRD assets in the “SPE” view. In this example, the PRDs are *Linked* from the SPE asset view

The Asset Views toolbar button first lists all Asset Views configured in the database, as well as providing ability to add, edit and delete Asset Views.

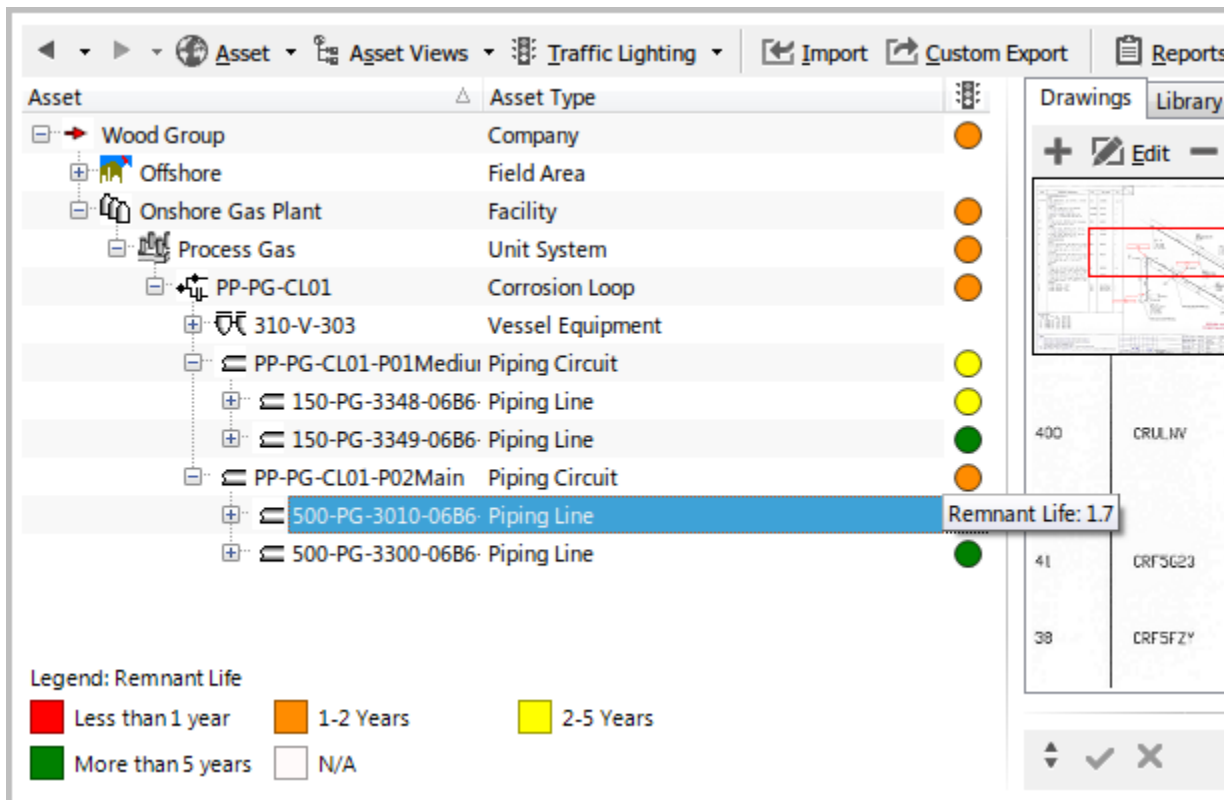
- **Asset Views** → **Add** Add a new asset view. Enter the name of the asset view and a descriptive comment (for informational and reporting purposes only).
- **Asset Views** → **Edit** Edit the properties of the currently selected asset view.

- **Asset Views** → **Delete** Delete the currently selected asset view.

Note: Deleting an asset view will delete all the assets contained within that view, regardless of whether those assets exist in other asset views.

2.1.4 Traffic Lighting

The **Traffic Lighting** functionality displays pre-defined colours against each asset (where configured). The legend is shown at the bottom of the asset hierarchy and will display the name of the Traffic Lighting rule and what each of the colours signify. Hovering over the traffic lighting with the mouse displays a popup hint of the value of the traffic light. This is shown in the following screenshot:



Traffic lighting can also be displayed on Drawings Links. For example, where an asset has a region defined on a drawing, and there is a traffic light colour assigned to that asset, then the region will be displayed in that colour. The display of traffic lighting on drawings is switched on and off from the Drawing Toolbar.

See [Traffic Lights](#) for details on configuring new Traffic Lighting rules.

The Traffic Lighting toolbar button shows a list of configured traffic lighting rules. By default there are three Traffic Lighting rules, None, Anomalies and Risk.

- **Traffic Lighting** → **None** This menu item clears all existing traffic lighting rules from the asset hierarchy.
- **Traffic Lighting** → **Anomalies** This menu item uses the Anomalies traffic lighting rules.
- **Traffic Lighting** → **Risk** This menu item uses the Risk traffic lighting rules.
- **Traffic Lighting** → **Active Workpack** This menu item will open the Select Workpack selection window from which you can choose a Workpack.

Elements of the **Assets** toolbar are available from multiple screens and dialogs in NEXUS IC including:

1. ASSETS
2. INSPECTION

The **Assets** toolbar button allows the user to add, edit, delete and move Assets to and from the hierarchy. Additional navigation and filtering capabilities are also provided from this toolbar.

- **Back** The Back menu item allows you to return to assets that you had previously selected in the Assets tree.
- **Forward** The Forward menu item allows you to return to assets that you had previously selected in the Assets tree, after you've used the Back button.
- **Assets → Add → Asset** Adds a new (child) asset to the asset currently selected in the hierarchy.
- **Assets → Add → Root Asset** Adds a new root level asset into the active Asset View. A root level asset is an asset which does not have a parent asset.
- **Assets → Add → Linked Asset (With Children)** Add a link to an existing asset including all its children. An asset tree will be displayed to allow selection of the asset to link as a child to the currently selected asset.
- **Assets → Add → Linked Asset (Without Children)** Add a link to an existing asset, without any of its children. An asset tree will be display to allow selection of the asset to link as a child to the currently selected asset.
- **Assets → Edit → Asset Properties** Change the name or Asset Type of the currently selected asset or add/remove the Primary Asset flag.
- **Assets → Edit → Asset Type Properties** Edit the *Asset Type* of the currently selected asset: change its name, and change what Asset Information groups, Event types and Survey types it is associated with.
- **Assets → Delete** Deletes or unlinks the selected asset. If the asset exists in multiple places just this location can be removed, instead of deleting all locations the asset exists. Click on the **Connections** button to view dependant records of the current asset.
- **Assets → Show Asset Type** Toggles the display of the asset type in the hierarchy.
- **Assets → Expand Children** All children, grandchildren, etc. of the selected asset will be expanded. (You can also press the * key on the numeric keypad.)
- **Assets → Collapse Children** All children, grandchildren, etc. of the selected asset will be collapsed.
- **Assets → Undo Move** Reverses the last asset move action. Note that ONLY the last asset move can be undone.
- **Assets → Copy to Clipboard** Copies either the asset name or full hierarchy location of the selected asset to the clipboard.
- **Assets → Reparent to Root** Repositions the selected asset in the asset tree so that it becomes a root asset.
- **Assets → Show on Drawing** Shows a list of drawings that have this asset as a layer. Click on a menu item to go to that drawing. If the drawing name has "(Different Asset)" after it, the drawing you will be taken to is not available on the current asset; thus, when you select the menu option, you will not only be taken to that layer on that drawing, you will also be navigated to the new asset. You can get back by using the **Back** toolbar button.
- **Assets → Other Locations** Shows a list of other locations that this asset exists in on the asset tree (including in other Asset Views). Click on a menu item to navigate there. If this asset does not appear in any other locations, you will not see any items in this list.
- **Assets → Connections** See *Connections* for information about the Connections toolbar option.
- **Assets → Anomaly Triggers** Asset-specific anomaly triggers are found here. Triggers for a field independent of asset are found in *Asset Information* and *Event Types*. If you have both an asset-specific and a generic anomaly trigger on the same field, for assets with the asset-specific trigger, only the asset-specific trigger

will apply. For assets with only a generic trigger, only the generic trigger will apply. Note that asset-specific anomaly triggers are specific to their asset — they do not automatically apply to an asset’s children.

- **Assets** → **Coordinates** This is the equivalent of the version 5 ‘Pipeline’ and ‘Map’ tabs.

- **Assets** → **Rotate Equipment**

The Rotate Equipment menu item is used to swap the location of the selected asset with another asset of the same type. Swapping assets will exchange their location in the asset tree and create records in the asset history tab for both assets, to record details of the exchange.

The Rotate Equipment menu item will only be enabled if the selected asset has an asset type. When you click on the **Rotate Equipment** menu item, an asset selection dialog will be displayed. Assets that are not of the same type will be greyed out in the tree. To swap the location of the selected asset, select another asset of the same type and click the **OK** button on the dialog. The asset tree will refresh and the swapped asset will be selected in the tree.

You cannot rotate an asset with one of its children.

The Rotate Equipment menu item is a Shortcut. As such, if necessary, it can be debugged using the Shortcut debugger. When you select the menu item, hold down the Control key on the keyboard. The Select Asset dialog will be displayed, but will be followed by the Debug Shortcut dialog. You can step through shortcut items one at a time, which may help to narrow down any problems.

This functionality is most commonly used for PRDs where they are “rotated” out for valves that have been tested and prepared for service.

- **Assets** → **Retire Equipment** The Retire Equipment menu item is used to change the location of the selected asset in the asset tree. Changing the asset location in the asset tree creates records in the asset history tab for the asset itself as well as the source parent, to record details of the relocation.

When you click on the **Retire Equipment** menu item, an asset selection dialog will be displayed. To change the location of the selected asset, select another asset as the destination parent and click the Ok button on the dialog. The asset tree will refresh and the asset will be selected in the tree in the new location.

The Retire Equipment menu item is a Shortcut. As such, if necessary, it can be debugged using the Shortcut debugger. When you select the menu item, hold down the Control key on the keyboard. The Select Asset dialog will be displayed, but will be followed by the Debug Shortcut dialog. You can step through shortcut items one at a time, which may help to narrow down any problems.

- **Asset Views** See [Asset Views](#) for detailed information on the Asset Views toolbar option.
- **Traffic Lighting** See [Traffic Lighting](#) for detailed description of the Traffic Lighting toolbar option.
- **Import** See [Assets Import](#) for detailed information on the Import Wizard. The MS Excel Import Template details the required format for importing Library Items.
- **Custom Export** See [Assets Export](#) for information about exporting Assets and Asset Information data.
- **Reports** See [Reports](#) for information about the Reports toolbar option.

Tip: The asset selection is persistent between ASSETS and INSPECTION screens, that means if you choose an asset in ASSETS screen and change the screen to INSPECTION, the same asset has been selected and vice versa.

Tip: If you exit out of NEXUS and open the application, it will reopen the application on the same location that you exited last time.

2.2 Asset Information

Asset Information forms retains asset specific information for the currently selected asset. The Asset Information screen is available in two locations in NEXUS IC, from the *ASSETS* screen and the *INSPECTION* screen. Functionality in both areas is the same.

An example asset information form is shown here:

The screenshot shows the 'Asset Information' form for a 'Piping (SPE - I)' asset. The form is organized into several sections:

- Operating Data:** Includes fields for Operating Temperature (30 C), Max Design Temperature (80 C), Operating Pressure (49.00 bar), Max Design Pressure (95.50 bar), Min Design Temperature (0 C), and a dropdown for 'Operating Pressure is Absolute Pressure?' (set to Absolute).
- Material Data:** Includes a dropdown for 'Material Type' (ASTM A333 Gr 6), 'Pipe Schedule' (120), 'Manufacturers Tolerance' (%), 'Heat Treatment' (None), 'MAWT Override' (5.70 mm), 'Wall Thickness Override' (14.27 mm), and 'Steel Product Form' (Pipe).
- Material Properties:** Includes 'Generic Material' (LT Carbon Steel), 'Corrosion Allowance' (mm), 'Joint Efficiency Factor (up to 1):', 'Minimum Allowable WT (MAWT)' (5.67 mm), 'Calculated Wall Thickness (mm)', 'Internal Diameter' (mm), and 'Stress Value' (137.8 MPa).

Callouts in the image identify specific features:

- Unit aware field:** Points to the Max Design Temperature field.
- Indicates hint text is available. Hover mouse over to see text.:** Points to the Material Type dropdown.
- Required Field:** Points to the Generic Material field.
- Calculated Field:** Points to the Minimum Allowable WT (MAWT) field.
- Global Lookup Field:** Points to the Internal Diameter field.

Not all Asset Information forms are relevant to all Asset Types. You can configure the relationship between Asset Information forms and Asset Types from *Configuration* → *Assets* → *Asset Information* or *Configuration* → *Assets* → *Asset Types*.

To select a different Asset Information form, click the Group menu button. If you have many Asset Information forms available on this asset type, you'll see a menu with submenus for each Category of form; if you have only a few, you'll see a single menu listing all your forms. Select a form. (Some forms may take a moment to display, depending upon the amount of calculation that must be done.)

Tip: If you are navigating through the Asset register and not concerned with the Asset Information, you can select a different tab, such as Library. This will prevent asset information from being loaded, which can be useful if the Asset Information is performing many calculations.

2.2.1 Toolbar

Use the button to toggle the Asset Information tab between two different locations:

- Amongst the other Asset tabs (Dashboard, Drawings, etc.)
- At the bottom of the window, below the other tabs.

This lets you easily view asset information at the same time as viewing other data; or lets you fill the available window space with the data you're interested in.

Once you have made changes, **✓ Save** and **✗ Revert** will become enabled, and you can use these to save or discard your changes. (If you select a different asset without clicking Save or Revert, your changes will be saved.)

Use the  *History* button to show a dialog with the *History* for this asset information form on this asset.

2.2.2 Ordering forms

To change the order of the Asset Information forms, go to *Configuration* → *Assets* → *Asset Types*. Edit the asset type in question, then select the Asset Information Groups tab. Use the up and down buttons to set order for forms.

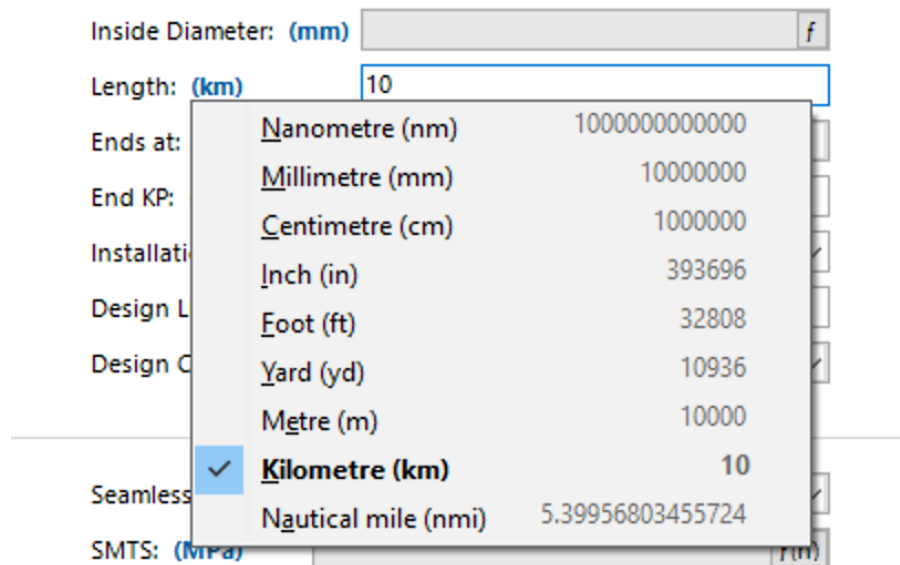
The following sections detail functionality available to the user from an Asset Information Group form.

2.2.3 Unit Aware Numeric Field

When Numeric field are configured in an Asset Information Group, you have an option to define a base unit type for that field. By default, the base unit type is displayed to all users, however, each user has the option to view the numerical value in that field in a different unit type. The menu item in bold indicates the default unit.


Unit aware numerical fields are identified by the label after the field name which states the unit type in blue text.

To view a different unit type in the Asset Information form, click on the unit label, choose an alternate unit type from the popup menu. Please note that NEXUS IC will “remember” your preferred unit type and display that next time you login to NEXUS IC.

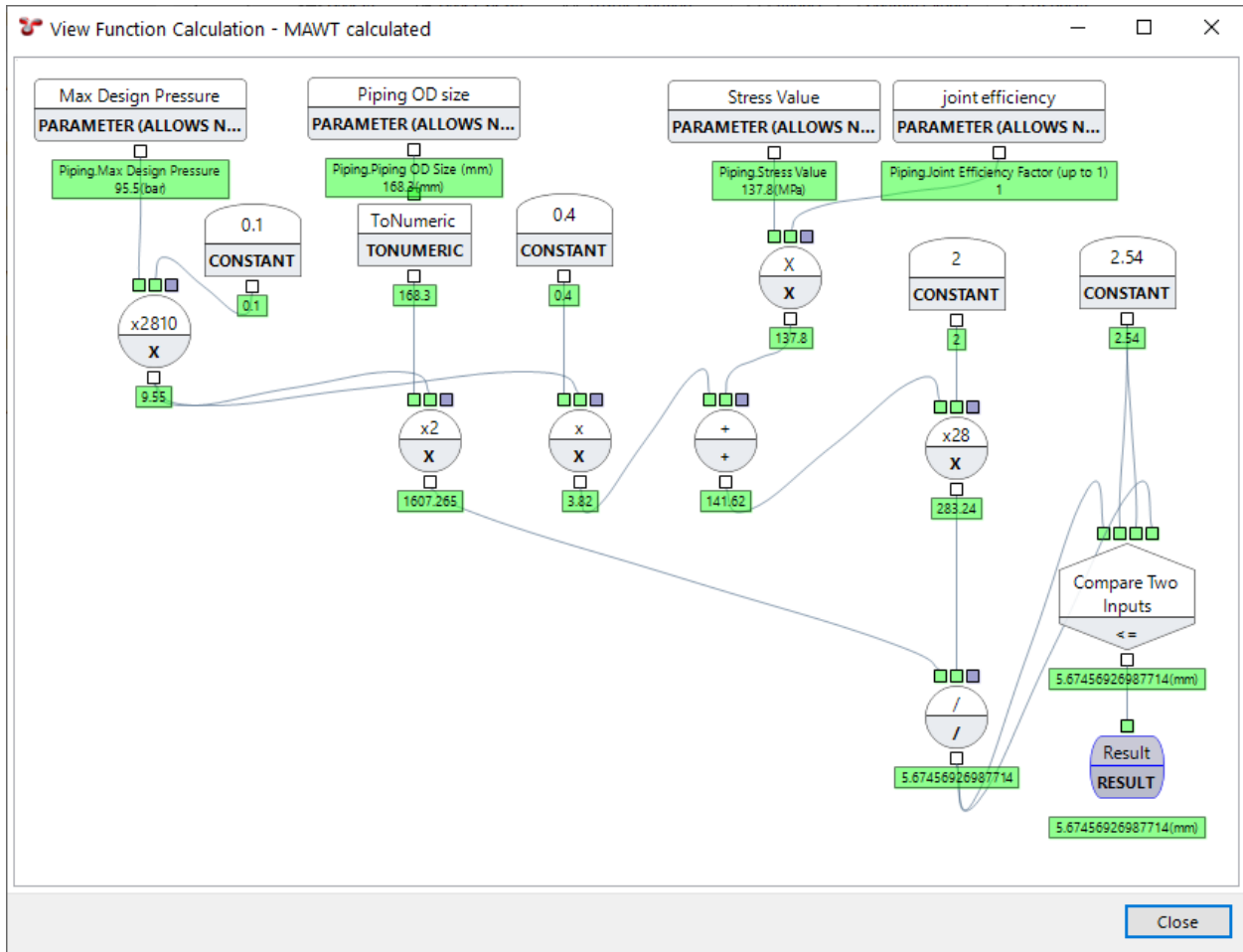


2.2.4 Calculated Field

Calculated fields are those where the value displayed is derived by a function which has been configured in the database.

Calculated fields are identified by the  icon.

To view the function for the calculated field, click on the  icon to launch the **View Function Calculation** dialog.




Please note that the function can not be edited from this dialog. You can, however, right-click on any element and select **View** to view its internal details.

Hint: When focus is on a calculated field (by clicking in it with the mouse or tabbing into it), any other fields on the same form which are inputs into the function, are highlighted a darker grey colour. You can also see a function’s inputs by clicking on the **f** icon — an input parameter will be labelled “Source - Constant” if it is being given a constant value rather than a value from a field; or “Source - Field” followed by the table name and the field name.

In the example shown below, the ‘Adjusted Safety Consequence’ calculated field has inputs from ‘Asset Area Location’ and ‘Safety Consequence’.

The screenshot shows the 'Safety Impact' form. The 'Adjusted Safety Consequence' field is highlighted in blue and shows a value of 'Critical'. The form includes fields for Platform Type (Occasionally Manned), Product (Gas, dry), Safety Consequence (Moderate), and Asset Area Location (Pipeline less than 50m from facilities (Zone 1)).

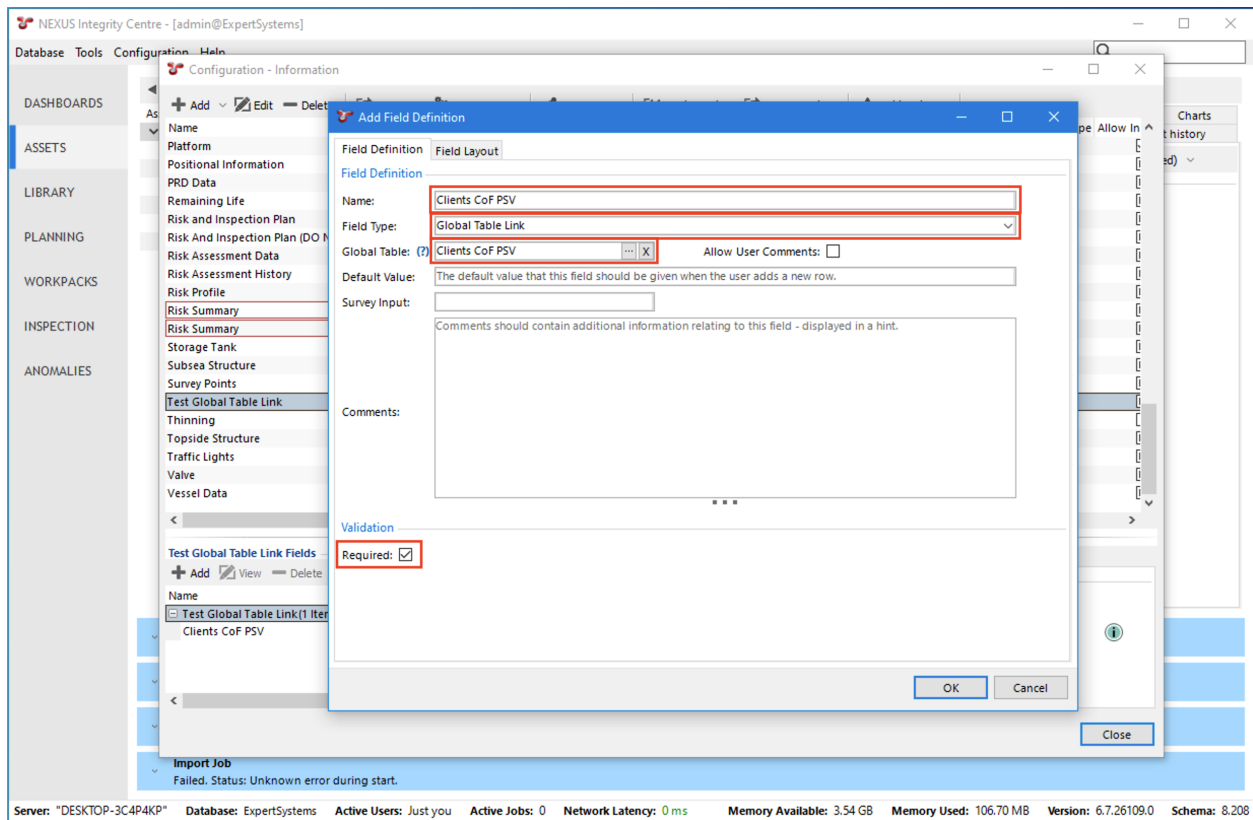
2.2.5 Passthru Field

Passthru fields show data from another field on the same asset. A passthru field will have a  icon at its right-hand side. Clicking this button will show a dialog telling you what form and field the passthru is pulling information from.

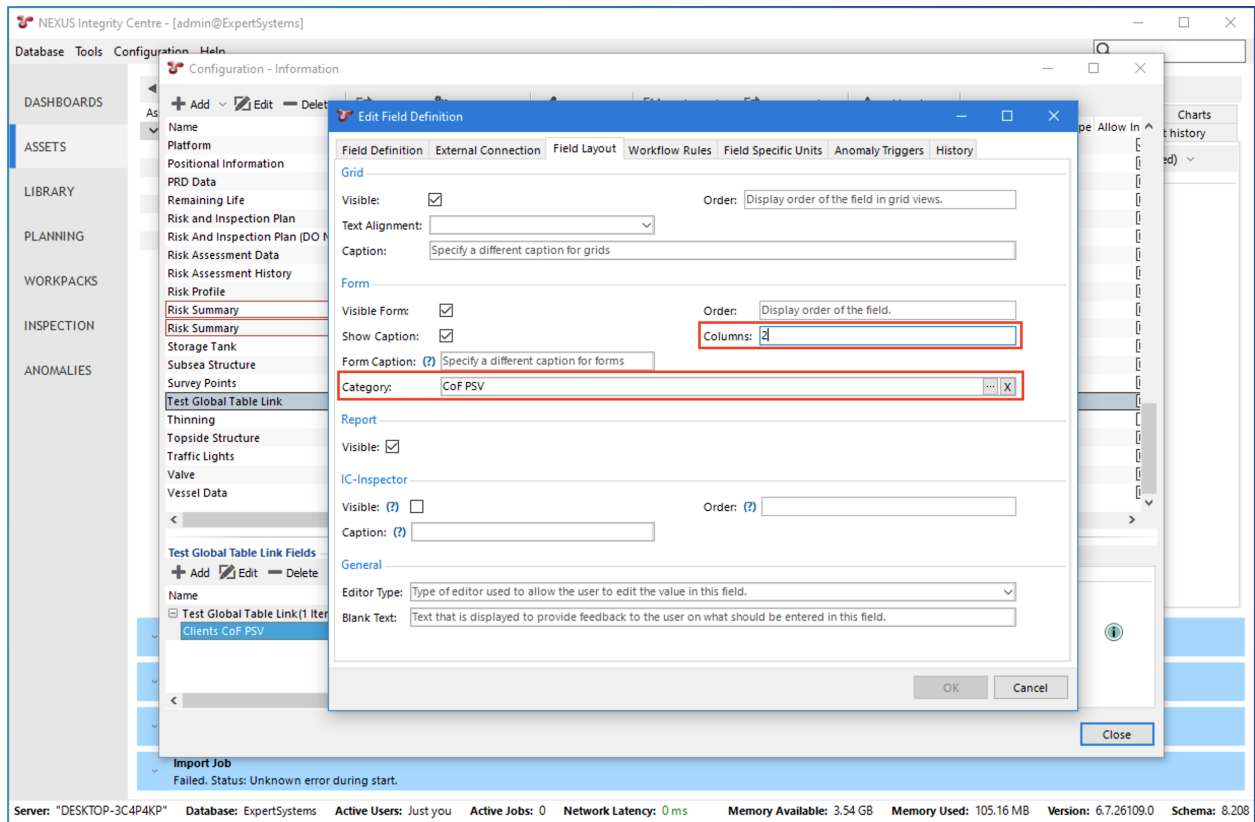
2.2.6 Global Table Link Field

Worked Example

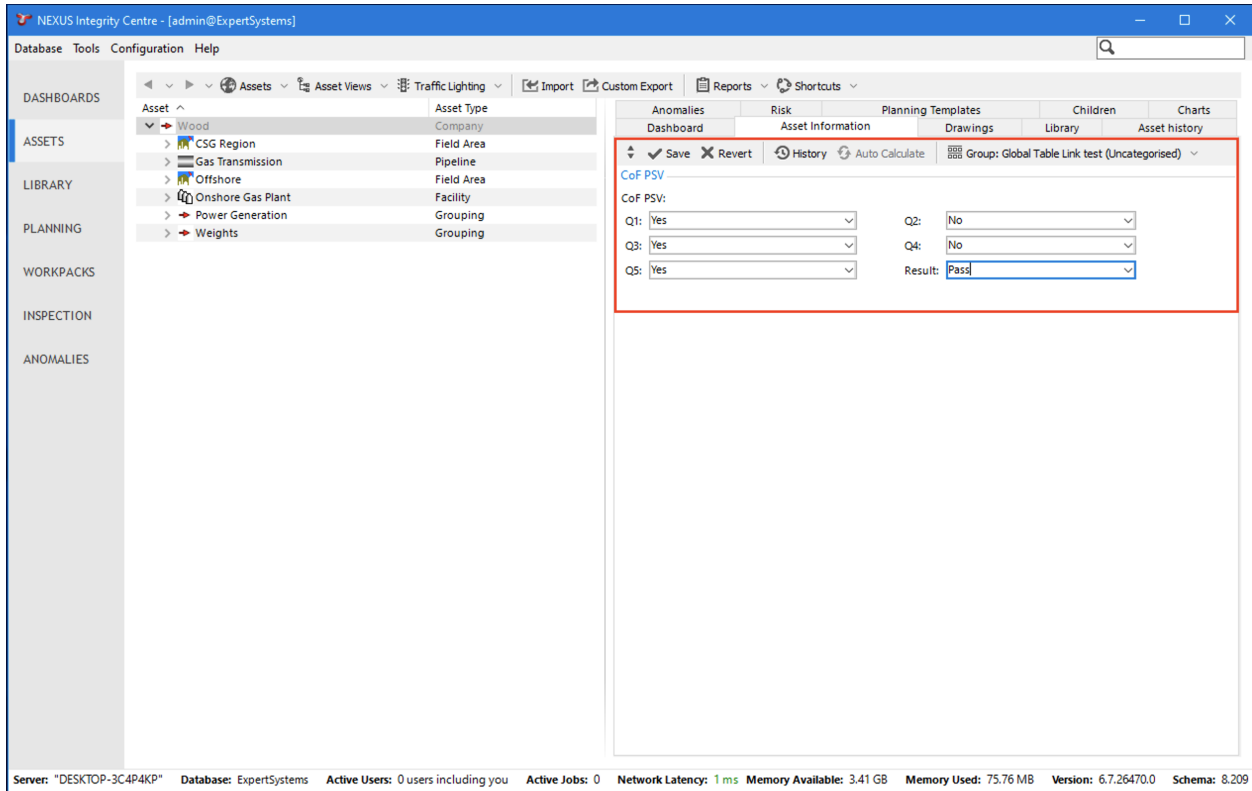
1. Create a new Asset Information Group field definition and select “Global Table Link” under field type. In the Global Table field, select your global table, and tick Validation Required. These forms are shown in the screenshot, outlined in red.



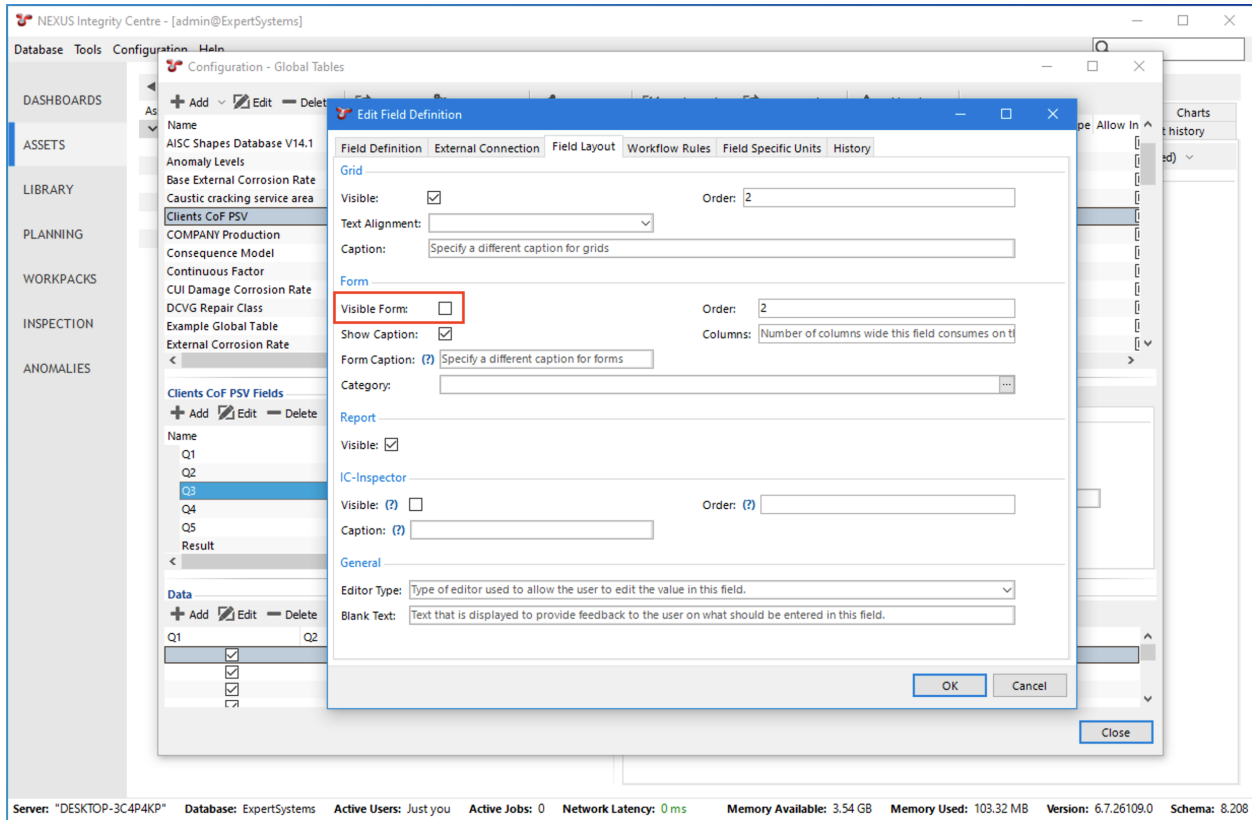
2. Edit the field layout of the Global Table Link field to display the form properly. Under Field Layout > Columns enter the number of columns you would like to display in the form. In this example we have chosen 2. You may alternatively select a category which has the number of columns predefined.



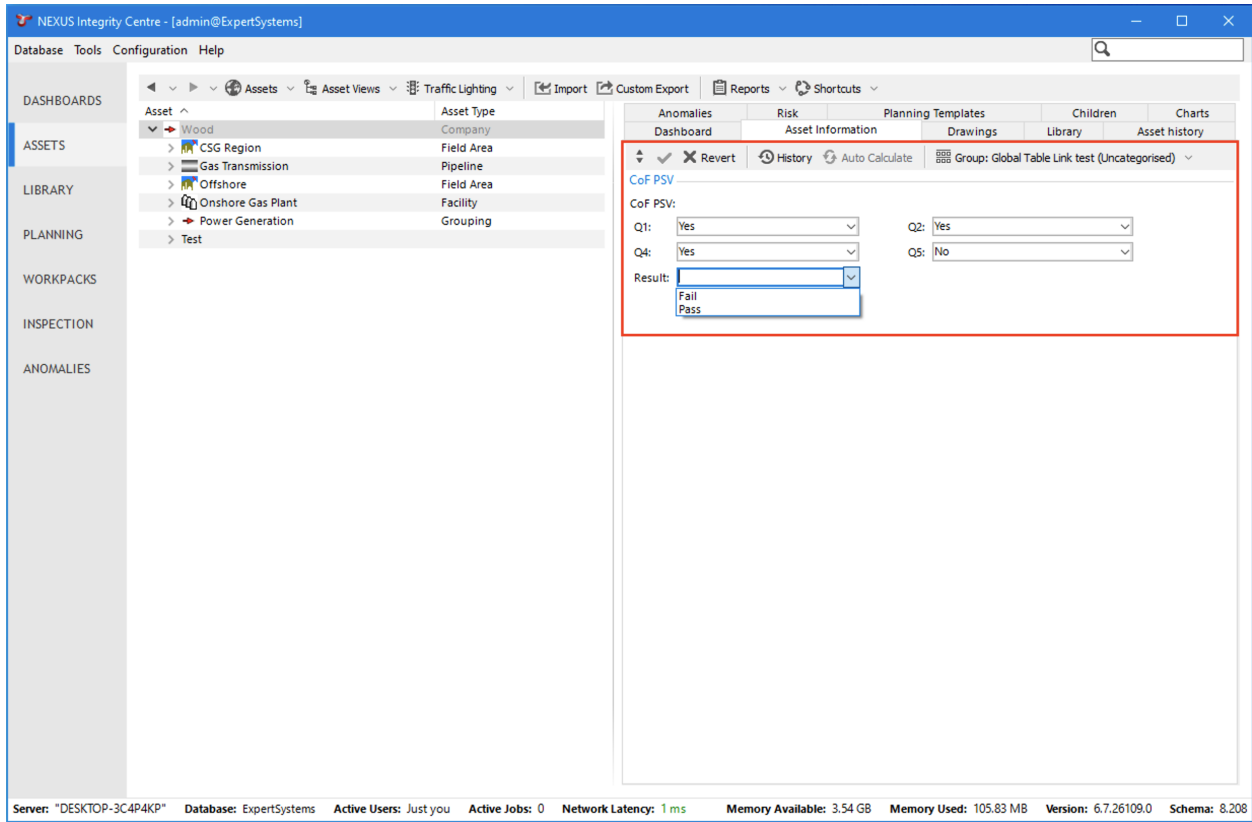
3. Select your Asset Information Group under Assets > [Asset] > Asset Information > Group and the Asset Information Group will display the questionnaire form. Navigating through the form will find a Global Table row via narrowing down the range of possible results that correspond to the combination of field values. In practice, this looks like a questionnaire that progresses one question at a time, until the result field is shown. The provided screenshot shows the questionnaire in a completed state. The result dropdown menu will contain the possible results according to the specified answers. Choosing a result will store a reference to it in the Asset Information Group.



4. We can edit the global table fields to configure which rows of the global table are queried in the questionnaire. This will alter the logic of which results are shown. For example, we hide the checkbox for question 3 by unchecking the Visible Form checkbox, so that the result is not dependent on question 3. After making changes to form visibility we will need to unselect and reselect the Asset Information Group from the assets screen to refresh the page.



5. The Asset Information Group will now display the altered questionnaire form, which does not factor question 3 into the result. This time, after progressing through the questionnaire, a larger number of possible results are shown in the results dropdown menu. The result can be chosen from the dropdown menu.



A Global Table Link field enables linking of a global table to an AIG. NEXUS-IC will apply filters progressively (guided by the user) until the desired table row is linked to the AIG. The UI should display all values for the selected global table field, in a combo box for the user to select, similar to a lookup list.

When adding or editing a Global Table Link, it will be displayed as a pseudo form. This will be built based on:

- What fields are visible in the Global Table form.
- The order of fields visible in the Global Table form.

For each field, NEXUS IC will display a combo box with the distinct set of values for that field. The first combo box will allow you to choose from all values available to that field. Once this is entered, the second field will be all distinct values from rows where the first field value matches what the user has chosen, and so on. If a field list only contains one value, it will be preselected automatically. This process continues until the user has chosen a value for each combo box, and thus filtered the global table row that will ultimately have its value persisted.

When importing or exporting a Global Table Link, the fields will be represented in the document as data separated by ‘/’ characters. For example:


Asset	Location.Full Location	Asset Type.Name	Component Damage Global Table Link.Component Damage
Wood	Company		Material / Insulation Failure / Degraded


Note that if a field called ‘Name’ is present in the global table, the values in that column will be used in place of the automated value for Importing, Reporting and displaying in the grid. If a ‘Name’ column is configured, it should be made invisible on the form via the Field Layout options.

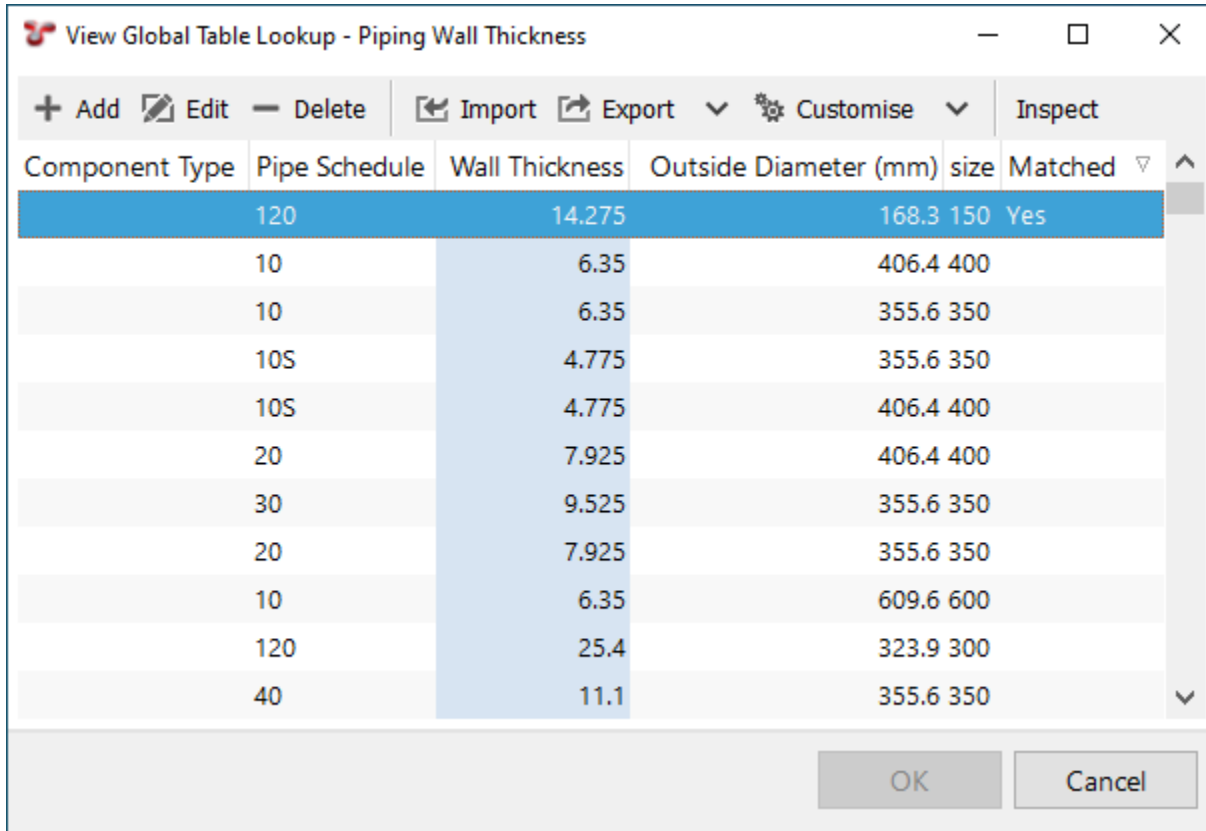
See *Worked Example* for more information.

2.2.7 Global Lookup Field

Global Lookup fields are fields whose value is returned from a *Global Tables* matrix table. Lookup values are passed into the comparison function and the first value which meets the specified criteria is returned as the value for that field. (see section *Global Tables* for further information on configuring Global Tables.)

Global Lookup fields are identified by the  icon.

Click on the  icon to launch the View Global Table Lookup dialog. This dialog highlights which row matched the Global lookup criteria and is being displayed in the field. Click the **Inspect** button to see the Compare function evaluation for the focused row.



Component Type	Pipe Schedule	Wall Thickness	Outside Diameter (mm)	size	Matched
	120	14.275	168.3	150	Yes
	10	6.35	406.4	400	
	10	6.35	355.6	350	
	10S	4.775	355.6	350	
	10S	4.775	406.4	400	
	20	7.925	406.4	400	
	30	9.525	355.6	350	
	20	7.925	355.6	350	
	10	6.35	609.6	600	
	120	25.4	323.9	300	
	40	11.1	355.6	350	

2.2.8 Sub-Asset Information Forms

Often you will have a list or table of information to place against a single asset. For example, you might have a list of different kinds of threats that apply to this asset, and their severity, etc.

To represent this, we use a sub-form within the form.

Mc	Corrosion Mechanisms	Likelihood	Consequence
<input type="checkbox"/>	External Corrosion - Atmospheric	1	2
<input type="checkbox"/>	Internal Corrosion - H2S	2	2

You can use in-grid editing to make changes to a row, and use **Add** and **Delete** to add or remove rows. If you click on a cell that is a function or global lookup field, you will see the or button.

The left-most column within the grid is **Modified**. Any row you make changes to will receive a check mark.

Once you have made changes, **Commit** and **Cancel** will become enabled, and you can use these to save or discard your changes. (If you select a different asset without clicking Commit or Cancel, your changes will be committed.)

2.2.9 Changes by other users

If a change is made in another copy of NEXUS IC or IC-Inspection to data on a form you are viewing, you will see a message saying that this item has been modified by another user.

PL - Section

This item has been modified by another user. [Refresh](#) the item to see their changes to avoid overwriting them.

Variations?

Design?: Dimensional?:

Material?: CWC?:

Click **Refresh** to load their changes into your copy of the application. (This will discard any changes you have made.) Or click the **Save** button to save your changes. (This will overwrite the changes the other user has made, meaning that they in turn will see this message, and have the opportunity to refresh or save.)

This feature applies generally throughout NEXUS IC and IC-Inspection, but asset information is perhaps the most common place to see it.

2.3 Dashboards

The Assets screen's Dashboards tab shows you the output of any of the pre-configured report templates in the database that has been marked as a Dashboard. The only difference is that the Dashboard report recognises what asset is currently selected in the asset hierarchy and will update the contents of the dashboard report base on the selected asset.

To choose which report templates are available as Dashboards, navigate to the *Configuration* → *Reports and Dashboards* → *Templates* dialog. Right-click the required report template and tick **Asset Dashboard**.

Note that this is distinct from the overall *DASHBOARDS* screen.

Refer to the section *Report Templates* for detailed information on configuring report templates.

Note: For the Dashboard report, chose a report template which requires an asset as a report parameter.

2.4 Drawings

Drawings displayed in the ASSETS screen are essentially *Library* records where the Library Type has the “Show as Drawings” flag checked.

“Layers” can be added to drawings for the purposes of:

1. Navigation
2. Data overlay
3. Reporting

“Layers” are marked up regions on the drawing which can be linked to assets in the asset hierarchy.

2.4.1 Properties of a Drawing

1. **Library Type** - By default, this will be “Drawings”.
2. **Name** - A 50 character field which is the name for the drawing, it is most common to use either the drawing title or the drawing number here.
3. **Description** - A 100 character field which provides more descriptive information of the Drawing.
4. **Document No.** - A 50 character field which stores the Drawing Number or Reference.
5. **Revision** - Revision of the drawing (eg. “A” or “C”).
6. **Reference Date** - Reference date of the drawing.
7. **Physical Location** - If this Library Item is a reference to hard copy document, then enter the physical location of the document here.
8. **Hyperlink** - When linking this document to a UNC or URL, then the full hyperlink is stored in this field.
9. **Attachment** - When loading a drawing into the NEXUS IC database, or replacing an existing drawing then click on the **Import** sub menu item. Other menu items available from this dropdown are:
 - **Link** - Link to a file on a mapped drive. A copy of the file will be stored in the NEXUS database and updated when the file changes.
 - **Export** - Saves the drawing to a folder location of your choice.
 - **Launch** - Launches the drawing in the default Windows viewer.
 - **Copy** - Copies the drawing to your clipboard.
 - **Clear** - Removes the drawing from the library item.
10. **Show Grey Scale** - A flag which will display DWG or DXF drawing layers in black and white in lieu of designed colours.
11. **Show Captions** - A flag which will show or hide caption layers of a DWG or DXF drawing.
12. **Show Dimensions** - A flag which will show or hide dimension layers of a DWG or DXF drawing.
13. **Use in Reports** - Can be used to filter what drawings are output to reports.

14. **Force 2D** - If you have DWG or DXF drawings which NEXUS is detecting as 3D, and you'd prefer NEXUS to treat them as 2D, tick this box for those drawings.
15. **Background Colour** - Allows you to define the background colour of a Drawing. Please note that this functionality will only work on drawing types which support transparency (eg. DXF, DWG, GIF etc.).

2.4.2 The Drawings Toolbar

- **Add** The **Add** menu item allows you to add a new Drawing. When you click **Add**, the **Add Library** dialog will appear. (This is because Drawings are *Library Items* in NEXUS IC 6.) Enter the **Name** of the Drawing and any other relevant document information. Then click on the **Attachment** button.

Note: You can also add drawings by dragging image files from Windows Explorer onto the Drawings pane. If you drag/drop one file, you will be given the Add Library dialog, and clicking Cancel will cancel the add. If you drag/drop multiple files, they will simply be added.

Note: NEXUS IC supports the following image formats:

- GIF, JPG, JPEG, TIF, BMP, PNG, PDF, DWG, CGM, DXF, SVG, WMF and EMF.
-

- **Edit** Edit the properties of the current drawing. From this dialog you can also **Add** and **Edit** connections to the drawing.
- **Delete** Delete or Unlink the drawing from the asset. **Delete** will delete the library item from NEXUS. **Unlink** will remove the link to the asset, but keep the library item.
- **Drawing Type** You can select which library types appear here. (To control what appears on this list, go to *LIBRARY*, edit the library types in question, and tick or untick **Show As Drawings**).
- **Include Parents** If you check Include Parents, drawings on this asset's parents will be shown in the thumbnail list for you to select.
- **Copy to Clipboard** Copies the drawing to your clipboard at the current scale and offset shown. The drawing thumbnail and layers will also be included.

Layers Menu

- **Layers** → **Edit Layers** Click this to add, edit delete layers on drawings. A 'layer' is a region, or a button, or a caption, drawn on the drawing.
- **Layers** → **Save** Save add/edit/deletions that you've done to layers on this drawing and exit Edit Layers mode. This option is only available if you've made changes.
- **Layers** → **Cancel** Cancel add/edit/deletions that you've done to layers on this drawing.
- **Layers** → **Layer properties** Properties of the currently selected layer(s). Different types of layer have different properties. Pick a different item from the **Layer Type** drop-down to change this layer to another type. You can set a **Colour**, which will be shown in the shape's border, and shown translucent in the shape's area. **Opacity** sets how translucent — 0 is completely transparent; 100 is completely opaque.
- **Layers** → **Delete Layer** Deletes the layer off the drawing.
- **Layers** → **Create Layer** If you're partway through creating, say, a Polygon layer (see below), you can right-click and choose **Create Layer** (or press Enter) to complete the shape. This will take you to the **Layer Properties** dialog for your new layer.

- **Layers** → **Cancel Point** Don't like the point you've just left-clicked to create? Right-click and choose **Cancel Point** (or press Shift-Ctrl-P).
- **Layers** → **Cancel Layer** Don't like the layer you're partway through creating? Right-click and choose **Cancel Layer** (or press Escape).
- **Layers** → **Copy** Select a layer using the **Selection Tool** (see below), and right-click and choose Copy (or press Ctrl-C). This will copy the region to NEXUS IC's internal clipboard. Then...
- **Layers** → **Paste** ...paste that layer by right-clicking and choosing Paste (or Ctrl-V). NEXUS will paste the layer in, offset a little from the original. Then click inside the layer with the left mouse button and drag the layer to its desired location.
- **Layers** → **Select All** Select all the layers on the drawing.

Tip: Using 'Select All' is useful way to reposition or delete multiple layers. You can also select multiple layers by holding down the Ctrl key and clicking each layer.

- **Layers** → **Clear Selection** Unselects all the layers. This is useful, for example, if you want to unselect the selected layer so you can see the colours of all layers at once. (The selected layer is shown in pale blue; Clear Selection means no layer is so shown.)

Layer Tools

- **Selection Tool** Click this, and when you click on a layer in the drawing you'll be selecting it. Ctrl-click to select additional layers. You can click inside a layer and drag to move layers. (Click-dragging a point will move just that point.)
- **Rectangle** Click this then click-drag to create a rectangular region on the drawing. Once complete, you can drag the four corners of the rectangle separately so that it's not a rectangle anymore.
- **Polygon** Click this to start drawing a polygon region. Each click in the drawing will add a point to your polygon. Press Enter or right-click and choose **Create Layer** to complete the polygon.
- **Ellipse** Click this then click-drag to create an ellipse region on the drawing. Once complete, this is turned into a 50-sided polygon.
- **Line Region** This tool is useful for putting regions on P&IDs etc., where you have a thin, possibly branching line and you want to put a narrow region over it. Click the **Line Region** button, then left-click on an end of the line you want to trace, left-click at the next point that it turns a corner, etc. As with **Rectangle**, when you complete (by pressing Enter or right-clicking and choosing **Complete Layer**), the layer is a region and you can adjust all its corners independently.
- **Caption** Click this then click in the drawing at the top left of where you would like your caption to appear. In the Layer Properties dialog, type some **Caption** text. Optionally choose a **Caption Colour** and a **Caption Angle** — blank or 0 gives ordinary horizontal text.
- **Button** Click this then click in the drawing at the top left of where you would like your caption to appear. In the Layer Properties dialog, type some **Caption** text — if you type no text, you will get a very small button, because the button sizes to fit the text.

View Menu

- **View** → **Fit Width** Changes the pan and zoom on the drawing so that it fits within the width available in the Drawings pane.

- **View** → **Fit Height** Changes the pan and zoom on the drawing so that it fits within the height available in the Drawings pane.
- **View** → **Default Size** Sets zoom to 100%. This may or may not fit in your Drawings pane, depending on how big the drawing is.
- **View** → **Zoom In** Zoom In.
- **View** → **Zoom Out** Zoom Out.
- **View** → **Zoom Selection** Click this, then in the drawing click and drag a rectangle. NEXUS IC will then zoom to the area you've selected.
- **View** → **Increase Caption Size** Increases the size of *all* captions on the drawing: on captions, buttons, and regions.
- **View** → **Decrease Caption Size** Decreases similarly.
- **View** → **Caption** → ... If you select **Default**, captions will display the text you have set in **Layer Properties**. If you select **Asset Information** or **Event**, NEXUS IC will display a picker. You pick a field, and NEXUS IC will use values from that field to fill captions. This only works for layers that have an asset set in **Layer Properties**.

Layer Colour Menu

- **Layer Colour** → **Default** Shows layers on drawings in the colours that you have selected in the Properties of each layer.
- **Layer Colour** → **Traffic Lighting** Shows layers on drawings in the colours specified by the currently selected Traffic Light.
- **Layer Colour** → **Transparent** Shows layers on drawings as just an outline, in the colours that you have selected in the Properties of each layer.
- **Layer Colour** → **Unknown Asset** Shows layers that have an asset in the **Known Asset Colour**, and layers that don't have an asset assigned in the **Missing Asset Colour**. You can configure these in *Database* → *Properties*.

2.4.3 3D Drawings Toolbar

3D Drawing Setup Example

There is some configuration required to be able to link assets in the NEXUS IC hierarchy to objects in a 3D drawing. Once configured successfully, you will be able to:

1. Hover over the object in the 3D Drawing to view the NEXUS IC asset name.
2. Click on an object in the 3D drawing to auto navigate to that asset in the NEXUS IC asset hierarchy.
3. Display traffic lighting on the 3D drawing objects.

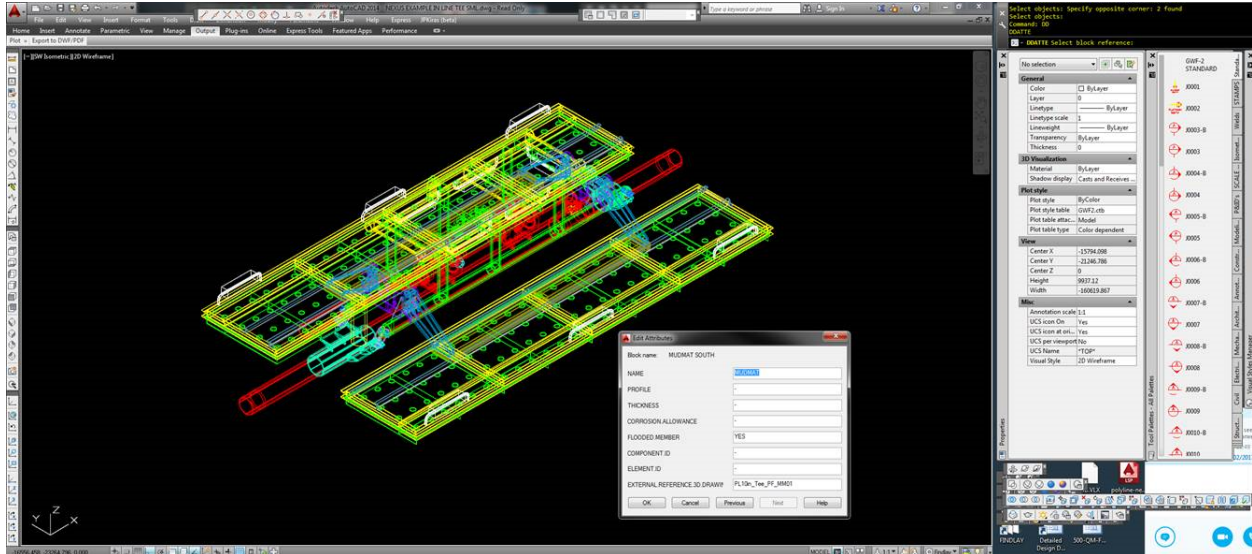
Caution: For optimal performance, an OpenGL graphics card is required on the client machine for this functionality. 3D drawings can take a considerable time to load. We recommend that 3D drawings are simplified as much as possible to reduce file size and load times.

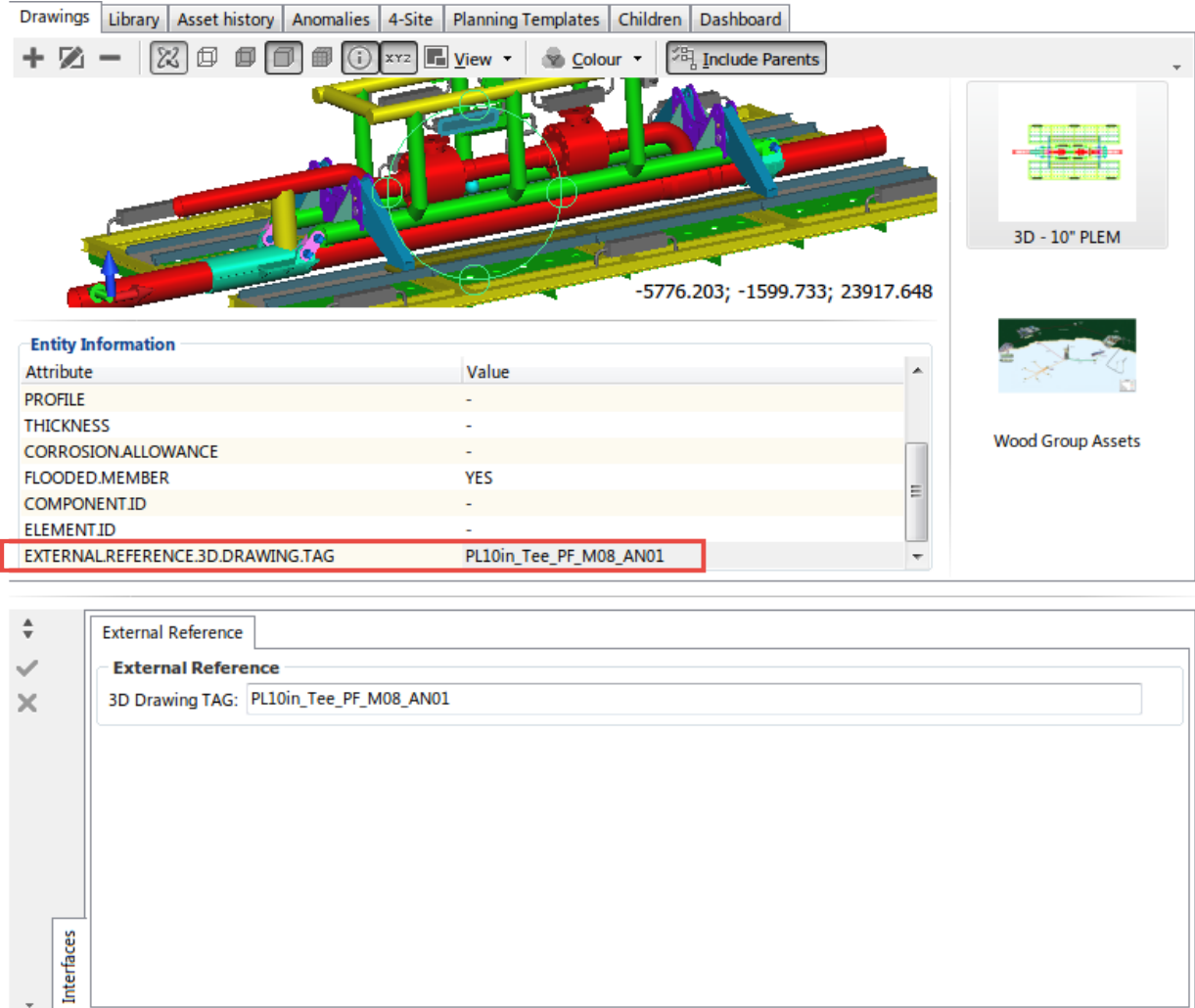
Step 1

The first step is to ensure that the 3D Drawing is configured with an Asset Serial Number attribute.

Using Autocad, create a block which represents a single asset in the NEXUS IC asset hierarchy. For each block, define an attribute (using the ATTDEF command) and populate the attribute with the “Asset Serial Number”.

In this example, the attribute in the 3D drawing is titled EXTERNAL.REFERENCE.3D.DRAWING.TAG. The following images illustrate the attributes in Autocad and in NEXUS IC.

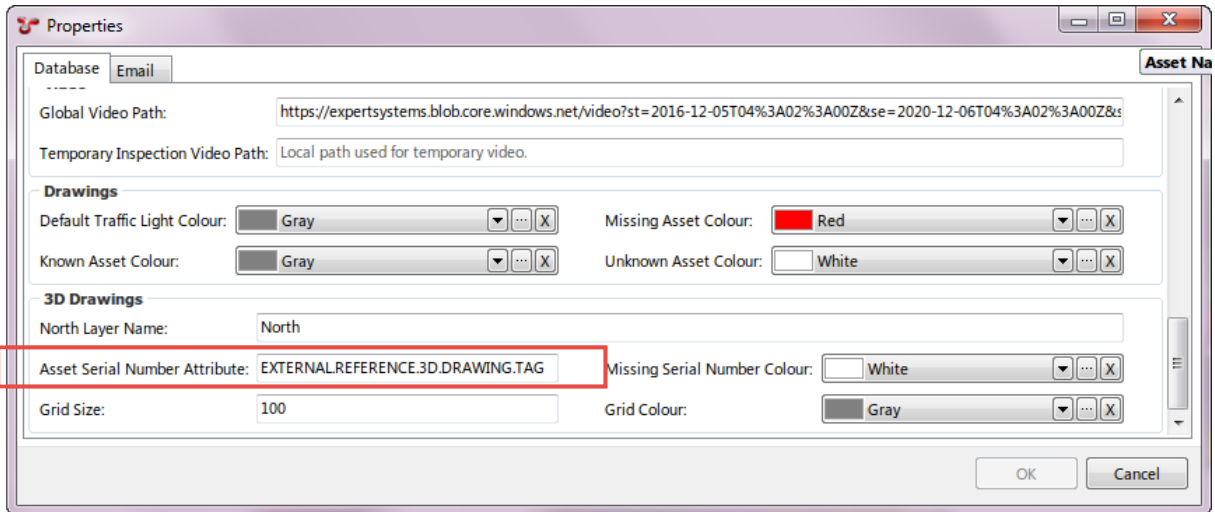




For detailed instructions on how to prepare an Autocad drawing, refer to *3D Drawing Preparation in Autocad*.

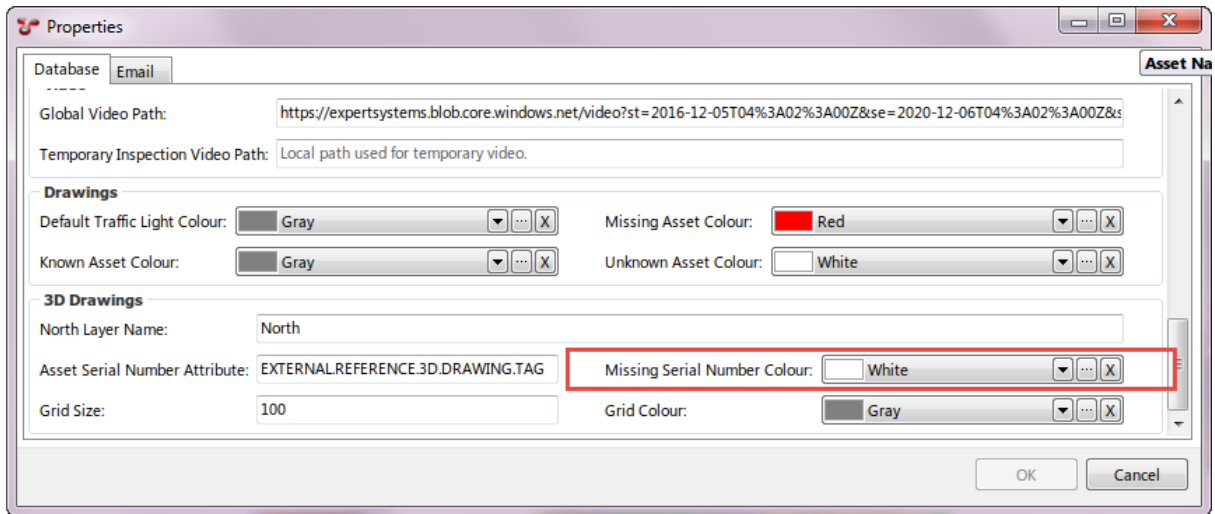
Step 2

Go to *Database* → *Properties* → *3D Drawings*. Type in the 3D Drawing Attribute name which contains the **Asset Serial Number** information. In this example, the attribute in the 3D drawing is titled EXTERNALREFERENCE.3D.DRAWING.TAG.



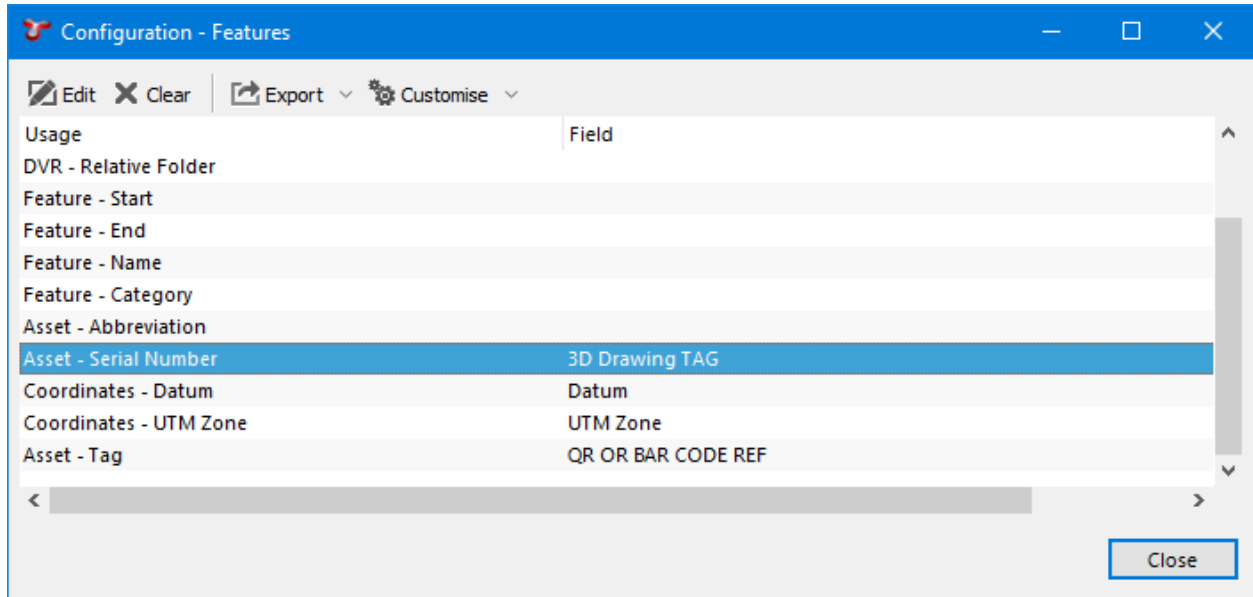
Step 3

Go to *Database* → *Properties* → *3D Drawings*. Select a colour to be displayed for any block where the attribute is defined, but there is no corresponding match in the asset hierarchy in NEXUS.



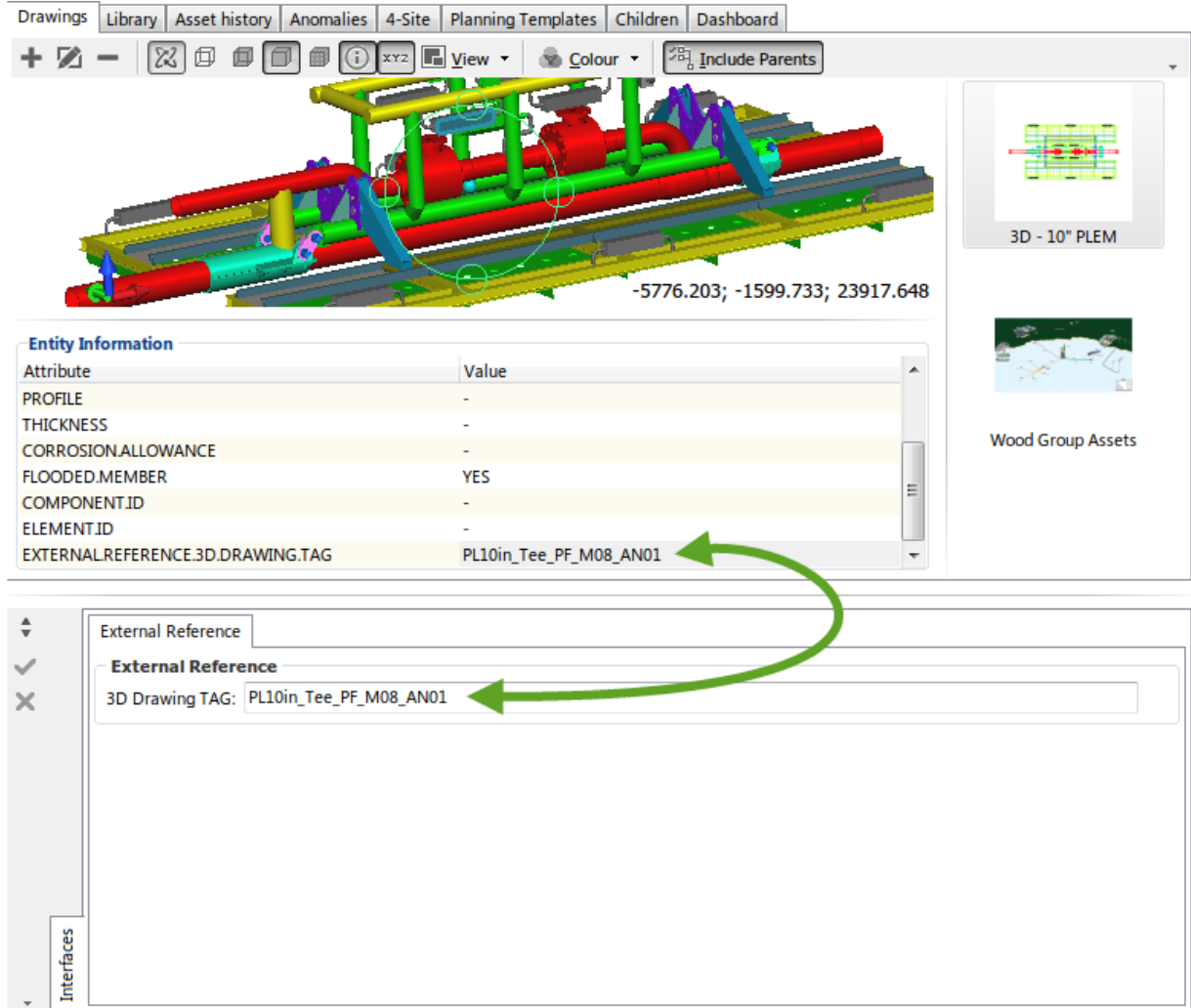
Step 4

Go to *Configuration* → *Assets* → *Features* to edit the field. In this example, the AIG field **Asset - Serial Number** has the **3D Drawing TAG** field set, located in the AIG titled **External Reference**.



Step 5

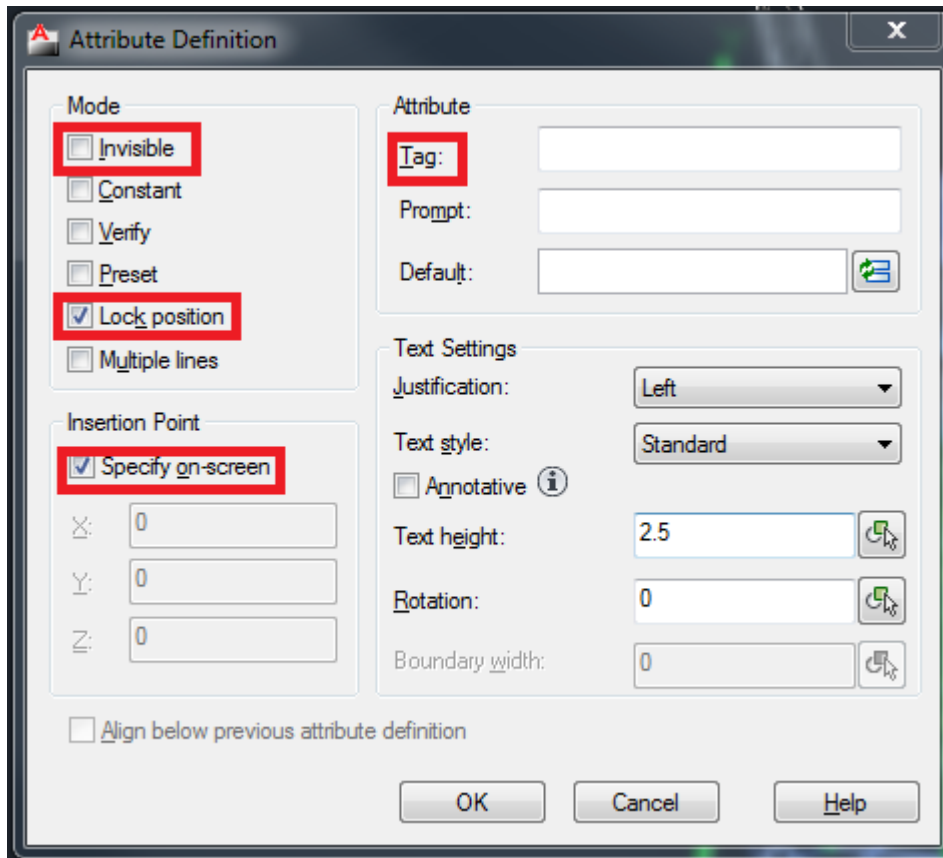
Ensure that the Asset Serial Number data is populated in the specified AIG field and that the data matches that in the Asset Serial Attribute in the 3D drawing.



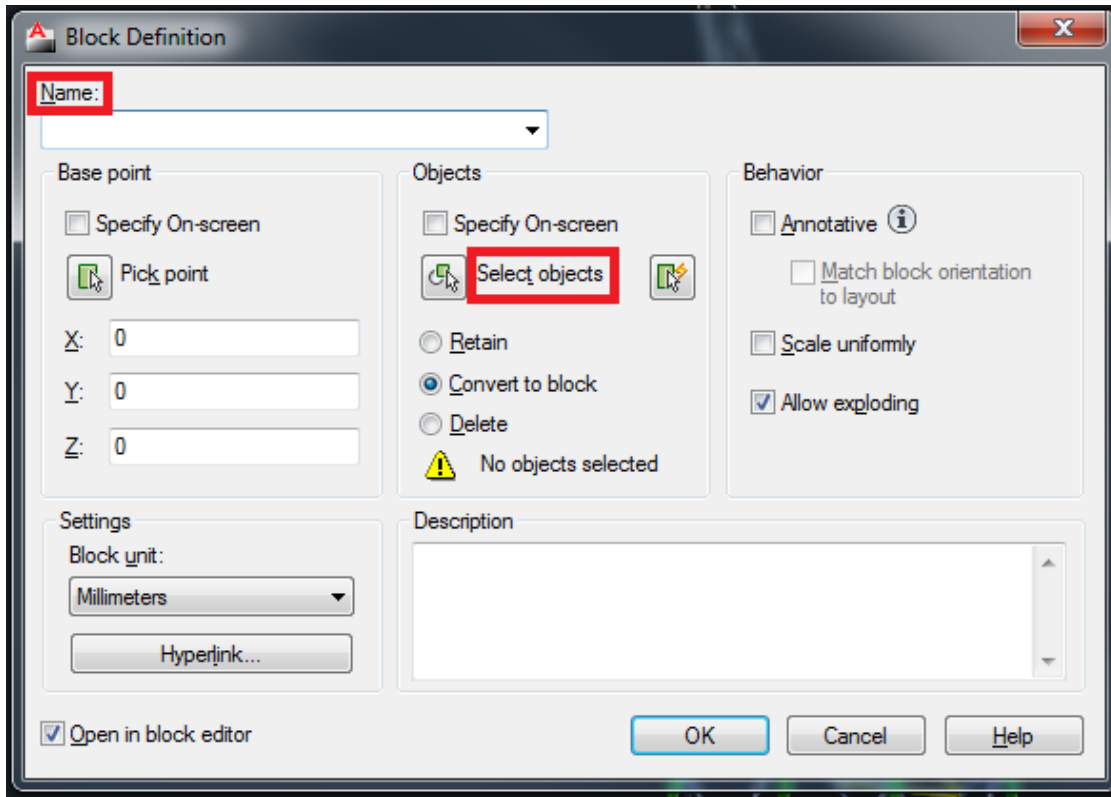
3D Drawing Preparation in Autocad

In order to prepare a 3D drawing follow the steps below:

1. Create the required attributes in Autocad
 - a) In Autocad type ATTDEF, the following form will open



- b) Check the **Invisible** mode and uncheck the **Lock position** mode
 - c) Uncheck the **Specify on-screen** and leave the coordinates X:0, Y:0, Z:0
 - d) In the **Tag** textbox, type the name of the attribute (e.g. EXTER-NAL.REFERENCE.3D.DRAWING.TAG)
 - e) Press **OK** button
 - f) Repeat steps a – e for each attribute to be created
2. Create blocks with attributes
 - a) In Autocad type BLOCK, the following form will open

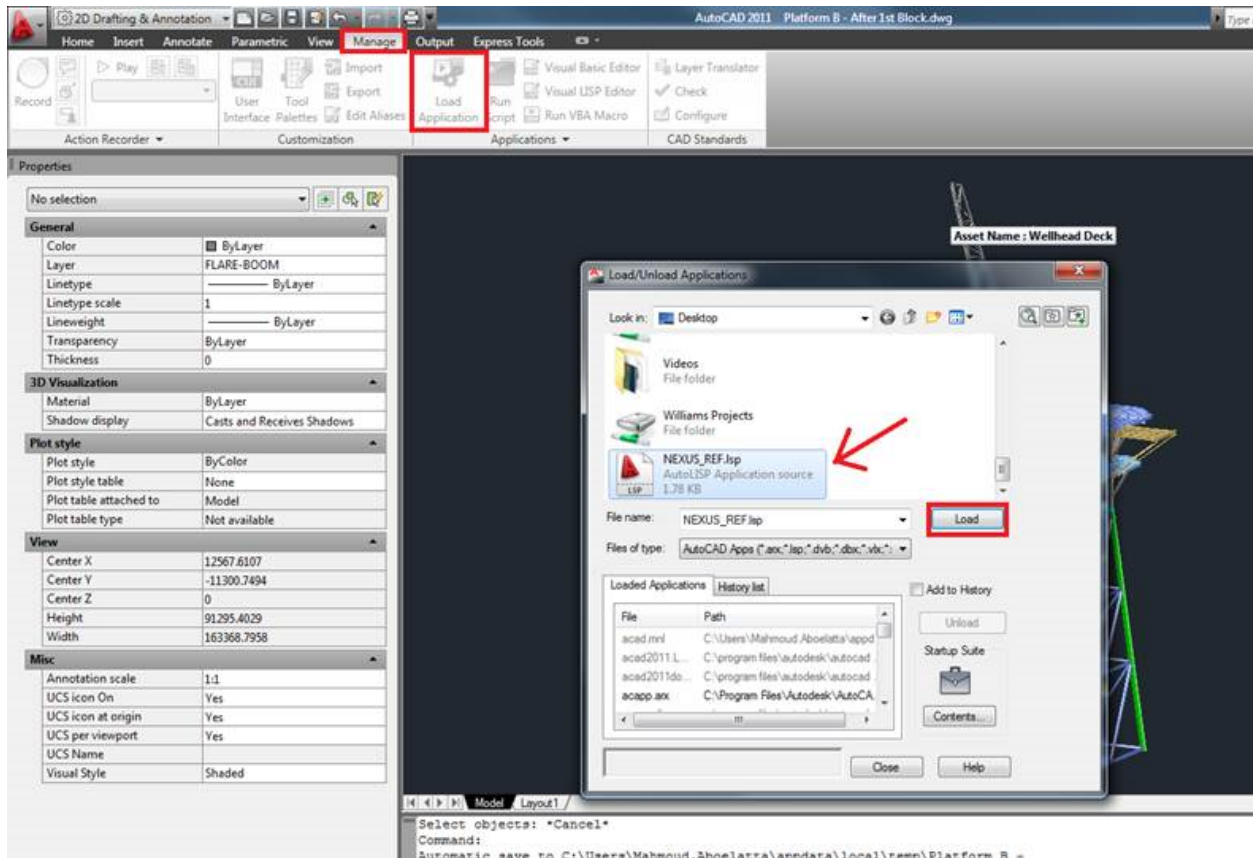


- b) Type the block name (preferred to be the object component unique ID)
 - c) Click on **Select objects**
 - d) Select the attributes created in step 1
 - e) Select the object required
 - f) Press **OK** button
3. Fill out the attributes values. The value will be filled with the unique identifier that will be used by NEXUS IC
 4. Repeat steps 1 – 3 for each object in the Autocad drawing

The above steps could be time consuming, therefore an AUTOLISP (one of the Autocad scripting languages) has been developed to automate the attribute and block creation as well as the attributes value population. You will need to download the AUTOLISP file from [here](#).

This file can be used to automatically do the steps for creating a 3D drawing using Autocad. The steps to use the AUTOLISP are as follow:

1. Open the drawing in Autocad
2. Go to the **Manage** tab and click on **Load Application**
3. Select the “NEXUS_REF.lsp” file
4. Press the **Load** button
5. Press the **Close** button



6. In the command line type the following command: (NEXUS_REF)

In order to use this AUTOLISP, it is required that each object in the drawing to be on a separate layer. These layers should be named as the external reference name (e.g. Leg_B1). The script will do the following:

1. Create attribute with the name “EXTERNAL.REFERENCE.3D.DRAWING.TAG”
2. Create a block for one object, setting the block name to be the same as the object’s layer name
3. Populate the attribute value with the object’s layer name
4. Loop on all the objects and repeat steps 1 - 3

You can download a sample 3D Drawing from the following [link](#).

This sample Autocad drawing can be used in conjunction with the Autoslip file for further clarification.

3D drawings get different items on their toolbar. **Add**, **Edit**, **Delete** and **Colour** are as described above.

- **Rotate** When selected, dragging on the 3D drawing will change the “camera” angle. When unselected, dragging on the drawing will pan.
- **Wireframe / Hidden Lines / Smooth Shading / Flat Shading** Select between these to control rendering of the drawing. Some are faster; some are prettier. For some drawings, Wireframe may not show anything.
- **Information** Toggle a panel at the bottom of the Drawings pane showing information for the selected region of the drawing.
- **Coordinates** Toggle the display of coordinates at the bottom right of the drawing, showing the mouse location.

View Menu

For 3D drawings, the View menu contains extra items:

- **View** → **Rotate** Same as the Rotate button.
- **View** → **View Direction** Select one of 10 viewing directions. You can get to any of these viewing directions via the Rotate button, but this is faster.
- **View** → **Viewports** For a 3D drawing, available viewports will be displayed on this menu.
- **View** → **3D Styles** Same as the Wireframe / Hidden Lines / Smooth Shading / Flat Shading buttons.
- **View** → **Hint** → ... Similar to **View** → **Caption** → ..., but information will be displayed as a mouse-over hint on the region you're currently on, rather than as captions.
- **View** → **Show** → ...

Information and Coordinates are the same as their respective buttons. **Grid** may or may not show a grid, depending on the drawing. **Axis** will show/hide the axis orientation arrows at the bottom left of the Drawing panel. **North Arrow** may or may not show an arrow illustrating the North direction, depending on the drawing.

Refer to *3D Drawing Setup Example* and *3D Drawing Preparation in Autocad* on how to configure 3D drawing objects to link to assets in the asset hierarchy.

2.4.4 Asset Information

You can right-click on an Asset Information field name and select "Display on drawing" to show values from that Asset Information field on drawing layers.

2.4.5 Drag and Drop

When you are editing layers, you can drag an asset from the asset tree at the left of the window onto the drawing. You will then be given a dialog asking you what type of layer you would like to add to represent this asset on this drawing.

You can also drag from the asset tree onto an existing region. The existing region will be given this new asset as its Caption and Asset, and you will be shown the Edit Layer dialog.

You can also drag an Asset Information field from a form onto the drawing. This makes the selected layer display text from that Asset information field.

2.4.6 Properties of a Layer

1. **Layer Type** - Specifies the way the layer will be rendered on the drawing. Only **Region** and **Button with Region** let you create complex outlines.
2. **Colour** - Colour of the layer. This colour is used for both the outline and the fill.
3. **Opacity** - Opacity of the filled part of the layer. 0 is transparent; 100 is solid.
4. **Show Caption** - Tick this to set the **Caption** (below) visible.
5. **Caption** - Text string to show for this layer. This caption text grows/shrinks as you zoom in/out. It can be moved using the "grab point" at its top left. The text can be replaced with other text when the drawing is used in a report template or the drag AIG feature is used.
6. **Caption Colour** - Colour of the **Caption**.

7. **Caption Angle** - 0° is horizontal, right way up. Positive angles rotate the text anticlockwise.
8. **Associated Field** - You can show text from an Asset Information field on this layer. The text will be appended after the fixed text specified in **Caption**.
9. **Asset** - A layer can link to an asset. Specify that asset here.
10. **Relative Asset** - Instead of specifying a particular asset, you can enter text here. NEXUS will search for children that match that name. If multiple children match, when the user clicks this layer and chooses **Navigate to**, there will be one entry for each in the pop-up menu.
11. **Associated Drawing** - When the user clicks this layer and chooses **Navigate to**, you can choose here which drawing will be selected once the navigation is complete. That drawing must be available on that asset.

2.5 Library

This functionality is also available via the *Library* screen. Here on the Assets screen, you can view all the library items for a particular asset.

Library Items are electronic documents which can be linked (via *Connections*) to data and data types in NEXUS IC.

+ Add Edit - Delete Launch Email Import Export Customise Connections								
A	Library Type	Name	Description	Document No	Revision	Reference Date	Physical Location	Hyperlink
	Photographs and negatives	Onshore LNG	Aerial Photo Onshore LNG Plant	N/A	N/A			
	Photographs and negatives	test						https://icwe
	Photographs and negatives	Welcome	Splash screen for welcome page					

The electronic documents can be uploaded directly into the NEXUS IC database, or can be referenced via URL or UNC paths.

Here are some examples of valid URL and UNC paths:

1. <https://www.youtube.com/watch?v=oHg5SJYRHA0>
2. \\example.com\groups\eng\this_doc.docx

Caution: Mapped drives - If you define a mapped drive as a hyperlink location (for example H:\Working\document.docx, then you must be certain that the drive letter H:\ is mapped for every other potential NEXUS IC user. In lieu of mapped drives, it is recommended that you use UNC paths for network drive locations.

The **Library** functionality is available from multiple screens and dialogs in NEXUS IC including:

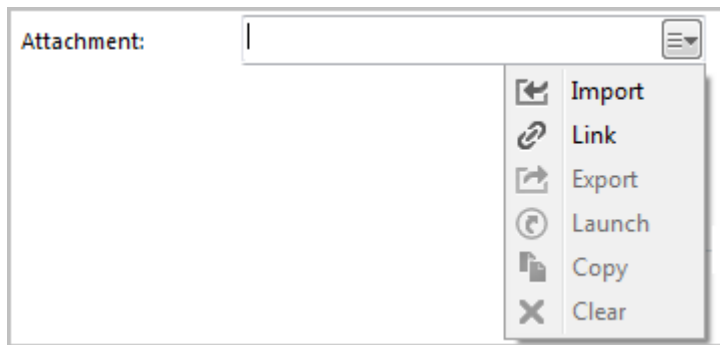
1. *ASSETS*
2. *LIBRARY*
3. *INSPECTION*
4. *ANOMALIES*
5. *Configuration* → *General* → *Functions* → *Edit Function Definition*
6. *Configuration* → *Assets* → *Types*
7. *Configuration* → *Events* → *Event Types* → *Edit Table Information*

Note: Example - Upload company Piping specifications to the NEXUS IC Library and assign to the Asset Type “Pipework”. This will make the Piping Specifications available from the ASSETS | Library screen whenever the active asset is of type “Pipework”.

2.5.1 Library Items Toolbar

The **Library** toolbar button allows the user to add, edit and delete Library Items.

- **Add** The **Add** menu item allows you to add a new Library item. Depending on what screen is active, the **Add** drop down menu will provide connection type options. Enter the **Name** of the Library item and any other relevant document information (Revision, Date, Document Reference etc). If the document is to be uploaded into NEXUS IC, then click on the **Attachment** button, else enter a **Hyperlink** location.



When adding an item, you can either **Import** or **Link** it. If you Import, the item will be brought into the database. If you subsequently change the original on disk, the item in the database will not change to match. If you Link the item, then when you change the original on disk, the next time you view the item within NEXUS IC, you *will* see the updated item.

Note: NEXUS IC will still load a copy of a Linked item into the NEXUS database — this is so that if the original is unavailable (for example, because you are away from your network), NEXUS IC can display the cached copy. When you view the item, if the original has been updated, we also update the database cached copy. You can’t Link items that are on your local hard disk — only items on network drives can be Linked. The Link feature is designed to keep you up to date with items that may have been changed by others, and that can’t happen on your local drive.

Hint: You can also add multimedia by dragging image files from Windows Explorer onto the Library Items pane. If you drag/drop one file, you will be given the Add Library dialog, and clicking Cancel will cancel the add. If you drag/drop multiple files, they will be added, and then multi-selected in the grid. You can then click Edit to *multi-edit* them. Drag-drop will **Import** items, not **Link** them.

- **Edit** The **Edit** menu item allows you to edit the properties of the currently selected Library Item (not the document itself).
- **Delete** Deletes the currently selected Library Item.

Note: Deleting a Library Item will delete all the connections of that Library Item.

- **Launch** Launches the Library item on the local machine. Note that by default NEXUS will only launch files with the following extensions: doc, docx, xls, xlsx, jpg, png, jpeg, bmp, tiff, gif, mpg, mp3, wav, ppt, pptx, txt, pdf, emf, zip, dwg, avi, rtf, mp4, csv.

Hint: Use the Space Bar on your keyboard to launch the currently selected Library item.

Note: If the local machine does not have an associated viewer for the document type (eg. AutoCad viewer for DWG type), then the document can not be launched.

- **Email Attachment** This option will launch a new email message and attach the associated Library Item to it. Note that Email account properties need to be set up for this option to function.
- **Import**

See [Import](#) for detailed information on the Import Wizard. The MS Excel Import Template details the required format for importing Library Items.

You can also import the *Connections* in the same import as the Library items, so in addition to the Library Import columns, you can additionally define the Connection information using the following column headings:

- Library Connection.Connect To
- Library Connection.Workpack
- Library Connection.Asset Type
- Library Connection.Asset
- Library Connection.Event Type
- Library Connection.Event
- Library Connection.Anomaly
- Library Connection.Risk Model
- Library Connection.Function

Note that the *Connect To* column should only contain one of the following text items:

- Anomaly
- Asset
- Asset Type
- Event
- Event Type
- Function
- Risk Model
- Workpack

- **Export** See [Export](#) for information about exporting Library Items. Please note that this option will only export the contents of the grid, not the Library Items themselves.
- **Customise** See [Customise](#) for information about the Customise toolbar option.
- **Connections** See [Connections](#) for information about the Connections toolbar option.

Double-click

The first time you double-click on a library item, NEXUS will ask you what action to take: you can either Launch the Library item in an external editor, or Edit the Library item. If you would like your choice to become permanent, tick the “Always do this” box. Note that if you hold down the **Alt** key while double-clicking, you will be asked again.

2.6 Asset History

The **Asset History** functionality provides the user with a tool to record key events of an asset (or a group of assets) throughout its (or their) life cycle. These asset history items represent information that should be captured for posterity. Asset history records can be retrieved in report templates or accessed via the UI.

The Asset History dialog allows for the user to enter a date for the Asset History item. If however the Asset history item is related to a Workpack or a Schedule, then the Date of the Asset History item will be populated from the Date of the Workpack or Schedule. Additionally, you can reassign (or change) the asset which this Asset History item is related from this dialog.

Hint: To bulk update (or delete) Asset History items, use the *Multi-Edit* functionality.

2.6.1 Asset History Toolbar

The **Asset History** toolbar allows the user to add, edit and delete Asset History Items.

- **Asset History** → **Add** The Asset History → Add menu item allows you to manually create a new Asset History item. Enter the **Title** and **Description** of the Asset History item. If the Asset History item is not related to a specific Workpack or Schedule, then enter a date for the record (usually the date which represents the event).
- **Asset History** → **Edit** Choose Asset History → Edit to edit the properties of the currently selected Asset History record. Changes are saved when you click on the **OK** button.
- **Asset History** → **Import** Refer to section *Import* for detailed information on the Import Wizard. The MS Excel Import Template details the required format for importing Asset History records.
- **Asset History** → **Export** Refer to section *Export* for information about exporting Asset History Items.
- **Asset History** → **Customise** Refer to section *Customise* for information about the Customise toolbar option.

2.6.2 Reporting on Asset History

To retrieve Asset History data in a report template, use the System Table titled **Asset History**.

2.7 Anomalies

Anomalies are records which identify discrete items or areas of concern. An anomaly record may have been originated from an inspection item (which means that it will have a finding linked to it) or it may be a stand alone record created outwith the integrity and inspection cycle (ad-hoc).

Anomalies can be accessed from the *ANOMALIES* screen, or from here in the Anomalies tab on the Assets screen. From here you will see only anomalies which pertain to the asset you have selected in the asset tree; or, if you click the **Child Assets** button, to this asset and all its descendants.

Anomalies can be bulk imported from MS Excel or manually created from the Add Anomaly dialog.

2.7.1 Properties of an Anomaly

1. **Asset** - The name of the asset that the anomaly is attached to. This is a required field.
2. **Name** - A short (50 character limit) name for the Anomaly.
3. **Description** - A 100 character field which provides more descriptive information of the anomaly.
4. **Code** - Code which identifies the type of anomaly. Some typical codes may include “CD”, “PD” or “VIB” (Coating Damage, Physical Damage or Vibration) however, anomaly codes are user-definable and can be configured from *Configuration → Anomalies*.
5. **Severity** - Choose from a list of pre-defined Severity Levels. Typical severity levels may include “Level 1 - Contributor”, “Level 2 - Degraded”, “Level 3 - Damaged”, “Level 4 - Danger” and “Level 5 - Extreme Danger” however, severity levels are user-definable and can be configured from the *Configuration → Anomalies* area. Anomaly severities can also be assigned to Anomaly Triggers and will be pre-populated from the initial automatically generated Finding, through to the anomaly that the finding is linked to.
6. **Priority** - Choose from a list of pre-defined Priorities. Typical priority levels may include “Very High”, “High”, “Medium”, “Low” or “Very Low” however, the list of anomaly priorities are user-definable and can be configured from the *Configuration → Anomalies* area.
7. **Anomaly Number** - A numerical property which can be used to store a number against the anomaly. This number is not auto-populated.
8. **Anomaly Set** - Is an alternative option for grouping anomalies. A common grouping may include “Topside” and “Subsea” however, Anomaly Sets are user-definable and can be configured from *Configuration → Anomalies*.

9. **Reference Number** - A 200 character limit field which can be used to reference (or cross reference) anomalies.
10. **Date Created** - The date the anomaly was first created. This will default to today's date, but is editable thereafter.
11. **Created By** - Name of the person creating the anomaly record. This will default to the currently logged in user, but is editable thereafter.
12. **Assigned To** - Name of the person to which the anomaly record is assigned.
13. **Comments** - A large free text field to retain additional information about the anomaly which may not be captured in the properties of the anomaly.
14. **Status** - Status of the anomaly. Anomaly statuses are user-definable and can be configured from *Configuration* → *Anomalies*.
15. **Closed Out** - A check box which identifies whether or not the anomaly is Open or Closed. Closed anomalies are normally excluded from anomaly statistical reporting.
16. **Risk Score** - This is a calculated field, the function assigned to this field is named "System - Anomaly - Risk Score" and must be configured through the *Functions*. Different fields such as the "Severity" and "Priority" of the anomaly can be used as the input parameters for the function.

2.7.2 Report Table Sources

To extract anomaly data into a report template, use the System Table titled **Anomaly** as the primary Table Source. For more information on Report Templates see *Report Templates*.

2.7.3 The Grid

The anomalies grid lists all anomalies based on the currently applied filters. Primary filtering options are:

- Workpack; and
- Asset.

Filters are set and cleared using the **Filter** menu on the Anomalies toolbar.

Tip: Use the grid *Grouping* functionality to group and filter anomaly records. It is a quick and easy way to drill down to the anomalies that you are particularly interested in reviewing.

2.7.4 The Anomalies Toolbar

Add, Edit, Delete: *Add / Edit / Delete* anomaly(s).

Tip: To bulk update (or delete) anomalies, use the *Multi-Edit* functionality available from the anomalies grid.

- **Import** See *Import* for full description of the Import menu item.
- **Export** See *Export* for full description of the Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.
- **Connections** See *Connections* for information about the Connections toolbar option.
- **Anomaly** → **Close Anomaly** Click this to close out the anomaly. You will be shown an Anomaly Action dialog. This dialog lets you create an anomaly action saying why the anomaly was closed out, and by whom.

- **Filter** → **No Filter** Clears any currently applied anomaly filters.
- **Filter** → **Workpack** Allows you to filter the anomaly listing by one or more workpacks. Workpacks are linked to anomalies via the linked findings and events.
- **Filter** → **Asset** Allows you to filter the anomaly listing by a user-selected sub-set of assets. Assets are linked to anomalies by the Asset chosen in the Anomaly record itself AND by the linked findings and events.
- **Reports** See *Reports* for information about the Reports toolbar option.

2.7.5 Matrix

You can show anomalies on a risk matrix. This (when configured) is visible at the right or bottom right of the screen.

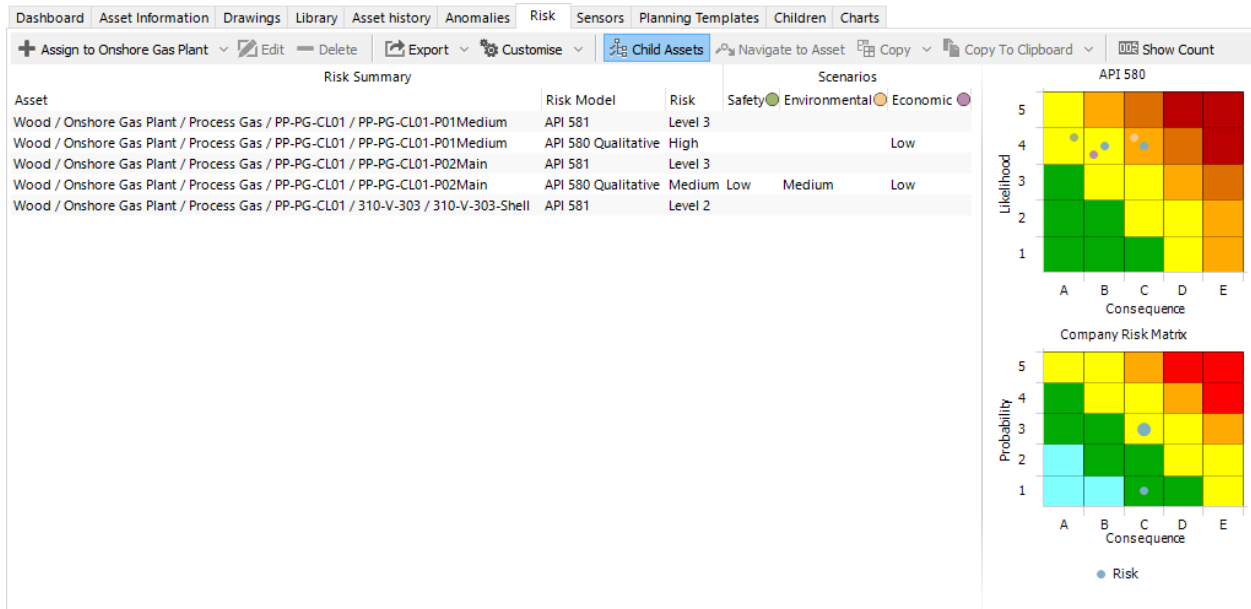
Each anomaly’s Risk Score is used to place it on the diagram. Note that anomalies do not have a Likelihood or Consequence to give them an X/Y position on the diagram — they only have a Risk Score. So if your diagram has several squares with the same Risk Score (as is usually the case), your anomalies will be placed in the left-most such square. That is, risk-assessed assets are placed in a particular square, but anomalies are merely placed in a particular band.

The matrix legend is displayed below the chart, with coloured indicators for open and closed anomalies. Legend keys can be clicked to toggle showing their corresponding anomalies on the matrix.

To make this matrix work, you will need to configure *Database* → *Properties* → *Database* → *Anomaly Risk Chart*. You will also need to configure the “System - Anomaly - Risk Score” function.

2.8 Risk

The **Risk** functionality displays the risk assessment results for the currently selected asset and all children. Results are graphically represented in the pre-configured Risk Matrix and in the data grid.



Where there are several risks at the same location in the chart, the dot will be shown larger.

Clicking on a row in the Grid will highlight that item in the Matrix. Similarly, clicking on a result indicator in the Matrix will highlight the relevant row (or rows) in the Grid.

If you are using scenarios, each scenario will be shown in its own colour. Scenario dots may be offset within the risk square; if so, this does not indicate a difference in risk — it is merely for legibility.

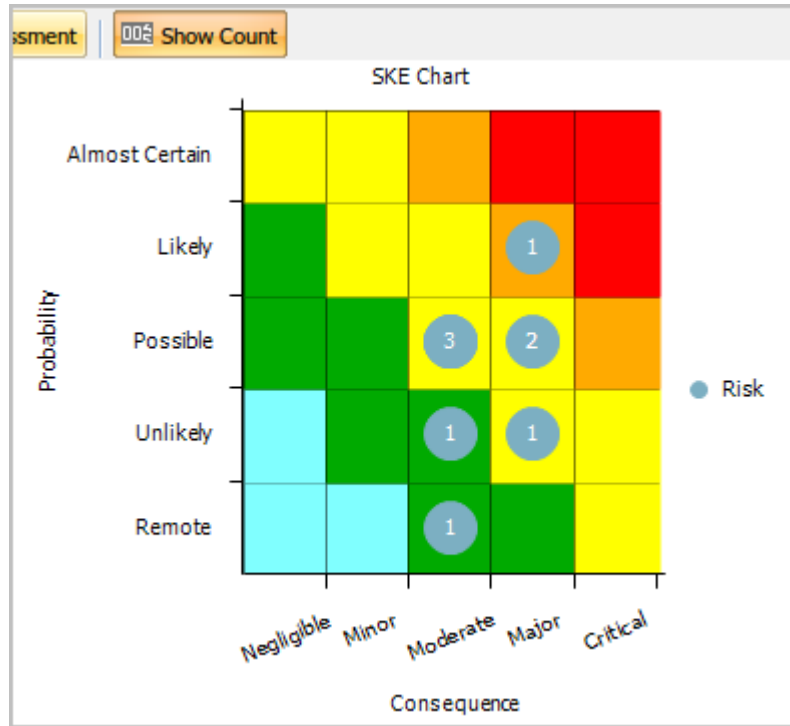
If you click on a scenario dot within the Matrix, the relevant row(s) in the grid will be highlighted, *and* the relevant dots for those assets' other scenarios will be highlighted in the Matrix.

2.8.1 Risk Toolbar

- **Assign** → **Risk Model** Choose from the list of pre-configured Risk Models in the Drop Down menu to assign to the currently selected asset. (See Copy Assessment below to bulk-assign a model to many assets.)
- **Edit** Launches the **Risk Assessment** dialog. Any Values in the Risk Assessment can be edited and saved from this dialog by clicking in the **Value** column of any Value type row (white rows). Please note that Pass Thru and Calculation values can not be edited. Clicking on a Factor or Model row however, we allow you to view the function and the function results that has been assigned to that row. From here you can also assign Scenarios to this Risk Assessment. Click on **OK** to save changes, or **Cancel** to exit without saving changes.
- **Delete** Deletes the currently selected Risk Assessment from the asset to which it is assigned. Please note that the Asset and all information linked to that asset will remain unchanged.
- **Export** See [Export](#) for full description of the Export menu item.
- **Customise** See [Customise](#) for full description of the Customise menu item.
- **Child Assets** Select to include risk assessments on all this asset's children.
- **Navigate to Asset** Will change the active asset in the hierarchy to the currently selected risk assessed asset. Note that this will filter the Risk grid so that only assessments for the active asset will be shown.

Hint: Use the **Back** toolbar button on the Assets toolbar to return to the previously selected asset.

- **Copy Assessment** This menu item will launch the Copy risk assessment to selected assets dialog. From here, select the assets which you want to assign the currently selected risk model to. Values assigned to Factors and Categories in the Risk Model will be copied also. Please note that you will only be able to select valid assets from this dialog (e.g. assets which already have the same risk model assigned cannot be selected). Click on **OK** to copy the Risk Assessments.
- **Copy To Clipboard** This menu item will copy the risk chart to the clipboard as an image.
- **Show Count** When in the “Down” state, the matrix will overlay the total number (count) of risk assessments at that location in the Matrix, as shown in the following image:



2.9 Sensors

Sensor data is periodically logged (for example, once per hour). Here you can see a summary of sensor data, including a “sparkline” chart showing the last 30 days of data. The dots on each chart show the minimum and maximum (within the 30-day range). The two lines show the minimum and maximum values for that particular range — if the chart is 90 pixels wide, each pixel represents a third of a day, so a considerable range of values may occur within a single horizontal pixel.

Typically, a Sensor will only have a single numeric field configured. However, if your Sensor data type has more than one field, then the Sparkline chart shown on the Sensors grid will display the data from the field that is ordered first. See *Sensors* for more information on Form Order.

Asset	Sensor Type	Number of Readings	Date of Last Reading	Last 30 Days	Min	Max	Last
... / DC2.P2_TH-P2	Valve Position	1273933	31/07/2017 11:00:00 PM		CLOSED	CLOSED	CLOSED
... / DC2.P2_PCV-P2	Choke Position	837520	31/12/2017 11:00:00 PM		0.0336	0.0345	0.0339
... / DC2.P2_GLCV-P2	Choke Position	837520	31/12/2017 11:00:00 PM		0.0033	0.0045	0.0037
... / DC2.P2_PTT2-P2	Pressure (kPa)	956317	31/12/2017 11:00:00 PM		5141.24	5928.87	5780.24
... / DC2.P2_PTT2-P2	Temperature (C)	1081085	31/12/2017 11:00:00 PM		9.31	13.71	12.19
... / DC2.P2_SD-P2_S	Sand Rate	846029	31/12/2017 11:00:00 PM		0.000	0.004	0.000

2.9.1 Sensors Toolbar

- **Child Assets** Will display all children of the currently selected asset (multiple levels of the hierarchy) if it is selected. Note that if the selected asset has many children that are sensors with large quantities of data, this may be slow.

- **Navigate to asset** Will change the active asset in the Asset hierarchy to the currently selected asset in the data grid. By navigating to a different asset in the hierarchy, this will also update the contents of data grid.
- **View Data** Will display the View Sensor Data dialog showing you the row-by-row data for this sensor. Note that this dialog has a Shortcuts button which shows any Sensor-specific On Focussed Item shortcuts.
- **Import** This is shared functionality. Refer to *Import* for a full feature description.
- **Export** This is shared functionality. Refer to *Export* for a full feature description.
- **Customise** See *Toolbar* → *Customise* for information about the Customise toolbar option.

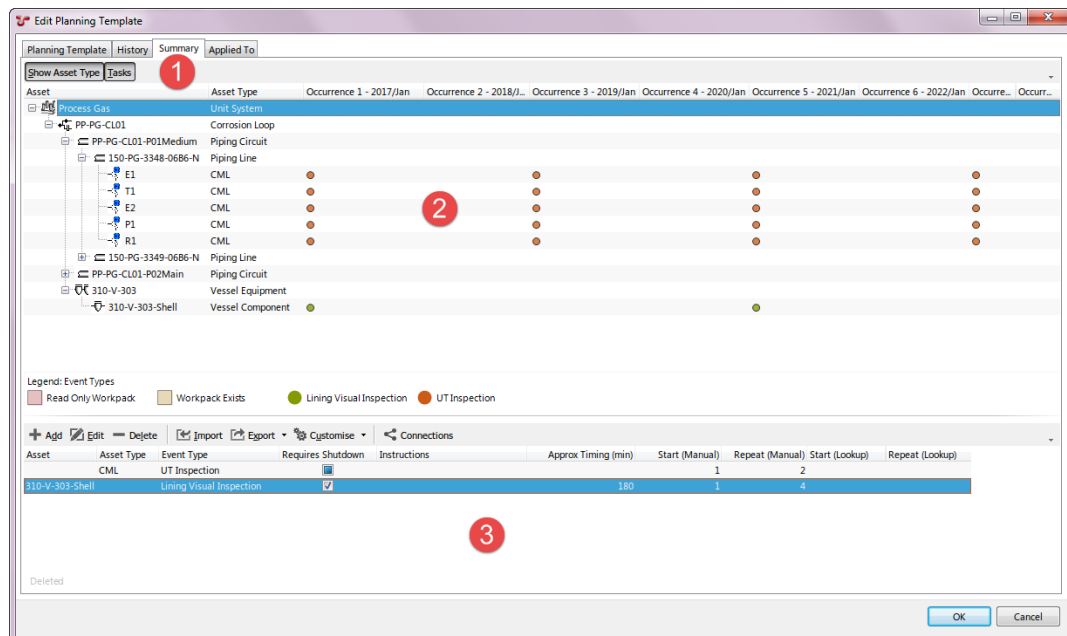
The Sensors feature is separately licensed. Contact support@nexusic.com for details.

2.10 Planning Templates

2.10.1 Summary

The Planning Template is made up of three sections:

1. Summary Toolbar (shown in 1. below)
2. Visual Summary (shown in 2. below)
3. Planning Template Task listing (shown in 3. below)



Summary Toolbar

- **Show Asset Type** Toggles off/on the **Asset Type** column in the Visual summary.
- **Tasks** Toggles off/on the Planning Template Task Listing at the bottom of screen.

Visual Summary

The asset hierarchy is filtered from the **Base Asset** (defined on the Planning Template). If no Base Asset is defined then the entire hierarchy for the default Asset View is displayed.

The number of Occurrence columns displayed on the right of the asset hierarchy is equal to the number of Occurrences defined on the Planning Template). Each Occurrence will be represented by a Workpack (after the Planning Template has been Applied)

Planning Tasks are represented by coloured circles in the Visual Summary. They are defined by the Planning Template Tasks.

Planning Template Task Listing

Properties of a Planning Task

Location fields are in the first section:

- **Asset** - Choose an asset from the hierarchy.
- **Ad-hoc Task** - When checked, the task generated from this Planning Task will be flagged as an Ad-hoc task.
- **Start KP/EL** - Enter the Start KP (Kilometre Point) or the Elevation location where the task is to be performed. A non-required field, can be left blank if not relevant.
- **End KP/EL** - Enter the End KP or Elevation where the task is to be performed. A non-required field, can be left blank if not relevant.
- **Asset Type** - If this task is not relevant to a single asset, but rather a group of assets of a particular type, then choose the Asset Type by clicking on the ellipsis button.

Then the Task Details:

- **Event Type** - Choose the type of task to be scheduled.
- **Schedule Type** - A non-required field, used for grouping, categorising.
- **Category** - A non-required field, used for grouping, categorising.
- **Requires Shutdown (Manual)** - Check this box to flag this task as requiring Shut Down prior to being completed.
- **Requires Shutdown (Lookup)** - Choose a *Yes / No* AIG field which contains the Shutdown flag for this task.
- **Order Number** - Used to identify the order in which this task should be carried out. Can be left blank if not applicable.
- **Approximate Timing (Manual)** - Used to calculate the estimated duration for the Workpack.
- **Approximate Timing (Lookup)** - Choose a *Numeric* AIG field (if any) which contains the estimated time to complete this task.
- **Instructions (Manual)** - Enter any specific task instructions here. Can be output to a Workpack report to provide guidance to the inspection engineer.
- **Instructions (Lookup)** - Choose the AIG field (if any) which contains the instructions for this task.

Then the Rules

- **Start (Manual)** - Enter a value which defines the first occurrence (or workpack) to create this task. This can either be a number type field which specifies the first occurrence, or a date type field (such as “last inspected date”) and the Update/Apply process will work out the occurrence based on the date.

- **Repeat (Manual)** - Enter a value which defines the frequency that the task is to be created. This can be either a number type field (which will be considered a frequency), or a date type field (such as “next inspection date”) and the Update/Apply process will figure out the occurrence based on the date.
- **Start (Lookup)** - Choose the AIG field which defines the first occurrence (or workpack) to create this task. This can either be a number type field which specifies the first occurrence, or a date type field (such as “last inspected date”) and the Update/Apply process will work out the occurrence based on the date. If a date type field is used, it will auto-populate the Due Date field of planning tasks generated by this template.
- **Repeat (Lookup)** - Choose the AIG field which defines the frequency that the task is to be created. This can be either a number type field (which will be considered a frequency), or a date type field (such as “next inspection date”) and the Update/Apply process will figure out the occurrence based on the date.
- **Create Action** - Two self explanatory options here, “Always create task when Start Occurrence is valid, regardless of Repeat Occurrence value.”; or “Only create task when Start Occurrence and Repeat Occurrence are valid.”.

Then the Origin fields

- **Anomaly Action** - If this Planning Template Task is related to a specific Anomaly Action, then click on the ellipsis button and choose the relevant Anomaly Action from the list.
- **Details** - A field which identifies a reference or source for the Planning Template Task, an example would be “Risk Based Assessment” or a company Procedure number.

2.10.2 Applied To

When a Planning Template is “Applied”, the tasks in that Planning Template are created and assigned to a workpack.

This screen provides the user with the name of each of the workpacks that has been created from, or linked to this Planning Template, as well as the Planning Template occurrence number relevant to that workpack.

Note that it is possible for a workpack to contain tasks from multiple Planning Templates.

The Applied To Toolbar

- **Export** See *Export* for full description of the Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.

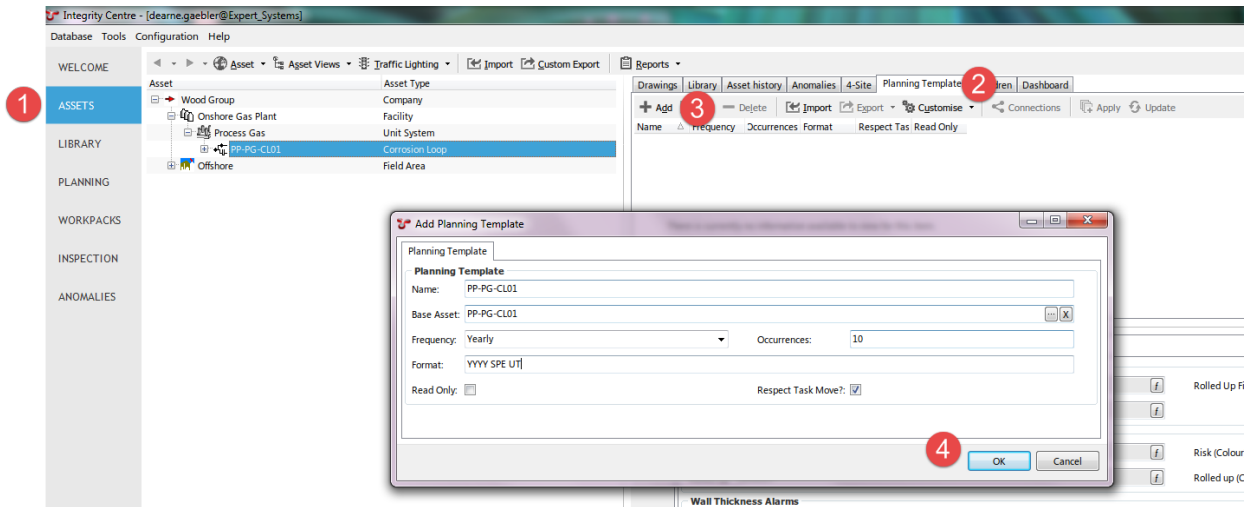
2.10.3 Worked Examples

Asset Tasks (Static Repeats)

In the following example we will create a UT inspection Planning Template for a subset of CML assets.

Step 1 - Create a Planning Template

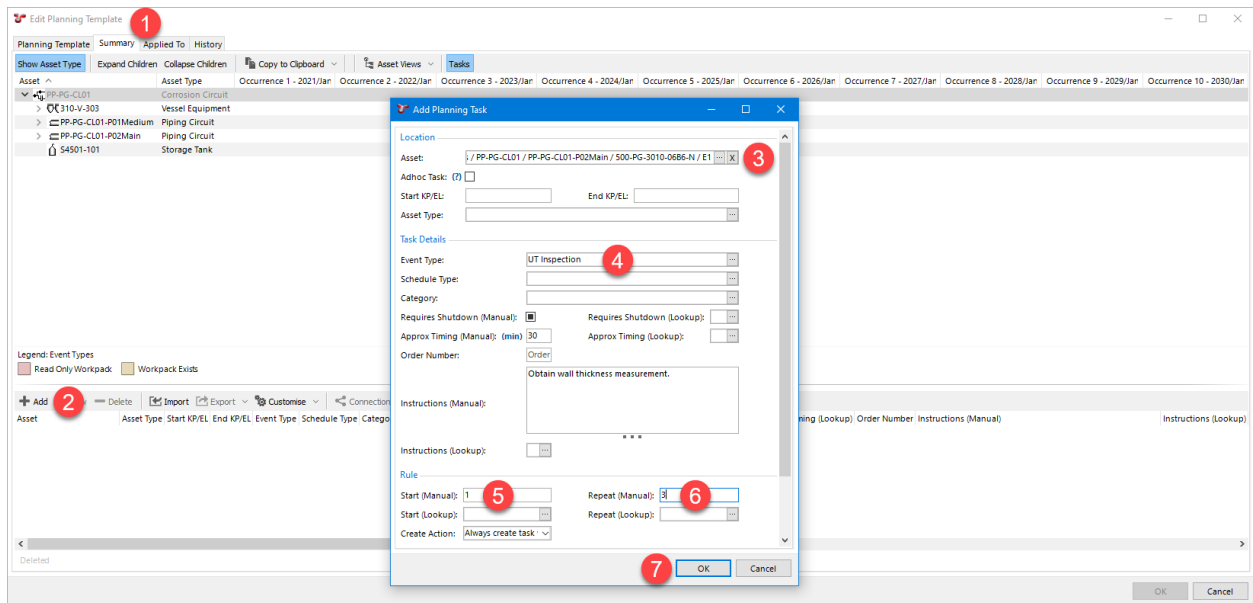
Go to *ASSETS* → *Planning Templates* and click on the **Add** toolbar button. Alternatively, go to *PLANNING* → *Planning Templates* and click on the **Add** toolbar button.



Input requirements for the Planning Template are the Name, Base Asset, Frequency, Occurrences and Format fields. Choose a name which best describes your planning template and a parent asset which will behave as a filter in later screens. In our worked example we have chosen a **Yearly Frequency**. The **Occurrences** field is arbitrary, we will be able to view **10** columns in the Summary page (see next step). Entering a **Format** of **YYYY SPE UT** means that when the workpacks are automatically generated, they will be named **2019 SPE UT**, **2020 SPE UT**, **2021 SPE UT** and so on.

Step 2 - Create the Planning Template Tasks

Edit the Planning Template create in Step 1, click on the **Summary** tabbed page, then click on the **Add** toolbar button to create a Planning Template Task.



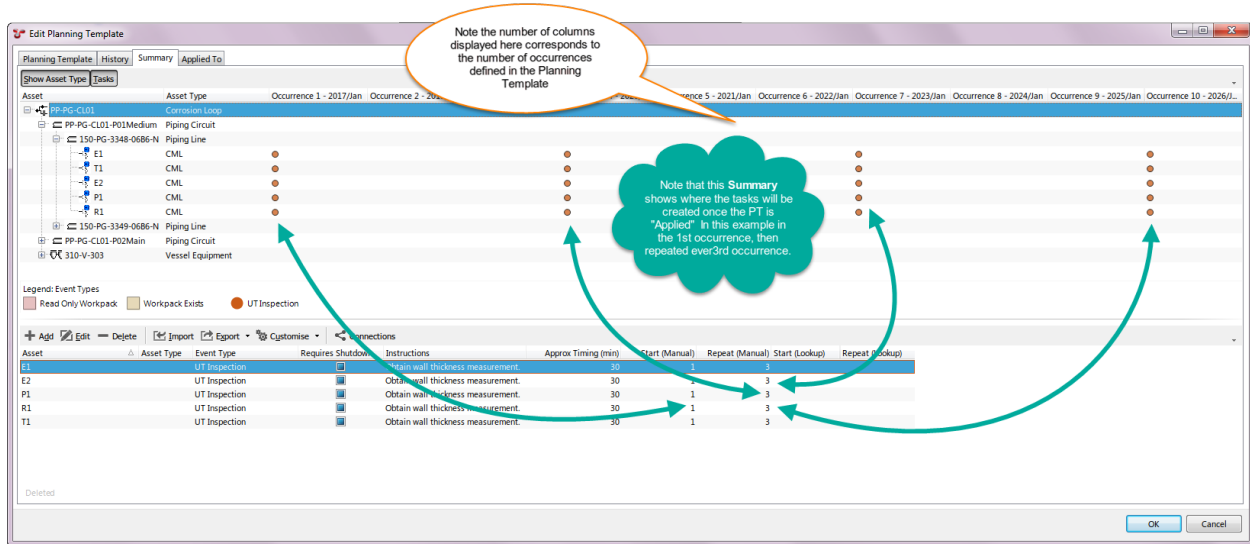
Input requirements for an Asset based planning template task are the **Asset**, **Event Type**, **Start** and **Repeat** fields.

- **Asset** - Identifies which asset the task belongs to.
- **Event Type** - Identifies the inspection method to be scheduled and carried out.
- **Start** - Identifies the first occurrence that this task should occur, or a lookup to an AIG field.

- **Repeat** - Identifies the frequency at which this task should be scheduled and can either be a manually entered number or a lookup to an AIG field.

Additional fields such as Start KP, End KP, Approximate Timing, Instructions etc. whilst not required fields, can be populated to provide more information on the individual tasks.

As tasks are added, the **Summary** screen shows where the tasks will be created once the Planning Template is Applied.



Step 3 - Apply the Planning Template

Applying the Planning Template will create the Workpack and Task records.

Go to **ASSETS** → *Planning Templates* (alternatively go to **PLANNING** → *Planning Templates*), select the Planning Template from the grid, and click on the **Apply** toolbar button to launch the **Apply Planning Template** wizard.

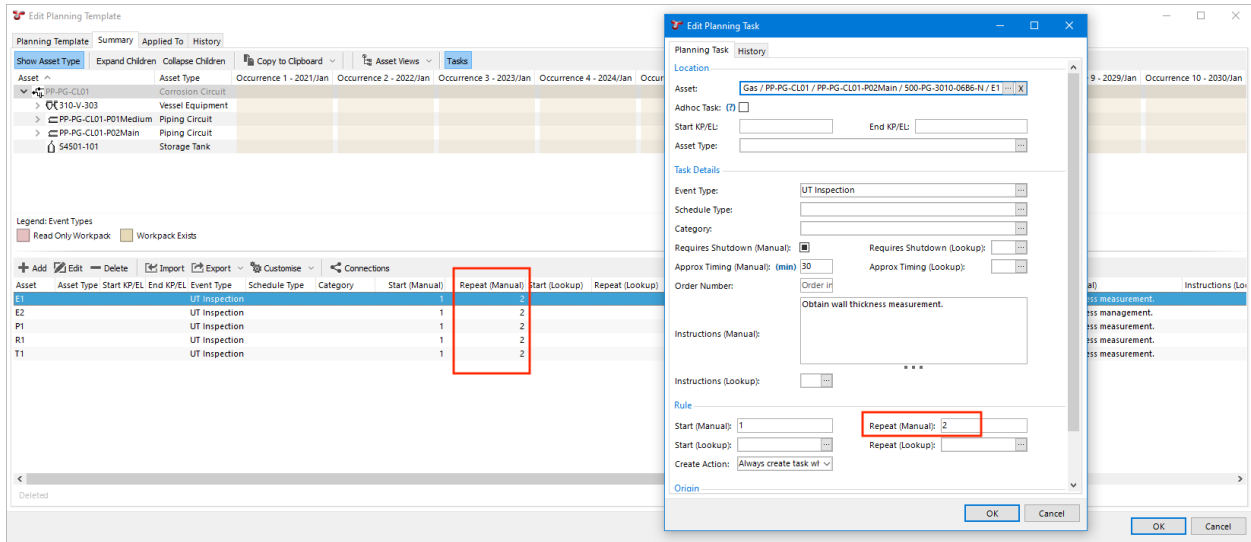
1. **Occurrences** - Allows you to choose how far into the future to create workpacks. Entering a date in the **Specific Date** field will automatically calculate the Number of Occurrences to apply, or entering a Number of Occurrences will automatically calculate the future Date. In this example we have entered 10, meaning that 10 years of future workpacks will be created. Click **Next**.
2. **Specify Workpacks** - For each occurrence, either choose an existing workpack or elect to create a new workpack for the tasks to be created in. In this example we are electing to create new workpacks, one in each occurrence (year) for 10 occurrences (years). Click "Apply".

Step 4 - Check Workpacks

Select the newly created workpack/s in the **WORKPACKS** screen and view the tasks in that workpack/s. In this example, tasks have been created in **2017 SPE UT** and **2020 SPE UT** and **2023 SPE UT** and **2026 SPE UT** workpacks (the 3rd occurrence, then every 3rd occurrence after that).

Step 5 - Edit Planning Template Task

In our example, we want to increase the frequency of the UT inspection campaigns to every second year. To do this, we edit the Planning Template task by editing the **Repeat** field from 3 to 2, as shown here:

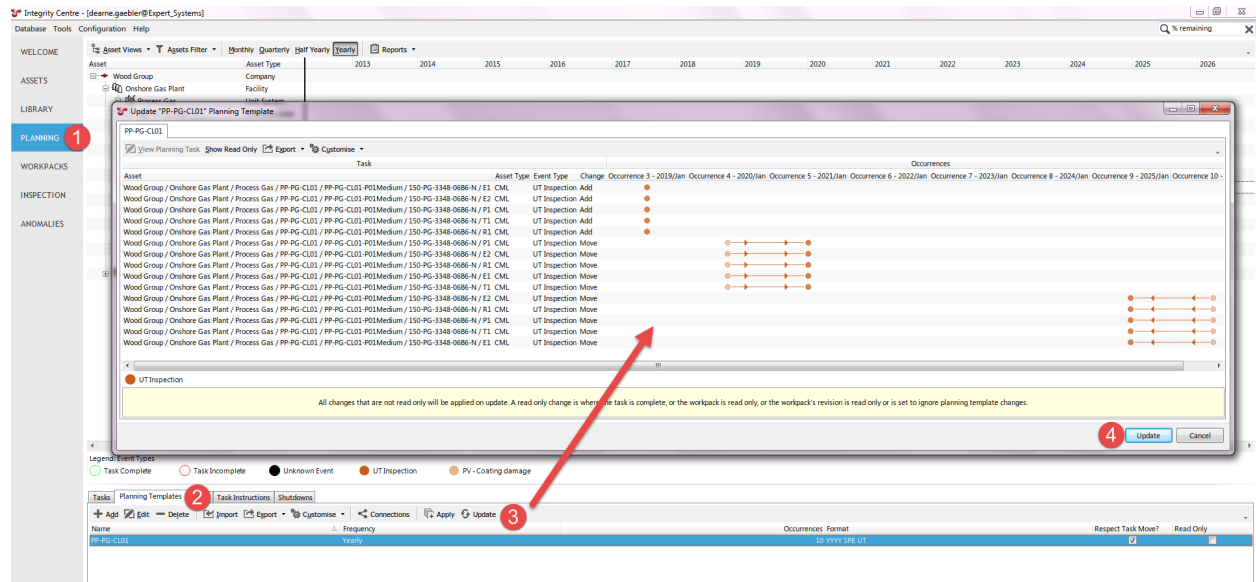


Step 6 - Update Planning Template

We then need to ensure that previously generated workpacks and tasks are updated with the revised frequency. So new tasks are created in 2019, 2020 tasks moved to 2021, and 2026 tasks moved to 2025 to reflect the new requirement for UT inspection every second year. 2023 tasks are unchanged, and so are not shown.

Go to **ASSETS** → **Planning Templates** (alternatively go to **PLANNING** → **Planning Templates**), select the Planning Template from the grid, and click on the **Update** toolbar button.

This launches the Update “Asset Based Example” Planning Template dialog which details all changes that will be applied once you click on the **Update** button.



Note: When you click the **Update** button at the bottom of the Update Planning Template dialog, the changes are made inside a database transaction. This means that changes can be rolled back in the event of a problem (such as loss of database connection partway through the process). But since SQL Server can handle at most one open transaction at a time, any other copy of NEXUS IC that attempts to carry out updates (or potentially other planning template changes)

will be blocked until the update process completes.

Asset Tasks (Lookup Repeats)

Most commonly, inspection frequencies are a moving target, in that frequencies tend to increase or reduce depending on inspection results. Where corrosion rates are low, then inspection can be less often; when high, then inspection needs to occur more often. To this end, NEXUS IC allows for the frequency (Repeat) field to be an input from a field in an AIG. Using the above example, we will change the Repeat from static 3 to use a field from the Remaining life AIG. Note that frequency will only be calculated if the CML is identified as an Active Monitoring Location.

Degraded: 6.490625
 Extreme: (mm) 5.7
Inspection Considerations
 Used to determine whether or not inspection locations will be scheduled from the Planning Template.
 Special Access Considerations?: Access Consideration Type:
 Active Monitoring Location?: % of Remaining Life: 50
 Inspection Frequency: 2

Extreme: (mm) 5.7
Inspection Considerations
 Used to determine whether or not inspection locations will be scheduled from the Planning Template.
 Special Access Considerations?: Access Consideration Type: No access
 Active Monitoring Location?: % of Remaining Life: 50
 Inspection Frequency:

In this example, when **Active Monitoring Location?** is unchecked, the Inspection Frequency is not calculated.

Step 1 - Edit the Planning Task

Edit the Planning Task as shown here:

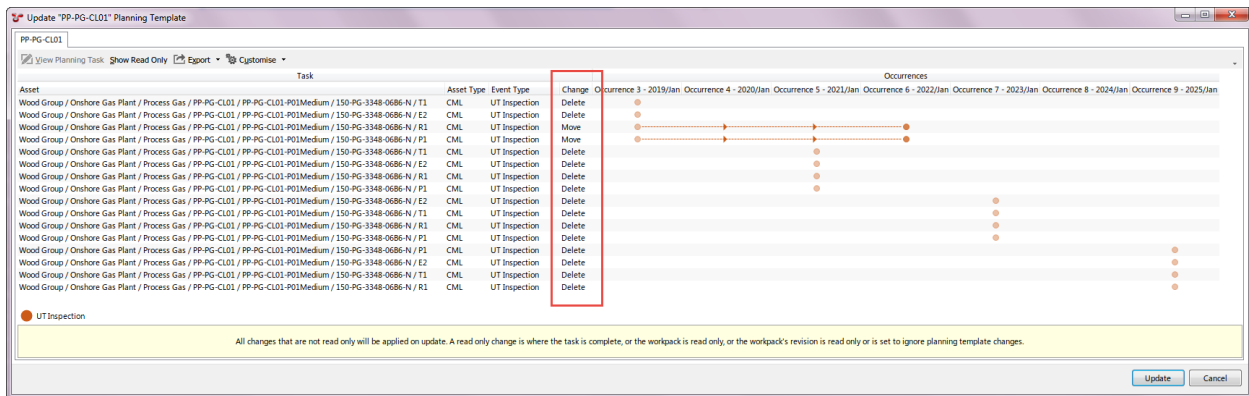
Edit Planning Task
 Planning Task: History
 Location: Less Gas / PP-PG-CL01 / PP-PG-CL01-P02Main / 500-PG-3010-0686-N / T1
 Adhoc Task:
 Start KP/EL: End KP/EL:
 Asset Type:
Task Details
 Event Type: UT Inspection
 Schedule Type:
 Category:
 Requires Shutdown (Manual): Requires Shutdown (Lookup):
 Approx Timing (Manual): (min) 30 Approx Timing (Lookup):
 Order Number:
 Obtain wall thickness measurement.
 Instructions (Manual):
 Instructions (Lookup):
Rule
 Start (Manual): 1 Repeat (Manual): The number of Occurrences
 Start (Lookup): Repeat (Lookup): Inspection Frequency
 Create Action: Always create task when
 Origin:
 OK Cancel

For each of the CMLs, the Frequency has been calculated as follows:

- E1 - 2 (Active Monitoring location is checked)
- T1 - NULL (Active Monitoring location is unchecked)
- E2 - 20 (Active Monitoring location is checked)
- P1 - 5 (Active Monitoring location is checked)
- R1 - 5 (Active Monitoring location is checked)

Step 2 - Update the Planning Template

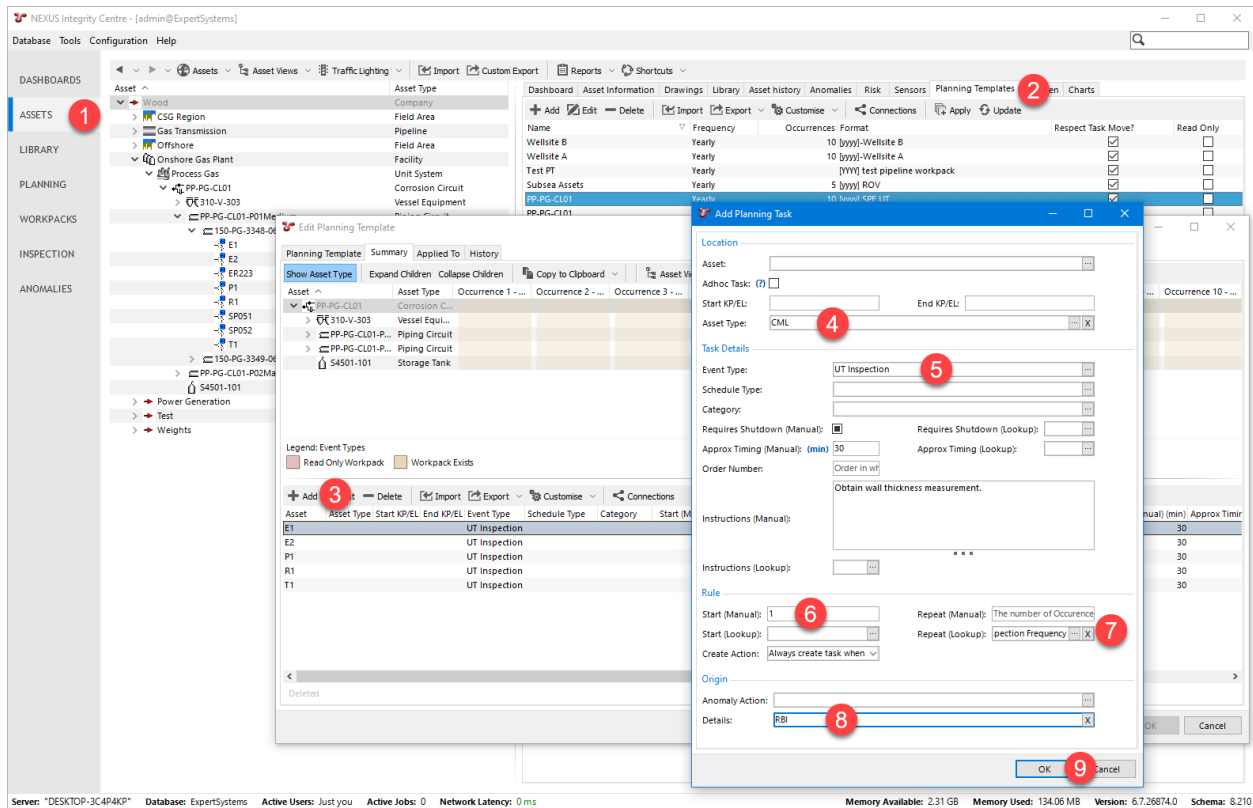
When the Planning Template is updated the previously created Tasks will be deleted and/or moved or new tasks created based on the revised frequency. Performing an Update allows you to view the proposed changes to existing tasks and view new tasks. Our Update is shown here:



Asset Type Tasks (Lookup Repeats)

Planning Tasks can be configured by Asset Type, so that instead of defining the particular asset, you define the asset type, and tasks will be created for all assets of the specified type using the frequency.

Step 1 - Create the Planning Task



Here we are creating a single Planning Task, and setting its Asset Type to CML. Thus, every CML under our planning template's Base Asset (PP-PG-CL01) will have a UT Inspection task created in the first occurrence, and frequency set according to the function. That's the same function shown in the previous example, **Asset Tasks (Lookup Repeats)**, and so relies on the same Remaining life AIG fields already filled in for that example. In this way, a single asset type planning task can potentially configure tasks for thousands of individual assets, based on the data in each one of those assets.

Deleting a Planning Task

Deletion of a planning task works slightly differently to deletion of other entities within NEXUS. For all other types of thing in NEXUS, clicking the **Delete** button deletes that thing. But for a Planning Task, if you have applied that Planning Task to create one or more Tasks, we want NEXUS to still know that those Tasks were created from this Planning Task. So instead, we simply set an under-the-hood `Is_Deleted` flag on the Planning Task. Once all the Tasks that were created from that Planning Task are deleted, the Planning Task will also be removed from the underlying database table.

Consider the case where you want to delete an event definition. First, you must delete everything that depends on that event definition. This includes Planning Tasks which use this event definition, but the way to remove those Planning Tasks is to remove the Tasks that in turn relied on that Planning Task. Once this is done you should be able to delete the event definition (which will delete all events of that type, etc).

Planning templates functionality exist in NEXUS IC 6.1 (and higher).

Planning Templates provides the user the ability to automatically set up future workpacks (groups of inspection or testing tasks).

- A Planning Template is a group of Planning Template Tasks.

- A Planning Task (once Applied) becomes a Task in a Workpack.

See *Worked Examples* for step-by-step guide on how to configure and maintain Planning Templates.

Planning Templates are records on which workpacks and tasks are generated.

2.10.4 Properties of a Planning Template

1. **Name** - A short (50 character limit) name for the Planning Template.
2. **Base Asset** - This field is non-required. However, if an asset is chosen, then the Planning Template tasks will be limited to the assets for the Base Asset and all child assets of the Base Asset.
3. **Frequency** - Determines the frequency assigned to the Planning Template. Options are Yearly, Half Yearly, Quarterly or Monthly. As an example, a Planning Template set up for Annual Subsea ROV Inspections would be set to Yearly, however a Planning Template set up for quarterly oil change on a gear box would be set to Quarterly.
4. **Occurrences** - The number of occurrences defines how many columns will be displayed in the Planning Template.Summary
5. **Format** - When “Applied”, each Workpack created from a Planning Template will take the naming convention described here. Using [yyyy] will insert the year into the Workpack name, or [yy] the abbreviated year, and using [mm] will insert the Month in the Workpack name. For example Workpacks generated where the format is defined as “[yyyy]-Annual UT”, will be titled “2018-Annual UT”, “2019-Annual UT” etc. [oc] represents the Occurrence Number and will increment as the workpack is generated.
6. **Workpack Group** - When Workpacks are created from this Planning Template, they will be created in the specified Workpack Group.
7. **Revision** - When Workpacks are created from this Planning Template, they will be created with the specified Revision.
8. **Read Only** - When Workpacks are created from this Planning Template, if this box is ticked, they will be created as Read Only.
9. **Respect Task Move** - This flag determines whether or not when tasks (which are generated from a Planning Template) are re-scheduled, the subsequent (or following) tasks are moved based on their frequency relative to the date of the moved task. If the checkbox is unchecked, then Tasks are simply created in the pre-determined occurrences.

Note: The **Respect Task Move** option will be checked by default for all new Planning Templates. For databases converted from v5, the **Respect Task Move** option will be unchecked by default.

2.10.5 Report Table Sources

To extract Planning Template data into a report template, use the System Table titled **Planning Template** as the primary Table Source. For more information on Report Templates see *Report Templates*.

2.10.6 Planning Templates Toolbar

- **Add, Edit, Delete:** *Add / Edit / Delete* Planning Template(s).
- **Import** See *Import* for full description of the Import menu item.
- **Export** See *Export* for full description of the Export menu item.

- **Customise** See *Customise* for full description of the Customise menu item.
- **Connections** See *Connections* for information about the Connections toolbar option.
- **Apply** Creates tasks in new (or existing workpacks) based on the currently selected Planning Templates. If you have selected multiple templates, they must all have the same Frequency, and you won't be able to select Workpacks to Apply to — fresh Workpacks will be created.
- **Update** Click on **Update** to view any changes that need to be made to Tasks that have already been created. Multi-select, Update is also available here. Updates to each Planning Template are represented on separate tabbed pages in the Update Planning Template dialog.

2.11 Children

The Children pane allows the user to display asset information data in a flat table for multiple assets. You can select one or more rows and edit them, but there are caveats: you must have exactly one asset information group selected under Groups, and the assets you select must all be of types that have that asset information group available on them.

You can also export the grid to Excel, Text or CSV.

Caution: If you elect to view complicated AIG forms which contain complex calculations and references, then the data grid may take several minutes to load. This will depend on the complexity of AIG forms and the number of assets to view.

Note: In some circumstances (particularly if your database used to be a version 5 database) you may have AIG records against assets whose type does not have that AIG assigned. This is because AIG records are not deleted when you unassociate an asset type from an AIG. Any such “secret” records will show in the Children tab with a purple border, to visually indicate to you that you won't see this data as an AIG form when you navigate to the asset.

- **Children → Edit** This button can be used to edit asset information. This Edit button is only enabled if you have exactly one Group selected under the Groups menu button, and you have one or more assets selected in the list, that have that Group assigned to them. This Edit button is useful for editing Asset Information data on many assets at once. When you have multiple assets selected in the Children grid, it follows the usual rules of *Multi-Edit*. You can edit asset information on single assets either via here or via *Asset Information* at the bottom right of the Assets screen.
- **Children → Export** This is shared functionality. Refer to *Export* for a full feature description.
- **Children → Groups** This menu lists all Asset Information Groups which are assigned to the Asset Types of the visible assets in the grid. Check and uncheck which Asset Information Groups or Sub-Asset Information Groups to view in the data grid.
- **Children → Filters** This menu item has a drop down list with two options to select either in the “up” state or “down” state. When “down”, the children grid displays only the direct descendants of the currently selected asset (one level of the hierarchy only). When in the “up” state, the grid will display all children of the currently selected asset (multiple levels of the hierarchy).
- **Children → Filters → Show All Children** This menu item will display all children of the currently selected asset (multiple levels of the hierarchy) if it is selected.
- **Children → Filters → Show Selected Asset** This menu item will display the selected asset and its direct descendants if it is selected, if it is not selected, the grid will only show the direct descendants without the selected asset in the hierarchy.

- **Children** → **Navigate** This menu item will change the active asset in the Asset hierarchy to the currently selected asset in the data grid. By navigating to a different asset in the hierarchy, this will also update the contents of data grid.
- **Children** → **Customise** See *Toolbar* → *Customise* for information about the Customise toolbar option.
- **Children** → **Connections** See *Toolbar* → *Connections* for information about the Connections toolbar option.
- **Children** → **Shortcuts** If your database has *Shortcuts* on Assets (which by default, databases do) they will appear here, in addition to appearing at the bottom of the Assets screen's main Assets menu.

2.12 Charts

This tab shows Chart Templates that are suitable to the selected asset's type. If you don't see any charts listed, try selecting an asset of a different type.

To expand/collapse each chart, click the  button at the top right of that chart, or click the chart's grey header row.

If a chart is misconfigured, you will see a message explaining this in place of the chart. Go to *Chart Templates* to resolve the described problem.

Charts are generated from Chart Templates. For details on setting these up, see *Chart Templates*.

Available charts will be listed alphabetically. The first chart will be automatically expanded.

Events with Findings will be shown on the chart in red.

For some Chart Templates, at the right or the bottom of the chart is the chart legend. If you hover the mouse over an item on the legend, other series on the chart will fade out temporarily. If you click an item on the legend, that series will be toggled on/off. If you export the chart (see below), only series currently visible will be exported.

2.12.1 Chart Width

When the Charts pane is 1000 pixels wide or less, all charts are shown at the full width of the chart pane. When the Charts pane is over 1000 pixels wide, some charts are shown full width, and some are shown half width, in order to fit more charts side-by-side onto your screen.

Charts that have an X axis of type string, date, or date/time, or whose X axis includes 'KP' are always shown full width. Of course, you can adjust the width of all charts by adjusting the width of the whole application window, adjusting other elements such as the asset tree wider/narrower, etc.

2.12.2 Zooming

At the bottom of most Chart Templates, below the horizontal scrollbar (if visible) is the Zoom Bar. You can hover the mouse over the left or right end of the selected part of the Zoom Bar and drag to change the selection. Initially the entire Zoom Bar will be selected, so hover the mouse over the left or right end of the bar and drag. Once a subset of the chart is selected, you can use the scroll bar or the Zoom Bar to drag the whole selection area without zooming.

You can also zoom in or out by clicking in the chart area and (with the mouse cursor still inside the chart area) spinning the mouse wheel. For charts with a lot of data (thousands of events) this can be slow, so the Zoom Bar may be faster. You can zoom on a single axis by putting the mouse pointer over that axis and spinning the mouse wheel. Not all charts support zooming in both axes.

You can also control zoom with toolbar buttons Zoom In, Zoom Out, and Reset Zoom.

2.12.3 Charts Toolbar

There is no toolbar for the whole Charts panel. Instead, each chart has its own toolbar.

- **Zoom In** Zoom in.
- **Zoom Out** Zoom out.
- **Reset Zoom** Resets to default zoom level.
- **Export the chart to image(s)** Click this button to open the Export dialog. Ensure the range you want is set correctly using the Zoom Bar. Ensure the series you want to export are visible. If you would like to export the chart as a series of images, each covering a smaller horizontal range, enter the range you would like each chart to cover in the **Range of X Axis per image** field. For example, if you have a 300km pipeline and you enter “10” as the range per image, it will be broken into 30 images, each covering 10km.
- **Copy the chart to the clipboard** Copies the chart, as you see it displayed, without the “zoom” section at the bottom, to the clipboard.
- **Toggle chart** Expand/collapse display of this chart.

2.12.4 Report Table Sources

To extract chart template data into a report template, use a Chart Template element in the report, and use the appropriate Event table as a source. For more information see [Report Templates](#).

Central to the NEXUS IC application is the Asset register. Most all information retained in NEXUS IC is linked back to an asset in the asset hierarchy, including (but not limited to) risk assessments, anomalies, drawings, library items, inspection data and inspection schedules.

Assets are presented to the end-user in a hierarchical tree view (each asset may have a single parent, and multiple children or siblings). Each asset is also assigned an *Asset Type*. There is no limit to the number of levels that can be configured in the Asset Hierarchy, however from a usability perspective Wood recommend keeping the hierarchy levels to less than 10 (this is for guidance purposes only).

Tip

Ctrl+C copies the name of the currently selected asset to the clipboard. Ctrl+Shift+C copies the full asset path of the currently selected asset to the clipboard.

Example Asset register:

Asset ^	Asset Type
▼ Wood	Company
> Gas Transmission	Pipeline
▼ Offshore	Field Area
2" PL	Pipeline
> 10" PL	Pipeline
> 24" PL	Pipeline
> 36" PL	Pipeline
Flexible Riser	Flexible Riser
> FSO	Floating Structure
> Platform A	Platform
> Platform B	Platform
Production Manifold	Subsea Structure
> Tree P1	Subsea Structure
Tree P2	Subsea Structure
Tree P3	Subsea Structure
Tree P4	Subsea Structure
Tree P5	Subsea Structure
▼ Onshore Gas Plant	Facility
▼ Process Gas	Unit System
▼ PP-PG-CL01	Corrosion Loop
> 310-V-303	Vessel Equipment
> PP-PG-CL01-P01Med...	Piping Circuit
> PP-PG-CL01-P02Main	Piping Circuit
S4501-101	Storage Tank

The asset tree appears on several screens within NEXUS IC: **ASSETS**, *PLANNING*, and *INSPECTION*. If you click on an asset to select it in one of those screens, it will be selected in all of those screens.

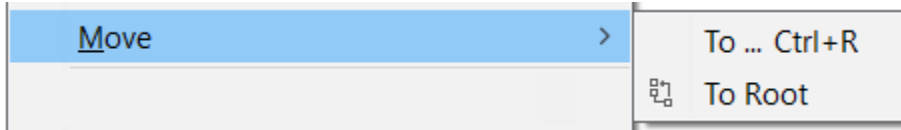
2.13 Asset Types

The Asset Type determines what Asset Information Groups are visible for that asset and also what Event Definitions are allowable for that asset.

2.14 Moving Assets

Tip

Ctrl-R is available as a shortcut key to initiate the move. Cursor up and down move between assets in the picker dialog. Cursor left and right close and open sub-trees. Enter or Escape complete or cancel the dialog.



To move an asset, right-click it and choose *Move* → *To...*, then select a destination from the resulting “picker”. Or choose *Move* → *To Root* to make this asset a new root-level asset.

If the asset that you have chosen to move has children, then the child assets will be moved along with the selected asset.

3.1 Library Items

Library Items are displayed in the data grid and are filtered by the currently selected Library Type. See *LIBRARY* for detailed information on editing Library Types.

1. **Library Type** - Select the type of the library from the drop down list.
2. **Name** - A 100 character field which is the name for the library. It is most common to use either the document title or the document number here. This field is mandatory.
3. **Description** - A 100 character field which provides more descriptive information of the document.
4. **Document No.** - A 50 character field which stores the Document Number or Reference.
5. **Revision** - Revision of the document (eg. "A" or "C").
6. **Reference Date** - Reference date of the document.
7. **Physical Location** - If this Library Item is a reference to hard copy document, then enter the physical location of the document here.
8. **Hyperlink** - When linking this document to a UNC or URL, then the full hyperlink is stored in this field.
9. **Attachment** - When loading a document into the NEXUS IC database, or replacing an existing document then click on the **Import** sub menu item. Other menu items available from this dropdown are:
 - **Link** - Link to a file on a mapped drive. A copy of the file will be stored in the NEXUS database and updated when the file changes.
 - **Export** - Saves the document to a folder location of your choice.
 - **Launch** - Launches the document in the default Windows viewer.
 - **Copy** - Copies the document to your clipboard.
 - **Clear** - Removes the document from the library item.
10. **Show Grey Scale** - A flag which will display drawing layers in black and white in lieu of designed colours. This item is only applicable to documents which are selected to be shown as drawing.
11. **Show Captions** - A flag which will show or hide caption layers of a document. This item is only applicable to documents which are selected to be shown as drawing.
12. **Show Dimensions** - A flag which will show or hide dimension layers of a document. This item is only applicable to documents which are selected to be shown as drawing.
13. **Use in Reports** - Can be used to filter what documents are output to reports.
14. **Force 2D** - If you have DWG or DXF drawings which NXUS is detecting as 3D, and you'd prefer NEXUS to treat them as 2D, tick this box on those drawings.

- Background Colour** - Allows you to define the background colour of a document. Please note that this functionality will only work on drawing types which support transparency (eg. DXF, DWG, GIF etc.).

Caution: Mapped drives If you define a mapped drive as a hyperlink location (for example H:\Working\document.docx, then you must be certain that the drive letter H:\ is mapped for every other potential NEXUS IC user. In lieu of mapped drives, it is recommended that you use UNC paths for network drive locations.

Library Items are electronic documents which can be linked (via *Connections*) to data and data types in NEXUS IC.

A	Library Type	Name	Description	Document No	Revision	Reference Date	Physical Location	Hyperlink
	Photographs and negatives	Onshore LNG	Aerial Photo Onshore LNG Plant	N/A	N/A			
	Photographs and negatives	test						https://icwe
	Photographs and negatives	Welcome	Splash screen for welcome page					

The electronic documents can be uploaded directly into the NEXUS IC database, or can be referenced via URL or UNC paths.

Here are some examples of valid URL and UNC paths:

- <https://www.youtube.com/watch?v=oHg5SJYRHA0>
- \\example.com\groups\eng\this_doc.docx

Caution: Mapped drives - If you define a mapped drive as a hyperlink location (for example H:\Working\document.docx, then you must be certain that the drive letter H:\ is mapped for every other potential NEXUS IC user. In lieu of mapped drives, it is recommended that you use UNC paths for network drive locations.

The **Library** functionality is available from multiple screens and dialogs in NEXUS IC including:

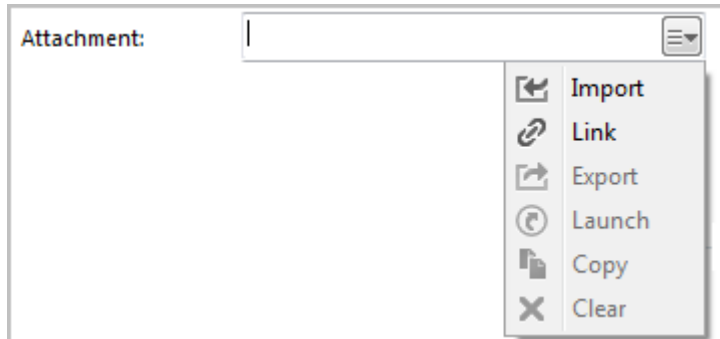
- ASSETS
- LIBRARY
- INSPECTION
- ANOMALIES
- Configuration → General → Functions → Edit Function Definition
- Configuration → Assets → Types
- Configuration → Events → Event Types → Edit Table Information

Note: Example - Upload company Piping specifications to the NEXUS IC Library and assign to the Asset Type “Pipework”. This will make the Piping Specifications available from the ASSETS | Library screen whenever the active asset is of type “Pipework”.

3.1.1 Library Items Toolbar

The **Library** toolbar button allows the user to add, edit and delete Library Items.

- **Add** The **Add** menu item allows you to add a new Library item. Depending on what screen is active, the **Add** drop down menu will provide connection type options. Enter the **Name** of the Library item and any other relevant document information (Revision, Date, Document Reference etc). If the document is to be uploaded into NEXUS IC, then click on the **Attachment** button, else enter a **Hyperlink** location.



When adding an item, you can either **Import** or **Link** it. If you Import, the item will be brought into the database. If you subsequently change the original on disk, the item in the database will not change to match. If you Link the item, then when you change the original on disk, the next time you view the item within NEXUS IC, you *will* see the updated item.

Note: NEXUS IC will still load a copy of a Linked item into the NEXUS database — this is so that if the original is unavailable (for example, because you are away from your network), NEXUS IC can display the cached copy. When you view the item, if the original has been updated, we also update the database cached copy. You can't Link items that are on your local hard disk — only items on network drives can be Linked. The Link feature is designed to keep you up to date with items that may have been changed by others, and that can't happen on your local drive.

Hint: You can also add multimedia by dragging image files from Windows Explorer onto the Library Items pane. If you drag/drop one file, you will be given the Add Library dialog, and clicking Cancel will cancel the add. If you drag/drop multiple files, they will be added, and then multi-selected in the grid. You can then click Edit to *multi-edit* them. Drag-drop will **Import** items, not **Link** them.

- **Edit** The **Edit** menu item allows you to edit the properties of the currently selected Library Item (not the document itself).
- **Delete** Deletes the currently selected Library Item.

Note: Deleting a Library Item will delete all the connections of that Library Item.

- **Launch** Launches the Library item on the local machine. Note that by default NEXUS will only launch files with the following extensions: doc, docx, xls, xlsx, jpg, png, jpeg, bmp, tiff, gif, mpg, mp3, wav, ppt, pptx, txt, pdf, emf, zip, dwg, avi, rtf, mp4, csv.

Hint: Use the Space Bar on your keyboard to launch the currently selected Library item.

Note: If the local machine does not have an associated viewer for the document type (eg. AutoCad viewer for DWG type), then the document can not be launched.

- **Email Attachment** This option will launch a new email message and attach the associated Library Item to it. Note that Email account properties need to be set up for this option to function.

- **Import**

See [Import](#) for detailed information on the Import Wizard. The MS Excel Import Template details the required format for importing Library Items.

You can also import the *Connections* in the same import as the Library items, so in addition to the Library Import columns, you can additionally define the Connection information using the following column headings:

- Library Connection.Connect To
- Library Connection.Workpack
- Library Connection.Asset Type
- Library Connection.Asset
- Library Connection.Event Type
- Library Connection.Event
- Library Connection.Anomaly
- Library Connection.Risk Model
- Library Connection.Function

Note that the *Connect To* column should only contain one of the following text items:

- Anomaly
- Asset
- Asset Type
- Event
- Event Type
- Function
- Risk Model
- Workpack

- **Export** See [Export](#) for information about exporting Library Items. Please note that this option will only export the contents of the grid, not the Library Items themselves.
- **Customise** See [Customise](#) for information about the Customise toolbar option.
- **Connections** See [Connections](#) for information about the Connections toolbar option.

Double-click

The first time you double-click on a library item, NEXUS will ask you what action to take: you can either Launch the Library item in an external editor, or Edit the Library item. If you would like your choice to become permanent, tick the “Always do this” box. Note that if you hold down the **Alt** key while double-clicking, you will be asked again.

The Details pane at the bottom of the Library screen displays the properties of the currently selected Library Item.

See section [Library Connections](#) for full explanation of the Connections functionality.

3.2 Library Connections

Each *Library* Item may have one or more ‘connections’ associated with it. A Library Connection is a ‘link’ between a Library Item and a data record. Connection Types include:

1. Asset (where a library item is linked to a specific asset or assets)
2. Asset Type (where a library item is linked to an asset type)
3. Event (where a library item is linked to a discrete event)
4. Event Type (where a library item is linked to an event definition)
5. Workpack (where a library item is linked to a specific workpack or workpacks)
6. Anomaly (where a library item is linked to an anomaly)
7. Risk Model (where a library item is linked to an Risk Model)
8. Function (where a library item is linked to a function)

The **Library Connections** toolbar button allows the user to add, edit and delete Library Connections of the currently selected library item.

- **Connections** → **Add** The Library → Add menu item allows you to add a new Connection to the currently selected Library item. When clicked, you will be presented with the **Add Library Connection** dialog which will prompt you to select the type of Connection to add. When you have chosen the Connection Type, then you will be presented with further options to finalise the Connection options.
- **Connections** → **Edit** The Connections → Edit menu item allows you to edit the properties of the currently selected Library Connection (not the Library Item properties or the document itself).
- **Connections** → **Delete** Deletes the currently selected Library Connection. Note: This will not delete the Library Item itself just the currently selected Library Connection.
- **Connections** → **Import** See *Import* for detailed information on the Import Wizard. The MS Excel Import Template details the required format for importing Library Connections.
- **Connections** → **Export** See *Export* for information about exporting Library Connections.
- **Connections** → **Customise** See *Customise* for information about customising the Connections grid.

Library Types are categories which are assigned to *Library Items*. A Library Type is defined by its name as well as a flag which determines whether or not the Library Item is to be displayed in the *Drawings* pane.

Note that there are two toolbars on this screen. The first applies to the Library Types list, and the second applies to the library items list. If you select a Library Type, you will see all the library items of that type in the Library Items list. If you select *multiple* Library Types, you will see all the library items of all those types in the Library Items list.

3.3 The Library Toolbar

The **Library** toolbar button allows the user to add, edit and delete Library Types.

- **Library** → **Add** The Library → Add menu item allows you to add a new Library item type.
- **Library** → **Edit** The Library → Edit menu item allows you to edit the properties of the currently selected Library Type (not the Library Item properties or the document itself).
- **Library** → **Delete** Deletes the currently selected Library Type.

Note: If there are library items which have been assigned the library type that you are attempting to delete, then you will be unable to delete the Library Type until all Library Items have been reassigned.

- **Library** → **Import** See *Import* for detailed information on the Import Wizard. The MS Excel Import Template details the required format for importing Library Types.
- **Library** → **Export** See *Export* for information about exporting Library Types.
- **Library** → **Connections** See *Connections* for information about the Connections toolbar option.
- **Library** → **Reports** See *Reports* for information about the Reports toolbar option.

3.4 Library Items

Library Items are electronic documents which can be linked (via *Connections*) to data and data types in NEXUS IC.

+ Add Edit - Delete Launch Email Import Export Customise Connections								
A	Library Type	Name	Description	Document No	Revision	Reference Date	Physical Location	Hyperlink
	Photographs and negatives	Onshore LNG	Aerial Photo Onshore LNG Plant	N/A	N/A			
	Photographs and negatives	test						https://icwe
	Photographs and negatives	Welcome	Splash screen for welcome page					

The electronic documents can be uploaded directly into the NEXUS IC database, or can be referenced via URL or UNC paths.

Here are some examples of valid URL and UNC paths:

1. <https://www.youtube.com/watch?v=oHg5SJYRHA0>
2. \\example.com\groups\eng\this_doc.docx

Caution: Mapped drives - If you define a mapped drive as a hyperlink location (for example H:\Working\document.docx, then you must be certain that the drive letter H:\ is mapped for every other potential NEXUS IC user. In lieu of mapped drives, it is recommended that you use UNC paths for network drive locations.

The **Library** functionality is available from multiple screens and dialogs in NEXUS IC including:

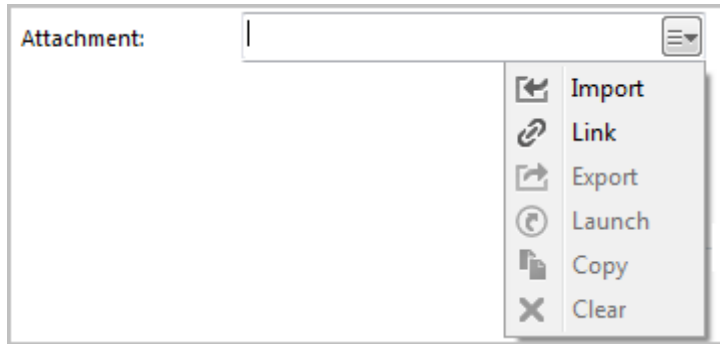
1. *ASSETS*
2. *LIBRARY*
3. *INSPECTION*
4. *ANOMALIES*
5. *Configuration* → *General* → *Functions* → *Edit Function Definition*
6. *Configuration* → *Assets* → *Types*
7. *Configuration* → *Events* → *Event Types* → *Edit Table Information*

Note: Example - Upload company Piping specifications to the NEXUS IC Library and assign to the Asset Type “Pipework”. This will make the Piping Specifications available from the ASSETS | Library screen whenever the active asset is of type “Pipework”.

3.5 Library Items Toolbar

The **Library** toolbar button allows the user to add, edit and delete Library Items.

- **Add** The **Add** menu item allows you to add a new Library item. Depending on what screen is active, the **Add** drop down menu will provide connection type options. Enter the **Name** of the Library item and any other relevant document information (Revision, Date, Document Reference etc). If the document is to be uploaded into NEXUS IC, then click on the **Attachment** button, else enter a **Hyperlink** location.



When adding an item, you can either **Import** or **Link** it. If you Import, the item will be brought into the database. If you subsequently change the original on disk, the item in the database will not change to match. If you Link the item, then when you change the original on disk, the next time you view the item within NEXUS IC, you *will* see the updated item.

Note: NEXUS IC will still load a copy of a Linked item into the NEXUS database — this is so that if the original is unavailable (for example, because you are away from your network), NEXUS IC can display the cached copy. When you view the item, if the original has been updated, we also update the database cached copy. You can't Link items that are on your local hard disk — only items on network drives can be Linked. The Link feature is designed to keep you up to date with items that may have been changed by others, and that can't happen on your local drive.

Hint: You can also add multimedia by dragging image files from Windows Explorer onto the Library Items pane. If you drag/drop one file, you will be given the Add Library dialog, and clicking Cancel will cancel the add. If you drag/drop multiple files, they will be added, and then multi-selected in the grid. You can then click Edit to *multi-edit* them. Drag-drop will **Import** items, not **Link** them.

- **Edit** The **Edit** menu item allows you to edit the properties of the currently selected Library Item (not the document itself).
- **Delete** Deletes the currently selected Library Item.

Note: Deleting a Library Item will delete all the connections of that Library Item.

- **Launch** Launches the Library item on the local machine. Note that by default NEXUS will only launch files with the following extensions: doc, docx, xls, xlsx, jpg, png, jpeg, bmp, tiff, gif, mpg, mp3, wav, ppt, pptx, txt, pdf, emf, zip, dwg, avi, rtf, mp4, csv.

Hint: Use the Space Bar on your keyboard to launch the currently selected Library item.

Note: If the local machine does not have an associated viewer for the document type (eg. AutoCad viewer for DWG type), then the document can not be launched.

- **Email Attachment** This option will launch a new email message and attach the associated Library Item to it. Note that Email account properties need to be set up for this option to function.
- **Import**

See [Import](#) for detailed information on the Import Wizard. The MS Excel Import Template details the required format for importing Library Items.

You can also import the *Connections* in the same import as the Library items, so in addition to the Library Import columns, you can additionally define the Connection information using the following column headings:

- Library Connection.Connect To
- Library Connection.Workpack
- Library Connection.Asset Type
- Library Connection.Asset
- Library Connection.Event Type
- Library Connection.Event
- Library Connection.Anomaly
- Library Connection.Risk Model
- Library Connection.Function

Note that the *Connect To* column should only contain one of the following text items:

- Anomaly
 - Asset
 - Asset Type
 - Event
 - Event Type
 - Function
 - Risk Model
 - Workpack
- **Export** See [Export](#) for information about exporting Library Items. Please note that this option will only export the contents of the grid, not the Library Items themselves.
 - **Customise** See [Customise](#) for information about the Customise toolbar option.
 - **Connections** See [Connections](#) for information about the Connections toolbar option.

3.5.1 Double-click

The first time you double-click on a library item, NEXUS will ask you what action to take: you can either Launch the Library item in an external editor, or Edit the Library item. If you would like your choice to become permanent, tick the “Always do this” box. Note that if you hold down the **Alt** key while double-clicking, you will be asked again.

4.1 Tasks

Tasks are work to be done. Often (but not always) this is inspection work. Typically you will specify an asset that the task is to be done on, and an event type specifying the type of work to be done. For example if the task is to carry out a GVI of the asset, you would specify event type 'GVI'. Tasks are grouped into workpacks.

Tasks can be created by using the **Add** button, or by importing, or can be raised as a result of an anomaly action: in a previous inspection you might have noted some fault by logging an event and logging a finding on that event, or NEXUS might have noticed that a data value was outside acceptable bounds and log a finding for you. You might then create an anomaly to track that problem, then create an anomaly action as your intended solution to the problem, and then create a task and link it to that anomaly action, so that the remediation gets carried out as part of a particular workpack.

Tasks can also be created as a continuation of an existing task: if you get partway through a task and are then forced to stop (by end of day, by weather, etc.), you may log a continuation task for the remainder of the work.

Edit Task
—
□
×

Task
History

Asset:

Adhoc Task: (?)

Start KP/EL: End KP/EL:

Task Details

Workpack:

Event Type:

Schedule Type:

Category:

Reference Number:

Assigned To: Requires Shutdown:

Order: Approx Timing: (min)

Due Date:

Instructions:

Inspect targeted area to confirm previous repairs still effectual.

* * *

Origin

Task Origin:

Anomaly Action: (?)

Planning Template: (?)

Completion Information

Event:

Task Status:

Is Completed: Yes

Is Deferred: (?) No

Is Held: (?) No

4.1.1 Properties of a Task

Field Name	Description	Optional Lookup
Asset	Where the task is to be completed.	
Ad-hoc Task	Some tasks are used to create multiple events in IC-Inspector. Check this box to indicate such tasks. A task generated by a planning template with the ad-hoc attribute selected will have this checkbox selected by default.	
Start KP/EL / End KP/EL	Defines the starting and ending kilometre point or elevation of a task (if required).	
Workpack	You must specify a workpack to contain your task.	
Event Type	The type of Event which is to occur to complete this task (can be null).	
Schedule Type	A non-required field, used for grouping, categorising.	
Category	You may optionally create task categories to further group your tasks (tasks that require rope access, tasks that should only be undertaken on days ending in a 'y', etc).	
Assigned To	You may optionally assign particular tasks to particular personnel.	
Requires Shutdown	In plant inspection, some work requires the asset to be shut down — for example, inspecting the interior of a vessel. Check this box for such tasks.	Yes
Order	Order in which the task is to be completed (for information purposes only). For example, if an asset should be cleaned and then GVI'ed, give the Cleaning task a lower order number than the GVI task. Repeated numbers are OK.	
Approx Timing	This will be used to estimate the overall duration (and optionally, cost) of work-packs.	Yes
Due Date	Optionally set a due date by which you want this task to be completed. If this task is generated by a planning template, and the template's <i>Start</i> field is in the form of a date lookup, the Due Date will be populated by this date value.	
Instructions	Any descriptive text relating to this task which may assist the inspector. If you find you are using the same instruction for every event of this type, you should instead put those instructions on the Event Type. (It is similarly possible to put instructions on a planning template.)	
Task Origin	150 characters.	
Anomaly Action	If this task was created from an anomaly action, it is shown here.	
Planning Template	If this task was created from a planning template, it is shown here.	
Event	If an event has been used to complete this task, it is shown here.	
Task Status	You may optionally create task statuses to classify your tasks.	
Is Completed	True if an event has been used to complete this task.	
Retasked	True if another task references this task (i.e. is linked to this task).	
Is Deferred	True if Is Completed is true and Is Retasked is true.	

If the task has instructions (from any of event type instructions, planning template instructions or instructions on the specific task), those instructions will be shown in a pane on the right.

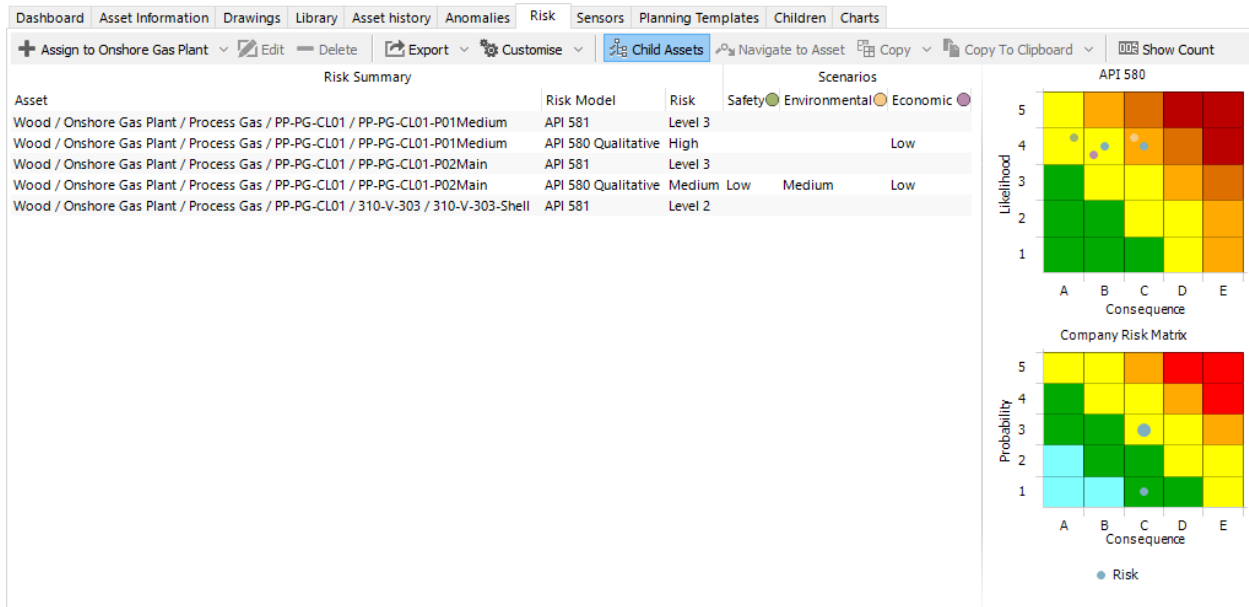
4.1.2 Tasks Toolbar

- **Add, Edit, Delete:** *Add / Edit / Delete* task(s).
- **Import** See *Import* for full description of the Import menu item.
- **Export** See *Export* for full description of the Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.

- **Connections** See *Connections* for information about the Connections toolbar option.
- **Instructions** Shows/hides the Task Instructions pane. Task instructions can come from the task’s Event Type, and/or from its planning template, and/or from the task itself.
- **Reschedule** Reschedule allows for Planning Template tasks to be moved from one Workpack to another. Once PT Task/s has/have been moved, then an “Update” should be performed on the Planning Template. The Reschedule option is not available for tasks which have been imported or manually created.
- **Child Assets** The Child Assets toolbar button is only shown in the Tasks pane from PLANNING screen where the asset hierarchy is visible. When down, tasks are shown for the currently selected asset and all child assets.

4.2 Risk

The **Risk** functionality displays the risk assessment results for the currently selected workpack’s asset and all that asset’s children. Results are graphically represented in the pre-configured Risk Matrix and in the data grid.



Where there are several risks at the same location in the chart, the dot will be shown larger.

Clicking on a row in the Grid will highlight that item in the Matrix. Similarly, clicking on a result indicator in the Matrix will highlight the relevant row (or rows) in the Grid.

If you are using scenarios, each scenario will be shown in its own colour. Scenario dots may be offset within the risk square; if so, this does not indicate a difference in risk — it is merely for legibility.

If you click on a scenario dot within the Matrix, the relevant row(s) in the grid will be highlighted, *and* the relevant dots for those assets’ other scenarios will be highlighted in the Matrix.

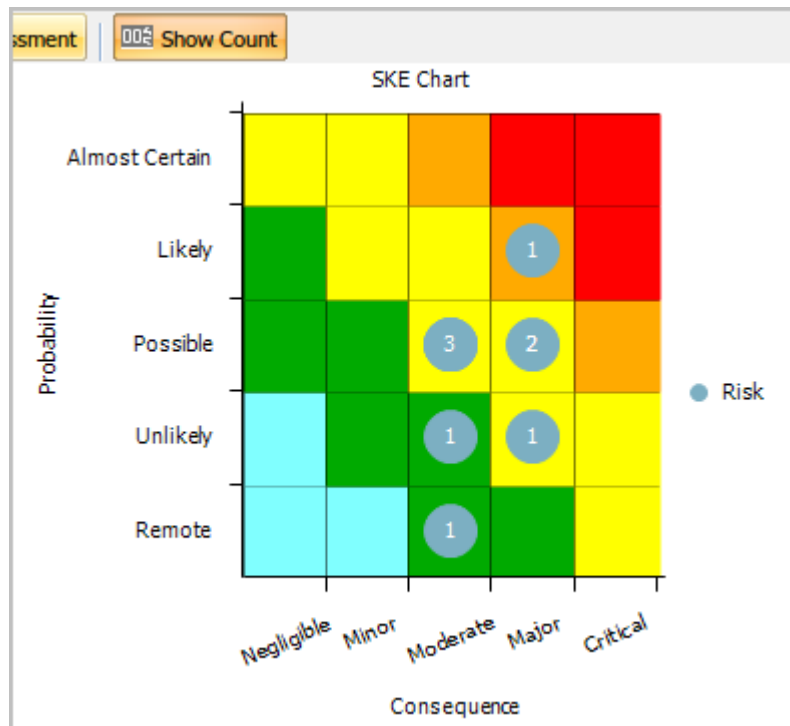
4.2.1 Risk Toolbar

- **Assign** → **Risk Model** Choose from the list of pre-configured Risk Models in the Drop Down menu to assign to the currently selected asset. (See Copy Assessment below to bulk-assign a model to many assets.)

- **Edit** Launches the **Risk Assessment** dialog. Any Values in the Risk Assessment can be edited and saved from this dialog by clicking in the **Value** column of any Value type row (white rows). Please note that Pass Thru and Calculation values can not be edited. Clicking on a Factor or Model row however, we allow you to view the function and the function results that has been assigned to that row. From here you can also assign Scenarios to this Risk Assessment. Click on **OK** to save changes, or **Cancel** to exit without saving changes.
- **Delete** Deletes the currently selected Risk Assessment from the asset to which it is assigned. Please note that the Asset and all information linked to that asset will remain unchanged.
- **Export** See *Export* for full description of the Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.
- **Child Assets** Select to include risk assessments on all this asset’s children.
- **Navigate to Asset** Will change the active asset in the hierarchy to the currently selected risk assessed asset. Note that this will filter the Risk grid so that only assessments for the active asset will be shown.

Hint: Use the **Back** toolbar button on the Assets toolbar to return to the previously selected asset.

- **Copy Assessment** This menu item will launch the Copy risk assessment to selected assets dialog. From here, select the assets which you want to assign the currently selected risk model to. Values assigned to Factors and Categories in the Risk Model will be copied also. Please note that you will only be able to select valid assets from this dialog (e.g. assets which already have the same risk model assigned cannot be selected). Click on **OK** to copy the Risk Assessments.
- **Copy To Clipboard** This menu item will copy the risk chart to the clipboard as an image.
- **Show Count** When in the “Down” state, the matrix will overlay the total number (count) of risk assessments at that location in the Matrix, as shown in the following image:



4.3 Task Instructions

You can specify instructions for each event type on each asset type. So you might specify one set of instructions for a GVI on a pressure vessel, and different instructions for a GVI on a piece of piping.

Here you will see listed each event type that is associated with the asset type selected in the top pane. So if in the top half of the screen you've selected an asset of type Corrosion Loop, here you'll see one row for each event type that is associated with the Corrosion Loop asset type.

If you see nothing in the list in the Task Instructions panel, that likely means that there are no event types associated with the asset type of the selected asset. You can change the associations between asset types and event types from *Asset Types* or *Event Types*.

To change the instructions for a particular event type on a particular asset type, select an asset of that type, and edit the appropriate row. Enter your desired instructions. There is no limit to the amount of text you can enter. Optionally enter an estimated time for this task. (This will be used to estimate the total duration of workpacks.)

4.3.1 The Task Instructions Toolbar

- *Edit* Edit the selected task instruction(s).
- *Export* → *Export* See *Export* for information about exporting Library Connections.
- *Customise* → *Customise* See *Customise* for information about customising the Connections grid.

4.4 Shutdowns

4.4.1 Properties of a Shutdown

1. **Name** - A short (50 character limit) name for the shutdown.
2. **Asset** - The asset that will be shut down. You should choose as specific an asset as you can.
3. **Start Date** - This is the date the shutdown is scheduled to begin.
4. **End Date** - This is the date the shutdown is scheduled to end.

4.4.2 The Shutdowns Toolbar

- *Add, Edit, Delete*: *Add / Edit / Delete* Shutdown(s).
- *Import* See *Import* for full description of the Import menu item.
- *Export* See *Export* for full description of the Export menu item.
- *Customise* See *Customise* for full description of the Customise menu item.

The Planning area shows tasks against their asset, in calendar form. Each task is a dot with two colours: an outer ring showing whether the task is complete, and an inner dot, showing the event type of the task. (You can set the colour for each event in *Event Types*.) If you hover the mouse over a task dot, you will get a hint, detailing the task's description, workpack, event type, completion status, and any associated anomaly action.

4.5 Report Table Sources

To extract task data into a report template, use the System Table titled **Task** as the primary Table Source. For more information see *Report Templates*.

4.6 The Planning Toolbar

- **Asset Views** See *Asset Views* for detailed information on the Asset Views toolbar option.
- **Assets Filter** → **Show Task Completion** When checked, each task in the calendar will be outlined with a green (complete) or red (incomplete) circle identifying the completion status of that task.
- **Assets Filter** → **Schedule Type...**
- **Monthly, Quarterly, Half Yearly, Yearly** Use these buttons to choose the ‘resolution’ of the grid — if you select Monthly, there will be one column for each calendar month, etc.
- **Reports** See *Reports* for information about the Reports toolbar option.

WORKPACKS

5.1 Tasks

Tasks are work to be done. Often (but not always) this is inspection work. Typically you will specify an asset that the task is to be done on, and an event type specifying the type of work to be done. For example if the task is to carry out a GVI of the asset, you would specify event type 'GVI'. Tasks are grouped into workpacks.

Tasks can be created by using the **Add** button, or by importing, or can be raised as a result of an anomaly action: in a previous inspection you might have noted some fault by logging an event and logging a finding on that event, or NEXUS might have noticed that a data value was outside acceptable bounds and log a finding for you. You might then create an anomaly to track that problem, then create an anomaly action as your intended solution to the problem, and then create a task and link it to that anomaly action, so that the remediation gets carried out as part of a particular workpack.

Tasks can also be created as a continuation of an existing task: if you get partway through a task and are then forced to stop (by end of day, by weather, etc.), you may log a continuation task for the remainder of the work.

Edit Task
—
□
×

Task
History

Asset:

Adhoc Task: (?)

Start KP/EL: End KP/EL:

Task Details

Workpack:

Event Type:

Schedule Type:

Category:

Reference Number:

Assigned To: Requires Shutdown:

Order: Approx Timing: (min)

Due Date:

Instructions:

Inspect targeted area to confirm previous repairs still effectual.

* * *

Origin

Task Origin:

Anomaly Action: (?)

Planning Template: (?)

Completion Information

Event:

Task Status:

Is Completed:

Is Deferred: (?)

Is Held: (?)

5.1.1 Properties of a Task

Field Name	Description	Optional Lookup
Asset	Where the task is to be completed.	
Ad-hoc Task	Some tasks are used to create multiple events in IC-Inspector. Check this box to indicate such tasks. A task generated by a planning template with the ad-hoc attribute selected will have this checkbox selected by default.	
Start KP/EL / End KP/EL	Defines the starting and ending kilometre point or elevation of a task (if required).	
Workpack	You must specify a workpack to contain your task.	
Event Type	The type of Event which is to occur to complete this task (can be null).	
Schedule Type	A non-required field, used for grouping, categorising.	
Category	You may optionally create task categories to further group your tasks (tasks that require rope access, tasks that should only be undertaken on days ending in a 'y', etc).	
Assigned To	You may optionally assign particular tasks to particular personnel.	
Requires Shutdown	In plant inspection, some work requires the asset to be shut down — for example, inspecting the interior of a vessel. Check this box for such tasks.	Yes
Order	Order in which the task is to be completed (for information purposes only). For example, if an asset should be cleaned and then GVI'ed, give the Cleaning task a lower order number than the GVI task. Repeated numbers are OK.	
Approx Timing	This will be used to estimate the overall duration (and optionally, cost) of workpacks.	Yes
Due Date	Optionally set a due date by which you want this task to be completed. If this task is generated by a planning template, and the template's <i>Start</i> field is in the form of a date lookup, the Due Date will be populated by this date value.	
Instructions	Any descriptive text relating to this task which may assist the inspector. If you find you are using the same instruction for every event of this type, you should instead put those instructions on the Event Type. (It is similarly possible to put instructions on a planning template.)	
Task Origin	150 characters.	
Anomaly Action	If this task was created from an anomaly action, it is shown here.	
Planning Template	If this task was created from a planning template, it is shown here.	
Event	If an event has been used to complete this task, it is shown here.	
Task Status	You may optionally create task statuses to classify your tasks.	
Is Completed	True if an event has been used to complete this task.	
Retasked	True if another task references this task (i.e. is linked to this task).	
Is Deferred	True if Is Completed is true and Is Retasked is true.	

If the task has instructions (from any of event type instructions, planning template instructions or instructions on the specific task), those instructions will be shown in a pane on the right.

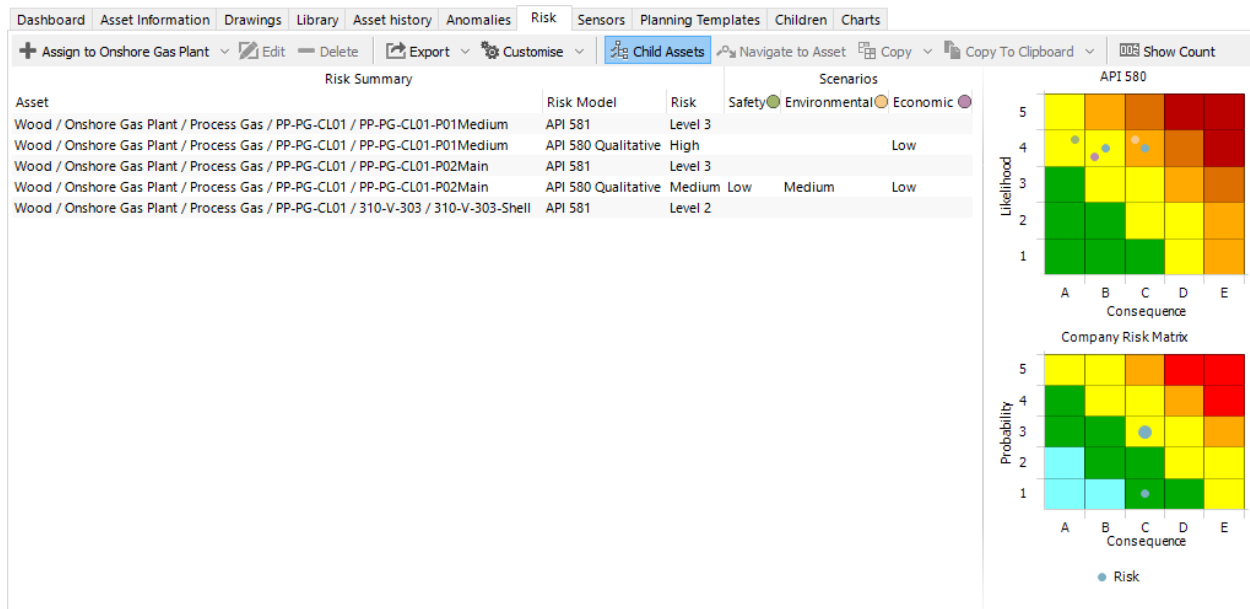
5.1.2 Tasks Toolbar

- **Add, Edit, Delete:** *Add / Edit / Delete* task(s).
- **Import** See *Import* for full description of the Import menu item.
- **Export** See *Export* for full description of the Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.

- **Connections** See *Connections* for information about the Connections toolbar option.
- **Instructions** Shows/hides the Task Instructions pane. Task instructions can come from the task’s Event Type, and/or from its planning template, and/or from the task itself.
- **Reschedule** Reschedule allows for Planning Template tasks to be moved from one Workpack to another. Once PT Task/s has/have been moved, then an “Update” should be performed on the Planning Template. The Reschedule option is not available for tasks which have been imported or manually created.
- **Child Assets** The Child Assets toolbar button is only shown in the Tasks pane from PLANNING screen where the asset hierarchy is visible. When down, tasks are shown for the currently selected asset and all child assets.

5.2 Risk

The Risk functionality displays the risk assessment results for the currently selected workpack’s asset and all that asset’s children. Results are graphically represented in the pre-configured Risk Matrix and in the data grid.



Where there are several risks at the same location in the chart, the dot will be shown larger.

Clicking on a row in the Grid will highlight that item in the Matrix. Similarly, clicking on a result indicator in the Matrix will highlight the relevant row (or rows) in the Grid.

If you are using scenarios, each scenario will be shown in its own colour. Scenario dots may be offset within the risk square; if so, this does not indicate a difference in risk — it is merely for legibility.

If you click on a scenario dot within the Matrix, the relevant row(s) in the grid will be highlighted, *and* the relevant dots for those assets’ other scenarios will be highlighted in the Matrix.

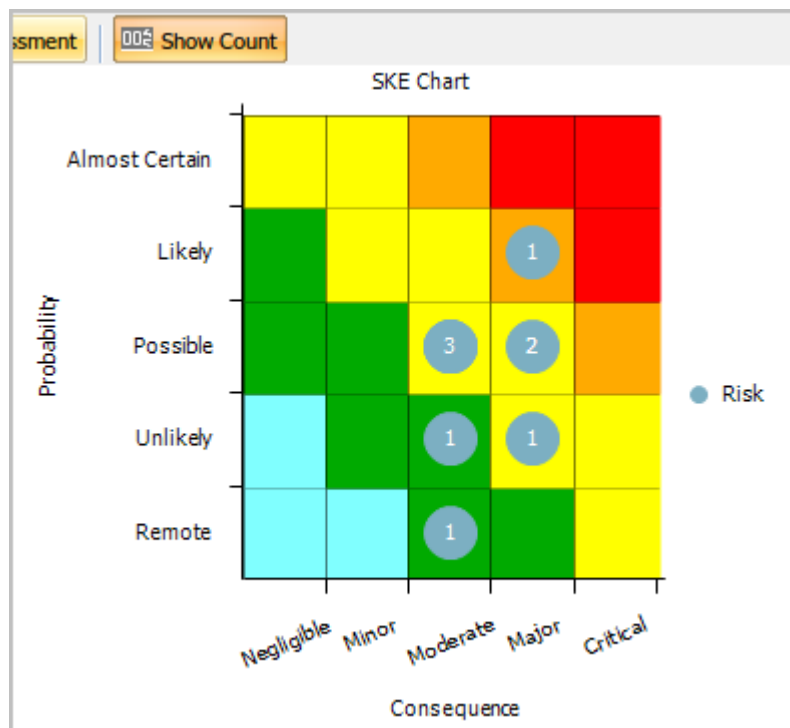
5.2.1 Risk Toolbar

- **Assign** → **Risk Model** Choose from the list of pre-configured Risk Models in the Drop Down menu to assign to the currently selected asset. (See Copy Assessment below to bulk-assign a model to many assets.)

- **Edit** Launches the **Risk Assessment** dialog. Any Values in the Risk Assessment can be edited and saved from this dialog by clicking in the **Value** column of any Value type row (white rows). Please note that Pass Thru and Calculation values can not be edited. Clicking on a Factor or Model row however, we allow you to view the function and the function results that has been assigned to that row. From here you can also assign Scenarios to this Risk Assessment. Click on **OK** to save changes, or **Cancel** to exit without saving changes.
- **Delete** Deletes the currently selected Risk Assessment from the asset to which it is assigned. Please note that the Asset and all information linked to that asset will remain unchanged.
- **Export** See *Export* for full description of the Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.
- **Child Assets** Select to include risk assessments on all this asset’s children.
- **Navigate to Asset** Will change the active asset in the hierarchy to the currently selected risk assessed asset. Note that this will filter the Risk grid so that only assessments for the active asset will be shown.

Hint: Use the **Back** toolbar button on the Assets toolbar to return to the previously selected asset.

- **Copy Assessment** This menu item will launch the Copy risk assessment to selected assets dialog. From here, select the assets which you want to assign the currently selected risk model to. Values assigned to Factors and Categories in the Risk Model will be copied also. Please note that you will only be able to select valid assets from this dialog (e.g. assets which already have the same risk model assigned cannot be selected). Click on **OK** to copy the Risk Assessments.
- **Copy To Clipboard** This menu item will copy the risk chart to the clipboard as an image.
- **Show Count** When in the “Down” state, the matrix will overlay the total number (count) of risk assessments at that location in the Matrix, as shown in the following image:



A workpack is a collection of *Tasks*.

Workpacks can be created in the following ways:

- automatically by means of *Planning Templates*
- manually created from the Add Workpack dialog
- bulk *imported* from MS Excel
- automatically via connection with a corporate ERP / CMMS.

5.3 Properties of a Workpack

1. **Name** - A short (50 character limit) name for the Workpack.
2. **Workpack Group** - Workpack groups are optional and user-definable and can be used to group work however you like: you could have different groups for different geographical areas, different groups for different kinds of inspections (GVI, non-destructive measurement, destructive measurement, etc.) or whatever is useful for you.
3. **Abbreviation** - A short (15 character limit) name for the workpack that may be useful in reports, etc.
4. **Description** - A 100 character field which provides more descriptive information of the workpack.
5. **Asset** - The asset that the workpack is attached to. You should choose as specific an asset as you can, while still including all the assets that tasks in this workpack will be on. So if all the tasks in this workpack were within MyCompany / MyField / Gas Plant, you could specify that as your asset for the workpack.
6. **Revision** - This field is used for quickly managing the status of workpacks: for example, when a workpack is complete, you can change its revision to Completed. Workpack Revisions are user-definable.
7. **Read Only** - The check box is only present for historical purposes. It has no effect in NEXUS IC 6.
8. **Actual Start** - This is the date the workpack is scheduled to commence.
9. **Task Time** - A sum of how long all the tasks in this workpack will take. For this to be meaningful, you must have given each task an Approx Timing.
10. **Work Hours (per day)** - Used to estimate duration, based on Task Time.
11. **Duration (Estimated)** - Task Time divided by Work Hours (per day) gives Duration (Estimated).
12. **Duration (Contingency)** - You can optionally add a value onto the estimated duration here, to allow for down-time.
13. **Duration (Override)** - You can optionally enter a value here instead of relying on the calculated process above. This would be useful if, for example, you have another management system that estimates duration for you.
14. **Actual End** - Actual Start plus Duration gives Actual End.
15. **Day Rate** - If you would like NEXUS IC to estimate cost, enter a day rate here. This should be the full cost of one inspector, if inspectors will be working on different tasks in parallel, or the full cost of the team if they are not.
16. **Cost based on Day Rate** - Day Rate x Duration = Cost based on Day Rate
17. **Costs (Fixed)** - Optionally enter any fixed costs here (for example, cost of mobilisation/demobilisation).
18. **Cost (Total)** - Cost based on Day Rate + Costs (Fixed) = Cost (Total)
19. **Cost (Override)** - You can optionally enter a value here instead of relying on the calculated process above. This would be useful if, for example, you have another management system that estimates cost for you.
20. **Final Estimate** - If you have entered an override, Final Estimate will be the override value. Otherwise, it will be the Cost (Total) value.

21. **Cost Code** - Cost Codes are optional and user-definable and can be used to group workpacks however you like.

5.4 Report Table Sources

To extract workpack data into a report template, use the System Table titled **Workpack** as the primary Table Source. For more information see *Report Templates*.

5.5 The Grid

The workpacks grid lists all workpacks.

Tip: Use the grid *Grouping* functionality to group and filter workpacks. It is a quick and easy way to drill down to the anomalies that you are particularly interested in reviewing. By default, this grid is grouped by Revision.

5.6 The Workpacks Toolbar

Add, Edit, Delete: *Add / Edit / Delete* Workpack(s).

Tip: To bulk update (or delete) workpacks, use the *Multi-Edit* functionality available from the workpacks grid.

- **Import** See *Import* for full description of the Import menu item.
- **Export** See *Export* for full description of the Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.
- **Connections** See *Connections* for information about the Connections toolbar option.
- **Monthly, Quarterly, Half Yearly, Yearly** Use these buttons to choose the ‘resolution’ of the grid — if you select Monthly, there will be one column for each calendar month, etc.
- **Today** Click this button to horizontally scroll the calendar to today’s date. Note that if the calendar does not cover today’s date (because all your workpacks are in the past, or all your workpacks are in the future, or no workpacks have start/end dates) then the Today button will not work.
- **Goto Item** Click this button to horizontally scroll the calendar to the selected workpack’ start date. If you have selected multiple workpacks, the calendar will scroll to the last one you selected.
- **Reports** See *Reports* for information about the Reports toolbar option.

INSPECTION

This is an overview of the INSPECTION screen.

Inspection event data can be uploaded, analysed, charted and reviewed from this screen.

Tip: The asset hierarchy is pivotal to the **INSPECTION** screen as all data will be filtered by the currently selected asset.

Select the asset from the asset hierarchy that contains the events you are interested in. Use the *Event Listing* pane to see those events. Use the Event Listing's Filter menu to control which events you see in the list, including whether you want to see just events directly on this asset, or events on this asset and all its descendants. The rest of the Inspections screen will then show data relevant to the events in the Event Listing, or relevant to the *selected* event(s) in the Event Listing.

6.1 Inspections Toolbar

6.1.1 Events Export

The *INSPECTION* → *Custom Export* functionality gives the user the ability to choose a subset of event data to export to Excel.

The format in which the data is exported to Excel is the same format in which the data can be reimported (with some exceptions). See *Import* for more detail on importing data from Excel.

The Events Export Wizard

1. **Export Filename** - Either use the default folder and filename that NEXUS IC proposes, or use the ellipsis button to navigate to an alternate Windows folder and edit the default filename.
2. **Export Options** - Select options here.
 - If you set **Columns** to User Selected, you will be shown a page later in the wizard to select those columns. If you set it to All Visible Columns, columns that have Visible Grid or Visible Form ticked will be exported. Workflow rules affecting field visibility will not be run.
 - **Asset Location** can be shown in a Single Column, like “Field / Asset / Elevation / Member / Anode”, or as Multiple Columns, with one tree level per column.
 - **Findings:** You can **Include** findings in the export, in which case they will get their own worksheet, or **Exclude** them, or **Only export Findings**.

- **Images:** You can **Embed thumbnails** at various resolutions, **Embed full size images**, **Hyperlink to external images**, or **Do not export images**. If an event has several images, you will get several sets of Multimedia columns, with images for an event shown horizontally within the event's row.
 - You can choose to export or not export **Calculated fields** and **Sub events**. If you export subevents, the event data will be repeated in several rows, one for each subevent.
 - Under **Worksheets** if you untick **One per event type**, you will get one Excel worksheet with (potentially) many different event types mixed together.
 - Extra sheets are exported for each **Lookup List** used in the forms. You can choose to hide these.
 - You can control **Formatting** for **Date** and **Time**. You can also control **Cell formatting** — if you select this, cells with invalid values will be shown in red, cells not relevant to this asset information group or event form will be greyed out, etc.
3. **Asset Selection** - Choose the Asset View and check which subset of assets to include in the export. **Note:** use the **Select Children** and **Unselect Children** toolbar buttons to include and exclude the visible and non-visible child assets. Simply checking an asset at the top level will not automatically check all the child assets beneath it.
 4. **Workpacks** - Choose which Workpacks to include in the exported document.
 5. **Events** - Choose which Event types to include in the exported document.

Hint: Column order within the exported sheet is determined by the grid column order set within each form in *Configuration* → *Assets* → *Asset Information*.

Hint: The exported Excel sheet will contain a Legend tab, which shows the meaning of various cell and row colours.

The **Inspections** toolbar allows the user to control the INSPECTION screen as a whole. Functionality specific to individual panes may be found on those panes.

- **Back** The Back menu item allows you to return to assets that you had previously selected in the Assets tree.
- **Forward** The Forward menu item allows you to return to assets that you had previously selected in the Assets tree, after you've used the Back button.
- **Assets** → **Asset Views** See *Asset Views* for detailed information on the Asset Views toolbar option.
- **Assets** → **Traffic Lighting** See *Traffic Lighting* for detailed description of the Traffic Lighting toolbar option.
- **Assets** → **Add** → **Asset** Adds a new (child) asset to the asset currently selected in the hierarchy.
- **Assets** → **Add** → **Root Asset** Adds a new root level asset into the active Asset View. A root level asset is an asset which does not have a parent asset.
- **Assets** → **Add** → **Linked Asset (With Children)** Add a link to an existing asset including all its children. An asset tree will be displayed to allow selection of the asset to link as a child to the currently selected asset.
- **Assets** → **Add** → **Linked Asset (Without Children)** Add a link to an existing asset, without any of its children. An asset tree will be display to allow selection of the asset to link as a child to the currently selected asset.
- **Assets** → **Edit** → **Asset Properties** Change the name or Asset Type of the currently selected asset or add/remove the Primary Asset flag.
- **Assets** → **Edit** → **Asset Type Properties** Edit the *Asset Type* of the currently selected asset: change its name, and change what Asset Information groups, Event types and Survey types it is associated with.

- **Assets** → **Delete** Deletes or unlinks the selected asset. If the asset exists in multiple places just this location can be removed, instead of deleting all locations the asset exists. Click on the **Connections** button to view dependant records of the current asset.
- **Assets** → **Show Asset Type** Toggles the display of the asset type in the hierarchy.
- **Assets** → **Expand Children** All children, grandchildren, etc. of the selected asset will be expanded. (You can also press the * key on the numeric keypad.)
- **Assets** → **Collapse Children** All children, grandchildren, etc. of the selected asset will be collapsed.
- **Assets** → **Undo Move** Reverses the last asset move action. Note that ONLY the last asset move can be undone.
- **Assets** → **Copy to Clipboard** Copies either the asset name or full hierarchy location of the selected asset to the clipboard.
- **Assets** → **Reparent to Root** Repositions the selected asset in the asset tree so that it becomes a root asset.
- **Assets** → **Show on Drawing** Shows a list of drawings that have this asset as a layer. Click on a menu item to go to that drawing. If the drawing name has “(Different Asset)” after it, the drawing you will be taken to is not available on the current asset; thus, when you select the menu option, you will not only be taken to that layer on that drawing, you will also be navigated to the new asset. You can get back by using the **Back** toolbar button.
- **Assets** → **Other Locations** Shows a list of other locations that this asset exists in on the asset tree (including in other Asset Views). Click on a menu item to navigate there. If this asset does not appear in any other locations, you will not see any items in this list.
- **Assets** → **Connections** See [Connections](#) for information about the Connections toolbar option.
- **Assets** → **Anomaly Triggers** Asset-specific anomaly triggers are found here. Triggers for a field independent of asset are found in [Asset Information](#) and [Event Types](#). If you have both an asset-specific and a generic anomaly trigger on the same field, for assets with the asset-specific trigger, only the asset-specific trigger will apply. For assets with only a generic trigger, only the generic trigger will apply. Note that asset-specific anomaly triggers are specific to their asset — they do not automatically apply to an asset’s children.
- **Assets** → **Coordinates** This is the equivalent of the version 5 ‘Pipeline’ and ‘Map’ tabs.
- **Assets** → **Rotate Equipment** See [Assets Toolbar](#) for details.
- **Assets** → **Retire Equipment** See [Assets Toolbar](#) for details.
- **Import** See [Event Import](#) for detailed information on the Import Wizard. The MS Excel Import Template details the required format for importing events.
- **Custom Export** Gives the user the ability to choose which subset of assets and associated event data to export to Excel. Clicking this launches the Event Export wizard. The format in which the data is exported to Excel is similar to but not the as same format in which the data can be reimported. See [Events Export](#) for more information about exporting event data.
- **Reports** See [Reports](#) for information about the Reports toolbar option.
- **View** → **Toggle Event/Findings** Flips between showing the Event Listing and the Finding Listing. Equivalent to clicking on the Event Listing tab or the Finding Listing tab. Having the menu item there lets us attach a shortcut key to it: F10.
- **View** The remainder of the View menu lists the various panes available in the Inspection screen. Click a menu item to check/uncheck it. Checked items are visible; unchecked items are not.
- **Time Source** If set to System Time, the date and time box visible just to the right of this button will show the current time according to this PC’s clock. If set to Video Time, it will show time from the video player — as you move backwards and forwards through the video, you will see this time move backwards and forwards in unison.

- **Time Source** → **Synchronise KP** If selected, then as video plays, KP on appropriate charts will be updated from Video Time: as video plays, we see what time the video is up to, then we check what KP is associated with that time, and we update charts that have a KP axis to that KP. This only works if there is suitable survey data in the database, allowing us to get KP from the current time. Updated charts include Event type -v- KP, CP -v- KP, and Pipeline View, as these all have a KP axis. It does not include the Cross-Profile chart, as this does not have a KP.
- **Desktops** If you have several saved desktop configurations for this screen, select which one is active here.
- **Save Desktop** If you have made changes to the currently selected desktop, click this to save them. Otherwise, when you restart the application, your changes will be lost.
- **Add Desktop** You can add a new desktop layout here.
- **Delete Desktop** Delete the currently selected desktop from the list by clicking this.

6.2 Alignment

The Alignment pane lets you align events in one workpack with events in another. If you have carried out multiple inspections on an asset with KP (such as a pipeline), survey may have been calibrated differently in different years. Thus, the same physical object may be logged at slightly different KPs in different inspections. This tool lets you bring all those subtly different KP measurements into alignment with each other.

Ensure that the events that you want to align on are visible in the *Event Listing*, by setting filters as required. Choose a baseline workpack and an alignment workpack using the toolbar buttons.

You will see a chart showing events from both workpacks, with the ‘Provide Suggested Control Points’ pane at the right. This pane lists the event types that NEXUS IC believes might be suitable for matching on — essentially, events that have KP. Each event type has a checkbox and a slider. If you check the box next to a given event type, NEXUS IC will suggest control points, in that event type’s colour. The slider at the right of each event type controls sensitivity: if the slider is all the way to the left, it will only suggest pairs of events that have identical KP. As you move the slider to the right, it will suggest points that have more and more KP difference, up to a maximum of 25 metres. The default slider position is 5 metres.

Check one or more event types. Good choices are event types that represent static objects: pipeline features, anodes, field joints, etc. Bad choices are event types that represent things that might change location over time: freespan, burials, etc. Adjust sliders as required: if the survey variation from one workpack to the other is more than 5 metres, you will need to adjust sliders upwards.

NEXUS IC should now display some suggestions. These are only suggestions — as yet, no links have been made. To convert a suggestion into a link, zoom in on the chart (put the mouse over the KP axis and spin the mouse wheel, or adjust the zoom bar at the bottom of the pane) far enough that you can select that individual point, click on the point to select it, and click **Link**.

You can also make a link that is not based on a suggestion — for example, suppose that a particular object has been logged one year as a Feature and the next year as a Survey Note. NEXUS IC will not automatically suggest a link if the event types are different, but you can still manually click those two events and click **Link**.

If you change your mind, you can click **Unlink** to unlink a single pair of events, or **Unlink All** to start again from scratch.

Once you are happy with the links you have made, click **Align**. NEXUS IC will then align events between the lowest and highest KPs you have created links for. Adjustments will be made to the KPs of events in the Alignment Workpack. This may take some time, depending on the number of events involved. (If you are carrying out a test, you may wish to do so on a small KP range.)

Events will be adjusted based on the Linked points nearest them: for example, if you have a point at KP 0 linked to a point at KP 0.004, and another point at KP 1 linked to a point at KP 1.004, all points in the Alignment Workpack

between KP 0.004 and KP 1.004 will have their KP decreased by 0.004 km. If your low points were at KP 0 and KP 0.004 and your high points were at KP 1 and KP 1.008, then weighted scaling would occur: a point halfway between at KP 0.506 would have a scaling halfway between 0.004 and 0.008 (i.e. 0.006) applied; a point at KP 0.252 would have a scaling of 0.005 applied, and so on.

6.3 Anomaly Triggers Tool

The Anomaly Trigger utility only checks against the filtered list of events in the *Event Listing* grid. It only need be run if Anomaly Trigger limits have changed. The Anomaly Triggers utility checks the event data for each event currently shown in the Event Listing grid against pre-configured Anomaly Triggers. The Anomaly Triggers tool will automatically create findings on those events where the event data exceeds specified criteria. Where findings exist and event data no longer exceeds the criteria, then findings will be deleted.

After you click the *Shortcuts* → *Anomaly Triggers* button, you will be shown an “Are you sure” message.

During the check:

1. If it fails (meaning data is outside of defined triggers), then it will create a new finding. We first match on the following to see if the finding already exists. It matches on:

1. Anomaly Trigger rule (Bound_ID)
2. Is Auto Generated = true


In other words, if there is no finding already created from this trigger for this event, NEXUS will create a finding.

2. If it passes (meaning data is within the defined limits), then we check to see if we need to delete an existing finding. We match the finding based on:

1. Anomaly Code (Code_ID)
2. Anomaly Severity (Severity_ID)
3. Reason (if there is an Error Message provided in the anomaly trigger)
4. Anomaly Trigger rule (Bound_ID)
5. Is Auto Generated = true
6. that it has not been linked to an anomaly (Anomaly_ID is null)
7. Anomaly Required is null

In other words, if a finding was automatically generated from a particular Anomaly Trigger rule, and the event data no longer exceeds that rule (because the event data has been changed or because the rule has been changed), and the Error Message in that rule still matches the Reason in this finding, and the finding has not been linked to an anomaly and the user has not marked *whether* it needs to be linked to an anomaly, NEXUS will delete it.

If you delete an Anomaly Trigger, findings created from it won't be deleted. If you *want* to delete all findings created from an Anomaly Trigger, don't delete the Anomaly Trigger — instead, modify it so that no data will be marked as anomalous (e.g. set it to only flag data between -2 and -1 on a field with no negative values, etc.), then run the Anomaly Triggers tool. *Then* as a second step you can delete the Anomaly Trigger.

When an anomaly trigger is violated, a yellow exclamation mark () will appear next to the field. You can set lower/upper bounds to be constant values (so a field might trigger if it was outside, say, 1 to 9) or to pull from a field, on this form or on another form. So for example if this field is Measured Wall Thickness, it might trigger if its value is less than Minimum Allowable Wall Thickness.

For *Lookup List* fields, the comparison is done of the lookup list item's Value, not its Comment. So if you have a lookup list titled “Anode Depletion”, and its first entry has value “25” and comment “0 to 25% depleted”, NEXUS will use the “25” for purposes of determining whether an anomaly trigger should be fired.

For Yes/No fields you can set the trigger to fire on any combination of Yes, No or blank; but you can't compare to another field.

The **Include Boundary** tickbox controls whether exact matches cause the trigger to fire: if you have set a trigger to “Fail when inside Upper/Lower bounds”, your lower bound is 1 and your upper bound is 9, this is the difference between “ $1 < x < 9$ ” and “ $1 \leq x \leq 9$ ”.

You can optionally give an anomaly trigger a date range. If you set just a Date From, the trigger will apply only to event data from that date forward. If you set just a Date To, the trigger will apply only to event data from that date or earlier. If you set both, the trigger will apply only to event data within the specified range. In this way, you can change triggers to reflect new conditions, without causing spurious warnings on historical data. For example, if you decrease the operating pressure of an asset, this might decrease the minimum allowable wall thickness. Rather than editing the existing anomaly trigger, you can set a “To” date on that old trigger, and add a new trigger with a “From” date.

Caution: In most cases, Findings are generated at the time events are added or *imported*. There are however some scenarios in which the Anomaly Triggers utility should be run manually. These are 1) whenever anomaly triggers are edited; 2) when anomaly triggers exist on a calculation field; 3) before any Finding review sessions; or 4) after a bulk import of event data (particularly when anomaly triggers rely on events other than itself).

Triggers for a field independent of asset are found in NEXUS IC in *Asset Information* and *Event Types*. Anomaly triggers for specific assets can be configured in NEXUS IC by right-clicking on an asset and choosing **Anomaly Triggers...** If you have both an asset-specific and a generic anomaly trigger on the same field, for assets with the asset-specific trigger, only the asset-specific trigger will apply. For assets with only a generic trigger, only the generic trigger will apply. Note that asset-specific anomaly triggers are specific to their asset — they do not automatically apply to an asset’s children.

A trigger can have an anomaly *Code* and a *Severity*, and you can have several different triggers on a single field, with different codes and/or severities. The dialog may also show a preview chart, showing which triggers apply at which KPs or depths.

See also the Anomaly Triggers section under *Event Types*.

6.4 Asset History


See *Asset History*.

6.5 Asset Information

See *Asset Information*.

6.6 Charts

The Charts tab will list all of the Chart Templates that are appropriate for the event data shown in the *Event Listing* pane. If you don't see any charts listed, try different types of events, by changing asset or by changing your filters. Charts will only show event data included in your filters (workpacks, event types, column-specific filters, etc). If your Chart Template is on Continuous Event data (such as cross-profiles), ensure that you select that Continuous Event in your event type filter.

To expand/collapse each chart, click the  button at the top right of that chart, or click the chart's grey header row.

If a chart is misconfigured, you will see a message explaining this in place of the chart. Go to *Chart Templates* to resolve the described problem.

Charts are generated from Chart Templates. For details on setting these up, see *Chart Templates*.

Available charts will be listed alphabetically. The first chart will be automatically expanded.

Events with Findings will be shown on the chart in red.

For some Chart Templates, at the right or the bottom of the chart is the chart legend. If you hover the mouse over an item on the legend, other series on the chart will fade out temporarily. If you click an item on the legend, that series will be toggled on/off. If you export the chart (see below), only series currently visible will be exported.

Every client database includes:

- Baseline Chart, which shows events' Easting and Northing, and optionally also shows a pipeline baseline track (if you've set one up);
- Cross-Profile chart, which shows seabed profile for a single KP (if you have any PL - Cross Profile data imported);
- Event Type -v- KP chart, which will show what events are logged at what KP of a pipeline (if you have any KP-based assets such as pipelines);
- Events by Type, a pie chart showing how many events you have of each type;
- Longitudinal Profile, which shows top of pipe, bottom of pipe, and left and right seabed versus KP (if you have any PL - Profile data imported); and
- Pipeline View, which shows events along your pipeline in a 3D view. This view can also show seabed profile (if you have any PL - Cross Profile data imported), and animates motion along the pipeline as you select events. See Charts Toolbar below for details of buttons that are used by the Pipeline View.

6.6.1 Chart Width

When the Charts pane is 1000 pixels wide or less, all charts are shown at the full width of the chart pane. When the Charts pane is over 1000 pixels wide, some charts are shown full width, and some are shown half width, in order to fit more charts side-by-side onto your screen.

Charts that have an X axis of type string, date, or date/time, or whose X axis includes ‘KP’ are always shown full width. Of course, you can adjust the width of all charts by adjusting the width of the whole application window, adjusting other elements such as the asset tree wider/narrower, etc.

6.6.2 Zooming

At the bottom of most Chart Templates, below the horizontal scrollbar (if visible) is the Zoom Bar. You can hover the mouse over the left or right end of the selected part of the Zoom Bar and drag to change the selection. Initially the entire Zoom Bar will be selected, so hover the mouse over the left or right end of the bar and drag. Once a subset of the chart is selected, you can use the scroll bar or the Zoom Bar to drag the whole selection area without zooming.

You can also zoom in or out by clicking in the chart area and (with the mouse cursor still inside the chart area) spinning the mouse wheel. For charts with a lot of data (thousands of events) this can be slow, so the Zoom Bar may be faster. You can zoom on a single axis by putting the mouse pointer over that axis and spinning the mouse wheel. Not all charts support zooming in both axes.

You can also control zoom with toolbar buttons Zoom In, Zoom Out, and Reset Zoom.

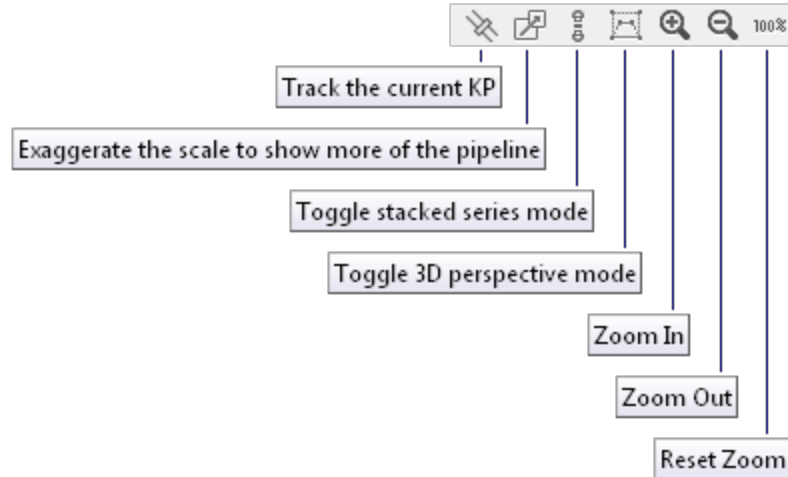
6.6.3 Charts Toolbar

There is no toolbar for the whole Charts panel. Instead, each chart has its own toolbar.

- **Zoom In** Zoom in.
- **Zoom Out** Zoom out.
- **Reset Zoom** Resets to default zoom level.
- **Export the chart to image(s)** Click this button to open the Export dialog. Ensure the range you want is set correctly using the Zoom Bar. Ensure the series you want to export are visible. If you would like to export the chart as a series of images, each covering a smaller horizontal range, enter the range you would like each chart to cover in the **Range of X Axis per image** field. For example, if you have a 300km pipeline and you enter “10” as the range per image, it will be broken into 30 images, each covering 10km.
- **Copy the chart to the clipboard** Copies the chart, as you see it displayed, without the “zoom” section at the bottom, to the clipboard.
- **Toggle chart** Expand/collapse display of this chart.

There are also several buttons specific to the Pipeline View chart:

- **Track the current KP** This button is only available in IC-Inspection. When selected, the pipeline view will move in time with the KP value coming in from survey. For NEXUS IC, see *Time Source* → *Synchronise KP* on the *Inspections Toolbar*.
- **Exaggerate the scale to show more of the pipeline** When selected, will distort the scale of the pipeline to make a greater KP range visible.
- **Toggle stacked series mode** When selected, will move events above the pipeline to make them more obvious. Different events will be moved up different distances so that all are easily distinguishable.
- **Toggle 3D perspective mode** When unselected, you will see the pipeline viewed from the side. When selected, you will see the pipeline viewed from above and slightly off to one side.



Tip: Click on the chart area and then, with the mouse cursor still inside the chart area, use your mouse wheel to increase/decrease the chart scale for export.

6.6.4 Report Table Sources

To extract chart template data into a report template, use a Chart Template element in the report, and use the appropriate Asset table or Event table as a source. For more information see [Report Templates](#).

6.7 Drawings

See [Drawings](#) and [Charts and Drawings](#).

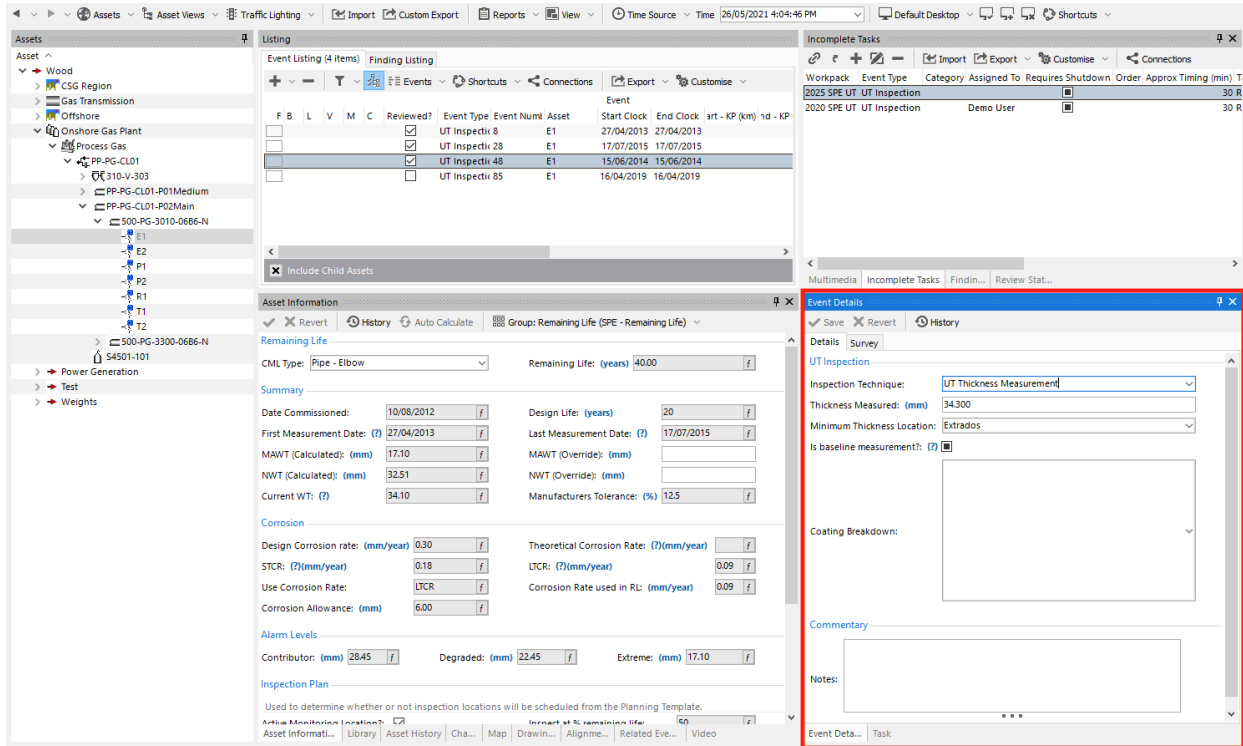
Here in INSPECTION, if you left-click on a drawing layer, you can create a new event on that layer's asset.

An additional option is available from the Layer Colour button menu: Finding Status. This shows the following colours:

- Green - No Findings, but Events exist.
- Grey - No Events exist.
- Yellow - Findings exist, but no severity.
- Other - Finding Severity Colour.

6.8 Event Details

The Event Details pane displays the Event data for the currently selected event.



An event represents a discrete inspection or survey item. Each event record has (as a minimum) the following data linked to it:

1. Asset
2. Workpack
3. Start Date/Time
4. End Date/Time
5. Survey Set

6.8.1 Report Table Sources

To extract event data (common to all events) into a report template, use the System Table titled **Event** as the primary Table Source. To extract additional data from specific events, add fields from the relevant Events which exist in the **Event** category.

For more information see *Report Templates*.

6.8.2 The Event Form

Fields on event forms and sub-event forms follow the same rules and have the same features as fields on *Asset Information* forms.

Event Details
🔍 ✕

✓ Save ✕ Revert 🕒 History

Details
Survey

UT Inspection

Inspection Date: Report No:

Thickness Measured: (mm) ! Contractor: ✕

Lowest CML Reading Location: Service Order No:

Isometric Drawing No:

Inspection Effectiveness

Internal Inspection Effectiveness: Internal Effectiveness Score: f

External Inspection Effectiveness: External Effectiveness Score: f

Coating Condition:

Visual Inspection

Visual Inspection Result:

Commentary

Notes:

The screenshot shows the 'Event Details' dialog box with the 'Survey' tab selected. The 'Event' section contains several fields: Workpack (2014 Pipeline ROV), Asset (Wood / Offshore / 24" PL), Survey Set (Raw Survey Data), Start Clock (25/07/2014 01:33:54 AM), and End Clock (25/07/2014 01:34:16 AM). The 'Survey' section contains a table of survey data for various fields, including KP (km), Depth (m), Elevation (m), Easting, and Northing, with Start and End clock values.

Field	Start	End
<input type="checkbox"/> Group : Survey - Pipeline		
KP (km)	0.4984	0.5027
<input type="checkbox"/> Group : Survey - Standard		
Depth (m)	133.52	133.53
Elevation (m)		
Easting	370260.372	416640.914
Northing	6456151.8	6747391.756

Event Details is broken into two tabs: the Details tab, containing Event and Commentary, and the Survey tab, containing key data and survey values.

Data fields specific to this event are displayed in the upper section of the Details tab. The fields displayed here are user-definable and can be configured from *Event Types*. Event specific data can be edited and saved using the controls in this section of the form.

The lower part of the Details tab titled **Commentary** has the Notes field, where free text relating to this event can be entered and saved.

At the top of the Survey tab is **Event**, containing the key data associated with this event. The Workpack, Asset, Survey Set, Start Clock and End Clock can all be edited from this section. Click on the ellipses buttons to edit Workpack, Asset or Survey Set. Type in or choose from the calendar and clock control to edit the Start and/or End Clock values.

Below this is the **Survey** section. This shows data for each survey field *assigned for this asset type*. The data shown is related to the Start Clock and End Clock: if another event has the same Start or End Clock, it will have the same survey data.

6.8.3 Event Details Toolbar

- **Save** Saves any changes made to the current event.
- **Revert** Ignores changes and reverts data in the event back to the last saved state.
- **History** Shows a *History* dialog for this event.

6.8.4 Editing Graphical Markup On Images In Events

If one or more event types are configured to show *graphical markup*, you will see a region on the event form showing any multimedia attached to this event. (If there are no multimedia attached to this event, this region will show as white. If there are several multimedia, you will see them all overlaid translucently, and you should use **Multimedia** toolbar option to untick the ones you don't want.) You can pan the photo by using the left mouse button to drag it. You can zoom with the **Zoom In / Zoom Out** buttons, or by using the mouse wheel. (You may need to click in the image region before the mouse wheel will zoom for you — this is a focus issue related to Windows.) You can then do graphical markup on the photo: click the **Redraw Layer** button, then click in the drawing region to mark up. (If your markup type is Point, click just once; otherwise click several times.) Then click **Save Layer** to complete the shape.

The screenshot shows the 'Event Details' window with the 'Survey' tab selected. The 'PL - Damage' section contains the following fields:

- Type: Weightcoat sp: (dropdown)
- Length: (m) 0.1
- Width: (m) 1.5
- Height: (m) 0

Below these fields is a toolbar with icons for image selection, drawing, and zooming. The 'region:' label is positioned to the left of a large image area. The image shows a textured surface with a blue polygonal shape drawn over it. Below the image is a 'Commentary' section with a text area containing the text 'Anomalous damage'. At the bottom of the window is a navigation bar with tabs: Task, Event Details, Multimedia, Incomplete T., Finding, and Review Status.

6.9 Event Listing

The Event Listing grid lists all events based on the currently applied filters. Primary filters are:

- Asset;

- Workpack; and
- Event Type

The number of events in the grid (based on the current filters) is displayed in the Event Listing tab title.

Tip: The asset hierarchy is pivotal to the **Inspections** screen as all data will be filtered by the currently selected asset. If the **Child Assets** toolbar button is not in the “Down” state, then only events recorded on the selected asset will be shown (eg. events on child assets will not be listed).

Finding Column

There is significance to the colours in the Finding column.

- Yellow - the finding needs to be reviewed;
- Green - the finding has been deemed insignificant and is not linked to an anomaly.
- Grey - the finding is linked to a closed anomaly;
- Red - The finding is linked to an open anomaly;
- White - there are no findings on this event.

6.9.1 The Grid

By default, the Event Listing grid displays columns which are common to all event types. The first six columns in the Event Listings grid represent:


1. **F** = The presence or absence of a **Finding** for this event.
2. **B** = The presence or absence of a **Bookmark** for this event
3. **L** = The presence or absence of a **Library Item** for this event
4. **V** = The presence or absence of **Video** for the event recorded at this date/time.
5. **M** = The presence or absence of **Multimedia** for this event
6. **C** = The presence or absence of Reviewer **comments** for this event

Tip: All columns listed above can be *filtered* and sorted. Each column has a filter icon which appears by hovering over the column header, for example the F column, by clicking on the filter, a drop down with a list of relevant items will appear that can be used to filter the events by that item in that column. By pressing on the column header, for example F, the events will be sorted in ascending order based on the findings, i.e all the events with findings will be listed at the bottom of the list, by clicking on the header for another time, the events will be sorted in descending order based on the findings, i.e all the events with findings will be listed at the top of the list. A small arrow (either up or down) on the column header shows this functionality.

Right clicking on any of the events in the Event Listing grid will pop up the **Events** menu.

Hint:

To bulk update (or delete) events, use the *Multi-Edit* functionality. If you're deleting only a few events, simply multi-select them

- Go to the *WORKPACKS* screen and create a workpack called DeleteMe.
- Return to the *INSPECTION* screen, multi-select the events you wish to delete, and in the *Event Details* pane, click **Survey**, click the  ellipsis button on Workpack, and set it to DeleteMe.
- Go to the Workpacks screen again.
- *Database* → *Close*, then *Database* → *Reopen* or *Database* → *Connect...* to clear those events from NEXUS IC's cache.
- Now delete the DeleteMe workpack.

Tip: The Event Listing grid performs a check whenever the filtered data set is updated, when it detects there are only events of a single event type, the properties of that event (the event data) will be displayed as additional columns in the Event Listing grid.

6.9.2 Event Listing Toolbar

- **Add Event...** The submenu here lists all event types in the database, grouped by Event Category. Disabled Event Types are those which are not “allowed” to be recorded on the currently selected asset. “Allowable” event definitions are dependant on the asset type of the currently selected asset. (This is configured in *Asset Types*.) The Workpack, Asset and Survey Set for your new event will be filled in to match the event you had selected in the grid before you clicked Add. You can enter survey data for your new event. If you specify a Start Clock or End Clock for which data already exists in the selected Survey Set, you will be shown that data; otherwise, you will be able to type in survey data.

At the top of the Add Event menu you'll see **Hide Unavailable**. If you select this, event types not relevant to the asset type of the currently selected asset will be hidden. If you unselect it, those irrelevant event types will be shown, but disabled. If you have too many event types to fit on your monitor, select Hide Unavailable.

- **Delete** Deletes the currently selected event. Where multiple events are selected, the Delete menu item will delete all selected events.
- **Filter** → **By Workpack ...** From the **Select Workpacks** dialog, check which Workpacks to include in the filter.
- **Filter** → **By Event Type ...** From the **Select Table Definitions** dialog, check which Event Types to include in the filter. If you have no Event Types selected, then all Events will be shown, and no Continuous events will be shown. To view Continuous events, you must explicitly select those event type(s) in the filter.
- **Child Assets** When in the **Down** state, events for the currently selected asset and all sub-assets will be included in the Event Listing. When in the **Up** state, only events that have been recorded on the currently selected asset will appear in the Event Listing.
- **Events** → **Event Reviewed** → **Mark Event as reviewed** Flags the currently selected event as **Reviewed**. The font colour of a reviewed event is blue, events which have not been reviewed are shown in the default colour font (black).
- **Events** → **Event Reviewed** → **Mark Event as reviewed (move next)** Flags the currently selected event as reviewed and changes focus to the next event in the Event Listing.
- **Events** → **Event Reviewed** → **Mark Event as reviewed (with comment)** Flags the currently selected event as reviewed and prompts the user to enter descriptive text into the **Add Signoff** dialog. Reviewed events with comment are identified with a blue callout symbol in Column 6 of the Event Listing grid.
- **Events** → **Event Reviewed** → **Mark Event as not reviewed** This option will only be enabled on an event that has already been Reviewed. Choosing this option will unflag the event as being reviewed.

- **Events** → *Navigate to the event asset* Will change focus in the Asset Hierarchy to the asset on which this event has been recorded. To change back, click on the back arrow in the Assets toolbar (see *Assets Toolbar*).
- **Events** → *Update Start* Will change the start time of the currently selected event to the time displayed in the **Time Source** control in the Assets toolbar.
- **Events** → *Update End* Will change the end time of the currently selected event to the time displayed in the **Time Source** control in the Assets toolbar.
- **Events** → *Toggle Bookmark* Bookmarks are simply flags on an event. Bookmarked events are identified by a green star symbol in column 3 of the Event Listing grid. The use of bookmarks and the workflow around setting and removing bookmarks will differ for each client.
- **Events** → *Match Task* When clicked, the Shortcut will loop through all selected events in the Event Listing. If it finds a matching Task, then the Event is linked to the Task and the Task is deemed completed. The following four criteria must be true for a Task to be matched to an event:
 1. Task.Event does not already have an Event assigned to it
 2. Task.Asset = Event.Asset
 3. Task.Workpack = Event.Workpack
 4. Task.Event Type = Event.Event Type
- **Shortcuts** → *Anomaly Triggers* See *Anomaly Triggers Tool* for a full description of the Anomaly Triggers utility.
- **Shortcuts** → *Change Type* The Change Type tool allows you to to change an Event's type while retaining the link to all associated Survey Data, Multimedia, and manually created Findings. Any auto-generated Findings will be unlinked from the Event, but not deleted.

To use the tool, select the Event or Events to be changed, and click *Shortcuts > Change Type*. Select the new Event Type in the prompt window. Where the Field Names across Event Types match, the data is retained. Where the Field Names do not match, the values are added to the Event Commentary.
- **Connections** See *Connections* for information about the Connections toolbar option.
- **Export** See *Export* for full description of the Summary Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.

6.10 Finding

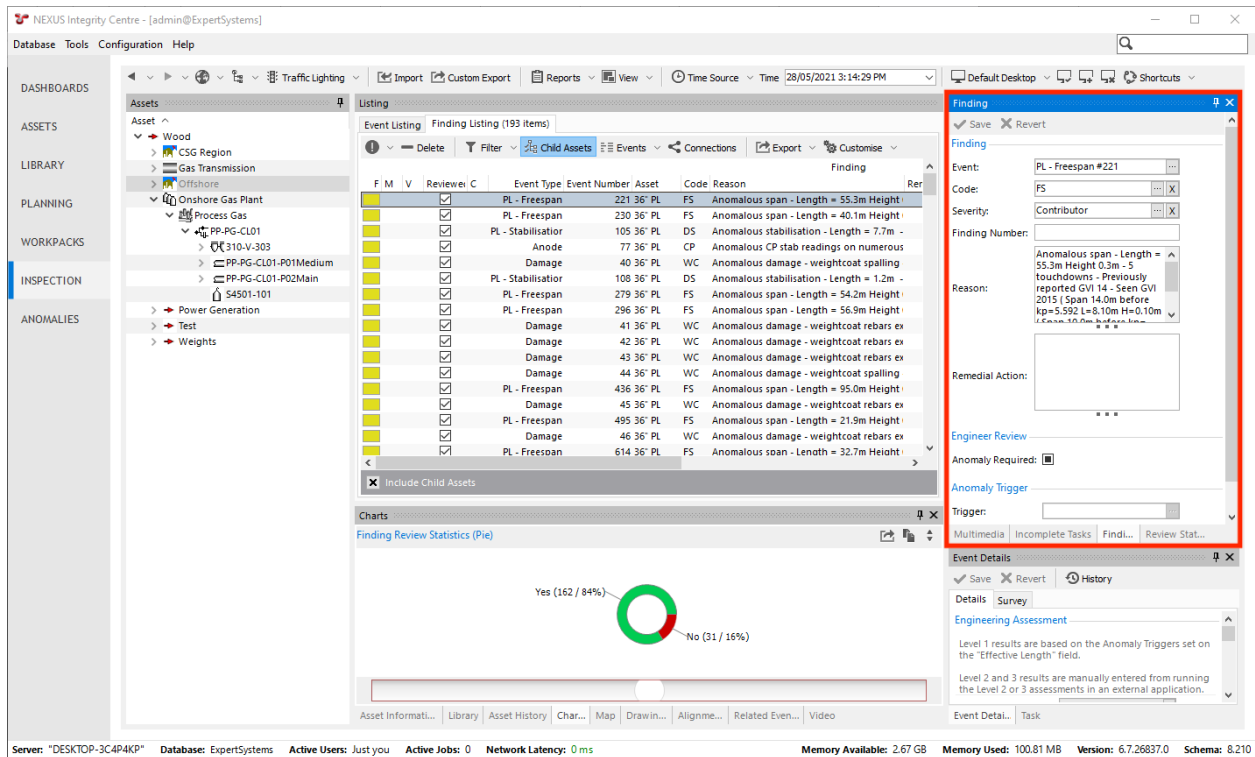
6.10.1 Findings Toolbar

- **Add** Creates a new finding on the currently selected event.
- **Edit** Launches the **Edit Finding** dialog. Properties of the finding can be updated and saved. Additionally, By checking the Anomaly Required checkbox, you can select an Anomaly to link the finding to by clicking on the Ellipsis button.
- **Delete** Delete will delete the currently selected finding record/s. If multiple findings have been selected, then the **Question** dialog will give notice of how many Findings will be deleted and prompt you to confirm by clicking on the **Delete** button.
- **Anomaly** → *Link Anomaly* Launches the Select Anomaly dialog. Select from the existing list of anomalies, or create a new anomaly, then click on **OK** to Link the Anomaly. Note also that you may select multiple findings in this grid and bulk assign an anomaly if required.

- **Anomaly** → **Unlink Anomaly** Will unlink the anomaly from the currently selected Finding. Please note that the Anomaly record itself will not be deleted, it will just be disassociated from the Finding.
- **Anomaly** → **Launch Anomaly** Launches the Edit Anomaly dialog. The Anomaly may be edited and saved by clicking on **OK**.
- **Export** See *Export* for full description of the Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.
- **Connections** See *Connections* for full description of the Connections menu item.

Link Anomaly, Unlink Anomaly and Close Anomaly are Shortcuts. As such, if necessary, they can be debugged using the Shortcut debugger. When you select the menu item, hold down the Control key on the keyboard. After you have given any necessary input (such as selecting an anomaly for **Link Anomaly**) the Debug Shortcut dialog will appear. You can step through shortcut items one at a time, which may help to narrow down any problems.

The Finding pane is only visible when the **Finding Listing** tab is active. The Finding pane displays the properties for the currently selected Finding (multi-select edit is also supported here).



When the **Event Listing** tab is active, then the Finding pane is hidden and the *Findings* pane is shown.

A finding record has a Number, a Code, a Severity ranking, Reason (descriptive text) and Remedial Action (descriptive text). Upon review, if you deem that the Finding should be escalated to an Anomaly, then you should tick the **Anomaly Required** field, and choose an Anomaly from the list and linked to the Finding. If you click the **Add** button on the **Select Anomaly** dialog, the new anomaly will have the asset, code, and various other fields pre-populated for you.

6.10.2 Properties of a Finding

1. **Number** - Optional. For use by users to label Findings.
2. **Event** - The Event which this Finding is connected to.

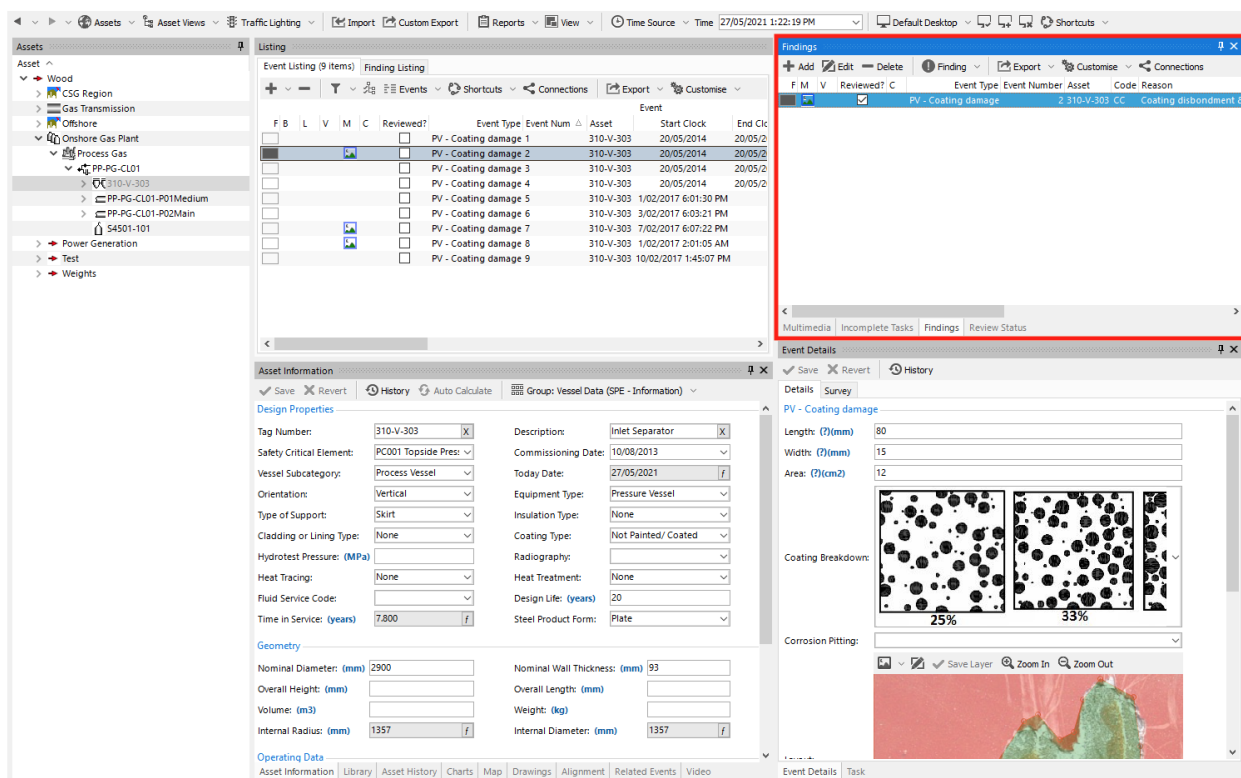
3. **Code** - Code which identifies the type of Finding. These are the same codes that are used to classify Anomalies. Some typical codes may include “CD”, “PD” or “VIB” (Coating Damage, Physical Damage or Vibration); however, anomaly codes are user-definable and can be configured from *Configuration → Anomalies*.
4. **Severity** - Choose from a list of pre-defined Severity Levels. Typical severity levels may include “Level 1 - Contributor”, “Level 2 - Degraded”, “Level 3 - Damaged”, “Level 4 - Danger” and “Level 5 - Extreme Danger”; however, severity levels are user-definable and can be configured from the *Configuration → Anomalies* area. These are the same severities that are used to classify Anomalies. Anomaly severities can also be assigned to Anomaly Triggers.
5. **Reason** - Text field. Size unlimited.
6. **Remedial Action** - Text field. Size unlimited.
7. **Anomaly Required** - Check this box if this Finding should be linked to an Anomaly.
8. **Anomaly** - Anomaly that this Finding is linked to. This field only appears if **Anomaly Required** is checked.
9. **Anomaly Trigger** - If this Finding was automatically generated by an Anomaly Trigger, that trigger is shown here.
10. **Is Auto Generated** - True if this Finding was automatically generated by an Anomaly Trigger.

6.10.3 Report Table Sources

To extract Finding data into a report template, use the System Table titled **Finding** as the primary Table Source, or use the System Tables titled **Event** or **Anomaly** and then add fields from the **Finding** table. For more information see *Report Templates*.

6.11 Findings

The Findings pane displays the finding/s for the currently selected event.



When the **Finding Listing** tab is active, then the **Findings** pane is hidden and the *Finding* pane is shown.

A Finding is the link between an Anomaly and an inspection or survey event. Findings are either escalated and linked to an Anomaly or deemed “insignificant” and remain simply as an observation on the source event.

Findings are automatically created on events when event data meets or exceeds the pre-configured anomaly criteria.

Example: An Anomaly trigger is defined on a CP event, where the CP reading value is outside -800mv and -1200mv, NEXUS IC will automatically create a Finding on that event when the event is created.

Findings will be created automatically when event data is *imported* from Excel.

A finding record has a Number, a Code, a Severity ranking, Reason (descriptive text) and Remedial Action (descriptive text). Upon review, if you deem that the Finding should be escalated to an Anomaly, then you should tick the **Anomaly Required** field, and choose an Anomaly from the list and linked to the Finding. If you click the **Add** button on the **Select Anomaly** dialog, the new anomaly will have the asset, code, and various other fields pre-populated for you.

6.11.1 Properties of a Finding

1. **Number** - Optional. For use by users to label Findings.
2. **Event** - The Event which this Finding is connected to.
3. **Code** - Code which identifies the type of Finding. These are the same codes that are used to classify Anomalies. Some typical codes may include “CD”, “PD” or “VIB” (Coating Damage, Physical Damage or Vibration); however, anomaly codes are user-definable and can be configured from *Configuration* → *Anomalies*.
4. **Severity** - Choose from a list of pre-defined Severity Levels. Typical severity levels may include “Level 1 - Contributor”, “Level 2 - Degraded”, “Level 3 - Damaged”, “Level 4 - Danger” and “Level 5 - Extreme Danger”; however, severity levels are user-definable and can be configured from the *Configuration* → *Anomalies* area. These are the same severities that are used to classify Anomalies. Anomaly severities can also be assigned to Anomaly Triggers.

5. **Reason** - Text field. Size unlimited.
6. **Remedial Action** - Text field. Size unlimited.
7. **Anomaly Required** - Check this box if this Finding should be linked to an Anomaly.
8. **Anomaly** - Anomaly that this Finding is linked to. This field only appears if **Anomaly Required** is checked.
9. **Anomaly Trigger** - If this Finding was automatically generated by an Anomaly Trigger, that trigger is shown here.
10. **Is Auto Generated** - True if this Finding was automatically generated by an Anomaly Trigger.

6.11.2 Report Table Sources

To extract Finding data into a report template, use the System Table titled **Finding** as the primary Table Source, or use the System Tables titled **Event** or **Anomaly** and then add fields from the **Finding** table. For more information see *Report Templates*.

6.11.3 The Findings Toolbar

Refer to section *Findings Toolbar* for full description of the this Toolbar.

6.12 Findings Listing

As with the *Event Listing*, the Findings Listing grid lists all Findings associated with the events based on the currently applied filters. Primary filters are:

- Asset;
- Workpack; and
- Event Type

The number of events in the grid (based on the current filters) is displayed in the Findings Listing tab title.

Tip: The asset hierarchy is pivotal to the **Inspections** screen as all data will be filtered by the currently selected asset. If the **Child Assets** toolbar button is not in the “Down” state, then only events recorded on the selected asset will be shown (e.g. events on child assets will not be listed).

A finding record has a Number, a Code, a Severity ranking, Reason (descriptive text) and Remedial Action (descriptive text). Upon review, if you deem that the Finding should be escalated to an Anomaly, then you should tick the **Anomaly Required** field, and choose an Anomaly from the list and linked to the Finding. If you click the **Add** button on the **Select Anomaly** dialog, the new anomaly will have the asset, code, and various other fields pre-populated for you.

6.12.1 Properties of a Finding

1. **Number** - Optional. For use by users to label Findings.
2. **Event** - The Event which this Finding is connected to.
3. **Code** - Code which identifies the type of Finding. These are the same codes that are used to classify Anomalies. Some typical codes may include “CD”, “PD” or “VIB” (Coating Damage, Physical Damage or Vibration); however, anomaly codes are user-definable and can be configured from *Configuration* → *Anomalies*.

4. **Severity** - Choose from a list of pre-defined Severity Levels. Typical severity levels may include “Level 1 - Contributor”, “Level 2 - Degraded”, “Level 3 - Damaged”, “Level 4 - Danger” and “Level 5 - Extreme Danger”; however, severity levels are user-definable and can be configured from the [Configuration → Anomalies](#) area. These are the same severities that are used to classify Anomalies. Anomaly severities can also be assigned to Anomaly Triggers.
5. **Reason** - Text field. Size unlimited.
6. **Remedial Action** - Text field. Size unlimited.
7. **Anomaly Required** - Check this box if this Finding should be linked to an Anomaly.
8. **Anomaly** - Anomaly that this Finding is linked to. This field only appears if **Anomaly Required** is checked.
9. **Anomaly Trigger** - If this Finding was automatically generated by an Anomaly Trigger, that trigger is shown here.
10. **Is Auto Generated** - True if this Finding was automatically generated by an Anomaly Trigger.

6.12.2 Report Table Sources

To extract Finding data into a report template, use the System Table titled **Finding** as the primary Table Source, or use the System Tables titled **Event** or **Anomaly** and then add fields from the **Finding** table. For more information see [Report Templates](#).

6.12.3 The Grid

By default, the Findings Listing grid displays columns which are common to all Findings. The first three columns in the Findings Listings grid represent:

1. **F** = The status of this finding.
2. **V** = The presence or absence of **Video** for the event recorded at this date/time.
3. **M** = The presence or absence of **Multimedia** for this event
4. **Reviewed** = Ticked if this Finding has been reviewed (and therefore has entries on the [Review Status](#) panel).
5. **C** = The presence or absence of Reviewer **comments** for this event

Right clicking on any of the events in the Findings Listing grid will pop up the **Findings** menu.

Hint: To bulk update (or delete) findings, use the [Multi-Edit](#) functionality.

Tip: The Findings Listing grid performs a check whenever the filtered data set is updated, when it detects there are only events of a single event type, the properties of that event (the event data) will be displayed as additional columns in the Findings Listing grid.

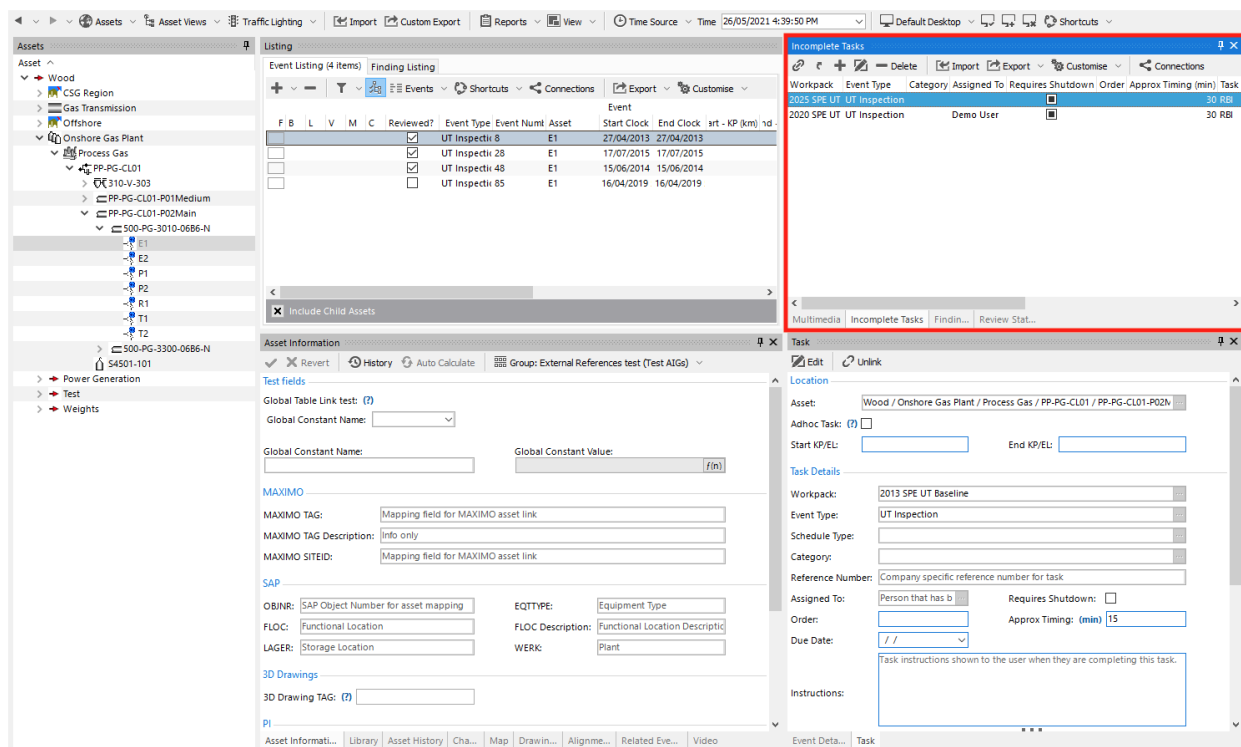
6.12.4 Findings Listing Toolbar

- **Finding → Mark finding as reviewed** Flags the currently selected finding as **Reviewed**. The font colour of a reviewed finding is orange, findings which have not been reviewed are shown in the default colour font (black), or blue, which indicates that the underlying event has been reviewed.

- **Finding** → **Mark finding as reviewed (with comment)** Flags the currently selected finding as reviewed and prompts the user to enter descriptive text into the **Add Signoff** dialog. Reviewed findings with comment are identified with a blue callout symbol in Column 3 of the Findings Listing grid.
- **Finding** → **Mark Finding as not reviewed** This option will only be enabled on an finding that has already been Reviewed. Choosing this option will unflag the finding as being reviewed.
- **Finding** → **Link Anomaly** Launches the **Select Anomaly** dialog. Choose the required Anomaly record from list and click on **OK** to close the dialog and link the anomaly to the Finding.
- **Finding** → **Unlink Anomaly** Will disassociate the linked anomaly from the currently selected finding. Please note that the previously linked Anomaly will not be deleted, and the Finding will remain unchanged (other than not having a linked Anomaly).
- **Finding** → **Launch Anomaly** Where a Finding has been linked to an Anomaly, then the **Launch Anomaly** menu item will launch the Anomaly dialog, displaying the properties of the Anomaly that the Finding is linked to.
- **Delete** Delete will delete the currently selected finding record/s. If multiple findings have been selected, then the Question dialog will give notice of how many Findings will be deleted and prompt you to confirm by clicking on the **Delete** button.
- **Filter** → **By Workpack ...** From the **Select Workpacks** dialog, check which Workpacks to include in the filter.
- **Filter** → **By Event Type ...** From the **Select Table Definitions** dialog, check which Event types to include in the filter.
- **Child Assets** When in the **Down** state, findings for the currently selected asset and all sub-assets will be included in the Findings Listing. When in the **Up** state, only findings that have been recorded on the currently selected asset will appear in the Findings Listing.
- **Events** → **Event Reviewed** → **Mark Event as reviewed** Flags the currently selected event as **Reviewed**. The font colour of a reviewed event is blue, events which have not been reviewed are shown in the default colour font (black).
- **Events** → **Event Reviewed** → **Mark Event as reviewed (move next)** Flags the currently selected event as reviewed and changes focus to the next event in the Event Listing.
- **Events** → **Event Reviewed** → **Mark Event as reviewed (with comment)** Flags the currently selected event as reviewed and prompts the user to enter descriptive text into the **Add Signoff** dialog. Reviewed events with comment are identified with a blue callout symbol in Column 6 of the Event Listing grid.
- **Events** → **Event Reviewed** → **Mark Event as not reviewed** This option will only be enabled on an event that has already been Reviewed. Choosing this option will unflag the event as being reviewed.
- **Events** → **Navigate to the event asset** Will change focus in the Asset Hierarchy to the asset on which this event has been recorded. To change back, click on the back arrow in the Assets toolbar (see [Assets Toolbar](#)).
- **Events** → **Toggle Bookmark** Bookmarks are simply flags on an event. Bookmarked events are identified by a green star symbol in column 3 of the Event Listing grid. The use of bookmarks and the workflow around setting and removing bookmarks will differ for each client.
- **Connections** See [Connections](#) for information about the Connections toolbar option.
- **Export** See [Export](#) for full description of the Summary Export menu item.
- **Customise** See [Customise](#) for full description of the Customise menu item.

6.13 Incomplete Tasks

The Incomplete Tasks pane lists all tasks for the currently selected asset which have not been flagged as completed.



A Task will be marked as completed under the following circumstances:

1. When an event is created directly from the Task in the data acquisition software **IC Inspection**.
2. When the task is launched from the **Incomplete Tasks** pane in the INSPECTIONS area.
3. When the Incomplete Task is manually **Linked** to an existing event from the **Incomplete Tasks** pane in the INSPECTIONS area.

6.13.1 Report Table Sources

To extract task data into a report template, use the System Table titled **Task** as the primary Table Source. For more information see [Report Templates](#).

6.13.2 Incomplete Tasks Toolbar

- **Link** This menu option will link the currently selected event in the **Event Listings** pane to the currently selected Task in the **Incomplete Tasks** pane. When clicked, the task will be linked to the event, flagged as completed and no longer shown in the **Incomplete Tasks** window. Please note that the event type of the event and the event type of the task need not necessarily match for them to be linked together.
- **Launch** Launches the event form for the currently selected task. Once the details in the event form have been completed and saved, the task will be linked to the event, flagged as completed and no longer shown in the **Incomplete Tasks** window.
- **Add, Edit, Delete:** *Add / Edit / Delete* task(s).
- **Import** See [Import](#) for full description of the Import menu item.
- **Export** See [Export](#) for full description of the Export menu item.
- **Customise** See [Customise](#) for full description of the Customise menu item.

- **Connections** See *Connections* for information about the Connections toolbar option.

6.14 Library

Library items are shown in this panel based on the Event selected in the *Event Listing*.

If you have events in the event listing, and you select one, then library items associated with the

- Event
- Event Type of the selected event
- Workpack of the selected event
- Asset of the selected event

will be shown in the list of library items.

6.14.1 Library Items

Library Items are electronic documents which can be linked (via *Connections*) to data and data types in NEXUS IC.

Library Type	Name	Description	Document No	Revision	Reference Date	Physical Location	Hyperlink
Photographs and negatives	Onshore LNG Aerial Photo	Onshore LNG Plant	N/A	N/A			
Photographs and negatives	test						https://icwe
Photographs and negatives	Welcome	Splash screen for welcome page					

The electronic documents can be uploaded directly into the NEXUS IC database, or can be referenced via URL or UNC paths.

Here are some examples of valid URL and UNC paths:

1. <https://www.youtube.com/watch?v=oHg5SJYRHA0>
2. \\example.com\groups\eng\this_doc.docx

Caution: Mapped drives - If you define a mapped drive as a hyperlink location (for example H:\Working\document.docx, then you must be certain that the drive letter H:\ is mapped for every other potential NEXUS IC user. In lieu of mapped drives, it is recommended that you use UNC paths for network drive locations.

The **Library** functionality is available from multiple screens and dialogs in NEXUS IC including:

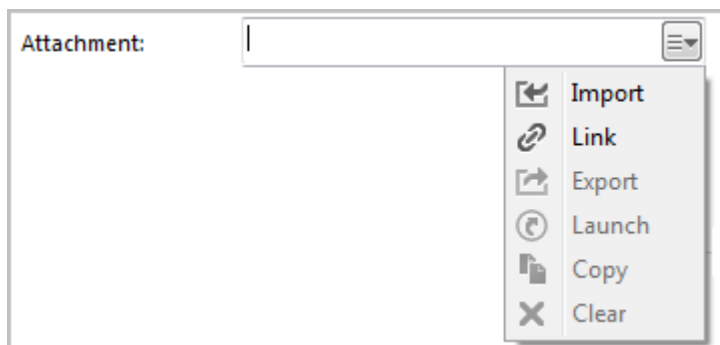
1. *ASSETS*
2. *LIBRARY*
3. *INSPECTION*
4. *ANOMALIES*
5. *Configuration* → *General* → *Functions* → *Edit Function Definition*
6. *Configuration* → *Assets* → *Types*
7. *Configuration* → *Events* → *Event Types* → *Edit Table Information*

Note: Example - Upload company Piping specifications to the NEXUS IC Library and assign to the Asset Type “Pipework”. This will make the Piping Specifications available from the ASSETS | Library screen whenever the active asset is of type “Pipework”.

6.14.2 Library Items Toolbar

The **Library** toolbar button allows the user to add, edit and delete Library Items.

- **Add** The **Add** menu item allows you to add a new Library item. Depending on what screen is active, the **Add** drop down menu will provide connection type options. Enter the **Name** of the Library item and any other relevant document information (Revision, Date, Document Reference etc). If the document is to be uploaded into NEXUS IC, then click on the **Attachment** button, else enter a **Hyperlink** location.



When adding an item, you can either **Import** or **Link** it. If you Import, the item will be brought into the database. If you subsequently change the original on disk, the item in the database will not change to match. If you Link the item, then when you change the original on disk, the next time you view the item within NEXUS IC, you *will* see the updated item.

Note: NEXUS IC will still load a copy of a Linked item into the NEXUS database — this is so that if the original is unavailable (for example, because you are away from your network), NEXUS IC can display the cached copy. When you view the item, if the original has been updated, we also update the database cached copy. You can’t Link items that are on your local hard disk — only items on network drives can be Linked. The Link feature is designed to keep you up to date with items that may have been changed by others, and that can’t happen on your local drive.

Hint: You can also add multimedia by dragging image files from Windows Explorer onto the Library Items pane. If you drag/drop one file, you will be given the Add Library dialog, and clicking Cancel will cancel the add. If you drag/drop multiple files, they will be added, and then multi-selected in the grid. You can then click Edit to *multi-edit* them. Drag-drop will **Import** items, not **Link** them.

- **Edit** The **Edit** menu item allows you to edit the properties of the currently selected Library Item (not the document itself).
- **Delete** Deletes the currently selected Library Item.

Note: Deleting a Library Item will delete all the connections of that Library Item.

- **Launch** Launches the Library item on the local machine. Note that by default NEXUS will only launch files with the following extensions: doc, docx, xls, xlsx, jpg, png, jpeg, bmp, tiff, gif, mpg, mp3, wav, ppt, pptx, txt, pdf, emf, zip, dwg, avi, rtf, mp4, csv.

Hint: Use the Space Bar on your keyboard to launch the currently selected Library item.

Note: If the local machine does not have an associated viewer for the document type (eg. AutoCad viewer for DWG type), then the document can not be launched.

- **Email Attachment** This option will launch a new email message and attach the associated Library Item to it. Note that Email account properties need to be set up for this option to function.
- **Import**

See [Import](#) for detailed information on the Import Wizard. The MS Excel Import Template details the required format for importing Library Items.

You can also import the *Connections* in the same import as the Library items, so in addition to the Library Import columns, you can additionally define the Connection information using the following column headings:

- Library Connection.Connect To
- Library Connection.Workpack
- Library Connection.Asset Type
- Library Connection.Asset
- Library Connection.Event Type
- Library Connection.Event
- Library Connection.Anomaly
- Library Connection.Risk Model
- Library Connection.Function

Note that the *Connect To* column should only contain one of the following text items:

- Anomaly
- Asset
- Asset Type
- Event
- Event Type
- Function
- Risk Model
- Workpack

- **Export** See [Export](#) for information about exporting Library Items. Please note that this option will only export the contents of the grid, not the Library Items themselves.
- **Customise** See [Customise](#) for information about the Customise toolbar option.
- **Connections** See [Connections](#) for information about the Connections toolbar option.

Double-click

The first time you double-click on a library item, NEXUS will ask you what action to take: you can either Launch the Library item in an external editor, or Edit the Library item. If you would like your choice to become permanent, tick the “Always do this” box. Note that if you hold down the **Alt** key while double-clicking, you will be asked again.

6.15 Map

The Map pane shows you the events in the *Event Listing* on a two-dimensional map, based on their Easting and Northing. Each event is a dot, coloured with the Event Type’s colour. (You can set the colour for each event in *Event Types*.)

The Map pane will only show event data included in your filters (workpacks, event types, column-specific filters, etc). If the events you are interested in are Continuous Event data (such as cross-profiles), ensure that you select that Continuous Event in your event type filter.

At the bottom or right of the map is the legend. If you hover the mouse over an item on the legend, other series on the Map will fade out temporarily. If you click an item on the legend, that series will be toggled on/off. If you export the Map (see below), only series currently visible will be exported.

6.15.1 Zooming

You can zoom in or out by clicking in the map area and (with the mouse cursor still inside the map area) spinning the mouse wheel. You can also control zoom with toolbar buttons Zoom In, Zoom Out, and Reset Zoom.

6.15.2 Maps Toolbar

- **Zoom In** Zoom in.
- **Zoom Out** Zoom out.
- **Reset Zoom** Resets the zoom so that all data points are visible.
- **Copy** Use this button to copy the Map, as currently displayed, to the clipboard.
- **Legend** Use this button to show the legend of the events on the map, the legend includes the Event Types that are selected and the Layers which their opacity has been set to anything above 0%. Layers and Event Types can be switched off by clicking on the layer or event on the legend.
- **Layers** OpenStreetMap, ESRI World Imagery, ESRI World Hillshade, ESRI World Topographic, ESRI Ocean Base Map and ESRI Street Map are free to use on the web. Each of these layers has an opacity drop down list to be selected from 0% to 100%. If 0% is selected for any of the layers, it will not be included in the map legend.
- **Event Types** Use this button to select what event types are displayed. This is more persistent than clicking/unclicking series on the map legend.
- **Inspection Track** Selecting a workpack from this menu will result in a line on the map connecting events in the order they were logged. If the events were logged by a single ROV (or a single human inspector), this track will show the path that the ROV (or inspector) took.
- **Configure** Specify the sources of the various fields used by the Map tab to display pipeline baseline data and map data. “As Built - Easting”, “As Built - Northing” and “As Built - Order” should all point to the same table — this is the table used to supply the pipeline baseline track. Typically you would point these three fields at a sub-AIG. If you don’t configure these, no as-built track will be displayed. If your pipeline has

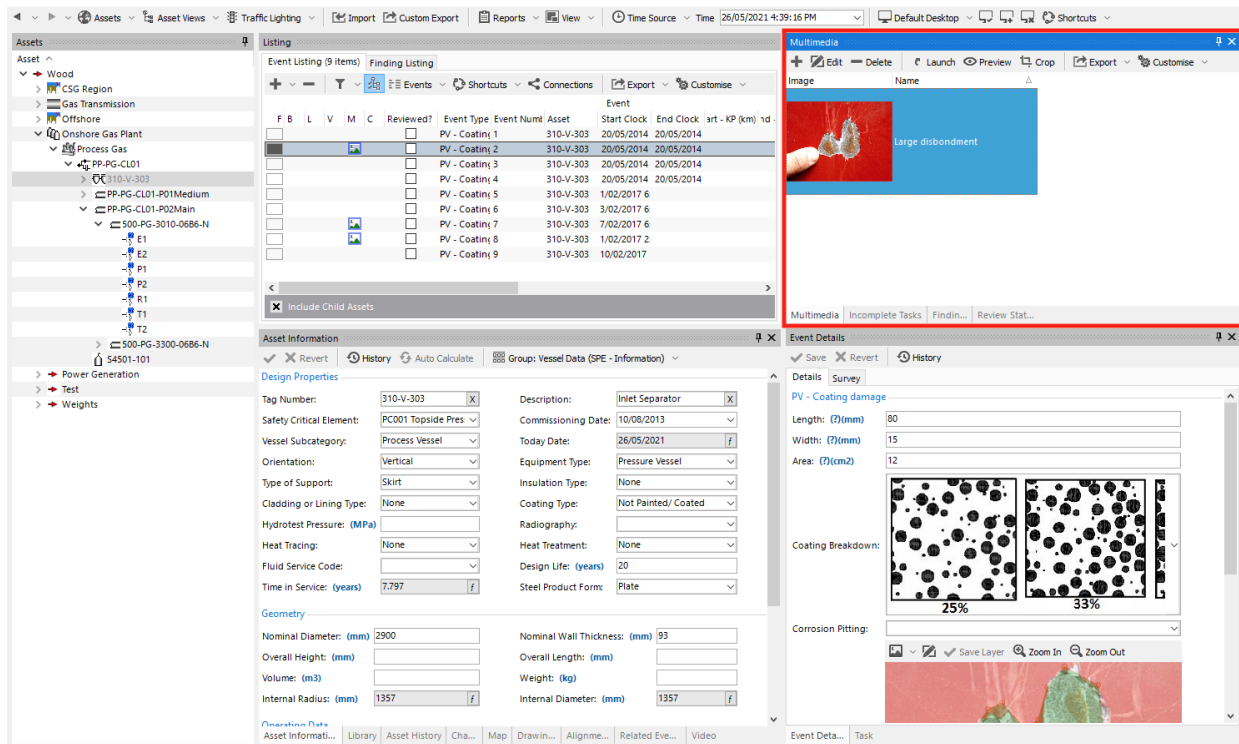
many events on it, not showing an as-built may be OK — users may be able to get a sense of the pipeline track from the events on it. “Coordinates - Datum” and “Coordinates - UTM Zone” should point to fields that provide these values. Typically they will be in an AIG — only one datum and one UTM Zone are necessary for an entire asset. Ask your surveyors for the values that you should fill in to these fields.

- **Export Image** Click this button to save the Map to an image file.

6.16 Multimedia

Multimedia are electronic images which have been uploaded against an event.

Multimedia items are displayed as thumbnails for the currently selected event(s).



Note: You can add multimedia by dragging image files from Windows Explorer onto the Multimedia pane.

6.16.1 Multimedia Toolbar


Multimedia File Formats

GIF, JPG, JPEG, TIF, BMP, PNG, PDF, DWG, CGM, DXF, SVG, WMF or EMF are all allowed Multimedia file types.

- **Add** Launches the **Add Multimedia** dialog to allow you to attach an image to the currently selected event. Please note that if multiple events are selected, then the image being added will be attached to all events.

Note: You can also add multimedia by dragging image files from Windows Explorer onto the Multimedia pane.

Note: The **Can Report** property of the Multimedia item can be used to filter which images are output to the report. (This column is invisible by default, but is available under *Customise* → *Columns*.)

- **Edit** Launches the **Edit Multimedia** dialog. Properties of the Multimedia can be updated and saved.
- **Delete** Delete will delete the currently selected multimedia record/s. If multiple Multimedia items have been selected, then the **Question** dialog will give notice of how many Multimedia items will be deleted and prompt you to confirm by clicking on the **Delete** button.
- **Launch** Launches the currently selected Multimedia file into the default Windows viewer for the selected file type. (Note that if your image viewer supplies “Next” and “Previous” buttons, these will show you the next and previous files in the temp folder, which may not be the next and previous images in NEXUS.)
- **Preview** Toggle display of preview. If this button is selected, then whichever image is focused in the grid will be shown in a “preview” window. If EXIF data is available for the image, it will be displayed.
- **Crop** Crop the selected image. Within the Crop dialog, click the **Crop** button or Ctrl-X, then click and drag a rectangle on the image. To complete the crop, click the  button, or **Crop To Selection**, or Ctrl-Shift-X.

If you want to replace the existing image with the new cropped version, ensure **Keep Original** is not selected. If you want the new cropped image to be added to the event’s collection of images without overwriting the existing image, ensure **Keep Original** is selected.

- **Export** See *Export* for full description of the Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.

6.17 Related Events

Related Events shows you events that are of the same Event Type, are from a different Workpack, and have a start/end KP that overlaps with the start/end KP of the event currently selected in the *Event Listing*.

If you click the Navigate Event button, the event selected here in Related Events will be selected in the Event Listing.

6.18 Review Status

When an event or finding has been reviewed (e.g. via the *Event Listing Toolbar*), the review details are shown in the **Review Status** pane.

For an event that has been marked as reviewed via *Events* → *Event Reviewed* → *Mark Event as reviewed*, this will be the name(s) of users who have marked the event as reviewed. For an event that has been marked as reviewed via *Events* → *Event Reviewed* → *Mark Event as reviewed (with comment)*, this will be the name(s) of users who have marked the event as reviewed, and the comment they gave.

If you have selected multiple events in the *Event Listing* pane, reviews for all of them will be shown here.

Similarly for findings in the *Findings Listing*: the list shows reviewer(s) and their comments; and if you select multiple findings, all relevant reviews will be shown here.

You can add, edit or delete reviews from here. If you Add, and multiple events are selected in *Event Listing*, a review will be added to each. This is useful for marking numerous events as reviewed at once.

6.18.1 Report Table Sources

To extract review data into a report template, use the System tables titled **Event Review** and **Finding Review** as the primary Table Source. For more information see *Report Templates*.

6.19 Event Import

The *INSPECTION* → *Import* functionality gives the user the ability to bulk import events.

The format of the Excel workbook needs to be very specific. It is recommended you use the **Example** button on the first page of the Import wizard to generate the workbook in the correct format for importing data.

Finding trigger checks are run on each event during the import process, or whenever an event is edited, or the *Anomaly Triggers Tool* is run from the Event Listing. Please note that the Anomaly Trigger tool is only run on the filtered list of events in the grid and should only be run if Anomaly Trigger limits have changed. During the check:

If it fails (meaning data is outside of defined triggers), then it will create a new finding. We first match on the following to see if the finding already exists. It matches on:

1. Anomaly Trigger rule (Bound_ID)
2. Is Auto Generated = true

In other words, if there is no finding already created from this trigger for this event, NEXUS will create a finding.

Note: If you do not specify a *Survey Set* for event survey data to be imported into, it will be imported into Raw Survey Data, which is the default set. If two different events have the same date/time, the second one imported will overwrite the survey values of the first. To avoid this, don't have two different events in the same survey set at the same time with different survey data.

Caution: When creating a new event, Event.Start Clock must be earlier in time than Event.End Clock for the import to succeed.

6.19.1 The Import Wizard

1. **Import Filename** - Navigate to the file which has been prepared for import. Compatible filetypes include .zip, .xlsx (Excel), .csv, and .txt. Zip files will contain the xlsx/csv/txt file plus any additional files, eg. multimedia images or electronic documents for importing into the library. You can tick the checkbox next to **Skip Blank Cells** to stop the importer from overwriting existing data with empty cell data. If it is left unchecked, and the import document contains fields with empty cells, those fields in the database will be overwritten with empty or null data, or be given a default value determined by NEXUS IC.

Tip

For very large imports, saving your Excel file as a .csv and then importing from the .csv may be faster.

2. **Configure Import** - If you would like to make changes to the Destination fields or elect to ignore some fields, then click on the column heading titled **Field:** and choose from the options presented in the pop up menu. Finally, ensure

that the correct Asset View is selected from the **Required Fields** selection box and that the number of **Header Rows** and worksheet are correct (by default this will be 1 or 2 rows). Note that if the field type is set to change for an existing field, the import will abort as data loss may occur.

3. **Test Import** - A test is run on the selected file, testing the import for errors. If the test is successful, you may proceed to submit the import job. If the test produced errors, you must rectify the errors in the import file and start the import wizard again. There are some niche edge cases where errors will not be reported during the test, however, generally the test import provides a good indication of whether the import will succeed.

Note

When importing inspection event data, anomaly triggers are checked during the import and findings created automatically from data which falls outside the data bounds.

4. **Submission** - If using a SaaS client, the import job is offloaded to the SaaS server and is started remotely. It is then possible to close the current NEXUS IC session while the active import job continues. If using a non-SaaS client, the import job is executed in the current NEXUS IC session and you may continue using NEXUS IC. Closing the current NEXUS IC session will cancel the active import job. In both cases, the UI will refresh intermittently throughout the import, and there will be delays between the import finishing and final refresh as NEXUS IC does not directly monitor changes. Jobs are visible in the *Job Management Console*, which records the status and history of all import jobs.

5. **Import Details** - The import job banner at the bottom of the window will contain a dropdown menu with the option to dismiss or show details. Clicking 'Details' will show a window that summarises the import, advising the user how many rows have been added to various forms/tables. It is important that you scrutinise this summary to ensure that the import has performed the actions that you expected. What is important to take note of is the total rows for a specific item; i.e. add together the number added and updated and make sure that is equal to the number you expect. If you have multiple rows in your import sheet that update the same row, these rows will be counted by the test import individually, whereas the final import statistics will only show 1 updated row. There is the option to save the summary to file.

Tip: If the importer encounters a completely blank row in an Excel file, it will stop importing at that point, even if there are non-blank rows further down. This can provide an easy way to test an import sheet: set it up, and then after just one or two rows of data, insert a blank. Run the import to see if it's doing what you expect, and if so, delete the blank and run again. Similarly, if the importer encounters a blank column in an Excel file, columns to the right of this will not be imported.

Tip: You can have one 'Asset Location.Full Location' column, with levels in the asset hierarchy separated by space slash space, like 'My Field / My Platform / My Member', or many 'Asset Location.Full Location' columns, with one asset hierarchy level in each. (But you can't mix the two, with one containing 'My Field / My Platform' and a second containing 'My Member'.)

6.19.2 Sub-rows

Sometimes a single “master” row will have several “detail” rows. For example, an asset information row might have several sub-AIG rows; or an event might have several findings or several multimedia images or both. When this occurs, you should repeat the row, with different “detail” values in each.

For example, if you have several multimedia images to import against a single event, your Excel sheet should have several rows that are identical except for the `Multimedia.Name` and `Multimedia.Image` columns. If you have specified an event number, and you use the same event number on each row, NEXUS will only create the event once, but will create several multimedia items. (If you do not specify an event number, NEXUS will instead create several different events with one multimedia item each.)

Tip

You can find the next available event number for a given event type by creating an event of that type using [Add Event](#), noting the event number, then deleting that event. If you want next available event numbers for several event types, create a report template with a Simple Source on table Event and a Pivot Table with a pivot row on Event Type and a value field on Event Number with aggregate Max. Then add 1.

It is also acceptable to leave event fields blank for all except the last row — under the hood, NEXUS is importing each Excel row into the event, and only the last Excel row imported will “stick”. Note that if your event has a finding, you should *not* repeat the finding data on each event row — if you do, NEXUS will create one finding for each Excel row that has finding data filled in.

In some cases you *do* want multiple findings on one event, and in that case you should fill in several rows as appropriate. Similarly for sub-event data or sub-AIG data: if you want several different sub-events or sub-AIG rows imported, you should repeat the event row or AIG row with different sub-event or sub-AIG data in each case. If you are repeating an Excel row for another reason and you do *not* want several sub-event or sub-AIG rows imported, you should fill in sub-event or sub-AIG data in only one of the Excel rows.

6.19.3 Excel

During an import, we communicate with Excel “behind the scenes”: we command Excel to open the file you want to import, and ask Excel what’s in each cell. An upshot of this is that if you use Excel to modify the file while we’re importing it, even if you don’t hit Save, you may confuse the import process. Similarly if you take a variety of other actions: using Save As, closing Excel, etc. If you see error text “Call was rejected by callee”, this is what’s happened: Excel has stopped answering our calls.

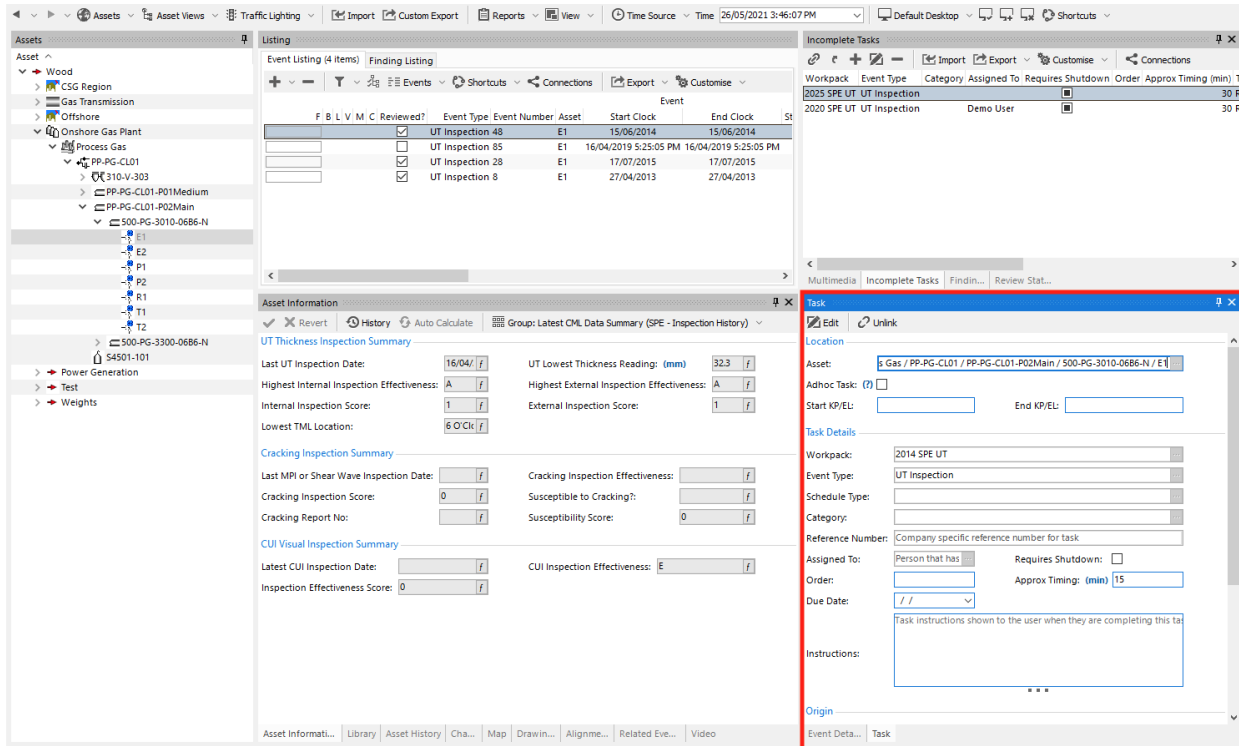
Note: It is possible to create new Asset Hierarchies by importing Assets with hierarchy structures that don’t already exist. In doing so, new Parent Assets will be created. In case this is not the desired result, the **Test Import** will throw a warning, for example:

Line x: Parent Asset “Example Parent” will be created for the location “Wood / Example Parent / 00C-2401A”

“xx new Parent Asset(s) will be added.”

6.20 Task

When an event has been linked to a [Task](#), the details of the originating task are shown in the **Task** pane.



6.20.1 Report Table Sources

To extract task data into a report template, use the System Table titled **Task** as the primary Table Source. For more information see *Report Templates*.

6.21 Video

6.21.1 How does video playback work?

The electronic video files (wmv, mp4 etc.) are stored in one or more sub-folders under a network share location called the **Global Video Path**. Video files are NOT stored in the NEXUS database.

If you are working in a subscriber database or are otherwise working with video that has not yet been uploaded to the Global Video Path, you can configure the **Temporary Inspection Video Path** to point to these video files.

When new files are added under the **Global Video Path** or **Temporary Inspection Video Path** (usually after a subsea or drone inspection has taken place), these need to be re-parsed by NEXUS. You can do this by clicking on *Tools* → *Parse Video*. (Already-parsed video will not be re-parsed.)

When video is parsed, NEXUS incrementally searches all folders under the **Global Video Path** and/or **Temporary Inspection Video Path** (if configured), searching for valid video files. As each file is found, NEXUS extracts the key information from each video file and stores that key information in the database. Key information includes:

- **Date-time** – This is then compared with Events to determine which Events contain video.
- **ROV name** – This is extracted from the video file name (eg. “Tiger”), allowing video to be sorted by *ROV*.
- **Channel name** – This is extracted from the video file name (eg. “Centre”, “Port”, “Starboard”), allowing video to be sorted.

- **Video attributes** – size, duration, and other data about the video file.

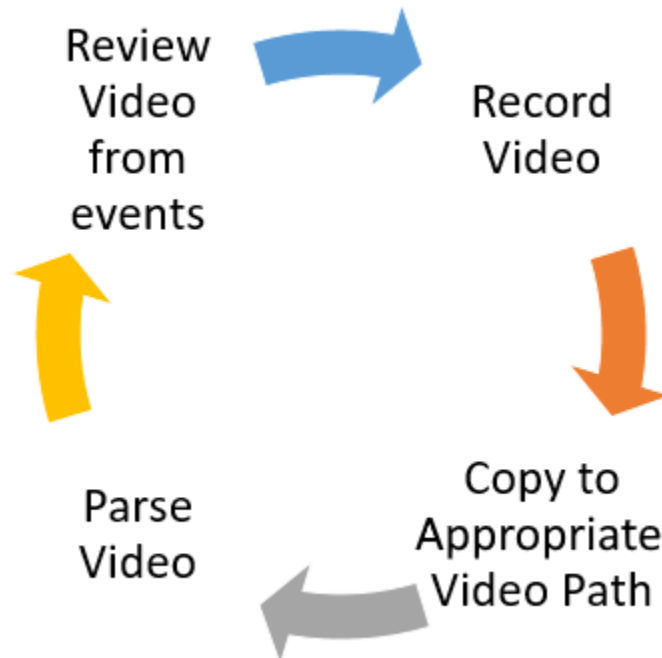
For example, a video file with the name:

```
2019-01-01 123456 - Port - [MINI ROV].wmv
```

will set the date and time to 12:34AM (and 56 seconds) on the 1st of January 2019, the channel to ‘Port’ and the ROV to ‘MINI ROV’. If the ROV name does not exist in the database, the ROV will be left empty when the video is parsed.

Now that NEXUS “knows” about the video files, it can determine which inspection events have associated video and allows the user to play the *Video* from the INSPECTION screen.

When you select an event with video, NEXUS will automatically play the relevant part of the inspection video based on the Event start and end times and the ROV name. If the video files and the event both have no ROV set, video will play. If either the video files or the event has a ROV set, both must have the same ROV to be considered a match.



Troubleshooting

When I play video for an event, multiple copies of a single video channel appear

This is likely because you have multiple copies of that file in one or the other or both video paths. For example if your Global Video Path contained Folder1\Video1.wmv and Folder2\Video1.wmv (i.e. two copies of the same file), or there is one copy of Video1.wmv in the Global Video Path and another in the Temporary Inspection Video Path, NEXUS will identify “both” files as being appropriate for the time range covered by that event, and will therefore display both.

Remedy: Find and remove duplicates. The Windows Explorer search feature might help.

The Video icon does not show against events that I know have video

Remember that you need to wait for video to be copied from your recorders to your network (where required) and then *Parse Video*.

Remedy: *Tools* → *Parse Video*. And *Tools* → *Video...* may be a useful place to look to check NEXUS' opinion of what video files it knows about, and whether or not they parsed successfully.

A video does not play on my machine, but does on another machine

This is likely a codec issue. NEXUS asks Windows Media to play the video within NEXUS' video frame. Windows Media will only play video it understands. Note that many video file extensions are envelopes that can contain videos of a variety of formats: just because your PC can play one .avi file does not necessarily mean it can play another.

Remedy: install appropriate codec. Use [GSpot](#), which despite its name is a long-standing reliable tool for checking codec details for a particular file. Run it on both a machine where the video file does play and a machine where the video file doesn't play, if possible. Drag the video file into GSpot in each case. Click the '1' and '2' buttons near the bottom and compare output. (There are more than one set of '1' and '2' buttons — they're all worth trying and comparing.) This may help you figure out which codec is required. If not, the [Shark Codec pack](#) is worth a try.

What's with the audio?

NEXUS lets you choose which channels to play audio for. This is handy if multiple channels have identical audio recorded, but are played back slightly out of sync. (If the filename specifies start time only down to the nearest second, two files could easily play 0.9 seconds out of sync.) But it also gives you the power to disable audio from all channels, or disable audio from all channels that have audio recorded on them.

Remedy: If you have too many channels playing audio, turn off audio for all but one using the Video pane's **Channels** menu button, or by clicking the speaker icon on each channel to mute/unmute. If you have no audio, ensure that audio is turned on in the Video pane. Try unplugging and replugging your headset or external speakers if appropriate, as sometimes this persuades Windows to route audio more correctly. Check volume controls under the Windows system tray at bottom right of your screen. Play audio from some other piece of software (Windows Media Player, youtube, etc.) to verify whether the problem is with the PC or with NEXUS.

Filename formats

Here are filename formats that NEXUS IC will parse:

- yyyy-mm-dd hhmmss - Channel Name.extension
- yyyy-mm-dd hhmmss - Channel Name - Ignored Text.extension
- yyyy-mm-dd hhmmss - Channel Name - [ROV Name].extension
- yyyy-mm-dd hhmmss - Channel Name - Optional Ignored Text[ROV Name]Optional Ignored Text.extension
- dd-mm-yyyy hhmmss - Channel Name.extension
- dd-mm-yyyy hhmmss - Channel Name - Ignored Text.extension
- dd-mm-yyyy hhmmss - Channel Name - [ROV Name].extension
- dd-mm-yyyy hhmmss - Channel Name - Optional Ignored Text[ROV Name]Optional Ignored Text.extension

VisualSoft style:

- yyyyymmddhhmmss.extension
- yyyyymmddhhmmss@Channel Name.extension
- Ignored Text_yyyyymmddhhmmss.extension
- Ignored Text_yyyyymmddhhmmss@Channel Name.extension

The above formats may contain additional text or digits after the 'ss', which will be ignored.

- Recorded on yyyy-mm-dd at hhmmss with Channel Name.extension

PKT style:

- Ignored Text_yy-mm-dd_hh-mm-ss_z.extension
- Ignored Text_Channel Name~Ignored Text_yy-mm-dd_hh-mm-ss_z.extension
- Ignored Text~Ignored Text_Channel Name~Ignored Text_yy-mm-dd_hh-mm-ss_z.extension

In the above three formats, the '_z' must be present, but 'z' represents a single character which will be ignored.

- Ignored Textyyyy-mm-dd hhmmssIgnored Text.extension
- Ignored Textyyyy-mm-dd_hhmmssIgnored Text.extension
- Ignored Textyyyy-mm-ddThhmmssIgnored Text.extension
- Ignored Textyyyy-mm-dd hhmmIgnored Text.extension
- Ignored Textyyyy-mm-dd_hhmmIgnored Text.extension
- Ignored Textyyyy-mm-ddThhmmIgnored Text.extension
- Ignored Textyyyymmddhhmmss_Channel Name.extension
- Ignored Textyy-mm-dd hh.mm.ss.extension
- Ignored Textyy-mm-dd hh.mm.ss_Channel Name.extension
- Ignored Textyyyy-mm-dd hh.mm.ss_Channel Name.extension

ROV-first style:

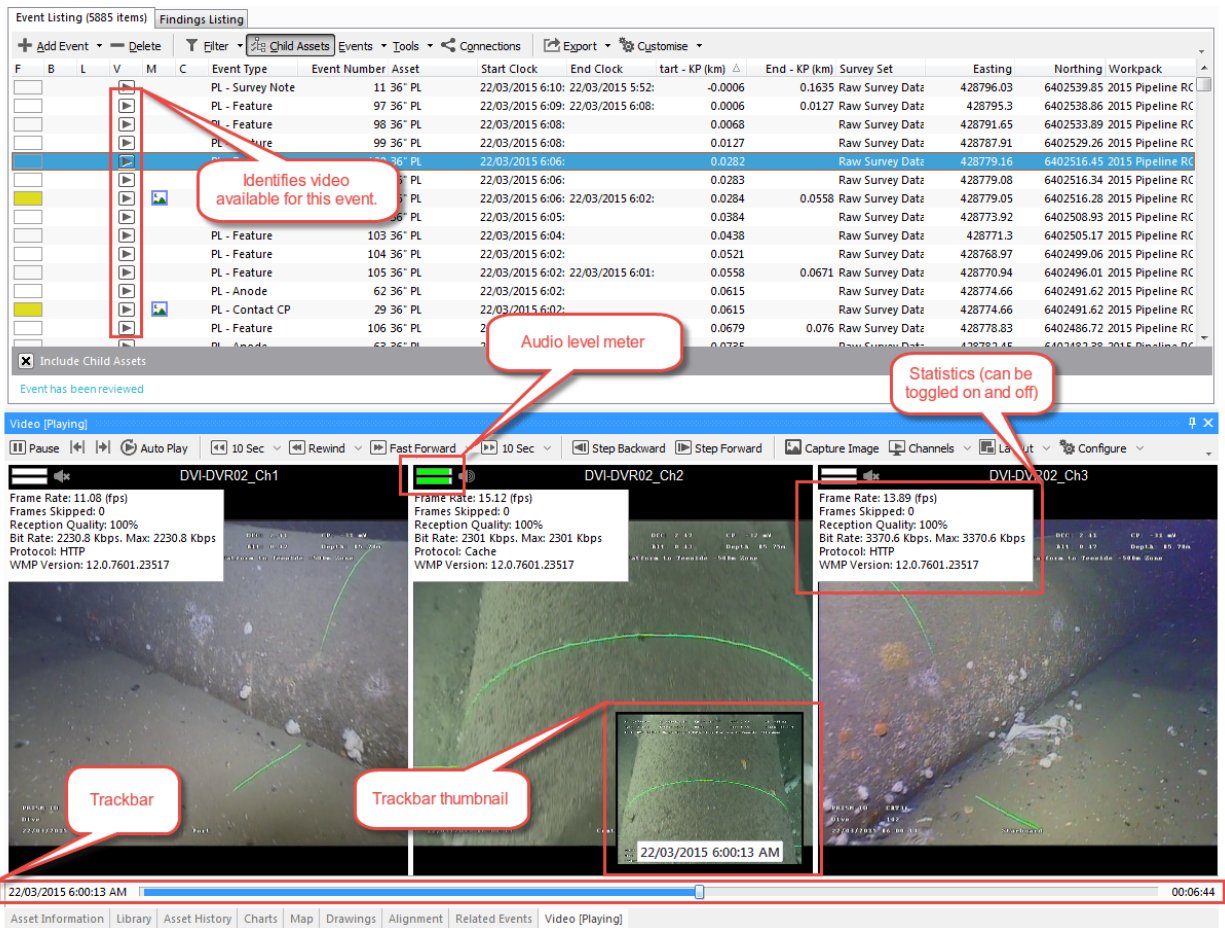
- ROV Name_Optional Ignored Textdd-mm-yyyy hh-mm-ss.extension
- ROV Name_Optional Ignored Textyyyymmdd-hhmmss.extension

File name formats that do not include a channel name are assigned to the channel "Digital Video".

The ROV Name, if present, must be enclosed in square brackets. Any "Ignored Text" above may contain such a ROV Name.

The Video window allows playback of centrally stored video which is linked via datetime stamp from the currently selected event.


Events with associated video are identified with a small play icon in the Event Listing window as shown here:



Tip: If you are experiencing degradation of video quality due to frame dropouts caused by insufficient bandwidth, then disable one or more channels.

6.21.2 Video Toolbar

- **Play/Pause** Starts playback at the current point in time. The video can be paused by pressing this button again.
- **Play from Event Start time** Plays video for the event selected in the Event Listing.
- **Play from Event End time** Plays video for the event selected in the Event Listing, starting at that event's End Clock.
- **Auto Play** The Auto Play toolbar button has two states, Up and Down. When Up, you will be required to click on the Play Event or Play toolbar buttons to start video playback. When Down, then video playback will automatically start when an event becomes active in the Event Listing.
- **Leap Backwards** Steps back in the video by the selected timeframe. Choose the timeframe from 1 second, 5 seconds, 10 seconds, 30 seconds, 1 minute or 5 minutes from the sub menu.
- **Rewind** Rewinds the video with preview using the selected speed. Choose the speed from -1 x, -1.5 x, -2 x, -2.5 x, -3 x, -4 x and -8 x from the sub menu. Depending on how the video has been encoded, some speeds may not be available. When the desired position is reached, the video can be played by pressing the Play button. (You can also set fast forward/rewind speed by putting the mouse cursor over the video window and using the mouse wheel.)

- **Fast Forward** Fast forwards the video with preview using the selected speed. Choose the speed from 1.5 x, 2 x, 2.5 x, 3 x, 3.5 x, 4 x and 8 x from the sub menu. Depending on how the video has been encoded, some speeds may not be available. When the desired position is reached, the video can be played by pressing the Play button. (You can also set fast forward/rewind speed by putting the mouse cursor over the video window and using the mouse wheel.)
- **Leap Forward** Steps forward in the video by the selected timeframe. Choose the timeframe from 1 second, 5 seconds, 10 seconds, 30 seconds, 1 minute or 5 minutes from the sub menu.
- **Step Backward** Steps backward in the video by one frame. Depending on how the video has been encoded, this button may step the video back to the previous key frame, which might be several seconds back.
- **Step Forward** Steps forward in the video by one frame.
- **Capture Image** Captures an image from each of the playing video channels and attaches it/them to the currently selected event as a multimedia item. Multimedia can be viewed from the *Multimedia* pane. Within the Capture Image dialog, you can select/unselect and crop images. To crop, click the **Crop** button or Ctrl-X, then click and drag a rectangle on the image. To complete the crop, click the  button, or **Crop To Selection**, or Ctrl-Shift-X.
- **Channels** Where multiple channels of video exist for a selected event, they will be listed in this sub menu. For each channel you may enable/disable the Video and/or Audio. To disable the audio or video, uncheck the video or audio from the sub menu. You can also enable/disable audio each channel's audio by clicking the speaker icon next to the audio level meter.
- **Layout** → **Automatic** This option will automatically size and position the channels (minimising unused space) based on the size and proportions of the video pane.

Tip: Note that the Video pane can be undocked, resized and placed outside of the NEXUS application, on another monitor for example.

- **Layout** → **Horizontal** The channels will be displayed horizontally by checking this option.
- **Layout** → **Vertical** The channels will be displayed vertically by checking this option.
- **Layout** → **Square** The channels will be displayed in square shape by checking this option.
- **Configure** → **Maintain Playback Rate** When Maintain Playback Rate is checked, the current video playback speed will be maintained when a new video loads.
- **Configure** → **Show Thumbnails** When Show Thumbnails is checked, hovering over the video trackbar will show a Thumbnail grab of the video at that position.
- **Configure** → **Show Statistics** The statistics for each video will be displayed on the top left side of the video by checking the Show Statistics.
- **Configure** → **Use Video Time** This option affects what is shown on the Thumbnail when hovering over the trackbar. When checked, the actual date and time of the video will be shown, when unchecked, the current video position will be shown (in minutes).
- **Configure** → **Enable Time Sync** When Enable Time Sync is checked, it will ensure that all the channels are in sync (at the same date/time in the video) when playing multiple channels.

Note: You can tell NEXUS IC where to look for video by setting Global Video Path and/or Temporary Video Path on the Database *Properties* dialog. See also *How does video playback work?*

ANOMALIES

7.1 Anomaly Actions

An anomaly may have one or more anomaly actions associated with it. Anomaly actions can be assigned to individuals or teams or departments and may have a “due by” date.

Anomaly actions are not necessarily inspection type actions (e.g. Confirm WT reading). The Anomaly actions functionality can be used as a reminder to initiate a study with a vendor, or to have a discussion with an OIE about access.

Edit Anomaly Action

Anomaly Action | Tasks | Planning Tasks | History

Anomaly Action

Anomaly: J/SL @ V8300-11

Name: Joint/Seal leak

Status: Assigned

Reference Number:

Action Type: [EVENT] - FM - Blast and Paint

Created At: 04/06/2020

Created By: John Citizen

Action Before: 31/07/2016

Assigned To: Maintenance

Completed At: 20/10/2016

Percent Complete:

Comments: Change out the gasket at next service. JC to raise WO.

OK Cancel

7.1.1 Properties of an Anomaly Action

Field Name	Description
Anomaly	This is the name of the anomaly that this action belongs to. To change the anomaly that the action is assigned to, click on the <input type="button" value="..."/> button to the right.
Name	A short (50 character limit) name for the anomaly action.
Status	Optionally select a status for the anomaly action. This list is user-definable and you can add/edit/delete statuses by clicking on the <input type="button" value="..."/> button on the right hand side of the Status input control.
Reference No.	Used to reference (or cross reference) number. The number may relate to a Work Order number in your Planned Maintenance System.
Action Type	Choose from a list of pre-defined action types. Typical action types may include “[EVENT] - UT Reading”, “[ENGINEERING ASSESSMENT]”, or “[TEMPORARY REPAIR]”, however this list is user-definable and you can add/edit/delete action types by clicking on the <input type="button" value="..."/> button on the right hand side of the Action Type input control.
Created At	Enter the date that the anomaly action is created. This will default to today’s date, but is editable thereafter.
Created By	Select the name of the person creating the anomaly action. This will default to the currently logged in user, but is changeable thereafter.
Action Before	Enter a date that the anomaly action should be completed by.
Assigned To	Select the name of an individual or department that is responsible for progressing or completing the Anomaly Action.
Completed At	Enter the date that the anomaly action was completed. Please note that an anomaly action is not deemed “completed” until there is a valid date entered in this field.
Percent Complete	Enter a value between 0 and 100. This is for reporting and information purposes only.
Comments	A large free text field to retain additional information about the Anomaly Action which may not already be captured in the properties of the anomaly action.
Is Tasked?	This field shows whether this action has had a task assigned to it.
Is Due	This will display whether the action’s due status is Completed, Overdue, or No due date set.

When you edit an Anomaly Action, you will also see Tasks and Planning Tasks associated with it. To link a task to an Anomaly Action, edit the Anomaly Action and navigate to the Tasks list. Here you can click Add to create a new task and associate it with the Anomaly Action.

Alternatively, go to the *Tasks* tab on the *WORKPACKS* screen. Add or edit a task, and set its Anomaly Action to match the desired anomaly action. Note that the task’s asset and the anomaly action’s asset must match.

7.1.2 Report Table Sources

To extract anomaly action data into a report template, use the System Table titled **Action** as the primary Table Source. For more information see *Report Templates*.

7.1.3 The Grid

The Actions grid lists all anomaly actions for the currently selected anomaly (or anomalies).

7.1.4 The Actions Toolbar

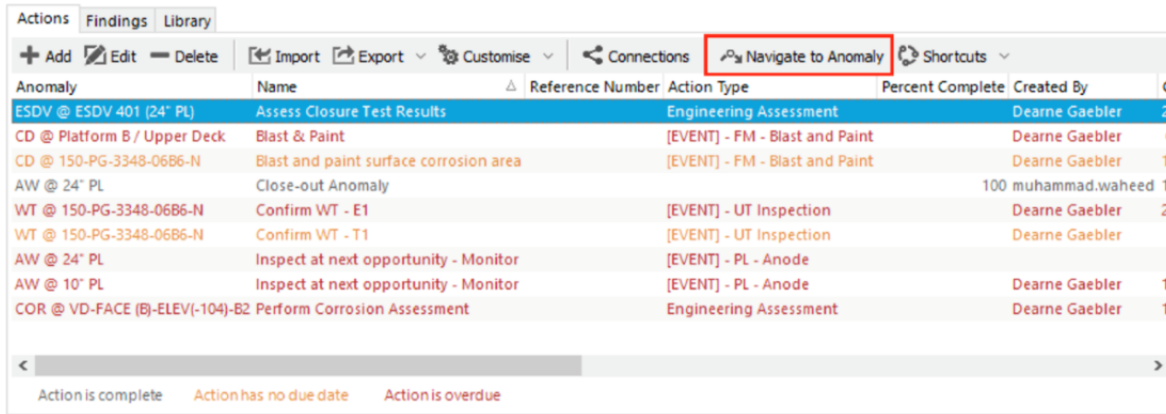
Add, Edit, Delete: Add / Edit / Delete Anomaly Action(s).

Tip: To bulk update (or delete) Anomaly Actions, use the *Multi-Edit* functionality available from the Actions grid.

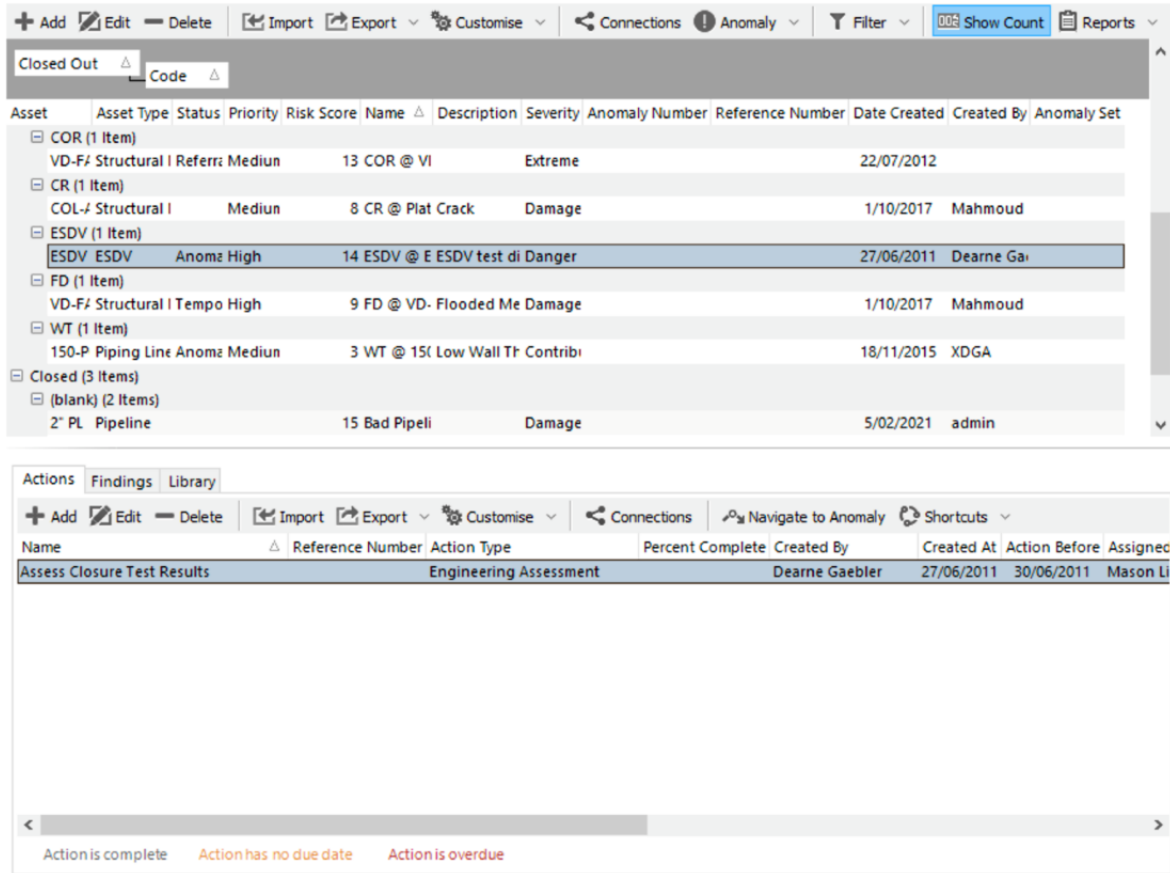
Navigate to Anomaly

The **Navigate to Anomaly** toolbar button allows you to navigate directly to an anomaly from a selected anomaly action.

Under the anomalies actions tab, select an anomaly action, and click **Navigate to Anomaly**.



The anomalies window will change so that the selected anomaly is revealed from within the asset tree. The actions window will now show only the selected anomaly action.



- **Import** See *Import* for full description of the Import menu item.
- **Export** See *Export* for full description of the Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.
- **Connections** See *Connections* for information about the Connections toolbar option.
- **Navigate to Anomaly** See *Navigate to Anomaly* for information about the Navigate to Anomaly toolbar option.
- **Assign Task** You can assign one or more tasks to an action of an anomaly. By clicking on this button the **Select Task** dialog will be displayed, you can select the task from the existing tasks or you can add a new task. (If you add a new task, it will have its Asset automatically populated from the anomaly.) The action must have **Action Type** to be able to assign tasks.

7.2 Findings

The Findings pane displays the finding(s) linked to the selected anomaly (or anomalies).

The screenshot shows two windows from the NEXUS software. The top window displays a list of anomalies with columns: Anomaly Number, Name, Status, Severity, Priority, Anomaly Se, Category, Action Statu, Action Over, Date Found, Primary Ass, Original Wo, Most Recen, Asset T. The bottom window displays a list of findings with columns: M, Event Type, Event Number, Asset, Workpack, Code, Reason, Remedial Action, Anomaly, Anomaly Start Clock. The findings table is highlighted with a red border.

M	Event Type	Event Number	Asset	Workpack	Code	Reason	Remedial Action	Anomaly	Anomaly Start Clock
	UT Inspection	2	EBA-HG-CL01-P101	UT Piping 2014	CP			Test Anomaly 1	<input checked="" type="checkbox"/> 4/12/2015
	Lining Visual Inspection	1	EBA-HG-CL01-P101	UT Piping 2014	CP			Test Anomaly 1	<input checked="" type="checkbox"/> 8/12/2015
	Dye Penetrant or Eddy Current Inspection	1	EBA-HG-CL01-P101	MPI Inspection 2014	CP			Test Anomaly 1	<input checked="" type="checkbox"/> 13/01/2016
	Contact CP Reading	1	Subsea Structure	2013 Drop Cell Survey	CP	CP reading outside limi		Test Anomaly 1	<input checked="" type="checkbox"/> 13/04/2016

A Finding is the link between an Anomaly and an inspection or survey event. Findings are either escalated and linked to an Anomaly or deemed “insignificant” and remain simply as an observation on the source event.

Findings displayed in this screen have been “escalated” during the during the finding review process and linked to an anomaly.

A finding record has a Number, a Code, a Severity ranking, Reason (descriptive text) and Remedial Action (descriptive text). Upon review, if you deem that the Finding should be escalated to an Anomaly, then you should tick the **Anomaly Required** field, and choose an Anomaly from the list and linked to the Finding. If you click the **Add** button on the **Select Anomaly** dialog, the new anomaly will have the asset, code, and various other fields pre-populated for you.

7.2.1 Properties of a Finding

1. **Number** - Optional. For use by users to label Findings.
2. **Event** - The Event which this Finding is connected to.
3. **Code** - Code which identifies the type of Finding. These are the same codes that are used to classify Anomalies. Some typical codes may include “CD”, “PD” or “VIB” (Coating Damage, Physical Damage or Vibration); however, anomaly codes are user-definable and can be configured from *Configuration* → *Anomalies*.
4. **Severity** - Choose from a list of pre-defined Severity Levels. Typical severity levels may include “Level 1 - Contributor”, “Level 2 - Degraded”, “Level 3 - Damaged”, “Level 4 - Danger” and “Level 5 - Extreme Danger”; however, severity levels are user-definable and can be configured from the *Configuration* → *Anomalies* area. These are the same severities that are used to classify Anomalies. Anomaly severities can also be assigned to Anomaly Triggers.
5. **Reason** - Text field. Size unlimited.
6. **Remedial Action** - Text field. Size unlimited.
7. **Anomaly Required** - Check this box if this Finding should be linked to an Anomaly.

8. **Anomaly** - Anomaly that this Finding is linked to. This field only appears if **Anomaly Required** is checked.
9. **Anomaly Trigger** - If this Finding was automatically generated by an Anomaly Trigger, that trigger is shown here.
10. **Is Auto Generated** - True if this Finding was automatically generated by an Anomaly Trigger.

7.2.2 Report Table Sources

To extract Finding data into a report template, use the System Table titled **Finding** as the primary Table Source, or use the System Tables titled **Event** or **Anomaly** and then add fields from the **Finding** table. For more information see *Report Templates*.

7.2.3 The Grid

The Findings grid lists all findings based on the currently applied filters. Primary filtering options are:

- Workpack; and
- Event Type.

Filters are set and cleared using the **Filter** menu on the Findings toolbar.

Tip: Use the grid *Grouping* functionality to group and filter Finding records.

7.2.4 The Findings Toolbar

Refer to section *Findings Toolbar* for full description of the Findings Toolbar.

7.3 Library

This functionality is also available via the *LIBRARY* screen. Here on the Anomalies screen, you can view all the library items attached to a particular anomaly.

Library Items are electronic documents which can be linked (via *Connections*) to data and data types in NEXUS IC.

Library Type	Name	Description	Document No	Revision	Reference Date	Physical Location	Hyperlink
Photographs and negatives	Onshore LNG Aerial Photo	Onshore LNG Plant	N/A	N/A			
Photographs and negatives	test						https://icwe
Photographs and negatives	Welcome	Splash screen for welcome page					

The electronic documents can be uploaded directly into the NEXUS IC database, or can be referenced via URL or UNC paths.

Here are some examples of valid URL and UNC paths:

1. <https://www.youtube.com/watch?v=oHg5SJYRHA0>
2. \\example.com\groups\eng\this_doc.docx

Caution: Mapped drives - If you define a mapped drive as a hyperlink location (for example H:\Working\document.docx, then you must be certain that the drive letter H:\ is mapped for every other potential NEXUS IC user. In lieu of mapped drives, it is recommended that you use UNC paths for network drive locations.

The **Library** functionality is available from multiple screens and dialogs in NEXUS IC including:

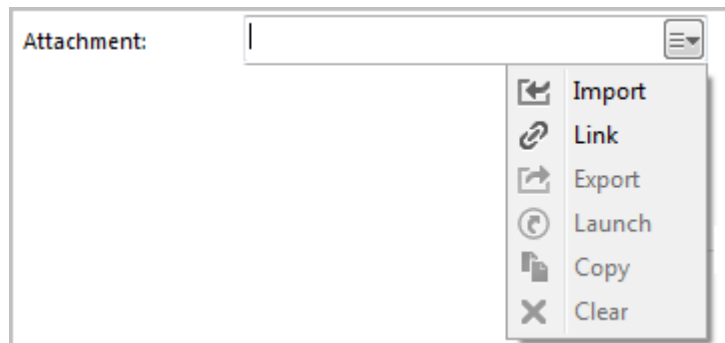
1. *ASSETS*
2. *LIBRARY*
3. *INSPECTION*
4. *ANOMALIES*
5. *Configuration → General → Functions → Edit Function Definition*
6. *Configuration → Assets → Types*
7. *Configuration → Events → Event Types → Edit Table Information*

Note: Example - Upload company Piping specifications to the NEXUS IC Library and assign to the Asset Type “Pipework”. This will make the Piping Specifications available from the ASSETS | Library screen whenever the active asset is of type “Pipework”.

7.3.1 Library Items Toolbar

The **Library** toolbar button allows the user to add, edit and delete Library Items.

- **Add** The **Add** menu item allows you to add a new Library item. Depending on what screen is active, the **Add** drop down menu will provide connection type options. Enter the **Name** of the Library item and any other relevant document information (Revision, Date, Document Reference etc). If the document is to be uploaded into NEXUS IC, then click on the **Attachment** button, else enter a **Hyperlink** location.



When adding an item, you can either **Import** or **Link** it. If you Import, the item will be brought into the database. If you subsequently change the original on disk, the item in the database will not change to match. If you Link the item, then when you change the original on disk, the next time you view the item within NEXUS IC, you *will* see the updated item.

Note: NEXUS IC will still load a copy of a Linked item into the NEXUS database — this is so that if the original is unavailable (for example, because you are away from your network), NEXUS IC can display the cached copy. When you view the item, if the original has been updated, we also update the database cached copy. You can’t Link items that are on your local hard disk — only items on network drives can

be Linked. The Link feature is designed to keep you up to date with items that may have been changed by others, and that can't happen on your local drive.

Hint: You can also add multimedia by dragging image files from Windows Explorer onto the Library Items pane. If you drag/drop one file, you will be given the Add Library dialog, and clicking Cancel will cancel the add. If you drag/drop multiple files, they will be added, and then multi-selected in the grid. You can then click Edit to *multi-edit* them. Drag-drop will **Import** items, not **Link** them.

- **Edit** The **Edit** menu item allows you to edit the properties of the currently selected Library Item (not the document itself).
 - **Delete** Deletes the currently selected Library Item.
-

Note: Deleting a Library Item will delete all the connections of that Library Item.

- **Launch** Launches the Library item on the local machine. Note that by default NEXUS will only launch files with the following extensions: doc, docx, xls, xlsx, jpg, png, jpeg, bmp, tiff, gif, mpg, mp3, wav, ppt, pptx, txt, pdf, emf, zip, dwg, avi, rtf, mp4, csv.
-

Hint: Use the Space Bar on your keyboard to launch the currently selected Library item.

Note: If the local machine does not have an associated viewer for the document type (eg. AutoCad viewer for DWG type), then the document can not be launched.

- **Email Attachment** This option will launch a new email message and attach the associated Library Item to it. Note that Email account properties need to be set up for this option to function.
- **Import**

See *Import* for detailed information on the Import Wizard. The MS Excel Import Template details the required format for importing Library Items.

You can also import the *Connections* in the same import as the Library items, so in addition to the Library Import columns, you can additionally define the Connection information using the following column headings:

- Library Connection.Connect To
- Library Connection.Workpack
- Library Connection.Asset Type
- Library Connection.Asset
- Library Connection.Event Type
- Library Connection.Event
- Library Connection.Anomaly
- Library Connection.Risk Model
- Library Connection.Function

Note that the *Connect To* column should only contain one of the following text items:

- Anomaly
 - Asset
 - Asset Type
 - Event
 - Event Type
 - Function
 - Risk Model
 - Workpack
- **Export** See [Export](#) for information about exporting Library Items. Please note that this option will only export the contents of the grid, not the Library Items themselves.
 - **Customise** See [Customise](#) for information about the Customise toolbar option.
 - **Connections** See [Connections](#) for information about the Connections toolbar option.

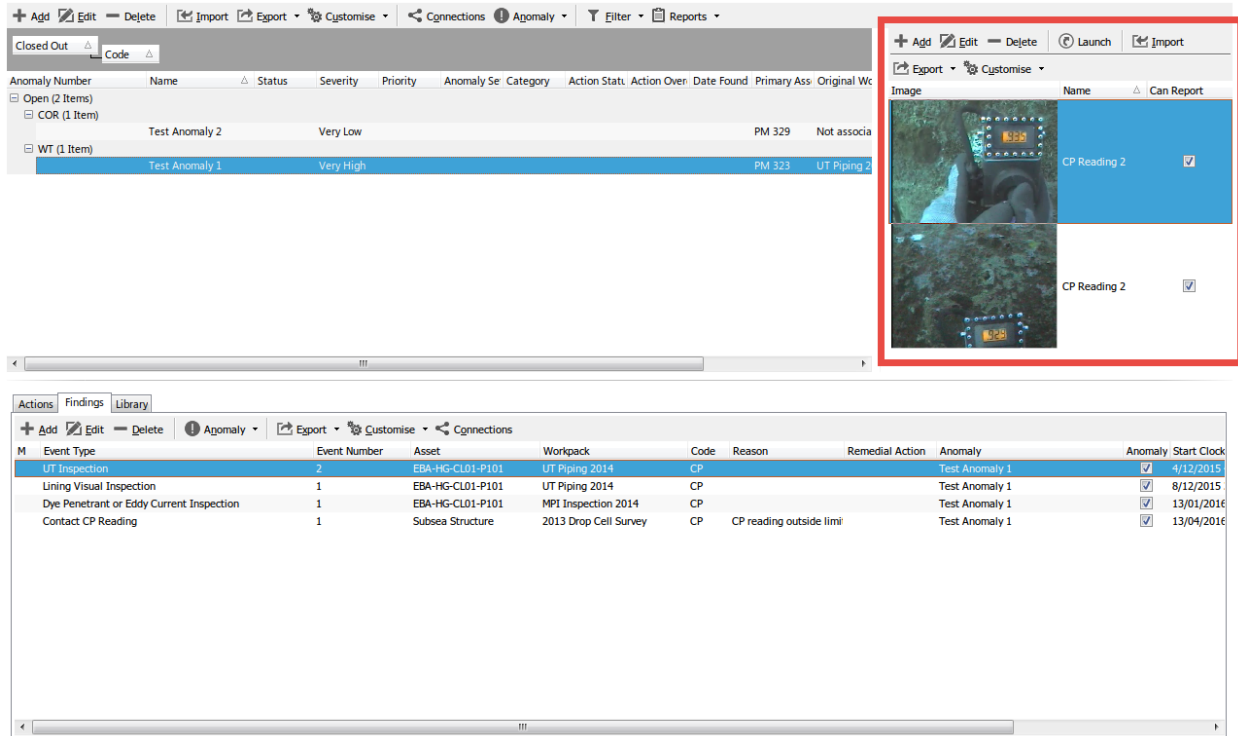
Double-click

The first time you double-click on a library item, NEXUS will ask you what action to take: you can either Launch the Library item in an external editor, or Edit the Library item. If you would like your choice to become permanent, tick the “Always do this” box. Note that if you hold down the **Alt** key while double-clicking, you will be asked again.

7.4 Multimedia

Multimedia are electronic images which have been uploaded against any of the events which are linked to the currently selected anomalies.

Multimedia items are displayed as thumbnails for the currently selected anomaly(s).



Multimedia items are displayed as thumbnails for the currently selected anomaly or anomalies.

7.4.1 Multimedia Toolbar

Multimedia File Formats

GIF, JPG, JPEG, TIF, BMP, PNG, PDF, DWG, CGM, DXF, SVG, WMF or EMF are all allowed Multimedia file types.

- **Add** Launches the **Add Multimedia** dialog to allow you to attach an image to the currently selected event. Please note that if multiple events are selected, then the image being added will be attached to all events.

Note: You can also add multimedia by dragging image files from Windows Explorer onto the Multimedia pane.

Note: The **Can Report** property of the Multimedia item can be used to filter which images are output to the report. (This column is invisible by default, but is available under *Customise* → *Columns*.)

- **Edit** Launches the **Edit Multimedia** dialog. Properties of the Multimedia can be updated and saved.
- **Delete** Delete will delete the currently selected multimedia record/s. If multiple Multimedia items have been selected, then the **Question** dialog will give notice of how many Multimedia items will be deleted and prompt you to confirm by clicking on the **Delete** button.
- **Launch** Launches the currently selected Multimedia file into the default Windows viewer for the selected file type. (Note that if your image viewer supplies “Next” and “Previous” buttons, these will show you the next and previous files in the temp folder, which may not be the next and previous images in NEXUS.)

- **Preview** Toggle display of preview. If this button is selected, then whichever image is focused in the grid will be shown in a “preview” window. If EXIF data is available for the image, it will be displayed.
- **Crop** Crop the selected image. Within the Crop dialog, click the **Crop** button or Ctrl-X, then click and drag a rectangle on the image. To complete the crop, click the button, or **Crop To Selection**, or Ctrl-Shift-X.
If you want to replace the existing image with the new cropped version, ensure **Keep Original** is not selected. If you want the new cropped image to be added to the event’s collection of images without overwriting the existing image, ensure **Keep Original** is selected.
- **Export** See *Export* for full description of the Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.

Anomalies are records which identify discrete items or areas of concern. An anomaly record may have been originated from an inspection item (which means that it will have a finding linked to it) or it may be a stand alone record created outwith the integrity and inspection cycle (ad-hoc).

Anomalies can be bulk imported from MS Excel or manually created from the Add Anomaly dialog.

7.5 Properties of an Anomaly

1. **Asset** - The name of the asset that the anomaly is attached to. This is a required field.
2. **Name** - A short (50 character limit) name for the Anomaly.
3. **Description** - A 100 character field which provides more descriptive information of the anomaly.

4. **Code** - Code which identifies the type of anomaly. Some typical codes may include “CD”, “PD” or “VIB” (Coating Damage, Physical Damage or Vibration) however, anomaly codes are user-definable and can be configured from *Configuration → Anomalies*.
5. **Severity** - Choose from a list of pre-defined Severity Levels. Typical severity levels may include “Level 1 - Contributor”, “Level 2 - Degraded”, “Level 3 - Damaged”, “Level 4 - Danger” and “Level 5 - Extreme Danger” however, severity levels are user-definable and can be configured from the *Configuration → Anomalies* area. Anomaly severities can also be assigned to Anomaly Triggers and will be pre-populated from the initial automatically generated Finding, through to the anomaly that the finding is linked to.
6. **Priority** - Choose from a list of pre-defined Priorities. Typical priority levels may include “Very High”, “High”, “Medium”, “Low” or “Very Low” however, the list of anomaly priorities are user-definable and can be configured from the *Configuration → Anomalies* area.
7. **Anomaly Number** - A numerical property which can be used to store a number against the anomaly. This number is not auto-populated.
8. **Anomaly Set** - Is an alternative option for grouping anomalies. A common grouping may include “Topside” and “Subsea” however, Anomaly Sets are user-definable and can be configured from *Configuration → Anomalies*.
9. **Reference Number** - A 200 character limit field which can be used to reference (or cross reference) anomalies.
10. **Date Created** - The date the anomaly was first created. This will default to today's date, but is editable thereafter.
11. **Created By** - Name of the person creating the anomaly record. This will default to the currently logged in user, but is editable thereafter.
12. **Assigned To** - Name of the person to which the anomaly record is assigned.
13. **Comments** - A large free text field to retain additional information about the anomaly which may not be captured in the properties of the anomaly.
14. **Status** - Status of the anomaly. Anomaly statuses are user-definable and can be configured from *Configuration → Anomalies*.
15. **Closed Out** - A check box which identifies whether or not the anomaly is Open or Closed. Closed anomalies are normally excluded from anomaly statistical reporting.
16. **Risk Score** - This is a calculated field, the function assigned to this field is named “System - Anomaly - Risk Score” and must be configured through the *Functions*. Different fields such as the “Severity” and “Priority” of the anomaly can be used as the input parameters for the function.

7.6 Report Table Sources

To extract anomaly data into a report template, use the System Table titled **Anomaly** as the primary Table Source. For more information on Report Templates see *Report Templates*.

7.7 The Grid

The anomalies grid lists all anomalies based on the currently applied filters. Primary filtering options are:

- Workpack; and
- Asset.

Filters are set and cleared using the **Filter** menu on the Anomalies toolbar.

Tip: Use the grid *Grouping* functionality to group and filter anomaly records. It is a quick and easy way to drill down to the anomalies that you are particularly interested in reviewing.

7.8 The Anomalies Toolbar

Add, Edit, Delete: *Add / Edit / Delete* anomaly(s).

Tip: To bulk update (or delete) anomalies, use the *Multi-Edit* functionality available from the anomalies grid.

- **Import** See *Import* for full description of the Import menu item.
- **Export** See *Export* for full description of the Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.
- **Connections** See *Connections* for information about the Connections toolbar option.
- **Anomaly** → **Close Anomaly** Click this to close out the anomaly. You will be shown an Anomaly Action dialog. This dialog lets you create an anomaly action saying why the anomaly was closed out, and by whom.
- **Filter** → **No Filter** Clears any currently applied anomaly filters.
- **Filter** → **Workpack** Allows you to filter the anomaly listing by one or more workpacks. Workpacks are linked to anomalies via the linked findings and events.
- **Filter** → **Asset** Allows you to filter the anomaly listing by a user-selected sub-set of assets. Assets are linked to anomalies by the Asset chosen in the Anomaly record itself AND by the linked findings and events.
- **Reports** See *Reports* for information about the Reports toolbar option.

7.9 Matrix

You can show anomalies on a risk matrix. This (when configured) is visible at the right or bottom right of the screen.

Each anomaly's Risk Score is used to place it on the diagram. Note that anomalies do not have a Likelihood or Consequence to give them an X/Y position on the diagram — they only have a Risk Score. So if your diagram has several squares with the same Risk Score (as is usually the case), your anomalies will be placed in the left-most such square. That is, risk-assessed assets are placed in a particular square, but anomalies are merely placed in a particular band.

The matrix legend is displayed below the chart, with coloured indicators for open and closed anomalies. Legend keys can be clicked to toggle showing their corresponding anomalies on the matrix.

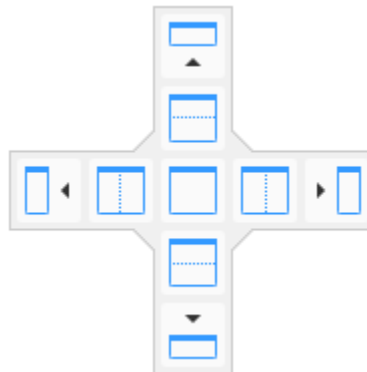
To make this matrix work, you will need to configure *Database* → *Properties* → *Database* → *Anomaly Risk Chart*. You will also need to configure the “System - Anomaly - Risk Score” function.

IC-INSPECTION

8.1 Desktops

The IC-Inspection 6 “desktop” works in the same way as NEXUS IC’s *Inspection* screen: you can use the **View** button to drop down a menu which lets you control what panels are visible, and you can drag panels around and “dock” them.



When you are dragging a window over an existing window, you will see a pale blue highlight and/or a set of icons:





If you drag the window over one of the icons, the pale blue highlight shows where the window will drop, and the new size and shape it will take on. If you *drop* the window onto one of the icons, the window will dock appropriately: dropping it onto the centre square icon will make this window part of the tab group; dropping it on the left, right, top or bottom icons will split the current window and drop this window to the left, right, top or bottom of it.

If you drop a window outside the IC-Inspection main window, they will become “floating” windows.

As far as the “desktop manager” that lets you drag/drop these windows is concerned, the IC-Inspection main window area starts as one large void. If you drop a window into the centre of that void, the dropped window fills the void, and subsequent drops can split that window into parts. If you drop a window into the left, right, bottom or top of the void, then the void is split, but the right, left, bottom or top will still contain the void.

You can resize windows with the “splitter” at each edge between two docked windows — when you move the mouse over a splitter the mouse cursor will change to a  or  split arrow. Drag the splitter to resize the windows.

(The difference between floating and docked windows is that docked windows will resize together: when you drag a splitter, one window will get bigger while another gets smaller. Thus, docked windows never overlap each other. Typically most or all of your windows will be docked.)

You can close panels with the **X** at their top right corner, or click on  to “unpin” panels so that they collapse to an edge of the IC-Inspection window. To recover an unpinned panel, click on the panel’s name at the edge of the IC-Inspection window, then click on the  icon.

Three desktop layouts are automatically created for you: Structures, Pipelines, and Setup.

You can save and switch desktops: click the **Add a new desktop with the current layout** button to create an entry in the list of desktops and save your current arrangement of panels into it; or click **Save the active desktop** to save your current settings. Settings are *not* automatically saved when you close IC-Inspection — this is so that if you get into a state you don't know how to get out of, you can simply close and re-open. You can also choose a different desktop from the **Desktops** menu to switch to it, and **Delete the currently active desktop** to delete it.

If you have two monitors, it may be useful to spread IC-Inspection across both, either by clicking the “Restore Down” button at the top right of the window if necessary and then dragging the main application window larger, or by floating windows such as Drawings and then dragging the floating windows onto the second monitor.

8.2 Inspections Toolbar

The **Inspections** toolbar allows the user to control IC-Inspection as a whole. Functionality specific to individual panes may be found on those panes.

- **Back** The Back menu item allows you to return to assets that you had previously selected in the Assets tree.
- **Forward** The Forward menu item allows you to return to assets that you had previously selected in the Assets tree, after you've used the Back button.
- **Assets** → **Show Asset Type** Toggles the display of the asset type in the hierarchy.
- **Assets** → **Expand Children** All children, grandchildren, etc. of the selected asset will be expanded. (You can also press the * key on the numeric keypad.)
- **Assets** → **Collapse Children** All children, grandchildren, etc. of the selected asset will be collapsed.
- **Assets** → **Copy to Clipboard** Copies either the asset name or full hierarchy location of the selected asset to the clipboard.
- **Assets** → **Show on Drawing** Shows a list of drawings that have this asset as a layer. Click on a menu item to go to that drawing. If the drawing name has “(Different Asset)” after it, the drawing you will be taken to is not available on the current asset; thus, when you select the menu option, you will not only be taken to that layer on that drawing, you will also be navigated to the new asset. You can get back by using the **Back** toolbar button.
- **Assets** → **Other Locations** Shows a list of other locations that this asset exists in on the asset tree (including in other Asset Views). Click on a menu item to navigate there. If this asset does not appear in any other locations, you will not see any items in this list.
- **Assets** → **Connections** See [Connections](#) for information about the Connections toolbar option.
- **Asset Views** See [Asset Views](#) for detailed information on the Asset Views toolbar option.
- **Traffic Lighting** See [Traffic Lighting](#) for detailed description of the Traffic Lighting toolbar option.
- **Start** Starts the inspection.
- **Stop** Stops the inspection.
- **Disable Survey Logging** ‘Disable Survey Logging’ is a button used to toggle off/on survey logging during an inspection. This option can only be toggled while an inspection is not running. IC-Inspection will show a warning if an inspection is started with Survey Logging disabled and a survey device enabled (except for Scale devices).
- **View** The remainder of the View menu lists the various panes available in IC-Inspection. Click a menu item to check/uncheck it. Checked items are visible; unchecked items are not.
- **Desktops** If you have several saved desktop configurations for this screen, select which one is active here.

- **Save Desktop** If you have made changes to the currently selected desktop, click this to save them. Otherwise, when you restart the application, your changes will be lost.
- **Add Desktop** You can add a new desktop layout here.
- **Delete Desktop** Delete the currently selected desktop from the list by clicking this.
- **Restore Desktops** Restores desktops to the factory defaults.

8.3 Active Events

8.3.1 Worked Examples

Populate event fields with device data

IC-Inspection can be configured so that incoming survey data can be auto-populated in discrete event fields. The following worked example details the steps to configure the survey data fields.

Step 1 - Configure Survey Device

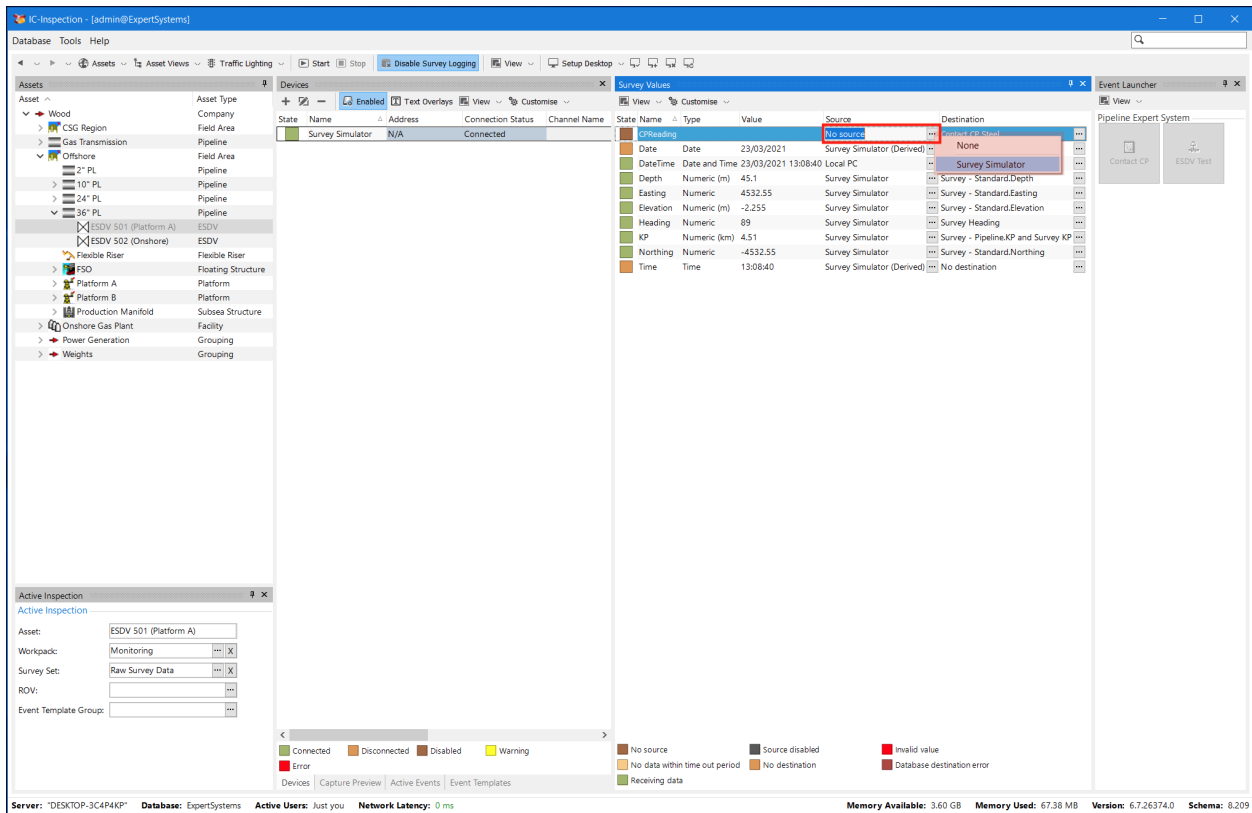
In IC-Inspection we should ensure that one of our survey devices contains the survey field name that we want to map to our event field.

The screenshot displays the IC-Inspection software interface. In the 'Devices' table, a 'Survey Simulator' device is listed with a 'Connected' status. A 'Survey Simulator Properties' dialog box is open, showing a table of 'Survey Fields' with columns for Name, Type, Unit, Value, and Increment. The 'CPReading' field is highlighted in red. The 'Survey Values' table in the background shows data for 'CPReading' with a value of 1223.

Name	Type	Unit	Value	Increment
CPReading	Numeric	Negative Mills	1062	1
DateTime	Date and Time		23/03/2021 11:46:5	
Depth	Numeric	Metre	21.24	0.02
Easting	Numeric		2134.62	2.01
Elevation	Numeric	Metre	-1.062	-0.001
Heading	Numeric		340	1
KP	Numeric	Kilometre	2.124	0.002
Northing	Numeric		-2134.62	-2.01

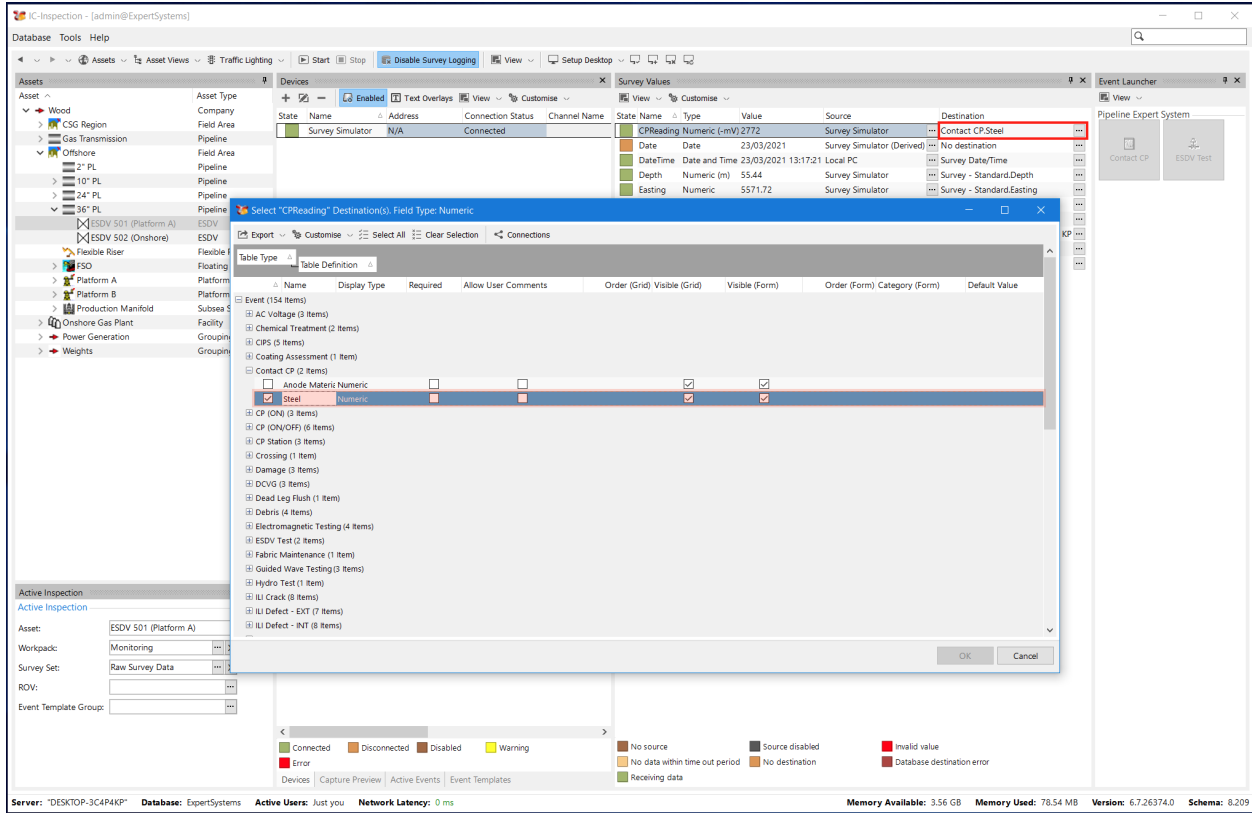
Step 2 - Setting Survey field source

In the ‘Survey Values’ frame, set the source of the survey field to the survey device we are using.



Step 3 - Setting Survey field destination

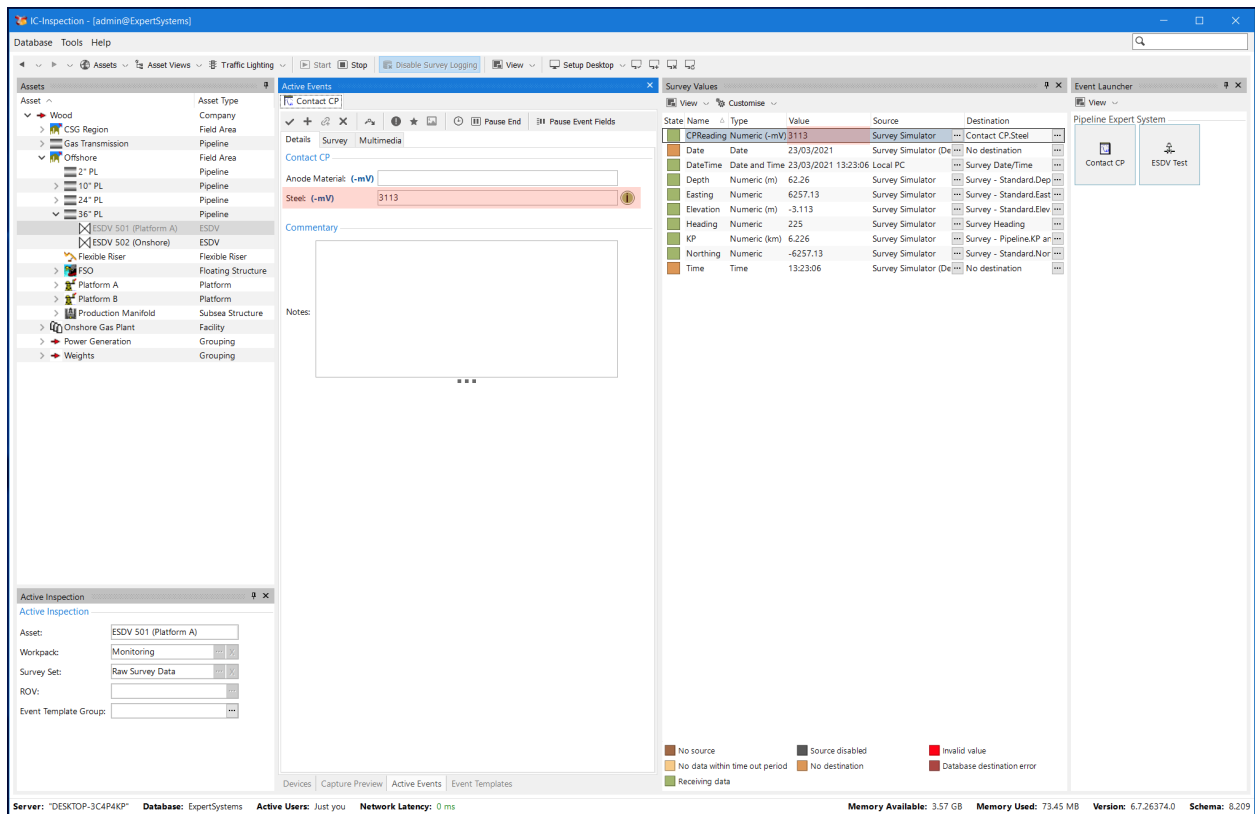
In the ‘Survey Values’ frame, select ‘Database Field(s)..’ from the Destination menu in the grid. In the dialog that appears, select the event field that we wish to map to the survey field.



Step 4 - Testing auto-population

Now we can test that the field is being automatically updated.

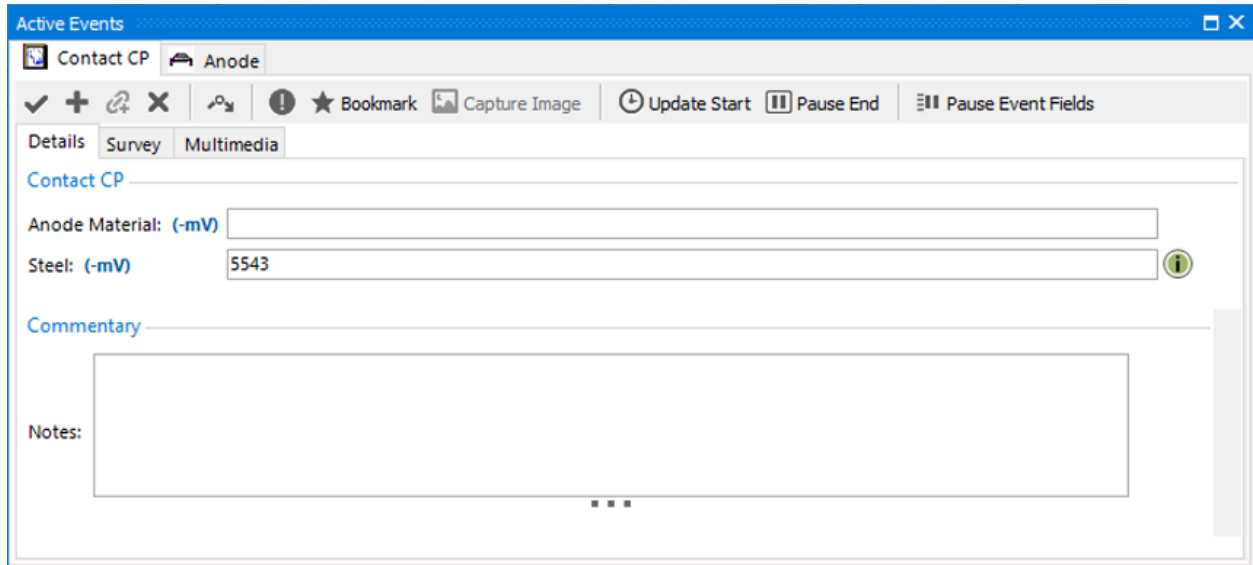
- Start the inspection by the Start button on the main toolbar.
- Select an asset type that is associated with our event, in this example we select an ESDV asset.
- Launch the event that has the event field mapped.



Now we can compare the survey value on the Event form to the value displayed in the ‘Survey Values’ frame. If the field has been mapped correctly, the active event value will automatically update with the survey value. Automatic event field updates can be paused/resumed by toggling the ‘Pause Event Fields’ button. Toggling the (i) button next to the field will also perform the same functionality.

The following video is a demonstration of the worked example.

The Active Events panel displays all the events that have been launched but not recorded, called the “active” events, and the data entry tabs for the currently selected active event. If more than one event is active (i.e. launched but not as yet recorded), then you will see tabs on the left-hand side of the panel, with one one for each active event. Each tab has the name of the event type it contains, but no event number — unsaved events do not yet have an event number. The panel has tabs for event Details (with an area for a descriptive comment for the event), Survey information, Multimedia and a manually created Finding (if present).



Hint: IC-Inspection can be configured to auto-populate event fields with incoming survey data. See *Worked Examples* for more information.

8.3.2 Events Toolbar

- **Save** Commits the active event and associated data to the database. Once the event has been recorded (or saved), then it will no longer appear in the Active Events panel.
- **Save & New** Saves the active event and associated data to the database and creates a new event of the same event type. Note that they are two distinct events.
- **Save & Hold** Saves the active event and associated data to the database and creates a new task to represent the outstanding work. Use this button when you have completed some but not all of the work represented by a single task; e.g. you have inspected part of an asset but have stopped because of bad visibility, etc. Save and Hold is only available on events that were launched from tasks, not on events that were launched ad hoc from the Event Launcher.
- **Cancel** Cancels the active event without saving to the database.
- **Navigate to Asset** This menu item will change the active asset in the Asset hierarchy to the asset of the current event. By navigating to a different asset in the hierarchy, this will also update the tasks shown in the task list, the asset shown on the overlay, etc.
- **Raise a Finding** Launches the Findings tab in the Active Events panel.
- **Capture Image** Captures a snapshot from the incoming video signal and references it to the active event. Within the Capture Image dialog, you can select/unselect and crop images. To crop, click the **Crop** button or Ctrl-X, then click and drag a rectangle on the image. To complete the crop, click the **✓** button, or **Crop To Selection**, or Ctrl-Shift-X.
- **Bookmark** Creates a bookmark on the current event as a reference for the data reviewer.
- **Update Start** Updates the start survey information of the active event with the survey data gathered at the time of the button click.
- **Pause End** Pauses the end survey information of the active event. By default, the end survey information is updated whilst the event is visible in the Active Events panel and is updated by incoming serial survey

information whilst the event is active.

- **Pause Event Fields** Pauses automatic updating of the value linked to the event's survey field. By default, the value is updated by incoming serial survey information whilst the event is active.

8.3.3 Adding an Event

There are several ways to add an Event for editing in the Active Events panel:

- **Event Launcher** - Click on the required event type to launch in the Active Events panel.
- **Event Launcher** - Click a pre-defined *Event Template* to launch it.
- Click on the **Save and New** toolbar button in the Active Events panel. This will save the active event to the database and launch a new event of the same type.
- **Drawings** panel - Using a Task button on the Drawings panel.
- **Tasks** panel - Double-click the task in the Task grid or click the **Launch** toolbar button to launch the selected task.
- **Tasks** panel - Click the **Launch Template** drop-down and choose the event template you want to launch this event with.

8.3.4 Creating a Finding

To create a Finding for the active event, click Raise a Finding in the Active Events panel. This will activate the Findings tabbed page in the Active Events panel. Enter the Description and Remedial Action/s and choose an anomaly code from the Code dropdown list.

Only one finding can be manually created for an event. Multiple findings can be created automatically by *Anomaly Triggers*. If you see a yellow exclamation mark (⚠) next to one or more fields in your event form, this is because one or more anomaly triggers have been violated, and a finding will be automatically created for each.

8.3.5 Completing a Task

If this event is launched from a task it will have a "Task" section at the top of the event form with a **Complete Task** checkbox. If this checkbox is left ticked, then when you save the event, the task will be completed. If this event is not launched from a task, but matches an existing task, you will again see the "Task" section. Tick the checkbox if you would like to use this event to complete the task. If there are multiple tasks that this event could complete, you will instead see a **Select Tasks** button which will let you pick which task(s) to complete.

8.4 Active Inspection

The Active Inspection panel displays the active (currently selected) IC-Inspection entities. Once set up, the selections are remembered from session to session, via the logged-in user ID. (If you log out and log in as a different user, that user may have different settings.) When you view data from any area of IC-Inspection, the data typically relates to the active entities displayed in the Active Inspection panel.

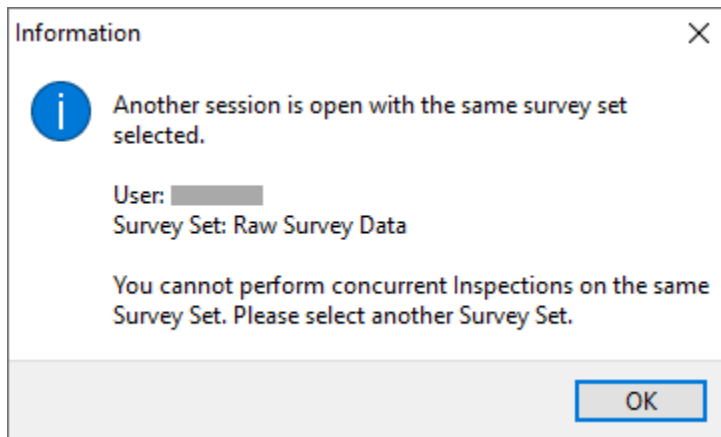
When you enter new data, the data is typically recorded against the active entities displayed in the Active Inspection panel, as appropriate for the particular entity. For example, if you launch an event, the event's Workpack will be the one selected here, and the event's Survey Set will be the one selected here (if any).

8.4.1 Functionality

- Asset - displays the currently selected asset.
- Workpack – click the Workpack ellipsis and select a workpack from the list.
- Survey Set - click the Survey Set ellipsis and select a survey set from the list. If you attempt to start inspections from two different copies of IC-Inspection on the same Survey Set simultaneously, you will receive an error: “Another session is open with the same survey set selected.” Doing this is forbidden because both IC-Inspections would be writing to the same survey set simultaneously, meaning that it would be impossible after the fact to associate events with correct survey data.
- ROV - clicking the ellipsis on this field will take you to the same picker as the Survey Set ellipsis. ROV is shown here to make it clear to inspectors what ROV their video is being recorded against.
- Event Template Group - click the Event Template Group ellipsis and select an *Event Template Group* from the list.

8.4.2 Warning

If you have two copies of IC-Inspection open, and both have the same survey set selected, you will see a warning dialog. The risk here is that if two ROVs are simultaneously writing to the same survey set, but those ROVs are at different points in space, the survey set will contain a hard-to-untangle mess of both locations interleaved. In this instance, you need to move (at least) one of the IC-Inspection instances to log to a different survey set. This means that after the fact, in track reposition etc., even two events logged at the exact same time can be given correct survey data, because each is given data from the appropriate survey set. To keep things maximally clear, fill out the ROV value in each survey set you’re using concurrently, so that reviewers can clearly understand what is intended to connect to what.



8.5 Anomaly Triggers

The Anomaly Triggers panel shows anomaly triggers assigned to the current asset. It may also show a preview chart, showing which triggers apply at which KPs or depths.

This panel only shows asset-specific anomaly triggers — it does not show triggers which may apply to event fields independent of asset. For example, if your Anode event is set to always raise a finding when its Depletion is greater than 75%, that would *not* be shown in this panel.

Anomaly triggers are pre-defined upper and lower bounds which are applied to event information. When the bounds are exceeded, IC-Inspection automatically creates a Finding on the event.

The **Is Active** column indicates with Yes or No whether the anomaly trigger is currently triggered. This is determined by the current incoming survey KP and Date/Time values:

- The survey KP value will be compared against the Start KP and End KP of the anomaly trigger.
- The survey Date/Time will be compared against the Date From and Date To of the anomaly trigger.
- The anomaly trigger must also be enabled.

Event	Field	Type	Code	Severity	Start KP	Upper Depth	End KP	Include Boundary	Lower Depth	Lower Bound	Lower Bound (Field)	Upper Bound	Upper Bound (Field)	Yes/No	Action	Is Active
PL - Freespan	Effective Length	Fail when outside Upper/Lower bounds.	FS	Degraded	0	25		<input checked="" type="checkbox"/>				49.9				No
PL - Freespan	Effective Length	Fail when outside Upper/Lower bounds.	FS	Degraded	25	200		<input checked="" type="checkbox"/>				70.9				Yes
PL - Freespan	Effective Length	Fail when outside Upper/Lower bounds.	FS	Degraded	200	220		<input checked="" type="checkbox"/>				66.8				No
PL - Freespan	Effective Length	Fail when outside Upper/Lower bounds.	FS	Degraded	220	280		<input checked="" type="checkbox"/>				57.9				No
PL - Freespan	Effective Length	Fail when outside Upper/Lower bounds.	FS	Degraded	280	404		<input checked="" type="checkbox"/>				46				No

When an anomaly trigger is violated, a yellow exclamation mark (!) will appear next to the field. You can set lower/upper bounds to be constant values (so a field might trigger if it was outside, say, 1 to 9) or to pull from a field, on this form or on another form. So for example if this field is Measured Wall Thickness, it might trigger if its value is less than Minimum Allowable Wall Thickness.

For *Lookup List* fields, the comparison is done of the lookup list item’s Value, not its Comment. So if you have a lookup list titled “Anode Depletion”, and its first entry has value “25” and comment “0 to 25% depleted”, NEXUS will use the “25” for purposes of determining whether an anomaly trigger should be fired.

For Yes/No fields you can set the trigger to fire on any combination of Yes, No or blank; but you can’t compare to another field.

Add Anomaly Trigger

Anomaly Trigger

Type:

Optional error message for finding.

Error Message:

Enabled:

Date From: Date To:

Lower Bound: Lower Bound (Field):

Upper Bound: Include Boundary: (?)

Upper Bound (Field):

Anomaly Details

Code: Severity:

OK Cancel

The **Include Boundary** tickbox controls whether exact matches cause the trigger to fire: if you have set a trigger

to “Fail when inside Upper/Lower bounds”, your lower bound is 1 and your upper bound is 9, this is the difference between “ $1 < x < 9$ ” and “ $1 \leq x \leq 9$ ”.

You can optionally give an anomaly trigger a date range. If you set just a Date From, the trigger will apply only to event data from that date forward. If you set just a Date To, the trigger will apply only to event data from that date or earlier. If you set both, the trigger will apply only to event data within the specified range. In this way, you can change triggers to reflect new conditions, without causing spurious warnings on historical data. For example, if you decrease the operating pressure of an asset, this might decrease the minimum allowable wall thickness. Rather than editing the existing anomaly trigger, you can set a “To” date on that old trigger, and add a new trigger with a “From” date.

Caution: In most cases, Findings are generated at the time events are added or *imported*. There are however some scenarios in which the Anomaly Triggers utility should be run manually. These are 1) whenever anomaly triggers are edited; 2) when anomaly triggers exist on a calculation field; 3) before any Finding review sessions; or 4) after a bulk import of event data (particularly when anomaly triggers rely on events other than itself).

Triggers for a field independent of asset are found in NEXUS IC in *Asset Information* and *Event Types*. Anomaly triggers for specific assets can be configured in NEXUS IC by right-clicking on an asset and choosing **Anomaly Triggers...** If you have both an asset-specific and a generic anomaly trigger on the same field, for assets with the asset-specific trigger, only the asset-specific trigger will apply. For assets with only a generic trigger, only the generic trigger will apply. Note that asset-specific anomaly triggers are specific to their asset — they do not automatically apply to an asset’s children.

A trigger can have an anomaly *Code* and a *Severity*, and you can have several different triggers on a single field, with different codes and/or severities. The dialog may also show a preview chart, showing which triggers apply at which KPs or depths.

8.6 Assets

Central to both IC-Inspection and NEXUS IC application is the Asset register. Most all information retained in NEXUS IC is linked back to an asset in the asset hierarchy, including inspection data.

In the Asset Tree panel, you can see assets in a hierarchical tree view. Each asset is also assigned an *Asset Type*.

The Asset Type determines what Asset Information Groups are visible for that asset and also what Event Definitions are allowable for that asset (see *Asset Types* for more detail on configuring Asset Types).

When you select an asset in the asset tree, it affects other panels. For example, it controls what buttons are enabled in the Event Launcher, what tasks are shown in the Tasks panel, what drawings are shown in the Drawings panel, etc.

The toolbar at the top of the IC-Inspection window has several items relevant to the Asset Tree panel: the **Previous Asset** button returns you to the asset that was selected before your currently selected asset, and the **Previous Asset** and **Next Asset** buttons and menus in general work the same way as back/forward buttons and menus in a web browser. The **Assets** menu lets you select **Asset Views** and **Traffic Lighting**. It also lets you control whether the Asset Type column is visible.

8.7 Asset Information

The Asset Information panel shows asset-specific information for the currently selected asset.

Different Asset Information forms are relevant to different Asset Types. (You can configure the relationship between Asset Information forms and Asset Types in NEXUS IC under *Tools* → *Configuration*.)

At the left are “sideways” tabs: one for each asset information Category relevant to this asset type. When you click on one of these Category tabs, you will be shown tabs across the top of the form, one for each Asset Information form in this Category that are relevant to this Asset Type. When you click on an Asset Information form tab, you will be shown that Asset Information form. (Some forms may take a moment to display, depending upon the amount of calculation that must be done.)

If you make changes, ✓ **Commit** and ✗ **Cancel** will become enabled, and you can use these to save or discard your changes. (If you select a different asset without clicking Commit or Cancel, your changes will be committed.)

8.7.1 Ordering forms

To change the order of the Asset Information forms, simply click, drag and drop the Asset Information tab title to a different location.

For more details on Asset Information forms and fields, see the NEXUS IC documentation.

8.8 Charts

The Charts window will list all of the Chart Templates that are appropriate for the inspection data shown in the *Event Listing* window. If you don’t see any charts listed, try different types of events, by changing asset or by changing your filters. Charts will only show event data included in your filters (workpacks, event types, column-specific filters, etc). If your Chart Template is on Continuous Event data (such as cross-profiles), ensure that you select that Continuous Event in your event type filter.

To expand/collapse each chart, click the ▲▼ button at the top right of that chart, or click the chart’s grey header row.

If a chart is misconfigured, you will see a message explaining this in place of the chart. Go to *Chart Templates* to resolve the described problem.

Charts are generated from Chart Templates. For details on setting these up, see *Chart Templates*.

Available charts will be listed alphabetically. The first chart will be automatically expanded.

Events with Findings will be shown on the chart in red.

For some Chart Templates, at the right or the bottom of the chart is the chart legend. If you hover the mouse over an item on the legend, other series on the chart will fade out temporarily. If you click an item on the legend, that series will be toggled on/off. If you export the chart (see below), only series currently visible will be exported.

8.8.1 Chart Width

When the Charts pane is 1000 pixels wide or less, all charts are shown at the full width of the chart pane. When the Charts pane is over 1000 pixels wide, some charts are shown full width, and some are shown half width, in order to fit more charts side-by-side onto your screen.

Charts that have an X axis of type string, date, or date/time, or whose X axis includes ‘KP’ are always shown full width. Of course, you can adjust the width of all charts by adjusting the width of the whole application window, adjusting other elements such as the asset tree wider/narrower, etc.

8.8.2 Zooming

At the bottom of most Chart Templates, below the horizontal scrollbar (if visible) is the Zoom Bar. You can hover the mouse over the left or right end of the selected part of the Zoom Bar and drag to change the selection. Initially the entire Zoom Bar will be selected, so hover the mouse over the left or right end of the bar and drag. Once a subset of the chart is selected, you can use the scroll bar or the Zoom Bar to drag the whole selection area without zooming.

You can also zoom in or out by clicking in the chart area and (with the mouse cursor still inside the chart area) spinning the mouse wheel. For charts with a lot of data (thousands of events) this can be slow, so the Zoom Bar may be faster. You can zoom on a single axis by putting the mouse pointer over that axis and spinning the mouse wheel. Not all charts support zooming in both axes.

You can also control zoom with toolbar buttons Zoom In, Zoom Out, and Reset Zoom.

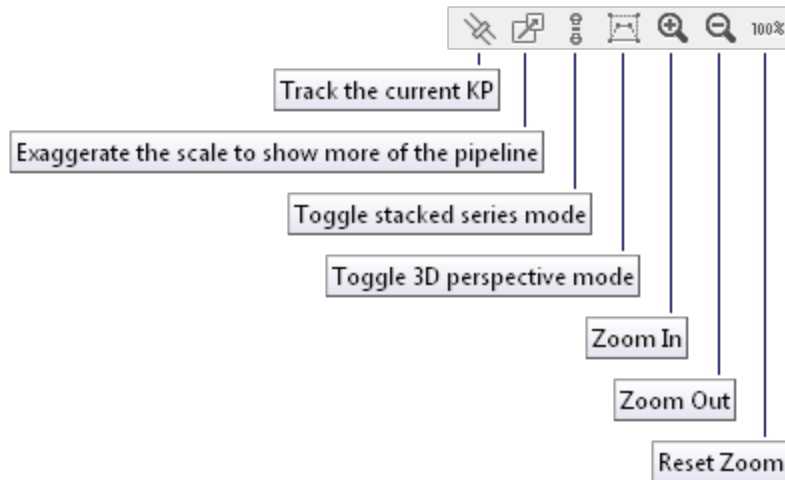
8.8.3 Charts Toolbar

There is no toolbar for the whole Charts panel. Instead, each chart has its own toolbar.

- **Zoom In** Zoom in.
- **Zoom Out** Zoom out.
- **Reset Zoom** Resets to default zoom level.
- **Export the chart to image(s)** Click this button to open the Export dialog. Ensure the range you want is set correctly using the Zoom Bar. Ensure the series you want to export are visible. If you would like to export the chart as a series of images, each covering a smaller horizontal range, enter the range you would like each chart to cover in the **Range of X Axis per image** field. For example, if you have a 300km pipeline and you enter “10” as the range per image, it will be broken into 30 images, each covering 10km.
- **Copy the chart to the clipboard** Copies the chart, as you see it displayed, without the “zoom” section at the bottom, to the clipboard.
- **Toggle chart** Expand/collapse display of this chart.

There are also several buttons specific to the Pipeline View chart:

- **Track the current KP** This button is only available in IC-Inspection. When selected, the pipeline view will move in time with the KP value coming in from survey. For NEXUS IC, see *Time Source* → *Synchronise KP* on the *Inspections Toolbar*.
- **Exaggerate the scale to show more of the pipeline** When selected, will distort the scale of the pipeline to make a greater KP range visible.
- **Toggle stacked series mode** When selected, will move events above the pipeline to make them more obvious. Different events will be moved up different distances so that all are easily distinguishable.
- **Toggle 3D perspective mode** When unselected, you will see the pipeline viewed from the side. When selected, you will see the pipeline viewed from above and slightly off to one side.



Tip: Click on the chart area and then, with the mouse cursor still inside the chart area, use your mouse wheel to increase/decrease the chart scale for export.

8.8.4 Report Table Sources

To extract chart template data into a report template, use a Chart Template element in the report, and use the appropriate Asset table or Event table as a source. For more information see [Report Templates](#).

8.9 Devices

The Devices panel allows you to manage:

- Incoming serial data;
- Control of DVRs.

8.9.1 Toolbar

- **Add** Add a DVR or survey device.
- **Edit** Edit the selected device. If the device has Diagnostics information available, you can view it here.
- **Delete** Delete the selected device.
- **Enabled** Disable/enable the selected device. When the selected device is enabled, this button will be in the “down” state.
- **Text Overlays** Edit IC-Recorder [Text Overlays](#).
- **View** → **Legend** Use this to show/hide the legend at the bottom of the grid.
- **View** → **Diagnostics** If selected, you will see a diagnostics pane appear in the bottom of the Devices panel. The Diagnostics pane will show details relevant to the device selected in the list.
- **View** → **Capture Preview** If selected, and the device selected in the list is capable of showing still images (e.g. it’s a DVR), you will see a preview of those still images here. You can specify a capture interval, and IC-Inspection will request an image from the device every time that interval elapses.

- *Customise* The usual.

8.9.2 Adding a Custom Survey device

In the Add New Device wizard, choose Survey Device, then choose Custom Survey. Choose a COM port as input. Under Properties, 9600 8N1 are industry-standard, though you should check them with whoever is supplying the survey string to you.

String Format

The following string formats are supported by IC-Inspection:

- **Character Delimited** Each unique survey field in the incoming Survey string is separated by a character delimiter (usually a comma), and each survey field is defined by its index in the Survey String.
- **Position and Length** Each survey field has a fixed length. If the survey field is less than this defined length, it may be padded with either zeros or spaces as appropriate.
- **Identifier and Length** The start of each survey field is defined by an identifier, and the end of the survey field is defined by its length. Again, the field may be padded with zeros or spaces as appropriate.
- **Identifier and Delimited** The start of each survey field is defined by an identifier, and a character delimiter (usually a comma) separates each data field.
- **Pre/Post Identifier and Delimited** The start and end of each survey field is defined by an identifier, and a character delimiter (usually a comma) separates each survey field. Identifier and Delimited is the most common format for an incoming Survey string. If this format is used, then in a noisy signal environment, IC-Inspection will still be able to correctly identify data even if only a partial string was received.

Delimiter should be set to match whatever is coming down the survey string. Comma (,) is the most common.

End of Line Signal should be set to be compatible with whatever is coming down the survey string. Enter ASCII control characters by typing a number prefixed with a #, so carriage return is #13, line feed is #10, and carriage return followed by line feed (the most common case) is #13#10.

Survey Fields

Add Survey Fields to reflect the parts of the incoming survey string you're interested in. Exactly what you can configure for each field depends on the String Format selected, but they all have Name, Type and Unit. If Type is Numeric, you can select a Unit for this field. For example, if the survey string is sending you Depth in feet, select the unit to be Feet. In NEXUS IC's *Configuration* → *Events* → *Event Types*, find your "Survey - Standard" form, edit the Depth field, and ensure that its Unit is set to Metres. Now IC-Inspection will convert the incoming depth from feet to metres before logging it in the database. Similarly if the survey string is sending you Heading in hundredths of a degree or whatever, you can use Units to convert.

8.9.3 Adding a Survey Out device

The Survey Out device lets you send survey data out a serial port, for downstream consumption by another system.

In the Add New Device wizard, choose Survey Device, then choose Survey out. Choose a COM port for output. On the Survey tab, make selections appropriate to what your downstream device is expecting. If you check **Include Identifiers**, data will be sent with identifiers prepended, like "DateTime=01/01/2001 12:34:56, Depth=100". **Include null values** controls what happens if some fields are null: do you want several separators in a row in this case, e.g. "1,,3"? **Null value replacement** is for downstream devices that cannot cope with this case, so you can have the null field replaced with the value of your choice ("0", " ", etc).

Uncheck fields you don't want sent. Use **Move Up** and **Move Down** to rearrange fields to suit the downstream device.

Date and Time format come from Windows settings — to change them, go to Windows' Region and Language control panel.

8.9.4 Adding an IC-Recorder device

In the Add New Device wizard, choose Video Device, then choose IC-Recorder.

If you're adding several IC-Recorders, you should give each one a different Display Name so that you can tell them apart.

If you have several instances of IC-Recorder running on one PC, they will each have a different port number. By default, the first run will have port 4500; the second, port 4501; and so on. You can change this in IC-Recorder's *Tools* → *Options* → *Advanced*.

If IC-Recorder's title bar doesn't say "Connected", then on the toolbar click **Enabled** twice, to disable then re-enable the device. This forces a fresh attempt at connection.

When you click **Start** to start an inspection, all Video Devices will attempt to start recording. While the Video Devices are in the process of starting recording, you will see a progress dialog. If this dialog persists for more than a couple of seconds, this may indicate a problem with one or more of your Video Devices. Check the status of each device, both here in IC-Inspection, and on IC-Recorder's own window (which may be on a different PC). When you click **Stop** to stop the inspection again, all Video Devices will attempt to stop recording.

8.9.5 Adding a third-party DVR device

In the Add New Device wizard, choose Video Device, then choose Generic Video Recorder. Any device that has implemented our standard DVR control protocol is supported. Supported devices are listed [here](#).

8.9.6 Text Overlays

If you are using IC-Recorder to record video with overlay, you *can* configure the overlay using either the **Text Overlays** button here in IC-Inspection, or by using a similar button in IC-Recorder. But the IC-Recorder button is only intended for IC-Recorder stand-alone, so you should use the button here in IC-Inspection. The reason is that when you have multiple recorders, you generally want the same overlay on each (except for channel name). Configuring here in IC-Inspection lets you do the configuration once and have it sent to all the recorders. (If a recorder is not currently connected, it will receive the configuration when next it is connected.) To do this:

Click Add, or select a Client overlay and click Edit, and you'll see the Edit Overlay dialog. If you've just added a new overlay, you'll need to fill in the Overlay Name field before you can click Save.

Drag the window larger to make the black overlay region larger. It doesn't need to match the actual size of your video feed, but it's convenient for you if you drag it to approximately the same shape.

You can drag fields from the tree at the left onto the black overlay layout region. If the field you want is not shown in the list, ensure that the appropriate survey field is configured and has a value.

Once you have dragged on your first field, you may wish to set its colour, font, size, etc., because additional fields you drag in will "inherit" their settings from the previous field you dragged in.

Once fields are on the overlay, you can "lasso" several fields by click-dragging a box around them, or you can click a single field to select it. You can use the toolbar buttons at the top of the dialog to act on all selected fields at once (to "nudge" them around the screen, align them in a tidy fashion with respect to each other, change their font size, or delete them). You can also use the list at the bottom of the screen to modify individual fields.

To put prefix text on a field (e.g. “Depth: “, etc.) edit its “Region Text”. You generally want a trailing space, so as to separate the caption from the text coming in from IC-Inspection. Short captions are often best — “E: ” for Easting, etc.

If you drag in an “Image” region, you will immediately be shown a file dialog, so that you can choose an image file for this region. If you choose a .PNG file, then the transparency in that file will be honoured: where the PNG is partly or wholly transparent, you will see the video through the image. You can drag on more than one image region if you so desire.

Note that the “Top” and “Left” shown in this list are for the current size of the preview shown here in the Edit Overlay window, *not* for the actual size of your captured video feed (so as you resize the window, you’ll see these values change). This is because the overlay editor does not depend on the dimensions of the video you are currently capturing. Font size, however, *is* in the dimensions of your video: a 10-point font on a 576-pixel high SD video will fill about 1/57th of the height of the image and will likely seem about right, whereas this would be too small on a 1080-pixel high HD feed.

If you untick the “transparent” option for one or more fields, those fields will be shown with a solid background rectangle of the colour you select. If you tick the “transparent” box, the text will be shown without a solid background rectangle. This conceals less of the video, but may be less clear on some colours of video. Note also the “Show overlay text shadow” option under *Tools* → *Options* → *Advanced* — ticking this works well with transparent-background fields, because it places a dark border around light text, or a light border around dark text, thus making text more legible if the underlying video colour is similar to the text colour. This option does consume a bit more CPU power, so if your CPU is near 100% during recording, try unticking this option.

If you are using a Marshall Encoder rather than system hardware, some overlay configuration options are ignored because the Marshall Encoder does not support them. Text, prefix, suffix, source, top, left, font size, and font colour are all supported, but font (Courier, Arial, etc.) is not. Additionally, the Marshall Encoder supports at most 16 overlaid fields.

Once you’ve OK’ed out of that chain of dialogs, you should see survey values updating in real-time on your recorders.

8.10 Drawings

Drawings are essentially *Library* records where the Library Type has the “Show as Drawings” flag checked.

“Layers” can be added to drawings. These let you use drawings for navigation and data overlay.

Layers are marked up regions on the drawing which can be linked to assets in the asset hierarchy.

For more on adding and editing drawings and layers, see the *NEXUS IC documentation*.

An extra item available only in IC-Inspection is the *Colour* → *Tasks* option. This shows layers on drawings in colours dependent on the tasks remaining on each layers’ asset:

- red for an asset with tasks, none of which are completed;
- orange for an asset with tasks, some of which are completed;
- green for an asset with tasks, all of which are completed;
- grey for an asset with no tasks.

This is dependent on the workpack selected in *Active Inspection*.

When you click on a layer, you will get a pop-up menu that lets you navigate to that asset or its child assets that have tasks, or launch tasks on that asset or its children.

8.11 Event Launcher

The Event Launcher panel allows you to launch ad-hoc events. (If there is a task for your event, you can also launch the event via the Tasks panel.)

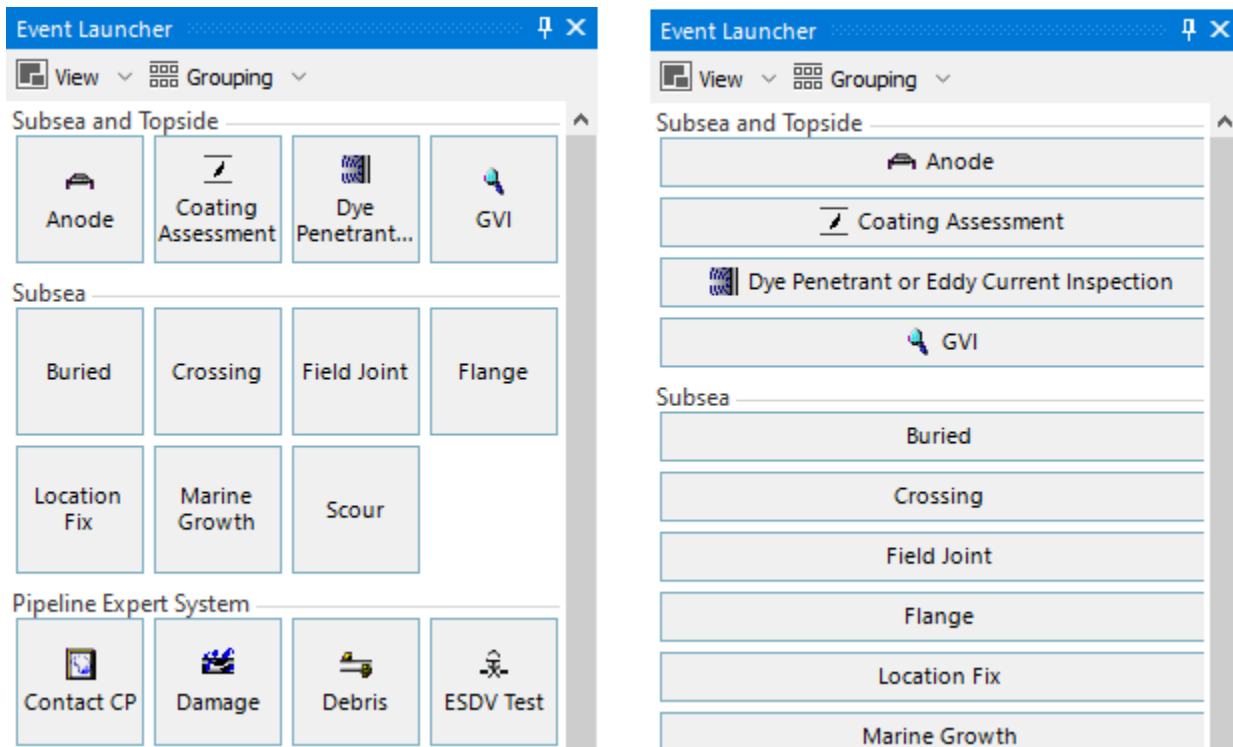
If you are not inspecting, all buttons on the Event Launcher panel are disabled.

Once you click the Start button, buttons for event types that are available on the currently selected asset type will be enabled. (Again, you can set which event types are available on each asset type in NEXUS IC, under *Configuration*.)

To launch an event, simply click the corresponding button. Clicking on an event template button will carry out the action(s) associated with that event template: filling in fields, capturing still images, etc.

8.11.1 View

Under Grid Layout, each event in your database is shown as a square button arranged adjacent to each other in a grid of events. Under List Layout, each event is shown as a button as tall as the text or icon, and as wide as the Event Launcher, creating a vertical list of Events.



Each *Event Template* in your database is also shown as a button. Note that to make events from your template group available for launching, you must select your event template group in the *Active Inspection* window. To hide Event Templates from the Event Launcher, unselect Show Event Templates in the View menu.

The View menu allows you to choose whether Event buttons show Captions and Icons, Only Captions, or Only Icons.

8.11.2 Grouping

Buttons are grouped by category by default (you can set event categories in NEXUS IC, under *Configuration*). If None is selected under the Grouping menu, events will be listed alphabetically.

8.12 Event Listing

The Event Listing panel allows you to view existing events in the current workpack (as selected in the Database Information panel), and if desired edit those events.

Note that there is a right-click menu allowing you to edit, navigate to the event asset, update start, update end, toggle bookmark, or delete.

The Event Listing Historical panel lets you view existing events, but also lets you select workpack(s) to view events from. You cannot edit events from Event Listing Historical.

The Event Listing grid lists all events based on the currently applied filters. Primary filters are:

- Asset;
- Workpack; and
- Event Type

The number of events in the grid (based on the current filters) is displayed in the Event Listing window title.

Tip: If the **Child Assets** toolbar button is not in the “Down” state, then only events recorded on the selected asset will be shown (e.g. events on child assets will not be listed).

Finding Column

There is significance to the colours in the Finding column.

- Yellow - the finding needs to be reviewed;
- Green - the finding has been deemed insignificant and is not linked to an anomaly.
- Grey - the finding is linked to a closed anomaly;
- Red - The finding is linked to an open anomaly;
- White - there are no findings on this event.

8.12.1 The Grid

By default, the Event Listing grid displays columns which are common to all event types. The first six columns in the Event Listings grid represent:

1. **F** = The presence or absence of a **Finding** for this event.
2. **B** = The presence or absence of a **Bookmark** for this event
3. **L** = The presence or absence of a **Library Item** for this event
4. **V** = The presence or absence of **Video** for the event recorded at this date/time.
5. **M** = The presence or absence of **Multimedia** for this event
6. **C** = The presence or absence of Reviewer **comments** for this event


Tip: All columns listed above can be *filtered* and sorted. Each column has a filter icon which appears by hovering over the column header, for example the F column, by clicking on the filter, a drop down with a list of relevant items will appear that can be used to filter the events by that item in that column. By pressing on the column header, for

example F, the events will be sorted in ascending order based on the findings, i.e all the events with findings will be listed at the bottom of the list, by clicking on the header for another time, the events will be sorted in descending order based on the findings, i.e all the events with findings will be listed at the top of the list. A small arrow (either up or down) on the column header shows this functionality.

Right clicking on any of the events in the Event Listing grid will pop up the **Events** menu.

Hint:

To bulk update (or delete) events, use the *Multi-Edit* functionality. If you're deleting only a few events, simply multi-select them

- Go to the *WORKPACKS* screen and create a workpack called DeleteMe.
 - Return to the *INSPECTION* screen, multi-select the events you wish to delete, and in the *Event Details* pane, click **Survey**, click the  ellipsis button on Workpack, and set it to DeleteMe.
 - Go to the Workpacks screen again.
 - *Database* → *Close*, then *Database* → *Reopen* or *Database* → *Connect...* to clear those events from NEXUS IC's cache.
 - Now delete the DeleteMe workpack.
-

Tip: The Event Listing grid performs a check whenever the filtered data set is updated, when it detects there are only events of a single event type, the properties of that event (the event data) will be displayed as additional columns in the Event Listing grid.

8.12.2 Event Listing Toolbar

- **Edit** Allow editing of the selected event(s). This sends the event to the Active Events window. If inspection is in progress, you will be able to **Update Start** and **un-Pause End**.
- **Delete** Deletes the currently selected event. Where multiple events are selected, the Delete menu item will delete all selected events.
- **Filter** → **By Workpack ...** From the **Select Workpacks** dialog, check which Workpacks to include in the filter.
- **Filter** → **By Event Type ...** From the **Select Table Definitions** dialog, check which Event Types to include in the filter. If you have no Event Types selected, then all Events will be shown, and no Continuous events will be shown. To view Continuous events, you must explicitly select those event type(s) in the filter.
- **Child Assets** When in the **Down** state, events for the currently selected asset and all sub-assets will be included in the Event Listing. When in the **Up** state, only events that have been recorded on the currently selected asset will appear in the Event Listing.
- **Events** → **Navigate to the event asset** Will change focus in the Asset Hierarchy to the asset on which this event has been recorded. To change back, click on the back arrow in the Assets toolbar (see *Assets Toolbar*).
- **Events** → **Update Start** Will change the start time of the currently selected event to the time displayed in the **Time Source** control in the Assets toolbar.
- **Events** → **Update End** Will change the end time of the currently selected event to the time displayed in the **Time Source** control in the Assets toolbar.

- **Events** → **Toggle Bookmark** Bookmarks are simply flags on an event. Bookmarked events are identified by a green star symbol in column 3 of the Event Listing grid. The use of bookmarks and the workflow around setting and removing bookmarks will differ for each client.
- **Export** See *Export* for full description of the Summary Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.
- **Connections** See *Connections*.
- **Details** Toggles visibility of the event details panel.

8.13 Event Templates

The Event Templates panel (or One-Click Eventing) displays a list of Events, which, when launched or recorded, are populated with pre-defined values. Various keyboard keys and/or key combinations (F2-F12; shift-, alt- or ctrl-F1-F12, alt- A-Z, ctrl-alt- A-Z, etc.) can be programmed to Launch or Record user defined Events. Event Templates are grouped into Event Template Groups.

Event Templates created here appear in the *Event Launcher*

The Event Templates panel is divided in three parts: the list of Event Template Groups; the list of Event Templates within the selected group(s); and the form for the selected template(s).

You can add different event template groups for different inspectors (“Alice’s Templates”, “Bob’s Templates”, etc.) or for different inspection types (“Structures Templates”, “Pipeline Templates”, etc.), or for whatever suits your situation.

You can add as many or as few events to each group as you like. You can add multiple events of the same event type. You can fill in as many or as few fields on each event form as you like.

The form for a specific event template shown at the right of the panel is read-only — to edit, double-click the template (or select the template and click Edit). When editing an event template, you can specify the Action you would like to occur when this event template is invoked: launch the event, launch the event and grab a still image from each connected DVR, or launch and instantly save the event. You can also specify the shortcut key: either drop down the Shortcut Key box and choose a function key, or click on the Shortcut Key box to give it focus and then press the desired key combination.

To launch an event template, go to the *Event Launcher* and click the corresponding button, or press the key or key combination associated with the event template.

Try to place key information near the start of the Event Template name, so it’s easily visible in the Event Launcher button.

8.14 Heading

The Heading panel is a graphical representation of the serial data being collected in the Heading field (which usually represents ROV heading). This allows you to tell at a glance which compass direction is left of the ROV, and which is to the right (which is useful when commentating pipeline inspections), and which face of a structure you are likely looking at (which is useful when you are commentating structure inspections).

It can be viewed in two modes:

- North up - The yellow heading indicator will move, keeping north at the top of the panel.
- Heading up – The yellow heading indicator will remain stationary at the top of the panel with the compass points rotating accordingly.

To switch between North up and Heading up modes, right click in the white space anywhere in the Heading panel and choose the mode from the drop down menu.

8.15 Library

The Library panel shows all the library items for the current asset.

Library Items are electronic documents which can be linked (via *Connections*) to data and data types in NEXUS IC.

+ Add Edit - Delete Launch Email Import Export Customise Connections								
A	Library Type	Name	Description	Document No	Revision	Reference Date	Physical Location	Hyperlink
	Photographs and negatives	Onshore LNG	Aerial Photo Onshore LNG Plant	N/A	N/A			
	Photographs and negatives	test						https://icwe
	Photographs and negatives	Welcome	Splash screen for welcome page					

The electronic documents can be uploaded directly into the NEXUS IC database, or can be referenced via URL or UNC paths.

Here are some examples of valid URL and UNC paths:

1. <https://www.youtube.com/watch?v=oHg5SJYRHA0>
2. \\example.com\groups\eng\this_doc.docx

Caution: Mapped drives - If you define a mapped drive as a hyperlink location (for example H:\Working\document.docx, then you must be certain that the drive letter H:\ is mapped for every other potential NEXUS IC user. In lieu of mapped drives, it is recommended that you use UNC paths for network drive locations.

The **Library** functionality is available from multiple screens and dialogs in NEXUS IC including:

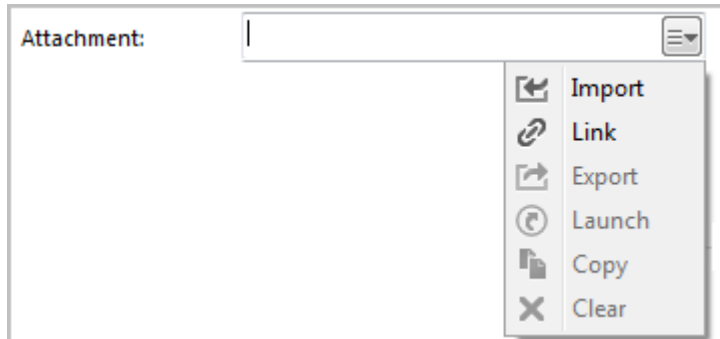
1. *ASSETS*
2. *LIBRARY*
3. *INSPECTION*
4. *ANOMALIES*
5. *Configuration* → *General* → *Functions* → *Edit Function Definition*
6. *Configuration* → *Assets* → *Types*
7. *Configuration* → *Events* → *Event Types* → *Edit Table Information*

Note: Example - Upload company Piping specifications to the NEXUS IC Library and assign to the Asset Type “Pipework”. This will make the Piping Specifications available from the ASSETS | Library screen whenever the active asset is of type “Pipework”.

8.15.1 Library Items Toolbar

The **Library** toolbar button allows the user to add, edit and delete Library Items.

- **Add** The **Add** menu item allows you to add a new Library item. Depending on what screen is active, the **Add** drop down menu will provide connection type options. Enter the **Name** of the Library item and any other relevant document information (Revision, Date, Document Reference etc). If the document is to be uploaded into NEXUS IC, then click on the **Attachment** button, else enter a **Hyperlink** location.



When adding an item, you can either **Import** or **Link** it. If you Import, the item will be brought into the database. If you subsequently change the original on disk, the item in the database will not change to match. If you Link the item, then when you change the original on disk, the next time you view the item within NEXUS IC, you *will* see the updated item.

Note: NEXUS IC will still load a copy of a Linked item into the NEXUS database — this is so that if the original is unavailable (for example, because you are away from your network), NEXUS IC can display the cached copy. When you view the item, if the original has been updated, we also update the database cached copy. You can't Link items that are on your local hard disk — only items on network drives can be Linked. The Link feature is designed to keep you up to date with items that may have been changed by others, and that can't happen on your local drive.

Hint: You can also add multimedia by dragging image files from Windows Explorer onto the Library Items pane. If you drag/drop one file, you will be given the Add Library dialog, and clicking Cancel will cancel the add. If you drag/drop multiple files, they will be added, and then multi-selected in the grid. You can then click Edit to *multi-edit* them. Drag-drop will **Import** items, not **Link** them.

- **Edit** The **Edit** menu item allows you to edit the properties of the currently selected Library Item (not the document itself).
- **Delete** Deletes the currently selected Library Item.

Note: Deleting a Library Item will delete all the connections of that Library Item.

- **Launch** Launches the Library item on the local machine. Note that by default NEXUS will only launch files with the following extensions: doc, docx, xls, xlsx, jpg, png, jpeg, bmp, tiff, gif, mpg, mp3, wav, ppt, pptx, txt, pdf, emf, zip, dwg, avi, rtf, mp4, csv.

Hint: Use the Space Bar on your keyboard to launch the currently selected Library item.

Note: If the local machine does not have an associated viewer for the document type (eg. AutoCad viewer for DWG type), then the document can not be launched.

- **Email Attachment** This option will launch a new email message and attach the associated Library Item to it. Note that Email account properties need to be set up for this option to function.

- **Import**

See [Import](#) for detailed information on the Import Wizard. The MS Excel Import Template details the required format for importing Library Items.

You can also import the *Connections* in the same import as the Library items, so in addition to the Library Import columns, you can additionally define the Connection information using the following column headings:

- Library Connection.Connect To
- Library Connection.Workpack
- Library Connection.Asset Type
- Library Connection.Asset
- Library Connection.Event Type
- Library Connection.Event
- Library Connection.Anomaly
- Library Connection.Risk Model
- Library Connection.Function

Note that the *Connect To* column should only contain one of the following text items:

- Anomaly
- Asset
- Asset Type
- Event
- Event Type
- Function
- Risk Model
- Workpack

- **Export** See [Export](#) for information about exporting Library Items. Please note that this option will only export the contents of the grid, not the Library Items themselves.
- **Customise** See [Customise](#) for information about the Customise toolbar option.
- **Connections** See [Connections](#) for information about the Connections toolbar option.

Double-click

The first time you double-click on a library item, NEXUS will ask you what action to take: you can either Launch the Library item in an external editor, or Edit the Library item. If you would like your choice to become permanent, tick the “Always do this” box. Note that if you hold down the **Alt** key while double-clicking, you will be asked again.

8.16 Map

The Map window shows you the events in the *Event Listing* on a two-dimensional map, based on their Easting and Northing. Each event is a dot, coloured with the Event Type's colour. (You can set the colour for each event in *Event Types*.)

The Map window will only show event data included in your filters (workpacks, event types, column-specific filters, etc). If the events you are interested in are Continuous Event data (such as cross-profiles), ensure that you select that Continuous Event in your event type filter.

At the bottom or right of the map is the legend. If you hover the mouse over an item on the legend, other series on the Map will fade out temporarily. If you click an item on the legend, that series will be toggled on/off. If you export the Map (see below), only series currently visible will be exported.

8.16.1 Zooming

You can zoom in or out by clicking in the map area and (with the mouse cursor still inside the map area) spinning the mouse wheel. You can also control zoom with toolbar buttons *Zoom In*, *Zoom Out*, and *Reset Zoom*.

8.16.2 Maps Toolbar

- ***Zoom In*** Zoom in.
- ***Zoom Out*** Zoom out.
- ***Reset Zoom*** Resets the zoom so that all data points are visible.
- ***Copy*** Use this button to copy the Map, as currently displayed, to the clipboard.
- ***Legend*** Use this button to show the legend of the events on the map, the legend includes the Event Types that are selected and the Layers which their opacity has been set to anything above 0%. Layers and Event Types can be switched off by clicking on the layer or event on the legend.
- ***Layers*** OpenStreetMap, ESRI World Imagery, ESRI World Hillshade, ESRI World Topographic, ESRI Ocean Base Map and ESRI Street Map are free to use on the web. Each of these layers has an opacity drop down list to be selected from 0% to 100%. If 0% is selected for any of the layers, it will not be included in the map legend.
- ***Event Types*** Use this button to select what event types are displayed. This is more persistent than clicking/unclicking series on the map legend.
- ***Inspection Track*** Selecting a workpack from this menu will result in a line on the map connecting events in the order they were logged. If the events were logged by a single ROV (or a single human inspector), this track will show the path that the ROV (or inspector) took.
- ***Configure*** Specify the sources of the various fields used by the Map tab to display pipeline baseline data and map data. "As Built - Easting", "As Built - Northing" and "As Built - Order" should all point to the same table — this is the table used to supply the pipeline baseline track. Typically you would point these three fields at a sub-AIG. If you don't configure these, no as-built track will be displayed. If your pipeline has many events on it, not showing an as-built may be OK — users may be able to get a sense of the pipeline track from the events on it. "Coordinates - Datum" and "Coordinates - UTM Zone" should point to fields that provide these values. Typically they will be in an AIG — only one datum and one UTM Zone are necessary for an entire asset. Ask your surveyors for the values that you should fill in to these fields.
- ***Export Image*** Click this button to save the Map to an image file.

8.17 Pipeline View

Pipeline View shows events along your pipeline in a 3D view. Each event will appear on the pipeline view when you click Save on the event form.

Pipeline View Historical is similar, but shows only the events listed in the Event Listing Historical panel. This view can also show seabed profile (if you have any PL - Cross Profile data imported), and animates motion along the pipeline as you select events.

See Charts Toolbar below for details of buttons that are used by the Pipeline View.

8.17.1 Chart Width

When the Charts pane is 1000 pixels wide or less, all charts are shown at the full width of the chart pane. When the Charts pane is over 1000 pixels wide, some charts are shown full width, and some are shown half width, in order to fit more charts side-by-side onto your screen.

Charts that have an X axis of type string, date, or date/time, or whose X axis includes ‘KP’ are always shown full width. Of course, you can adjust the width of all charts by adjusting the width of the whole application window, adjusting other elements such as the asset tree wider/narrower, etc.

8.17.2 Zooming

At the bottom of most Chart Templates, below the horizontal scrollbar (if visible) is the Zoom Bar. You can hover the mouse over the left or right end of the selected part of the Zoom Bar and drag to change the selection. Initially the entire Zoom Bar will be selected, so hover the mouse over the left or right end of the bar and drag. Once a subset of the chart is selected, you can use the scroll bar or the Zoom Bar to drag the whole selection area without zooming.

You can also zoom in or out by clicking in the chart area and (with the mouse cursor still inside the chart area) spinning the mouse wheel. For charts with a lot of data (thousands of events) this can be slow, so the Zoom Bar may be faster. You can zoom on a single axis by putting the mouse pointer over that axis and spinning the mouse wheel. Not all charts support zooming in both axes.

You can also control zoom with toolbar buttons Zoom In, Zoom Out, and Reset Zoom.

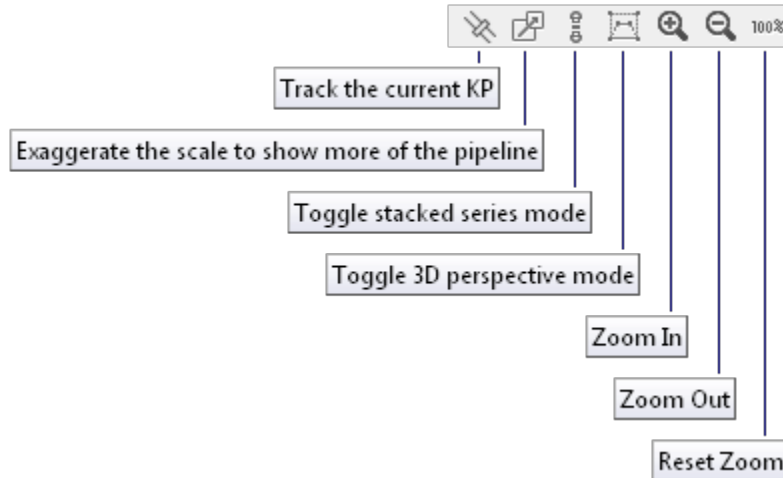
8.17.3 Charts Toolbar

There is no toolbar for the whole Charts panel. Instead, each chart has its own toolbar.

- **Zoom In** Zoom in.
- **Zoom Out** Zoom out.
- **Reset Zoom** Resets to default zoom level.
- **Export the chart to image(s)** Click this button to open the Export dialog. Ensure the range you want is set correctly using the Zoom Bar. Ensure the series you want to export are visible. If you would like to export the chart as a series of images, each covering a smaller horizontal range, enter the range you would like each chart to cover in the **Range of X Axis per image** field. For example, if you have a 300km pipeline and you enter “10” as the range per image, it will be broken into 30 images, each covering 10km.
- **Copy the chart to the clipboard** Copies the chart, as you see it displayed, without the “zoom” section at the bottom, to the clipboard.
- **Toggle chart** Expand/collapse display of this chart.

There are also several buttons specific to the Pipeline View chart:

- **Track the current KP** This button is only available in IC-Inspection. When selected, the pipeline view will move in time with the KP value coming in from survey. For NEXUS IC, see *Time Source* → *Synchronise KP* on the *Inspections Toolbar*.
- **Exaggerate the scale to show more of the pipeline** When selected, will distort the scale of the pipeline to make a greater KP range visible.
- **Toggle stacked series mode** When selected, will move events above the pipeline to make them more obvious. Different events will be moved up different distances so that all are easily distinguishable.
- **Toggle 3D perspective mode** When unselected, you will see the pipeline viewed from the side. When selected, you will see the pipeline viewed from above and slightly off to one side.



Tip: Click on the chart area and then, with the mouse cursor still inside the chart area, use your mouse wheel to increase/decrease the chart scale for export.

8.17.4 Report Table Sources

To extract chart template data into a report template, use a Chart Template element in the report, and use the appropriate Asset table or Event table as a source. For more information see *Report Templates*.

8.18 Survey Values

The Survey Values panel displays a list of all defined serial survey fields, the current value and the source of the serial input. Survey fields are defined in the Device Manager, within the device they are being received from. A red status colour shows for survey fields that are not receiving data or are disabled. A green status colour flashes for survey input fields that are receiving data.

Type checking occurs for the values entered in the Value Column. A Value cell gets a red background if the cell contains a value that does not match its survey field type. It gets a green background if the cell's value matches its survey field type. If IC-Inspection knows that this cell should contain a whole number, a "numeric" (i.e. a number that can have a decimal point), a date, a time, or a date/time, then it can know whether to colour the cell red or green. For example, if it's a KP and it contains "1-1-2017", then that's not valid. For other types (such as text), IC-Inspection doesn't attempt to show any validation.

8.18.1 Updating the Source for a Survey Field

To change the source of a Survey Field, click on the ellipsis (⋮) button in the Source cell adjacent to the survey field and choose the relevant input device from the drop down menu.

If your incoming survey contains a combined Date/Time, you will see a “Derived” option on your separate Date and Time source entries. These take just the Date, and just the Time, respectively, from the combined Date/Time. Similarly if your source has separate Date and Time fields, you will see a “Derived” option on your combined Date/Time field, which combines the separate Date and Time fields into a single value.

8.18.2 Updating the Destination for a Survey Field

You can log data from a survey value into one or more survey fields in the database. Click on the ellipsis button in the Destination cell adjacent to the survey field and tick one or more Survey fields. Now, during an inspection, the data in this survey value will be logged into that survey field.

There are several “meta” destinations available for use when a real survey field is not appropriate: Survey Date/Time, Survey Heading, and Survey KP. You should use Survey Date/Time as the destination for your DateTime field. (There is no field called “Survey - Standard.DateTime”, “Survey - Pipeline.DateTime”, etc. because date/time is the key value for every survey table, and it would be arduous and error-prone to force you to select them all separately.)

You should use Survey Heading if you do not wish to log Heading to a database field, but still want things that rely on Heading (such as the *Heading* window) to work.

You should use Survey KP if you do not wish to log KP to a database field but still want things that rely on KP (such as the *Charts* window or the *Pipeline View* window) to work.

8.19 Tasks

Tasks displayed in this panel are determined by the Workpack selected in the Database Information panel and the Asset selected in the Assets panel.

8.19.1 Tasks Toolbar

- *Launch* - launches the currently selected task in the Event panel.
- *Template* -
- *Edit* - Edit the selected task.
- *Navigate to task asset* - Will change the active asset in the hierarchy to the currently selected task’s asset. Note that this will change what tasks are visible in the Tasks window.
- *Children* - toggles on and off display of tasks on assets that are descendants of the asset selected in the Asset Tree panel.
- *Parent* - toggles on and off display of tasks on assets that are ancestors of the asset selected in the Asset Tree panel.
- *Customise* - See *Customise*.
- *Connections* - see *Connections*.
- *Instructions* – toggles visibility of the Instructions panel.

8.19.2 Launching a Task

To launch a Task from the Task panel, click Launch Task, or double-click the task in the grid.

Note that there is a right-click menu allowing you to launch a task, edit a task, or navigate to a task's asset.

8.20 Alerts

In certain circumstances, IC-Inspection will inform you of changes in its situation. Examples include: inspection started/stopped; incoming survey started/stopped; video recorders started/stopped. When these messages are low priority, they appear briefly at the bottom right corner of IC-Inspection's main window. When you are inspecting and they require your attention before you continue to inspect, they appear in the centre of the window, flash red, and remain until the problem is resolved or you manually dismiss the warning.

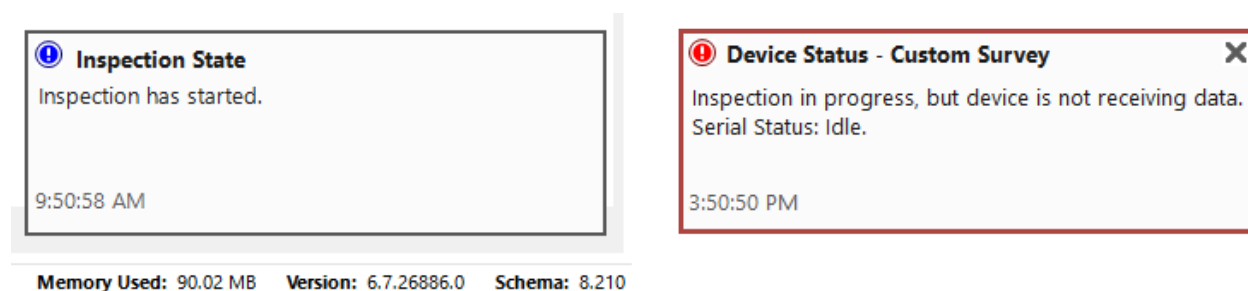


Fig. 1: A low-priority notification and a high-priority notification

If you start an inspection and a DVR fails to start recording, you will get a modal dialog telling you so. If you decide that you don't need that recorder, Cancel that dialog and disable the device in the *Devices* panel. If you don't disable the device, then every time you launch an event, IC-Inspection will warn you that the recorder is not started. These dialogs and notifications are to make it hard for you to accidentally event without recording video.

Other reasons alert notifications will be shown include:

- Invalid survey value. This can be caused if the incoming survey value does not match the expected data type (numeric, date/time, etc).
- Survey database destination error. This can be caused when a unit conversion fails between the incoming value and the database field.
- No survey data received in the last five seconds.

This information will be reflected in both the notification and in the State column of the Survey Values frame.

IC-Inspection is an on-line Eventing software application optimised for use in the off-shore environment. IC-Inspection is built around a Microsoft SQL Server relational database with events (items of inspection) referenced to positional data and assets. IC-Inspection can be configured to interface with:

- Survey systems, showing time, date, and ROV position;
- ROV video inputs, enabling image and video sequence references to events;
- Digital video recorders;
- Instruments such as CP Probes, FMD, providing automatic data input of results;
- Other digital input devices, through customisation of the software to suit the input string.

The IC-Inspection package is teamed with *IC-Recorder* to provide a digital recording package for real-time based online eventing. Multi-camera, sonar and profiling data can be recorded digitally with positional data displayed by IC-Recorder. NEXUS Integrity Centre (NEXUS IC) is used to configure the database, event definitions and other relationships used within IC-Inspection.

To learn how the grids and toolbar buttons presented in many of IC-Inspection's panels work, see *Common Features*.

A basic strategy for using IC-Inspection would be:

- Configure a NEXUS IC database, including *Assets*, *Event Types*, and optionally *Tasks* and *Drawings*.
- Configure IC-Inspection, including desktops, *Devices*, *Survey Values* and optionally *Event Templates*.
- Configure digital video recorders, whether *IC-Recorder* or a third-party recorder.
- Use the *Tasks* list or the *Drawings* to drive the inspection, completing tasks until none remain.
- *Launch* ad-hoc events as required.
- For each *event form*, fill in the form, optionally attaching still images captured from digital video recorders.

A training manual, showing how to use IC-Inspection for offshore eventing and NEXUS IC for offshore review, is available.

IC-INSPECTOR

9.1 Deployment

To deploy IC-Inspector 6.6, acquire appropriate iPad(s) and download the IC-Inspector 6.6 app, available for free from the [App Store](#).



9.1.1 Requirements

- iOS 13
- IC-Web Read/Write License
- IC-Web 6.6 or higher (6.6 recommended)
- NEXUS DB schema 8.200

9.1.2 Recommendations

We recommend the latest iPad Pro. IC-Inspector will run on any iPad (which can be useful for testing and training), but will not run on iPhones or iPod Touches.

If you expect inspectors to mark up photos, we suggest also purchasing an Apple Pencil.

If you expect inspectors to do significant quantities of typing, we suggest also purchasing a keyboard cover. Note that in quiet environments, you can use the iPad's built-in speech-to-text dictation capability. On some devices this capability works independent of internet connection — go to *Settings* → *General* → *Keyboard* and check the very bottom of the screen for the message “You can use Dictation for English when you are not connected to the Internet.”

Tip: When using speech-to-text for numeric fields, use phrases like “numeral one” for single-digit numbers; phrases like “one dot two three” for decimal numbers less than 10; phrases like “twenty three dot one nine” for decimal numbers from 10 to 100; and phrases like “one two three dot four five” for decimal numbers greater than 100.

If you require intrinsic safety, intrinsically safe enclosures are available from third-party vendors, but note that you may need to ship your iPad to the vendor so that they can install it into the enclosure.

9.1.3 NEXUS IC Configuration

When configuring *Asset Information* forms, we suggest keeping forms as simple as possible. Only mark fields as mandatory if it is guaranteed that inspectors are able to fill them in — if inspectors are required to fill a field but are unable to do so meaningfully, they will perforce enter junk data. Avoid text fields where possible. As an alternative you may be able to use a lookup list, where the inspector will pick from a list of options.

To make tasks available to an inspector, edit the tasks (possibly with multi-select) and set “Assigned To” to the desired inspector. You can click **Add** on this picker to create a new inspector. The next time the inspector clicks **Sync** in IC-Inspector, they will receive their tasks.

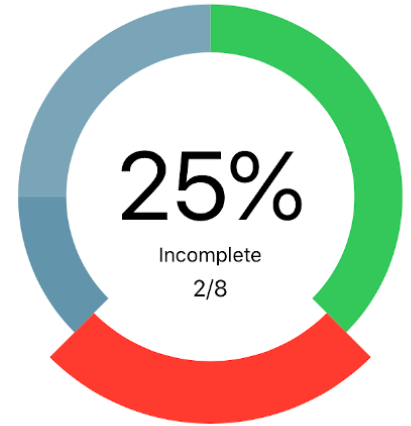
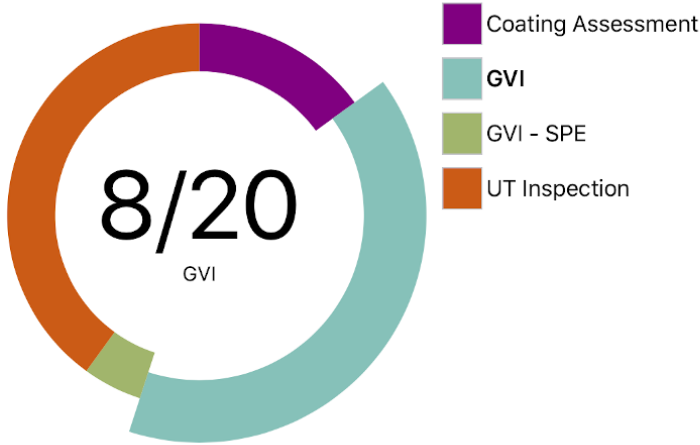
You can mark a task as ad hoc by ticking “Adhoc Task”. If you do this, when an inspector selects the task and fills out the form, the task will not vanish from their list — it will be available for them to complete again and again. You only need to create one ad hoc task of each type, as a single ad hoc task will be available on all assets. You should create that task on the highest-level relevant asset that has that event type *available*. Ad hoc tasks are suitable for events like “Damage”, where you want inspectors to be able to note any damage they see, even if it’s not part of the explicitly-tasked scope.

9.2 Summary

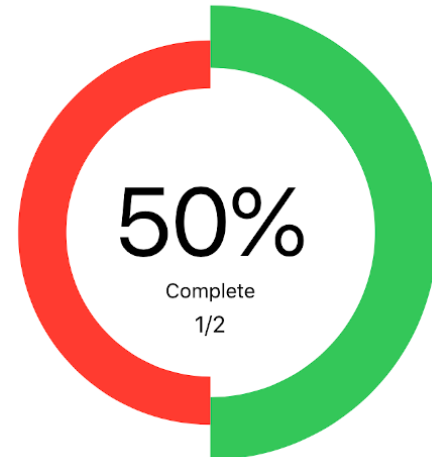
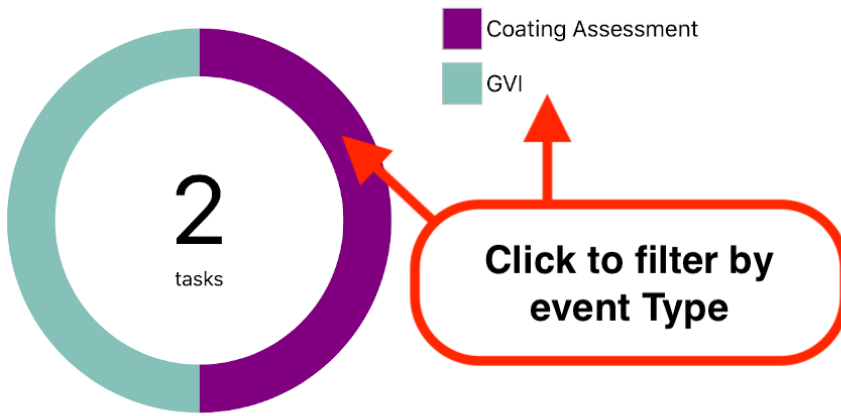
This screen shows an overview of tasks assigned to you. Tap **Task**, **Workpack** or **Asset** to see the tasks divided up in any of those three ways. For example, if you tap **Asset**, you’ll see one pair of donut charts for each different asset you have been assigned tasks on. In each case, the left-hand chart shows the tasks of each type, and the right-hand chart shows the completion of those tasks. To see completion for a particular donut segment, tap that segment. Tap the text at the centre of a donut to be taken to the relevant collection of tasks. Depending on what you have selected under **•••** → *Show Tasks in Drawings*, you will either be shown a list of *Tasks*, or a collection of *Drawings* with tasks in layers on those drawings.

Summary

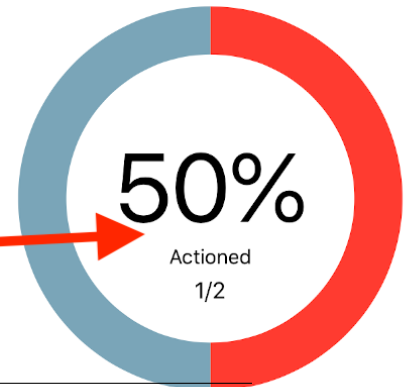
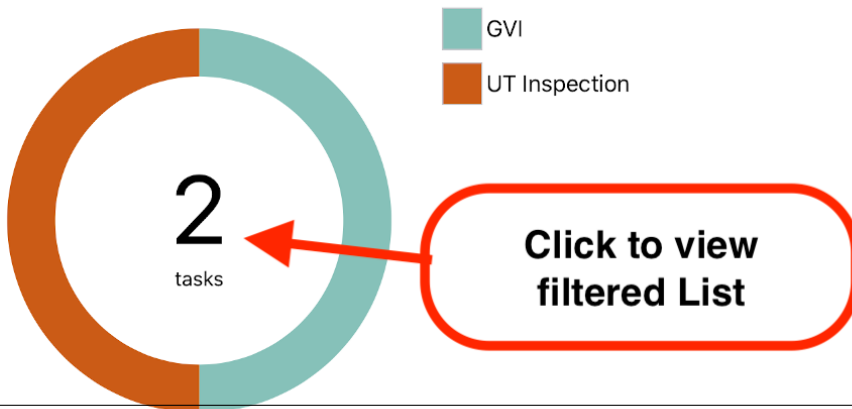
WOOD / OFFSHORE / PLATFORM A / CELLAR DECK



WOOD / OFFSHORE / PLATFORM A / CELLAR DECK / CLOSED DRAIN PUMP



WOOD / OFFSHORE / PLATFORM A / MAIN DECK



Summary

167

Task

Workpack

Asset

Hint: You can tap the top centre of the screen to quickly return to the top of the list.

9.3 Tasks

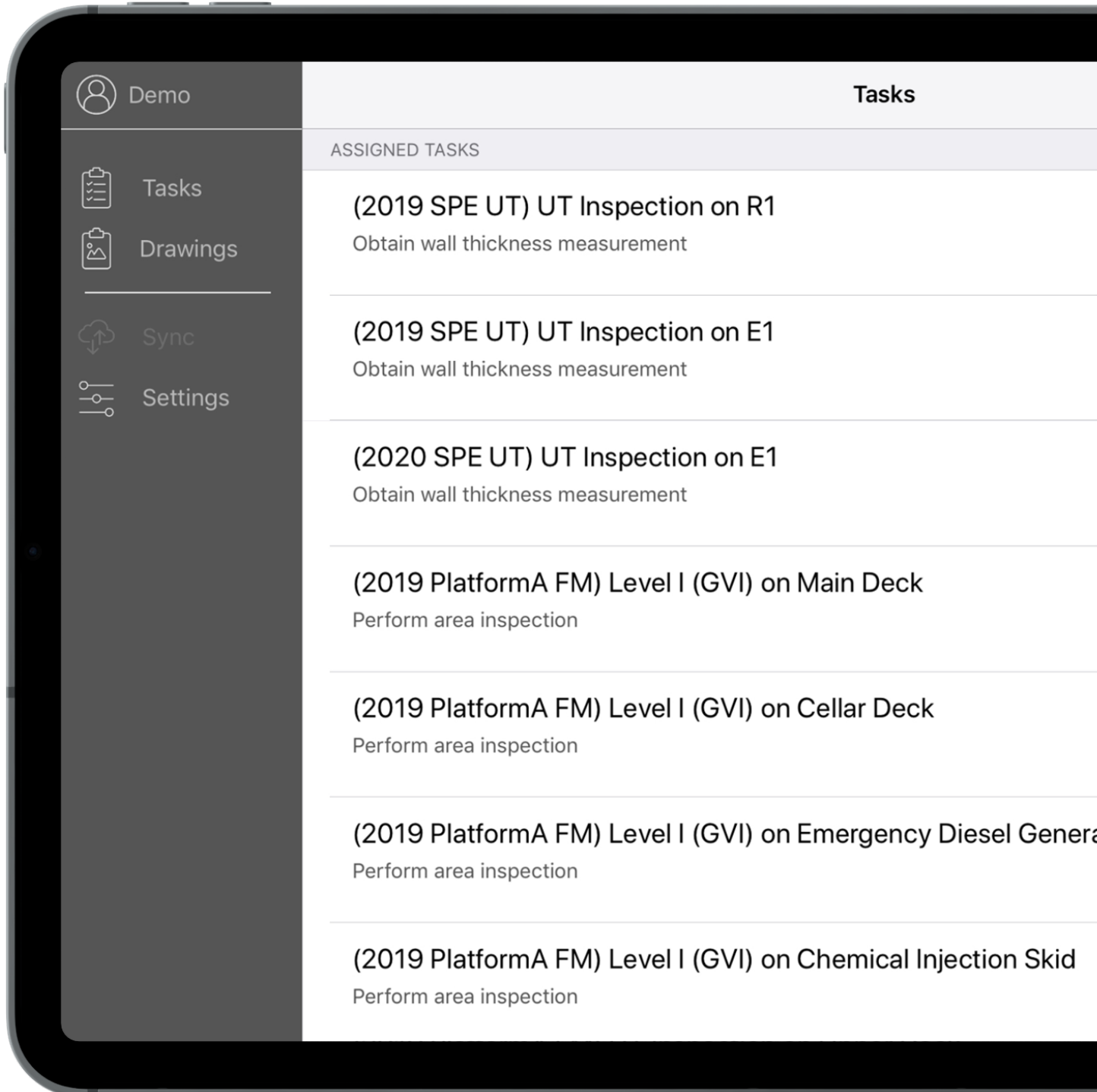
On this screen you'll see a complete list of tasks assigned to you.

Tasks come in two varieties: assigned and ad hoc.

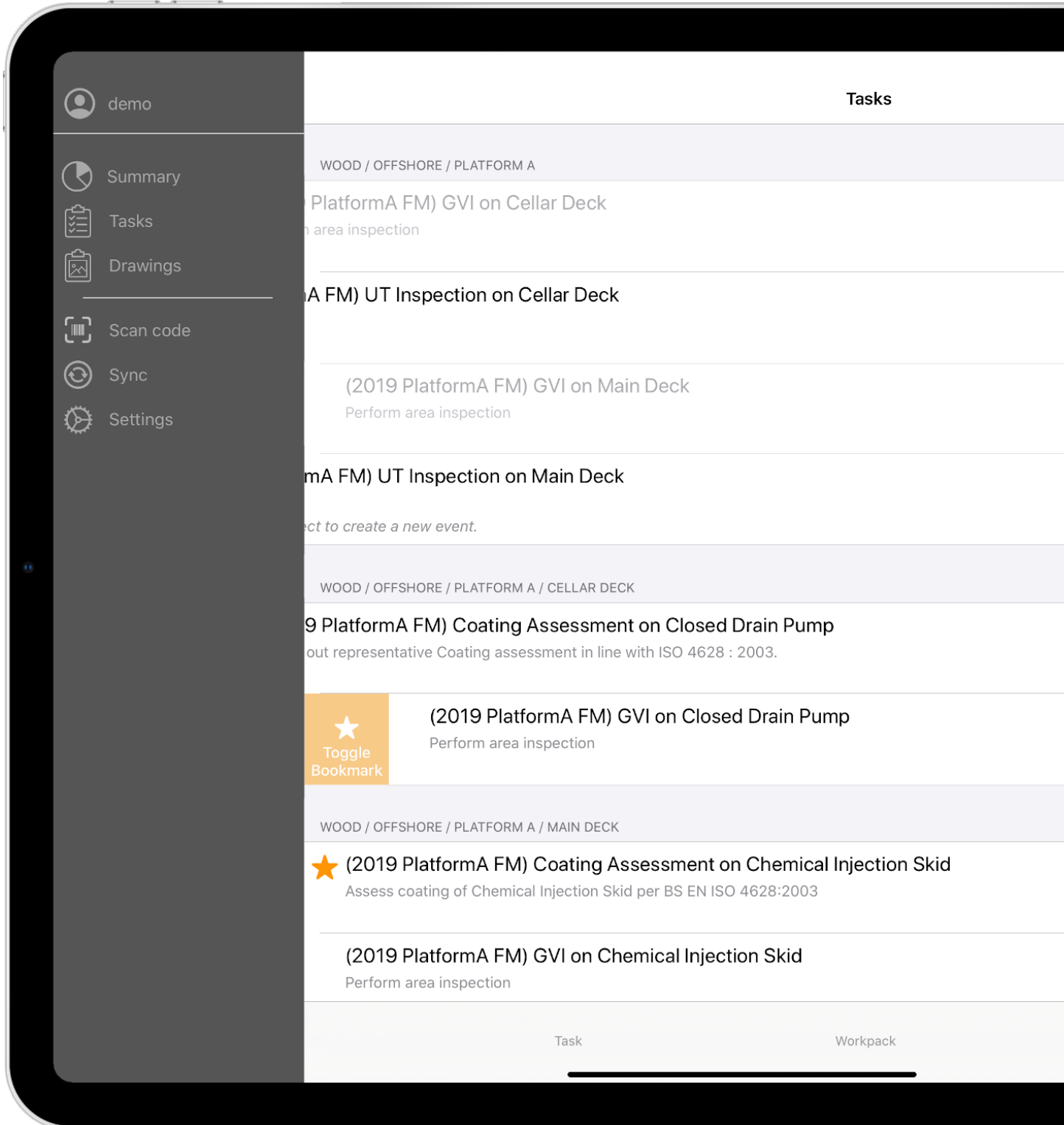
- Assigned tasks are a piece of work that you are tasked with doing. An example might be: carry out a General Visual inspection on a particular piece of piping.
- Ad hoc tasks are available for you to fill out as required. For example, if your GVI procedure tells you that where you see evidence of corrosion on a piece of piping, you should carry out a UT measurement task, then you should find the ad hoc task for UT Measurement on this asset and carry it out. Or if you have a Leak ad hoc task, then wherever you observe a leak, you should tap that task.

Tasks may be grouped by Workpack or Asset Location. By default, tasks within these groups will be ordered by the Order Number given to the Task in NEXUS. If no Order Number is defined, then they will be ordered by Name.

When you tap a task you'll be taken to the *Event Details* screen to fill out more information. In the case of an ad hoc task a new assigned task will be added to the list.



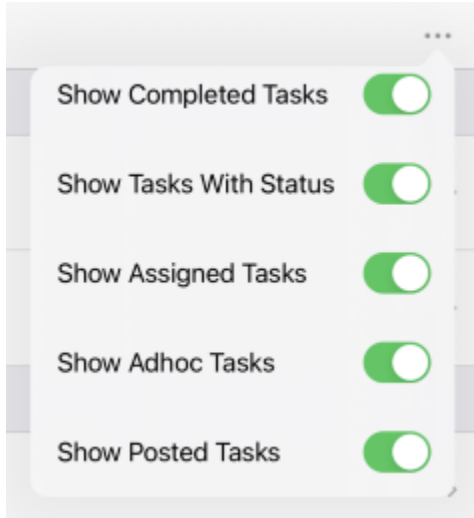
When you complete a task, it will be marked as completed. You can complete a task in the [Event Details](#) screen or by swiping the task's row. When the task has been completed it will be uploaded to the server during the next [Sync](#).



You can choose which tasks to show by tapping the ... ellipsis at the top right:

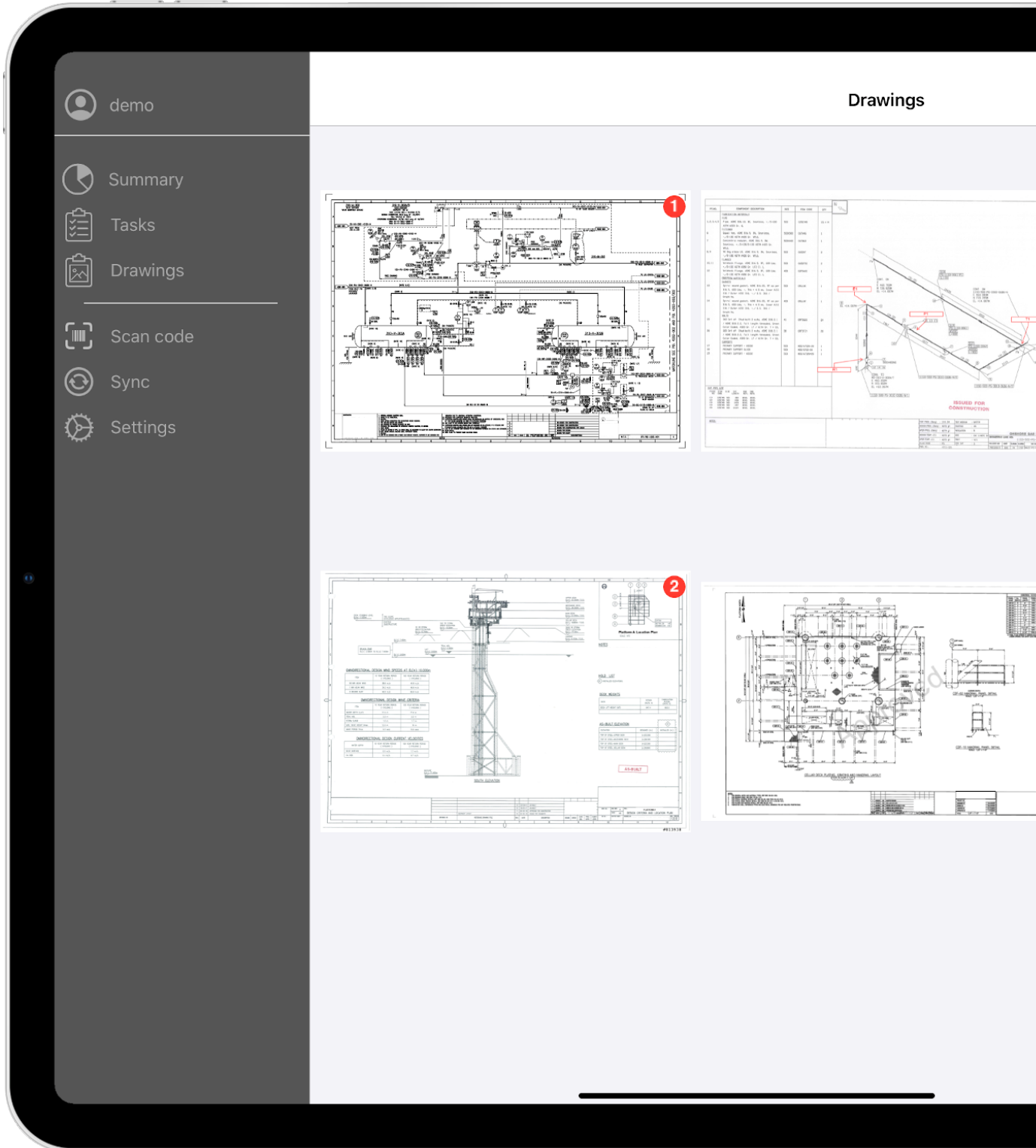
Note:

To make the **Show Posted Tasks** option visible, go to *Settings | General Options* and disable **Remove completed tasks during sync**.



9.4 Drawings

This is the collection of drawings available to you. Scroll to see more. Each drawing shows its number of incomplete tasks at the top right. Tap a *Drawing* to go to it.

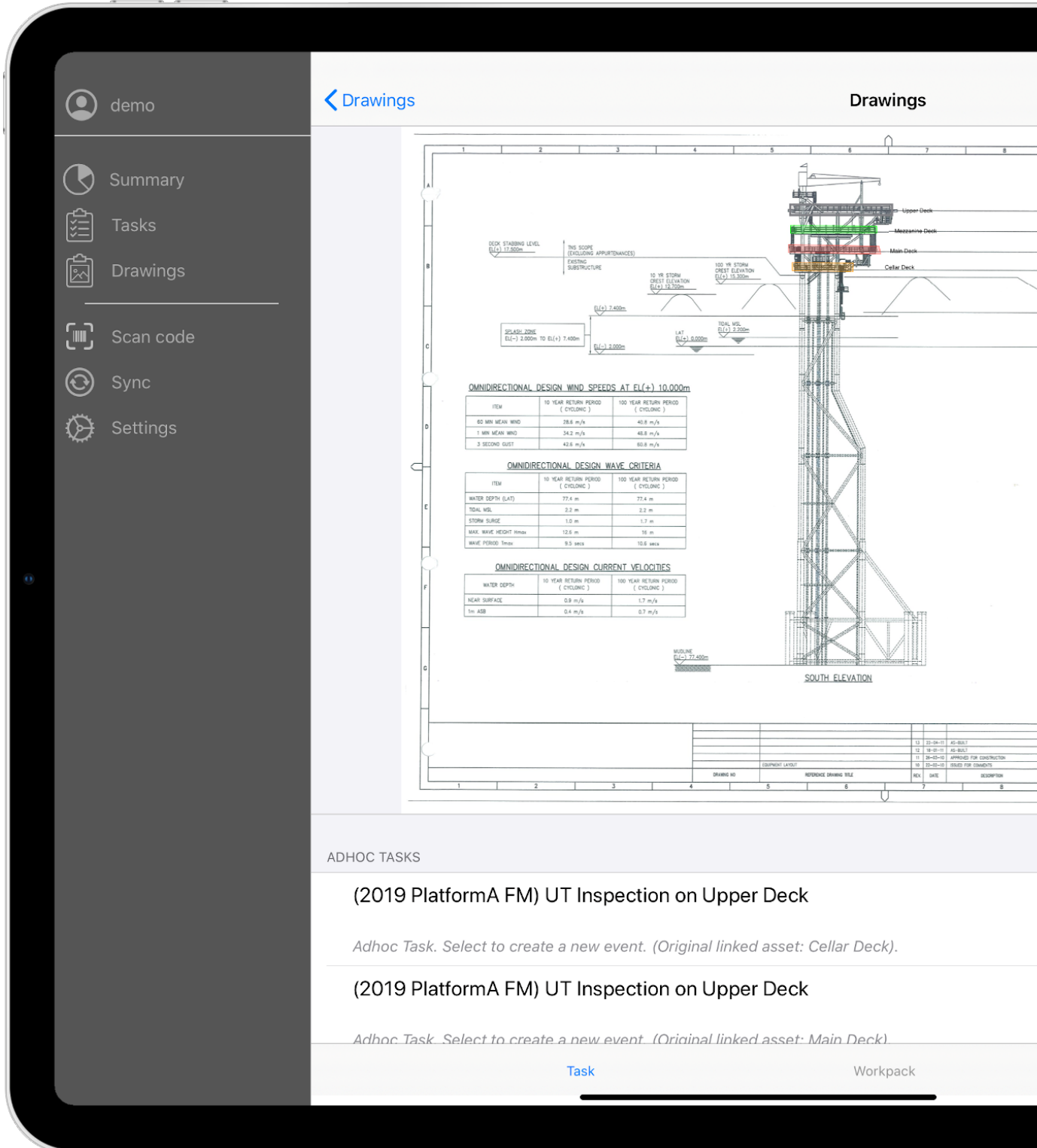


9.5 Drawing

A drawing has layers. These are created in NEXUS IC. A layer will be coloured according to its tasks:

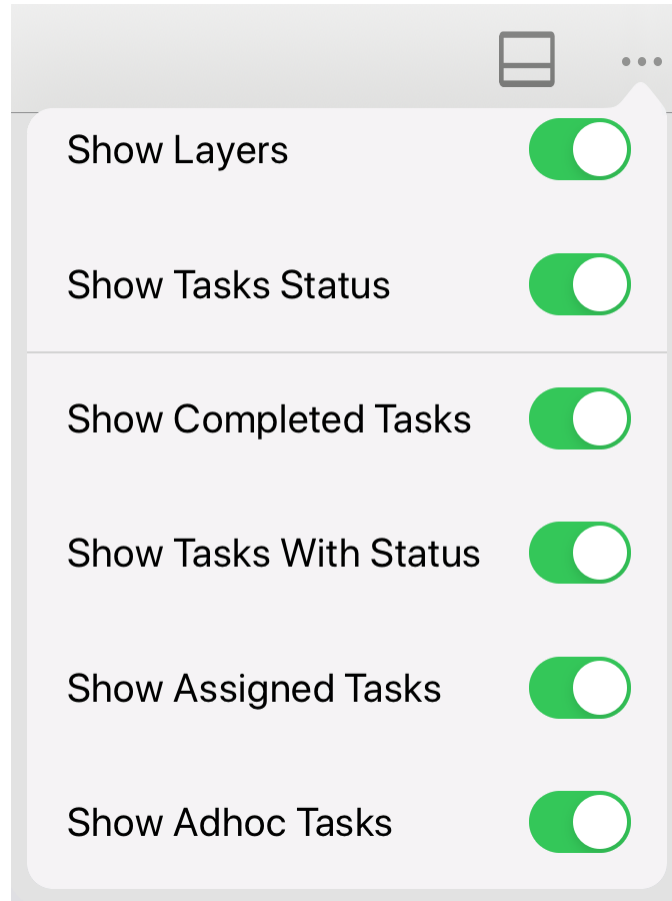
- If a layer has no tasks it will be grey.
- If a layer has tasks, all incomplete, it will be red.
- If a layer has tasks, some of which are complete, it will be orange.
- If a layer has tasks, all completed, it will be green.

To see a layer's tasks, tap on that layer.





To complete a task, tap on that task. You will be taken to the *Event Details* screen for that task.

At the top right of the Drawing screen you will see an \dots ellipsis. Tap this to reveal options to change what you see on the Drawings screen.



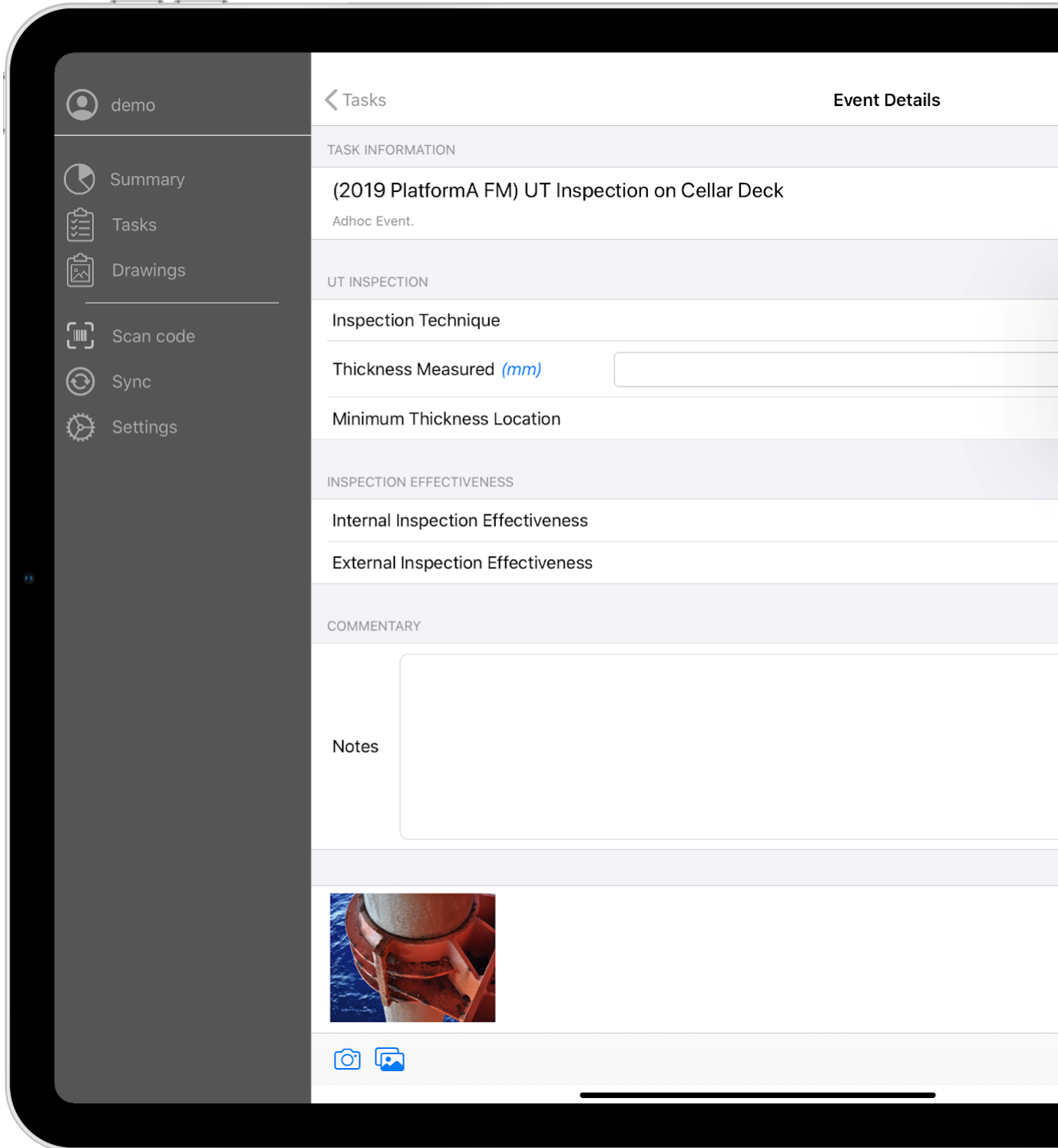
9.6 Event Details

For each type of task, there's a corresponding event form. (These forms can be *designed* in NEXUS IC.) You can fill details into the form as appropriate. Some fields are required; when empty, these have a red  required mark. You can clear a non-required field by tapping the  clear icon.

Tip: You can change the text size on event forms (and therefore how much of the form fits on your screen at once) in your iPad's Settings app, under *Display & Brightness* → *Text Size*.

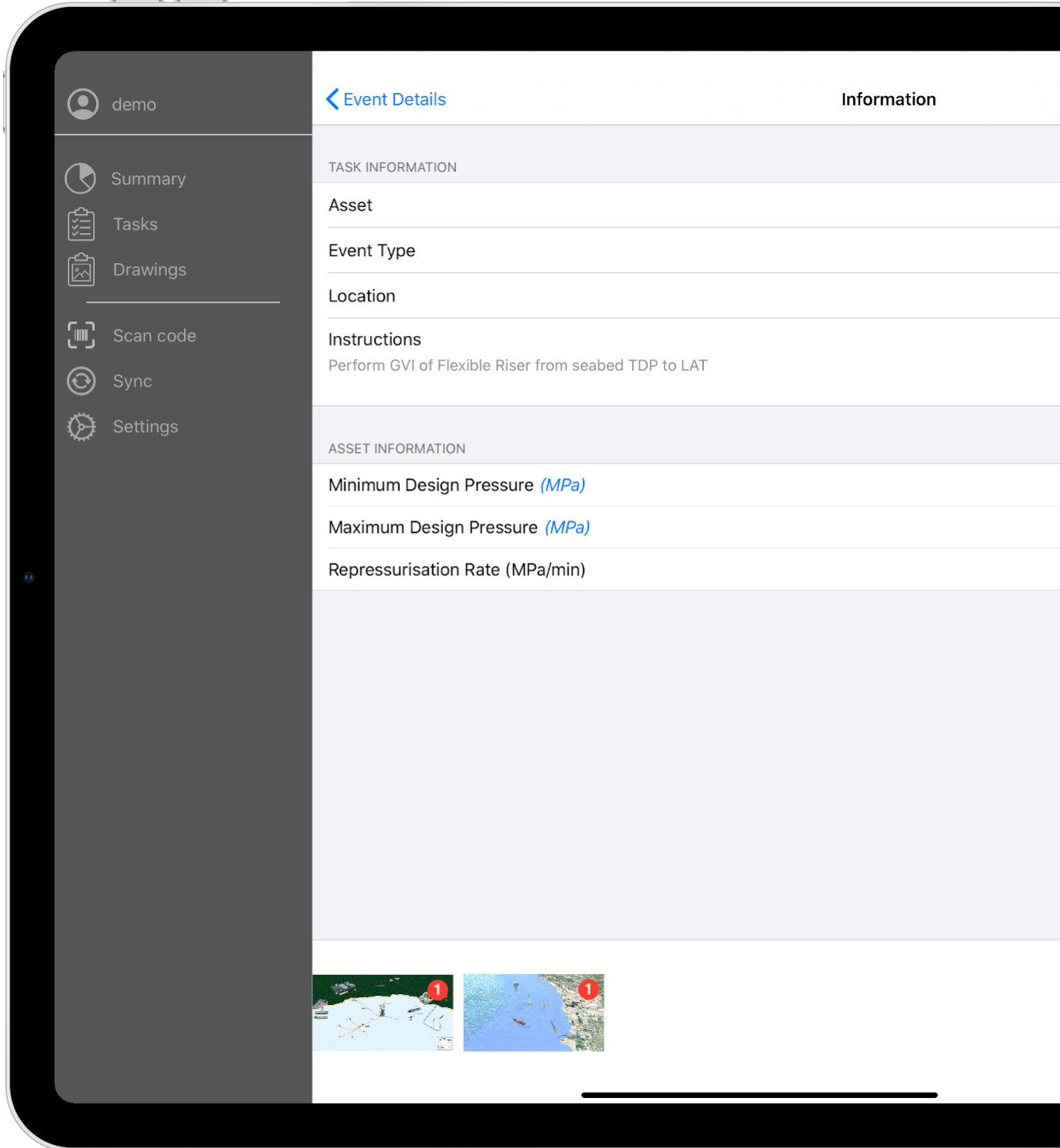
Once you have filled in any required fields, you can complete the task by tapping **Status** then **Mark as Complete**.

If you are unable to complete an event, you can tap **Status** then tap an option from the drop-down. The items available in this list depend on what your database has configured in NEXUS IC under *Task Status*.




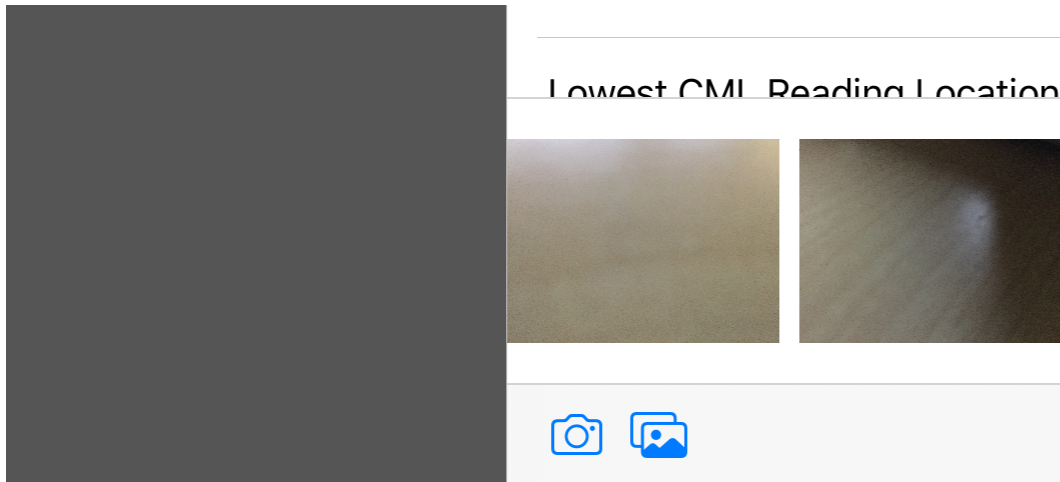
9.6.1 Task Information

Tap on **TASK INFORMATION** to see details of this task (the asset name, event type, asset location, any task instructions, and any drawings directly linked to this asset). If any *Asset Information* is configured to be shown in IC-Inspector, it will be shown on this screen.






9.6.2 Photos

You can add photos to your event details. Tap the  camera button at the bottom left to take a photo, or tap the  picture icon to select one or more images from your iPad's photos library.





Tap a photo to *edit* it, including adding markup-up.

To remove photos, tap **Photo Options** (at the bottom right) then tap one or more photos to select them. Then tap the  trashcan icon. Similarly to send photos somewhere else (to a message or email, to the Photos app, to a printer, etc.) select then tap the  share icon.

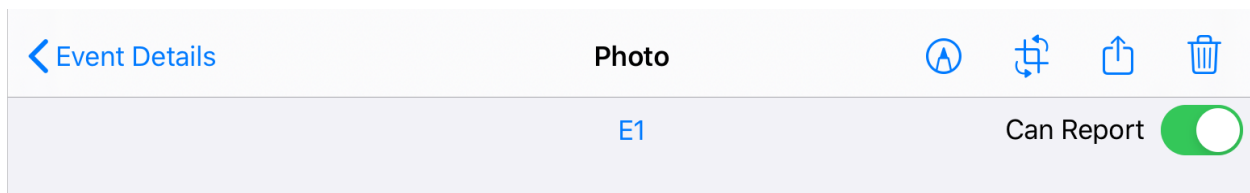
Tip: If you want to mark up an IC-Inspector drawing, view the drawing in IC-Inspector, then take a screenshot by briefly holding the Home and Power buttons simultaneously. Save that screenshot to your Photos. Then tap  to bring it into IC-Inspector, and tap the new “photo” to mark it up.

9.6.3 Bookmarks

You can “bookmark” an event by tapping . The icon will change to . You can tap again to remove the bookmark. Bookmarking is used for user-defined purposes: it can mean whatever your organisation wants it to mean. Its usual use is to flag events which require review: checking grammar, checking that you are on the correct asset, sense-checking data recorded, etc. You may wish to add text in the Notes field flagging the reason you have bookmarked this event. Bookmarked events will be flagged with a green star in NEXUS IC’s *Event Listing*.

9.7 Photo Editing and Markup

You can edit and mark up a photo. On an *event*, tap a photo. You will be taken to an editing screen. You can swipe left and right to move between photos.




By default a photo is given the name of the task it was created from. To edit this, tap the name.

You can toggle the **Can Report** status of a photo. **Can Report** is an optional field that can be used in report templates to select only key photos for reporting.

At the top you'll see four icons, for markup, crop/rotate, share and trash.



9.7.1 Markup

Tapping  will take you to the markup screen.

You will see tools at the bottom of the screen:



These are colour, shape, line thickness, text entry, eraser, and select/move.

Tap colour to choose the colour(s) to mark up the photo with. If you have an Apple Pencil, the Secondary colour may be useful to you; otherwise only the Primary colour is used.

Tap shape to choose the shape to mark up the photo with. **Pen** allows freehand drawing. When drawing other shapes, you are dragging from one corner of the shape's bounding rectangle to the other.

Tap line thickness to set the thickness of the line shapes will be drawn in.

Tap text to add text to the photo. Tap the photo to initially place your blank text box — the box will be placed centered on the location you tap. Type text, using either the on-screen keyboard or a keyboard connected to your iPad (via the magnetic Smart Connector or via Bluetooth). To move the edit cursor around within the text you are typing, use the cursor keys on a physical keyboard (possibly in conjunction with Shift, Control, Option and Command keys) or long-hold the spacebar on the on-screen keyboard, and then drag. For multi-line text, press Enter at an appropriate point.

You can drag the whole text box around the screen, or drag the white drag-handle at the bottom right of the text box to resize/rotate the text.

Tap erase to erase some or all of existing mark-up.


Hint: You can create a dashed line by drawing a continuous line and then swiping across it with the eraser.

Tap select to select a previously created markup item. You can then drag that item to a new location. If you select a text markup, you can edit the text. While a markup item is selected, a trash icon will appear at the bottom right. Tap this to trash the selected markup item.

Undo and redo buttons are available at top right.

Cancel and **Done** buttons are available at bottom corners.

9.7.2 Crop and Rotate

Tapping  will take you to the crop-and-rotate screen. Use the slider at the bottom of the screen to rotate the photo by an arbitrary angle, from 180° anticlockwise to 180° clockwise. Or tap any of the five buttons below the slider to select specific angles.


Note: Using angles other than -180°, -90°, 0°, 90° or 180° will crop away part of your photo.

Press **Done** or **Cancel** at the top right to keep or discard your changes.


Note: You can also rotate the image in 90° steps with buttons at the bottom left and bottom right of the Photo screen but the rotations will not be saved.

You can also crop your photo here.

9.7.3 Share

Tap  to see an iOS share sheet, which works in the way you'd expect — tap a destination to send the marked-up photo there. Both rows of the share sheet can be scrolled horizontally to reveal more options, including the **More** option, which lets you configure which items appear, and what order they appear in.

9.7.4 Trash

Tap  to discard this photo and return to the *event* screen. This is different from tapping the **< Event Details** button at the top left, which will return you to Event Details *without* discarding the photo.

9.8 Scan Code

If your NEXUS database has a field (such as an asset information field) configured to contain an asset tag, you can affix QR codes or bar codes to your physical assets, then scan them in IC-Inspector. Tap **Scan code**, then point the iPad's camera at the QR code or bar code. If the code is found in your NEXUS database, and IC-Inspector currently has one or more tasks for that asset, the asset name that matches this code will be shown at the bottom of the screen. Tap the asset name to see its list of tasks, then select tasks from the list as normal. More information about configuring an asset tag can be found under *Features*.

9.9 Sync

Whenever you are in network range (wifi and/or cellular phone, depending on your iPad model) you can tap the **Sync** button. Tasks you have completed will be sent to your database server. Any new tasks (and their attendant drawings) will be sent to your iPad. Between syncs, you may operate outside of network range; it's only during sync that you need coverage.

In Demo mode, sync is disabled.

9.10 Settings

If you would like to try IC-Inspector with demo data, tap the **Use demo data** switch. Note that using demo data will erase any local data currently in the app.

If you are planning to use real data, enter your server name and credentials. The credentials are typically the same as those you enter when you start NEXUS IC. (If you don't enter any credentials when you start NEXUS IC, you may be using Single Sign-on — enter your Windows domain credentials here instead.) Then tap **Test the connection**. If all is well, you can tap **Save Server Settings**. If you change user credentials, the previous user's data (tasks, events, etc.) will be cleared, and the new user's data will be loaded from the server. Ensure that the account you use has a IC-Web

Read/Write *license* in NEXUS — if it does not have this, you will not be able to sync your work back to the server. (You will be told “This account has a readonly license.”)

The **Remove completed tasks during sync** switch controls whether no-longer-available tasks remain on your iPad. (They may be no longer available either because someone has removed them in NEXUS IC, or because you have completed them.)

Workpack display name lets you control how workpack names are displayed in IC-Inspector. This can be useful if you are using many workpacks and have configured Workpack Groups in NEXUS IC, and/or you have configured abbreviations for your workpack names in NEXUS IC.

Display selection wheel for lookup lists controls how IC-Inspector lets you select a value from a lookup list of choices. This is particularly useful when some of your lookup lists may have many choices.

Clear Data will erase data from this iPad.

Settings

DEMO DATA

Use demo data

Using the demo data will erase any existing data.

SERVER

Server IC-Web server address

Login User name

Password Password

Test the connection Save Server Settings

To use the server configuration, the demo data needs to be turned off.

GENERAL OPTIONS

Remove completed tasks during sync

Workpack display name Name

Display selection wheel for lookup lists

Clear Data

Erase all data from IC-Inspector.

ABOUT

Software Version 6.6.23501

IC-Inspector is a tablet application optimised for inspection data collection using an iPad. IC-Inspector communicates with a NEXUS *REST* server to receive tasks and drawings, and to upload inspection data. It can be used for inspection with no internet connectivity, although it requires connectivity to initially receive tasks and finally send inspection data.

A basic strategy for using IC-Inspector would be:

- Configure a NEXUS IC database, including *Assets*, *Event Types*, *Tasks*, and optionally *Drawings*.
- Assign *Tasks* to personnel.
- Configure IC-Inspector with a REST server address, login name and password. The login name should match an inspector who has tasks assigned to them.
- Synchronise to the REST server to receive your assigned tasks.
- Use the task list or the drawings to complete tasks by filling in event forms. Take or attach photos as desired. Optionally, create ad hoc tasks to allow you to fill in additional event forms over and above those assigned to you.
- Synchronise to the server again to send your inspection data to the database.

Tasks in IC-Inspector can be completed in two ways: by tapping on a layer on a *Drawing* from the list of *Drawings*, or by tapping on a task in the list of *Tasks*.

You can download the IC-Inspector app free from the [App Store](#).



It is only available for iPads. The app comes with demo data suitable for touring and learning the app. You can connect it to your actual database via *Settings* and *Sync*.

IC-RECORDER

10.1 IC-Recorder Deployment

IC-Recorder is a single-channel recording application. But it is designed to smoothly allow several copies to be run on one or more PCs for multi-channel recording scenarios.

When deploying IC-Recorder you will need to either:

- run the software on existing DVR hardware, or
- source appropriate hardware specifically for video recording.

The hardware that you require depends on the number of channels to be recorded and the required video resolution & framerate (SD or HD?). The below information is provided to help guide your selection.

10.1.1 PC-based Video Capture Devices

IC-Recorder supports a variety of video capture hardware, both internal and external. In short, if a device supports “DirectShow”, it is likely to work with IC-Recorder.

[Startech](#) sell an external USB device, suitable for use on laptops and on any machine where you want single-channel recording. It captures the full analog resolution (720x576 if you’re recording in PAL). Any USB device that says it has a “2861” or “EM2861” chip or chipset is likely good too. They aren’t broadcast quality, but by the time the signal reaches the capture device, it is unlikely to make much difference — electrical noise and signal attenuation will have degraded the image enough that the capture device won’t be the weakest link. We have had some negative experience with connecting multiple of these USB devices to a single machine, but one has always been fine.

[Osprey](#) sell a family of internal cards. These are broadcast quality. We’ve had good experience with the 260e and the 210e’s older sibling. We’ve not tried the 100e, but it is likely fine.

For multi-channel recording there’s also the 4-channel 460e, which has also worked fine for us. (Note — There is one known issue with the 460e: Windows occasionally misallocates IRQs on the PCIe bus, causing the 460e to drop frames. To mitigate this, go to *Options* → *Hardware* → *Properties* → *Device*, and move the slider on the ‘PCIe Bus Usage’ section (up or down, it doesn’t matter). Then click Apply. After next reboot, the problem may recur.)

[Blackmagic](#) also sell a range of suitable cards, but they have historically been more finicky to set up than Osprey devices, and are less heavily tested with IC-Recorder.

For HD, Osprey have [USB 3.0 devices](#) and [internal cards](#).

If you want the ability to edit recording profiles, you will also need [Windows Media Encoder](#) installed. After installing, copy its `WmProEdt.exe` (usually found in `C:\Program Files (x86)\Windows Media Components\Encoder`) to IC-Recorder’s Profiles folder (usually `C:\Users\Public\Documents\IC-Recorder\Profiles`).

Computing power

With these devices, video is converted into WMV format by the PC's own CPU. Thus, the CPU needs to be powerful enough to do the conversion work.

In very rough terms, a single channel of HD video at 1080p25 requires a multi-CPU score of about 11000 on [Geekbench](#). Two channels requires twice as much (i.e. 22000). Double the frame rate (e.g. 1080p50) requires twice as much, and so on. An SD channel has about one fifth as many pixels as a 1080p25, and thus requires about a fifth as much CPU.

If buying an Intel CPU, an LGA 2066 socket and an X299 chipset is likely most suitable (as of 2018). Number of PCIe lanes required depends on number of hard disks connected to motherboard NVMe connectors: if only one motherboard NVMe port is used, likely a 28-lane CPU will suffice; if several NVMe SSDs are connected, more lanes might be advisable. Check motherboard documentation to see which PCIe card slots will be activated under what circumstances (often in a phrase like “x16/x0/x8/x0 or x8/x0/x8/x8”). As of 2018, AMD CPUs may provide more power per dollar than Intel, and should work fine.

In general terms, a single modern PC with an Osprey 460e will be capable of recording 4 channels of SD video.

In general terms, a single modern PC with an Osprey 825e should be capable of recording 2 channels of HD video.

Hardware

When selecting PC hardware, be sure to choose hardware with an adequate number of PCIe lanes for the cards in use (typically capture card(s) plus optional graphics card plus optional RAID controller). Bear in mind that SATA, M.2 etc. drives may consume lanes. Once you have selected a CPU, check motherboard documentation: if the CPU has a small number of lanes (e.g. less than 44), not all PCIe slots may be active, or may be active at less than their full physical width.

As of 2019, we recommend the X299 chipset as being suitable. A high-end graphics card is not necessary: the key feature of a graphics card for this purpose is how many “heads” (i.e. monitors) it will support at once. (Some cards have more physical output connectors than they are capable of driving at once.) As of 2019, i7-7800X is likely a suitable CPU.

Where possible, we recommend avoiding RAID on the encoding machine(s), as RAID introduces failure points and complicates troubleshooting. Instead, we advocate moving video off the encoding machine(s) and onto a NAS or other redundant storage system.

If you are using SSD, be sure that the SSD sustained write speed is adequate for the maximum video capture rate: recording several HD channels may exceed the sustained write capabilities of some SSDs. You can mitigate this by installing several SSDs, and writing different channels to different disks. (The pathological case is when you nearly fill the disk, then delete files to create space, then immediately start recording video: for an SSD, erasing previously-used space to make it available for re-use is time-consuming.) Spinning hard disks are also perfectly acceptable in this use case. You may wish to use a small SSD for the operating system, plus a hard disk for the video data.

10.1.2 Non-PC based Video Capture Devices

IC-Recorder also supports the [Marshall VS-103E-3GSDI encoder](#). IC-Recorder controls this in a similar way to an on-board capture device, but the conversion to digital video is done by the Marshall encoder's own hardware, not by the PC/laptop's CPU. Its text overlay is slightly less capable, but still perfectly adequate. This device captures either standard definition composite analog video or HD digital video via SDI or HDMI (but not both simultaneously). The Marshall Encoder can only record to AVI, when controlled by IC-Recorder.

Computing power

Video is digitised and encoded on the Marshall device which reduces the load on the PC or laptop to simple video decoding for the purpose of viewing the video stream. In general terms, a single PC will be capable of controlling and previewing 4 channels of video from 4 encoders.

Hardware

If possible, use a PoE-capable Ethernet switch for your Marshall encoders. This removes the need for a separate wall-wart power brick for each unit, and provided that the switch is on good-quality power, removes power as a source of trouble.

Limitations of SSD write speed described above also apply here.

Preview

You can preview video from a Marshall encoder in IC-Recorder, complete with overlay. In some circumstances, this preview may stutter or skip. This preview is separate from the recorded stream, so typically skipping on the preview does *not* imply skipping in the recorded video. Play back a recorded video to check.

If you want an accurate video reference, use VLC Player via `rtsp://<IP address>/video1_audio1` or connect a monitor directly to the Marshall encoder's HDMI Out port. You won't see text overlay on HDMI Out because it's just pass through.

10.1.3 Storage & Redundancy

IC-Recorder will store video in the location it is directed to by IC-Inspection. Care should be taken to ensure there is sufficient storage space for the recorded video and that appropriate measures are taken to secure and backup the video data. There are no inherent archiving or backup routines within IC-Recorder. We recommend using a network based archiving utility or powershell scripts to handle the video data as desired.

Consideration should always be given to hardware redundancy to allow continued operation in case of any hardware failure.

10.1.4 Time

We recommend unticking "Automatically adjust clock for Daylight Saving Time" on DVR computers. IC-Recorder periodically receives time updates from IC-Inspection, but between messages it dead-reckons. If the IC-Recorder PC's clock occasionally jumps forward or backward by an hour during operations, bad things might happen. Daylight Saving: Just Say No.

IC-Recorder is a Digital Video Recorder software application capable of overlaying text onto video as it is recorded. It can accept video from a variety of sources (USB cameras, SD cameras, HD SDI cameras, etc) depending on the capture hardware available to the PC. A single IC-Recorder instance captures a single channel of video, but several IC-Recorder instances can be run on one PC, enabling multi-channel capture on a single PC.

IC-Recorder is designed to work seamlessly with IC-Inspection to deliver the most efficient offshore campaigns possible and the software is provided **free-of-charge** as a companion product to IC-Inspection. (Contact us to request a copy.)

When you start IC-Recorder, if the default TCP port (4500) is unavailable, IC-Recorder will "probe" each higher port number in turn (4501, 4502, etc.) to find a free port. Thus, you can run several IC-Recorders and each will find a free port. IC-Recorder will load a settings file based on the port number it found, so each IC-Recorder can be pointed at different capture hardware, different output recording folders, etc. So the typical use case is that if you have several

capture devices on a single PC, or a multi-channel capture device on a single PC, you will run several copies of IC-Recorder on that PC. In the first IC-Recorder select the first capture device (or the first channel on your multi-channel device), etc.

When you first start IC-Recorder, you'll need to configure it. Go to *Tools* → *Options*.

10.2 Hardware

The first page is **Hardware**, and the first choice is **Input**, where you can choose Video Hardware, Still Camera, or Marshall Encoder. “Video Hardware” can be any device that implements Microsoft’s DirectShow interface. This includes nearly every video capture card, sound card, or USB capture device. A Video Hardware device will begin recording when an inspection is started. “Still Camera” mode allows IC-Recorder to treat the camera device as a snapshot-taking device, rather than a video recorder. This means in IC-Inspection the device will not begin recording immediately upon starting an inspection. See *Marshall Encoder* for information on the “Marshall Encoder” option.

10.2.1 Video Hardware

Choose your input Video Capture Device and (optionally) Audio Device. For your main (centre) video channel you should record audio. For other channels you may wish to not record audio — this is to prevent “echo” during multi-channel playback caused by several copies of the same audio playing in not-quite-perfect synchronisation. If in doubt, we recommend recording audio on only the main video channel.

If you are running several IC-Recorders, you should choose a different Video Capture Device in each — in general you can’t consume one Video Capture Device twice.

Video Device and **Audio Device** each have a **Properties** button next to them. Clicking these will pop up a dialog provided by the driver of the hardware device in question. This dialog is not designed by us, and what you see will vary according to your capture device. Some device drivers do not supply a Properties dialog at all — in this case, clicking **Properties** will do nothing.

The **Video Preview** option controls some behaviour of the underlying Windows Media encoder. Its default of “Software - Most CPU for compression/Some CPU for Preview” is fine for most circumstances. With this setting, if there is insufficient CPU power, preview may become jerky (with just a few frames per second), but it will still try to record smooth video. If you are seeing jerky preview, you should record a test video with plenty of movement in it, then play back that video (using Windows Media Player or some other tool) to see if it seems smooth. If you are experiencing no preview whatsoever, you should still try a test recording and playback, as there are circumstances where Windows Media encoder may fail to deliver preview, but still record perfectly.

10.2.2 Marshall Encoder

The Marshall VS-103E Encoder is an external piece of hardware that takes a single video signal in, converts it to a digital stream, and sends it to IC-Recorder over Ethernet. IC-Recorder then records that to disk as a file. The advantage of this approach is that there is little CPU overhead on the computer running IC-Recorder, as most of the “work” is done by the Marshall Encoder. The Marshall Encoder also overlays text onto the video, under the direction of IC-Recorder.

Set the **IP Address** to the address of the Marshall Encoder. Set the **Username** and **Password** to match the values you have set up in your Marshall Encoder. Tick the **Use Authentication** box. Set **Channel** to 1. (The remaining fields on this page are informational.)

When you click **OK**, you should see a preview of the video feed coming in to the Marshall Encoder.

10.3 Video Format

For system hardware (cards or USB devices directly connected to this PC), there are a variety of video format options to configure. For Marshall Encoder devices there are none, because the encoding is carried out by the Marshall Encoder, not by IC-Recorder. When controlled by IC-Recorder, Marshall Encoder video recordings will always be AVI.

For system hardware, the first choice on the Format page is whether to use AVI or WMV. This is like an “envelope”: digital video can be encoded with a variety of different codecs, but can also be wrapped in a variety of different video format “envelopes” (such as AVI or WMV). The analogy is to a paper letter in an envelope: the choices as to what envelope to use, and what language to write the letter in, are separate. When a computer plays back a video file, it will first handle the envelope, and then handle the video stream(s) within. If you know that video will only be played back on Windows computers, WMV is a good choice, because all Windows computers have WMV support pre-installed. Support for other formats depends on operating system version and what codecs are installed. Getting a codec installed on a particular client computer may require cooperation from corporate IT.

10.3.1 AVI

If you choose AVI, you will need to specify a **Codec**. For the video files to be playable on a particular client computer, a suitable codec must be installed on that computer, so again choosing something widely supported may be important.

Next to Codec is an **Advanced** button, which shows the configuration dialog supplied by the codec. Again, the appearance and functionality of this dialog will vary from codec to codec, and some codecs may not supply a configuration dialog at all.

Device Resolution has a **Change** button next to it. This lets you configure “Capture Pin Properties”. “Capture Pin” is a Windows Media concept, and what (if anything) you can change here may be restricted by the codec you are using. If possible, ensure that the device resolution and frame rate match what is actually coming in from the device. (“Capture Pin Properties” is quite a technical thing, and ordinarily you won’t need to change it or look at it.)

10.3.2 WMV

If you choose WMV, you will need to choose a **Profile**. The profile’s resolution and frame rate should match the resolution and frame rate of the incoming video feed. If they do match, you’ll see a green message telling you so; if they don’t match, you’ll see a red message telling you so.

If you have installed [Windows Media Encoder](#) on this PC and you have copied WmProEdt.exe (usually found in C:\Program Files (x86)\Windows Media Components\Encoder) to the Profiles folder (usually C:\Users\Public\Documents\IC-Recorder\Profiles), you can click the **Edit** button to adjust settings within a profile. A button is provided to open the Profiles folder, for your convenience in copying in profiles.

Your aim is to make the incoming resolution and frame rate match the resolution and frame rate in the profile, by modifying one or the other. If the resolution matches, you will see a green message on this page saying “Valid resolution for [device].” If they don’t match, you will see a red message saying “Invalid resolution for [device]”. Note that if the resolution does not match, you will not be able to record.

Whichever format you choose, during recording IC_Recorder will write to a file whose name ends in “.part”. Once recording is complete, the file will have “.part” removed from its name, and will end in “.avi” or “.wmv”. You should configure any backup processes to ignore “.part” files.

10.3.3 Video Standards

SD (Standard Definition) NTSC video is 60 [interlaced](#) fields (30 full frames) or 59.94 fields (29.97 frames) per second, with a vertical resolution of about 486 lines. SD PAL video is 50 interlaced fields (25 full frames) per second, with a vertical resolution of 576 lines. Analog video does not have a fixed number of horizontal pixels, but 768, 720 and 704

are common numbers used when converting to digital. NTSC and PAL encode colour differently, so if you choose the wrong format, you may get black and white video.

HD (High Definition) video is at least 720 pixels high, but 1080 pixels high is the most common resolution. It is usually in an aspect ratio of 16:9 (i.e. 1280x720, or 1920x1080). It can be interlaced (“i”) or progressive (“p”). The frame rate is most often 25, 29.97, 30, 50, 59.94, or 60 fields per second. “1080p25” for example, is a 1920x1080 pixel image delivered 25 times per second. “1080i50” is the same, but is delivered as 50 interlaced fields per second, where two interlaced fields are the same as one full frame. So when using progressive video, it is fine for the final number to be half the size. All other things being equal, progressive video is preferable to interlaced video, as it is slightly easier to encode and avoids artifacts such as “combing”.

SD video is usually delivered as analog video. Analog video can be delivered as composite, S-Video, or Component, but composite is almost always the format used in our industry. HD video is usually delivered as SDI (Serial Digital Interface, a digital format). In other words, SD usually isn’t SDI. SDI deliberately uses the same types of cables and connectors as analog, to allow TV studios to re-use existing cabling, but if you feed a digital signal into an analog capture device (or vice versa) you will not get video captured.

10.4 Project

In IC-Recorder you can set a Project Location. In NEXUS IC, under *Configuration* → *Assets* → *Features*, edit **DVR - Relative Folder** to select the field that will be used for DVR folder. This path is then appended to the project location.

Camera is the name that will be used in video files. This is a free text field with some presets available. Note that if your IC-Recorder is being controlled by *IC-Inspection* (the common use case), file names will be determined by IC-Inspection, and you should configure the camera name there, not here.

Project Location controls where IC-Recorder will save video files as they are created. It’s usual to record video to a local drive rather than to a network drive, to avoid problems with bandwidth, latency, dropouts, etc. IC-Inspection can specify a subfolder, so if your IC-Recorder folder is “E:\Video” and IC-Inspection specifies the “Main Pipeline” subfolder, then video will be recorded to “E:\Video\Main Pipeline”.

If you are running several IC-Recorders, you can specify the same recording folder for all of them, and rely on each one having a different camera name to distinguish files, or you can specify a different folder for each (“C:\Video\Port”, “C:\Video\Centre”, etc). If two copies of IC-Inspection attempt to record the same filename at the same time (e.g. “C:\Video\2018-01-01 120000 Digital Video.wmv”), one of them will fail.

See also *Devices*.

10.5 Recording

The Recording page lets you set a variety of settings related to recording.

Recording settings includes the option to include the video count in the video filename.

Filename Offset includes the option to automatically calculate the recording start time and include it in the filename.

Hard Disk Space allows you to set thresholds of available disk space, for when to trigger a warning and when to stop recording. By default it is set to 500 MB remaining to trigger a warning, and 100 MB to stop recording.

Borderless, if ticked, means that when you start recording (either by clicking the **Record** button or by starting an inspection in IC-Inspection), IC-Recorder will hide its border, toolbars, etc. This can be useful if you want to maximise the amount of monitor space devoted to video. You can switch back by right-clicking on the video area and unticking **Borderless Mode** in the pop-up menu, or by double-clicking in the video area.

Record Limits is to reduce video to manageable “chunks”: if you want video files to never be more than 2GB (to fit within FAT32 file size limits, for example), you should specify a time limit that ensures that files are always below this limit. Or use a File Size Limit instead.

10.6 Remote

Here you can specify settings for remote access of your recording device. **Remote Access** allows you to specify a port to listen on (default port is 4500), and **Time Sync** allows IC-Recorder to synchronise its time with IC-Inspection when connected.

10.7 Advanced

Show overlay text shadow, if ticked, puts a white border around dark text or a black border around light text on your overlay, thus making text more legible if the underlying video colour is similar to the text colour. This option does consume a bit more CPU power, so if your CPU is near 100% during recording, try unticking this option.

Logging level should generally be left at its default setting unless directed by technical support. The more verbose levels write more detailed information which can sometimes help us solve bugs, but more verbose logging can also slow the system down.

10.8 Edit Overlays

IC-Recorder can overlay data onto video without requiring additional overlay hardware. If you are controlling IC-Recorder from IC-Inspection 6, you should configure overlays *in IC-Inspection 6*.

Click the Edit Overlays button. This will show you a list of overlays. Any overlays with a Source of Server were created in IC-Inspection 6, and can only be edited from there. Any overlay with a Source of Client is created from within IC-Recorder, and can be edited from here. Click Add, or select a Client overlay and click Edit, and you’ll see the Edit Overlay dialog. If you’ve just added a new overlay, you’ll need to fill in the Overlay Name field before you can click Save.

Drag the window larger to make the black overlay region larger. It doesn’t need to match the actual size of your video feed, but it’s convenient for you if you drag it to approximately the same shape.

You can drag fields from the tree at the left onto the black overlay layout region. This tree is populated from IC-Inspection, so if the field you want is not shown in the list, ensure IC-Inspection is running and is connected (via its *Devices*) to this IC-Recorder, and that the appropriate survey field is configured and has a value in IC-Inspection.

Once you have dragged on your first field, you may wish to set its colour, font, size, etc., because additional fields you drag in will “inherit” their settings from the previous field you dragged in.

Once fields are on the overlay, you can “lasso” several fields by click-dragging a box around them, or you can click a single field to select it. You can use the toolbar buttons at the top of the dialog to act on all selected fields at once (to “nudge” them around the screen, align them in a tidy fashion with respect to each other, change their font size, or delete them). You can also use the list at the bottom of the screen to modify individual fields.

To put prefix text on a field (e.g. “Depth: “, etc.) edit its “Region Text”. You generally want a trailing space, so as to separate the caption from the text coming in from IC-Inspection. Short captions are often best — “E: ” for Easting, etc.

If you drag in an “Image” region, you will immediately be shown a file dialog, so that you can choose an image file for this region. If you choose a .PNG file, then the transparency in that file will be honoured: where the PNG is partly

or wholly transparent, you will see the video through the image. You can drag on more than one image region if you so desire.

Note that the “Top” and “Left” shown in this list are for the current size of the preview shown here in the Edit Overlay window, *not* for the actual size of your captured video feed (so as you resize the window, you’ll see these values change). This is because the overlay editor does not depend on the dimensions of the video you are currently capturing. Font size, however, *is* in the dimensions of your video: a 10-point font on a 576-pixel high SD video will fill about 1/57th of the height of the image and will likely seem about right, whereas this would be too small on a 1080-pixel high HD feed.

If you untick the “transparent” option for one or more fields, those fields will be shown with a solid background rectangle of the colour you select. If you tick the “transparent” box, the text will be shown without a solid background rectangle. This conceals less of the video, but may be less clear on some colours of video. Note also the “Show overlay text shadow” option under *Tools* → *Options* → *Advanced* — ticking this works well with transparent-background fields, because it places a dark border around light text, or a light border around dark text, thus making text more legible if the underlying video colour is similar to the text colour. This option does consume a bit more CPU power, so if your CPU is near 100% during recording, try unticking this option.

If you are using a Marshall Encoder rather than system hardware, some overlay configuration options are ignored because the Marshall Encoder does not support them. Text, prefix, suffix, source, top, left, font size, and font colour are all supported, but font (Courier, Arial, etc.) is not. Additionally, the Marshall Encoder supports at most 16 overlaid fields.

10.9 Communication with IC-Inspection

IC-Recorder works best in conjunction with *IC-Inspection*. A connection to IC-Inspection is necessary for the following functionality:

- Synchronise stop/start recording across multiple video channels.
- Display survey and asset data on overlays.
- Capture images from IC-Inspection.

10.9.1 IC-Inspection 6

IC-Inspection sends the time to IC-Recorder, and IC-Recorder uses this to generate a filename. During recording, this filename is used. Once recording is complete, IC-Recorder checks to see if there was a time difference between it creating the video file and actual recording starting. If there is, it adjusts the filename accordingly (typically by only 1 second, depending on machine load).

In IC-Recorder you can set a Project Location. In NEXUS IC, under *Configuration* → *Assets* → *Features*, edit **DVR - Relative Folder** to select the field that will be used for DVR folder. This path is then appended to the project location.

Go to IC-Inspection 6’s *Device Manager* and add a Generic DVR or an IC-Recorder.

10.9.2 Daylight Saving

If Windows automatically switches to daylight saving time during an inspection campaign, this could potentially cause video files to be confusingly named. For example at the beginning of daylight saving in spring, there could appear to be a one-hour gap in your video recording when there was none in reality, because your PC clocks have sprung forward one hour. Similarly in autumn/fall, video files might be recorded apparently at the same time as videos actually recorded an hour earlier, because clocks have fallen back by an hour.

For this reason, we recommend disabling automatic daylight saving adjustment on PCs that will run either IC-Inspection or IC-Recorder. This also applies to any third-party systems that might e.g. be supplying time via a survey string. Choose your timezone at the start of any given inspection campaign, and remain in that timezone for the duration.

11.1 IC-Web Deployment Guide

- *Requirements*
- *Installation*
- *Updating*
- *Configure IIS*
- *Configure IC-Web*
- *Authentication*
- *Common Errors and Troubleshooting*

11.1.1 Requirements

Server Side

- Microsoft Windows Server 2008 R2 (or above)
- IIS 8.0 (or above). Running:
 - ISAPI Extensions
 - IIS Management Studio (is highly recommended)
- Connection to SQL server running a NEXUS IC database

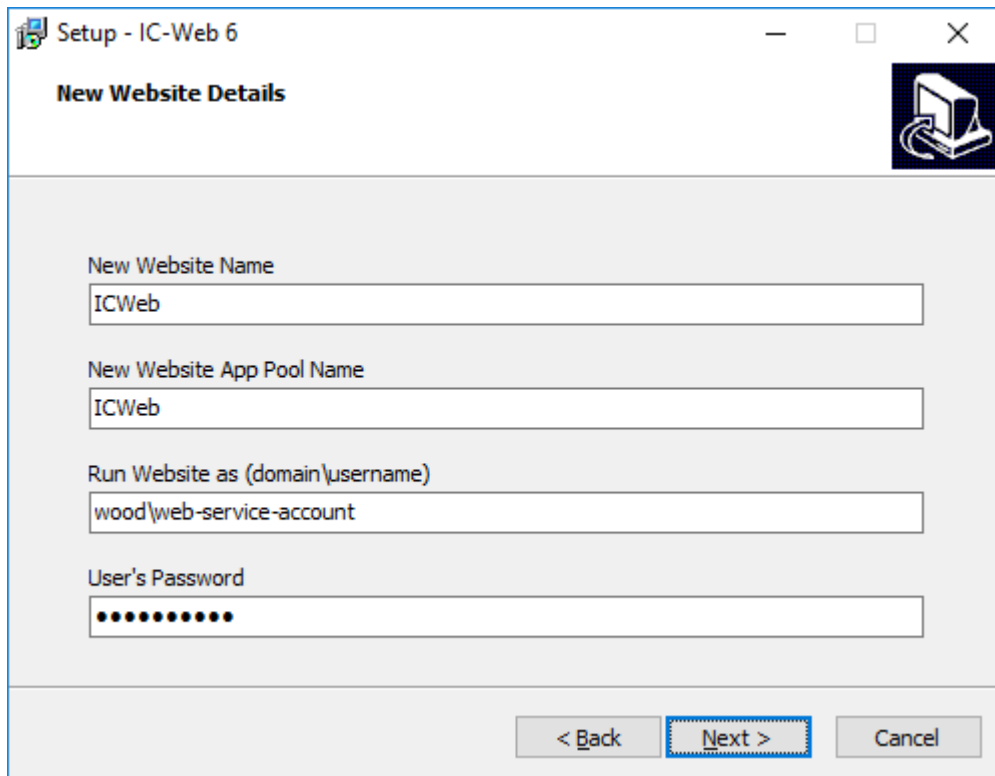
Client Side

- A Modern web browser. The following have been tested to work:
 - Chrome 54.0 or above
 - Microsoft Edge 79 or above
 - Safari 9.1 or above
 - Firefox 53.0 or above. 3D drawings may be slower in Firefox.

11.1.2 Installation

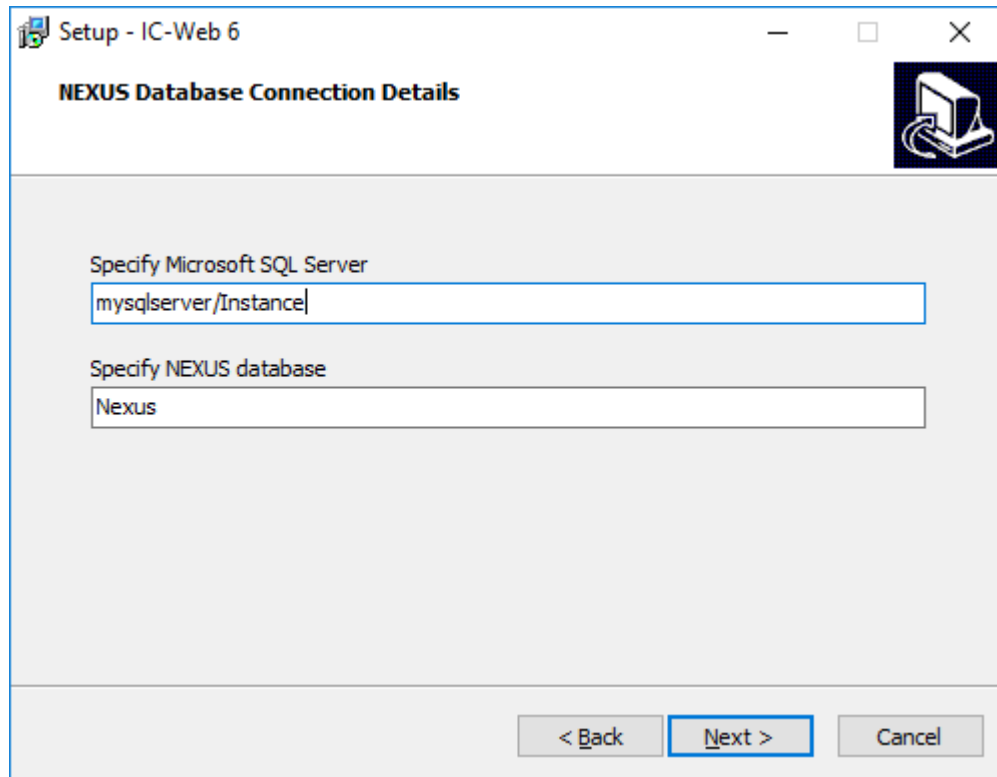
On the web server:

1. Run ICWebSetup.exe
2. Accept the License Agreement.
3. If you don't have Internet Information Service (IIS) installed then select *Yes*, otherwise select *No*.
4. Select *New Website*.
5. On the New Website Details page:
 - *New Website Name* - this is the name of the website in IIS.
 - *New Website App Pool Name* - this is the name of the Application Pool the website will use.
 - *Run Website as* - this needs to be the username of an account with rights to connect to the SQL server and DB_OWNER of the NEXUS IC database. (Note if a domain account it must be in the format domain\username.)
 - *User's Password* - the password of that account specified above.



6. On the destination page - IC-Web Path is the path where the website will be installed to.
7. On the Website Bindings page:
 - *Website Binding URL Name* - lets you set the URL of the website binding (Normally it is fine to leave as *.)
 - *Port* - this should be left as port 80 unless your web server listens on a non-standard port.
8. On the NEXUS Database Connection page:

- *Specify Microsoft SQL Server* - this should be the IP address or domain name, and database server instances.
- *Specify NEXUS Database* - this is the name of the NEXUS IC database hosted on the SQL server.



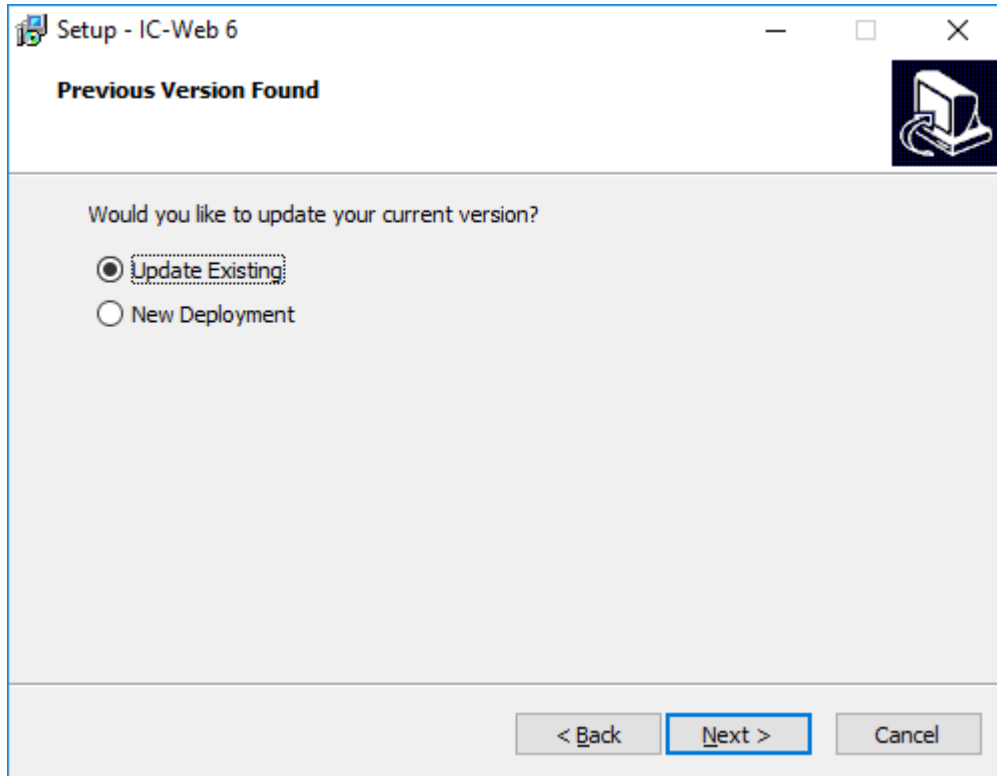
9. Click install and the file and configuration will be setup.
10. The last step contains a link to a driver for ODBC Driver 17 for SQL Server (<https://www.microsoft.com/en-us/download/details.aspx?id=56567>). This must be downloaded and installed on the server before you run IC-Web.

11.1.3 Updating

If you have installed IC-Web once and just want to update to a new version without having to reconfigure the web server,

On the web server:

1. Stop the World Wide Web Publishing Service via services.msc.
2. Run ICWebSetup.exe
3. Accept the License Agreement.
4. Select *No* to install IIS (as you already have IIS installed).
5. Select *Update Existing* when asked if you want to update you existing version



6. Click Next

7. Click install

This will install the new version of IC-Web but will leave the web server settings and configurations settings as they are.

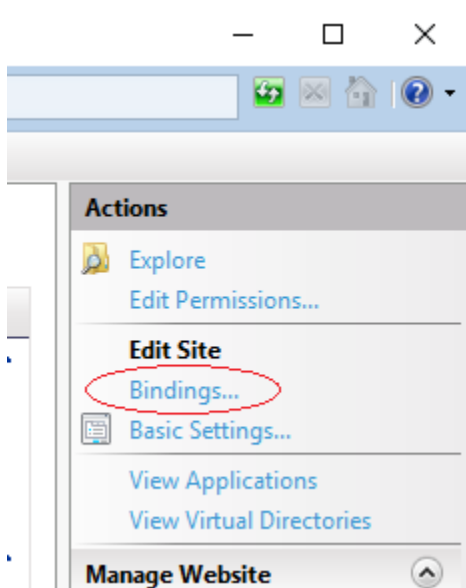
8. Start the World Wide Web Publishing Service via services.msc.

11.1.4 Configure IIS

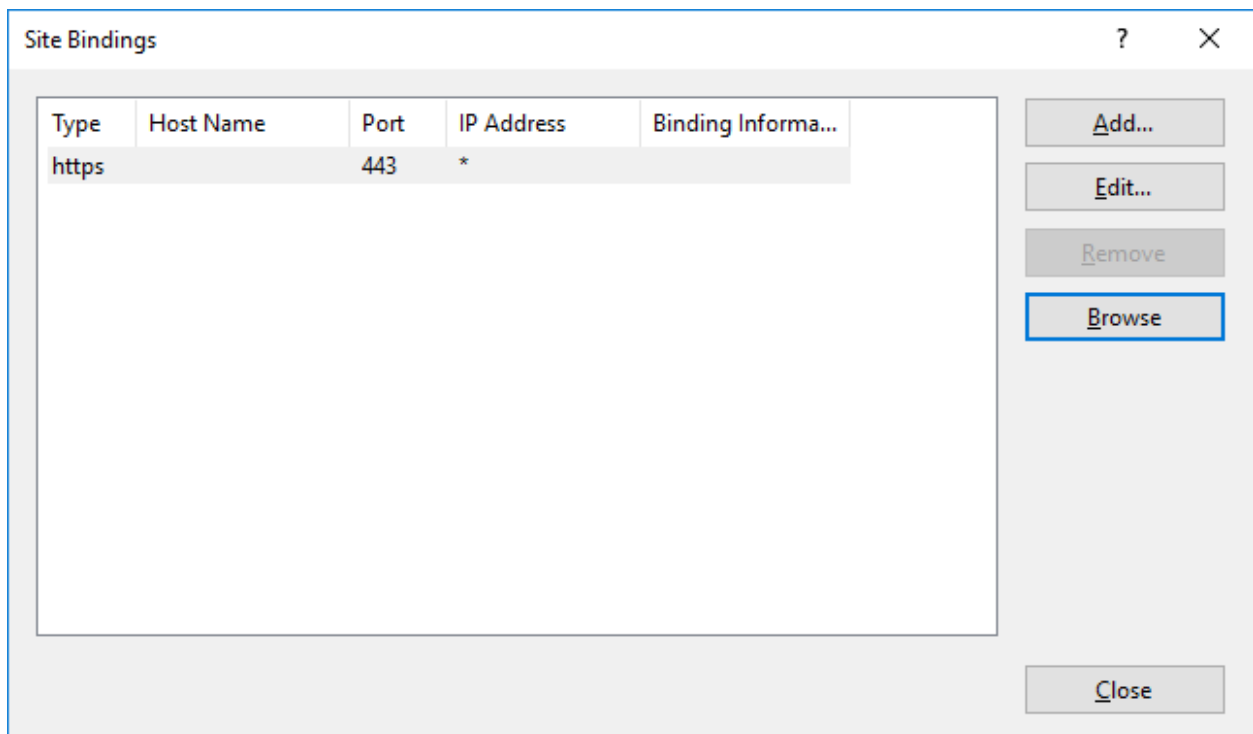
Once installed, IIS should be set up and IC-Web should be running on the HTTP protocol on port 80 of your web server. Running IIS on HTTP should only be done for initial testing. As soon as you are happy with the deployment you must modify the IC-Web website to use Secure HTTP (HTTPS) and stop the IC-Web HTTP protocol or redirect it to HTTPS. Not doing this step is a security risk and will exposes users' passwords so it is vital that this is done straight away.

HTTPS Configuration

1. Open IIS Manager, expand out the website tree and select the IC-Web website.
2. On the Actions section on the right of IIS Manager click on **Bindings...**



3. Remove the HTTP item. (NB you may leave this if you intend to redirect HTTP to HTTPS and understand the security ramifications — not covered by this deployment guide.)
4. Add an HTTPS item. (This will require at least one SSL certificate on your server to do this without errors.)
5. Your bindings should now look like:



6. You should now be able to browse to your website via <https://<your site>>, and <http://<your site>> should give you a 404 file not found error.

If you wish to manually check server settings:

Web server

- Open IIS Manager, open the ISAPI and CGI Restrictions. Make sure there is an entry for <the_path_you_set_in_step_6_of_the_install>\webroot\data\ICWeb.dll
- Double click Feature Delegation. Make sure Handle Mapping is set to Read/Write.
- Select the Application Pools and select the ICWeb application pool click on the Advanced Settings. Make sure “Enable 32-Bit Application” is set to false.
- Check the “Identity” in the application pool advanced settings is set to the correct username and password.
- Open the ICWeb website in the IIS tree. Expand out the tree and select the data directory under the ICWeb website. Open *Handle* Mappings. Click on Edit Feature Permissions on the right. Make sure Execute is ticked.

Website

The installer should do this for you but if you want to check the settings:

- Select the IC-Web website and select the Advanced Settings in IIS Manager.
- Check the Physical Path is correct - note this should be what ever you specified in step 6 of the install wizard with “\webroot” added; e.g. if it was “c:\Websites\ICWeb” the physical path should be “c:\Websites\ICWeb\webroot”.
- Check the Physical Path credentials.

11.1.5 Configure IC-Web

The installer should do this for you but if you want to check the settings:

Open the ICWeb website in the IIS tree. Expand out the tree and select the data directory under the ICWeb website. Double Click the Configuration Editor. Open the Collection. It should contain 6 entries:

- `Server` - This is the domain name or IP address and instance of the SQL server.
- `DatabaseName` - This is the name of the NEXUS IC database on the SQL server.
- `Username` - This attribute contains the username of a NEXUS account that exists and is enabled in the Database.
- `InstallPath` - This is the directory location of the directory that holds the IC-Web \webroot directory.
- `LogLevel` - (optional) Allows you to specify the log level of the ICWeb.dll.
- `TokenUrl` - (optional) The URL address of the ICWeb homepage - this is used by email/token authentication methods.
- `sqlUserName` - (optional) Can be used to authenticate to a database server if you want to use SQL authentication instead of Windows authentication for the SQL connection between IIS and the SQL server.
- `sqlPassword` - (optional) As above.

Note, these values are case sensitive

11.1.6 Authentication

Authentication can be via local NEXUS account or *Single Sign On* account.

- If your IC-Web account is a local NEXUS IC account, just enter this as the username and password.

- If your account has been set up in NEXUS as a SSO account then your username must be in full UPN format username@domain. Your password is just your normal SSO password.



IC-Web
NEXUS 6

Username : joe.blogs@mycompany.com

Password :

Login

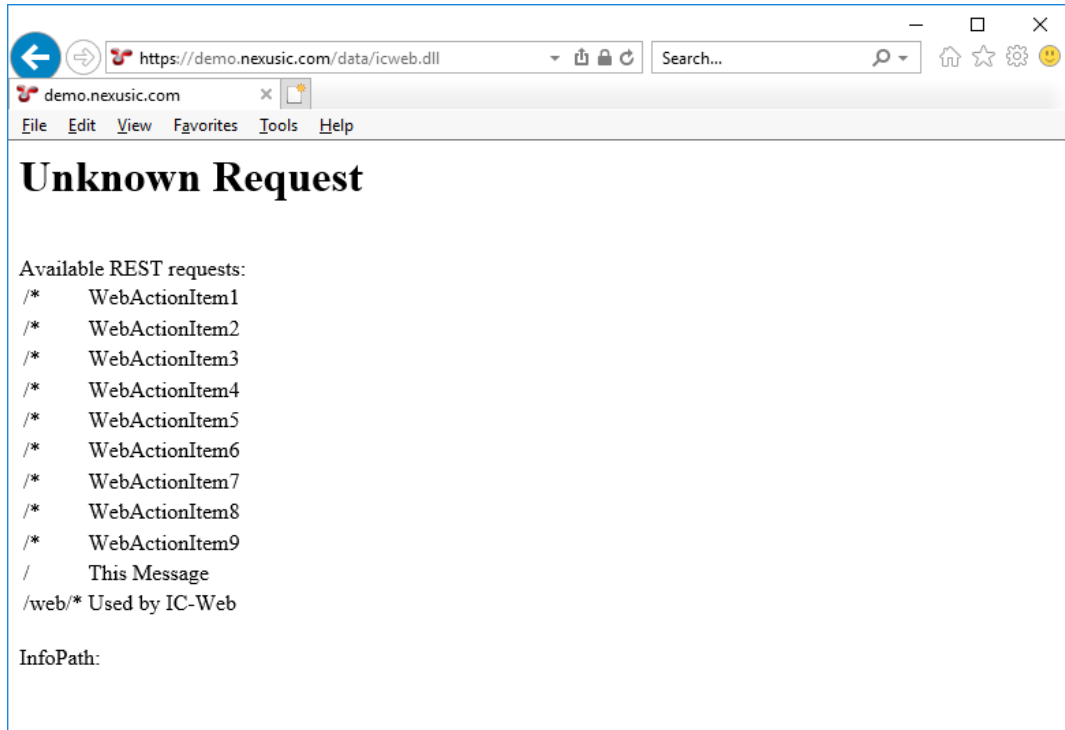
Version : 6.3.20278.0
Schema : 8.173

11.1.7 Common Errors and Troubleshooting

Test the REST service

Test the REST services is working:

1. Turn on Error Pages by opening IIS manager selecting the web server and open Error Pages.
2. Click Edit Feature Settings and set it to Detailed Errors.
3. Open the ICWeb.dll by browsing to your website address and adding /data/ICWeb.dll to the end of the address URL. This should bring up a default page for the ICWeb.dll rest service similar to the image below. If there are any errors with the DLL they should show here.

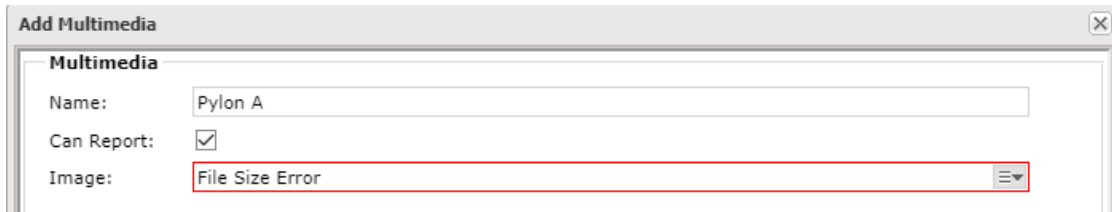


If you get a completely blank screen here please ensure you have installed the ODBC Driver 17 for SQL Server (<https://www.microsoft.com/en-us/download/details.aspx?id=56567>).

If the ICWeb.dll tries to download instead of run please ensure the web server is configured to execute ISAPI extensions. See the last item under *Configure IIS -> Web server*.

File Size Errors

If you are unable to upload files and you are seeing an “File Size Error”



You might need to adjust a setting on your IIS server to allow your users to upload larger files. On the web server if you go to location you installed IC-Web too. In the <installedLocation>webrootdatadirectory is a web.config file. Open this file with a text editor and make sure this line circled below appears in there. If not add you will need to add it in.

```

<?xml version="1.0" encoding="UTF-8"?>
<configuration>
  <system.webServer>
    <handlers accessPolicy="Read, Execute, Script" />
    <security>
      <requestFiltering>
        <requestLimits maxAllowedContentLength="1073741824" />
      </requestFiltering>
    </security>
  </system.webServer>
  <appSettings>
    <add key="Server" value="mySqlServer" />
    <add key="DatabaseName" value="NexusDB" />
    <add key="Username" value="admin" />
    <add key="LogLevel" value="" />
    <add key="InstallPath" value="C:\Websites\Nexus" />
    <add key="tokenUrl" value="" />
  </appSettings>
</configuration>

```

The number you enter for the `maxAllowedContentLength` represents the maximum size of the file allowed to be loaded to the server and thus inserted into the NEXUS IC database in Bytes. So in the example above this is 1073741824 Bytes (which is 1GB).

IIS Server Modules

Ensure the following modules are installed and running in IIS through the Add Roles and Features sections of your server:

- Default Document
- HTTP Errors
- Static Content
- Static Content Compression
- HTTP Logging
- ISAPI Extensions
- IIS Management Console

Check the Application Pool and the website account have rights to run the website and connect to the SQL server and NEXUS Database.

11.2 User Interface Features

- *Grid Pagination*
- *Grid Search*
- *Multiple Column Sorting*

- *Navigating via URL*

11.2.1 Grid Pagination

By default, IC-Web grids use pagination of 100 rows at a time. If a higher number are present in the grid then the rows will be spread across multiple pages. The pagination UI element contains a 'Previous' button, 'Next' button, and also the first and last page.

Note: The pagination functionality refers to the new type of grid format. Since grid styles are being changed over from the previous format, IC-Web grid pagination will not apply to all grids in IC-Web.

The screenshot shows the IC-Web application interface. The main content area displays a table of library items. The table has the following columns: LIBRARY TYPE, CONNECTED TO, CONNECTION TYPE, NAME 1, DESCRIPTION, DOCUMENT NO, and REFERENCE DATE. The data rows are as follows:

LIBRARY TYPE	CONNECTED TO	CONNECTION TYPE	NAME 1	DESCRIPTION	DOCUMENT NO	REFERENCE DATE
Test			test 1	test 1	100	10/11/2020
Test			test 10	test 10	109	10/11/2020
Test			test 100	test 100	199	10/11/2020
Test			test 1000	test 1000	1099	10/11/2020
Test			test 101	test 101	200	10/11/2020
Test			test 102	test 102	201	10/11/2020
Test			test 103	test 103	202	10/11/2020

Below the table, the pagination controls are highlighted with a red box. The controls include: '< Previous', '1', '2', '3', '...', '10', 'Next >', and '(1-100/1000) Per page: 100, 150, 250, 500, 750, 1000'. The '1' button is currently selected.

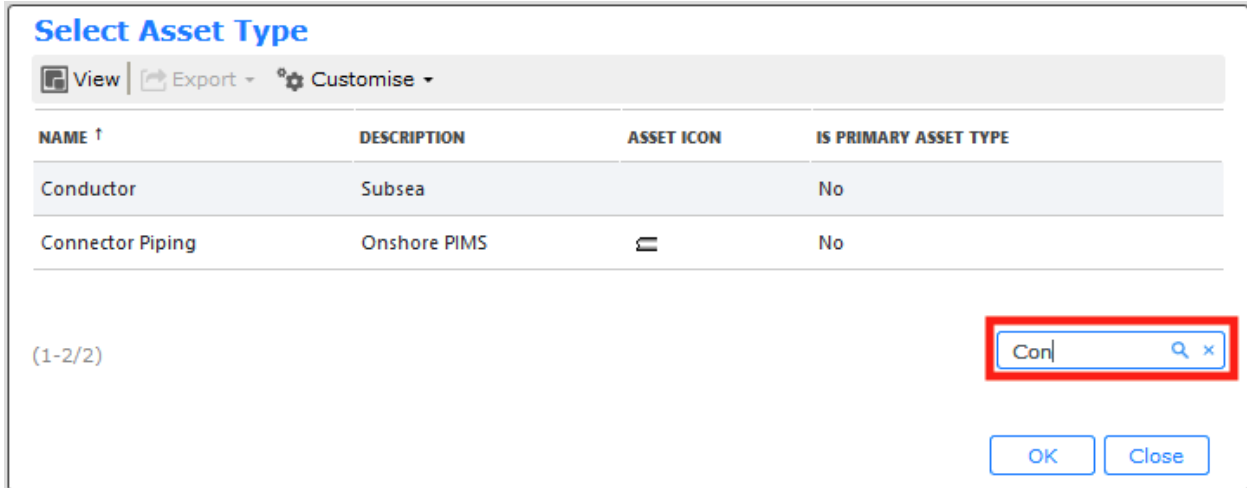
Below the pagination controls, there is a 'DETAILS' section for the selected item. The details are as follows:

Library

Library Type: Test
 Name: test 1
 Description: test 1
 Document No: 100
 Revision: 1
 Reference Date: 10/11/2020
 Physical Location:
 Hyperlink: https://support.nexusic.com/redmine
 Attachment:
 Show Grey Scale:
 Show Dimensions:
 Show Captions:
 Use in Reports:

11.2.2 Grid Search

Grids can be searched when a search bar is present to the bottom right of the grid. To run a each query, enter three or more characters into the search bar, then click the search button or press enter. To cancel the search, click the X next to search or press escape.



11.2.3 Multiple Column Sorting

Sorting the grid is performed by clicking a column header and toggling between ascending (arrow up) and descending (arrow down). Grids can be sorted by multiple columns by selecting an initial column, followed by holding down the CTRL key and selecting a second column. This will sort the grid by the first column, then sort by the second column.

The grid sorting should persist locally and can be cleared via the *customise > reset to default* option.

11.2.4 Navigating via URL

It is possible to navigate to sections of IC-Web and select page elements via URL parameters. The URL parameters direct the browser towards an area of the database via GET request. The key *searchKey* refers to a table and the value *searchValue* refers to the numeric ID of the element in the table. A overview of inputs can be seen below.

Note

For Asset, Planning and Review a random view may be picked if the component exists in multiple views.

<table> value	<value> meaning
Asset	Component_ID
Library	Library_ID
Planning	Component_ID
Workpack	Workpack_ID
Review	Header_ID
Anomaly	Anomaly_ID

These parameters can be appended to the IC-Web url like so:

<https://demo.nexusic.com/valid.html?searchKey=<table>&searchValue=<value>>

Example:

Using the Expert Systems database, the following URL will direct to the Gas Transmission asset.

<https://demo.nexusic.com/valid.html?searchKey=Asset&searchValue=2638>

IC-Web is a web-based version of NEXUS IC, running in Chrome, Edge, Safari or Firefox. It aims to replicate the functionality of NEXUS IC in a web browser, using Javascript and REST, with the exception of *Configuration*, which is available only from NEXUS IC.

It aims to meet two use cases: read-only access for a large number of users, and read/write access for a smaller number of users with an IC-Web read/write *license*.

To *deploy* IC-Web your organisation will need an IC-Web license. Contact support@nexusic.com for details. If your NEXUS IC is hosted within Wood infrastructure, IC-Web may be available via *Software as a Service (SaaS)*.

For the most part, user documentation for NEXUS IC applies to IC-Web. There are a variety of differences related to the different implementation challenges in Javascript/REST versus Windows/SQL. Recent changes in NEXUS IC may not yet be reflected in IC-Web, and vice versa.

11.3 Differences

11.3.1 User Interface Elements

- IC-Web pop-up “windows” are not actual windows, and cannot be moved outside the bounds of the web browser.
- NEXUS IC remembers many window and panel sizes and positions in a settings file for each user. IC-Web does not.
- In the Assets window, the options for adding, editing, and removing assets are limited slightly. There is no option to add a Linked Asset (With Children). There is also no option to edit Asset Type Properties.
- IC-Web shows version information at top right instead of at bottom right. Other NEXUS IC status bar fields are inapplicable to IC-Web, and are not shown.
- Some data entry controls, such as date/time pickers, will look and work slightly differently in IC-Web.
- IC-Web paginates grids across multiple pages when there are a large number of rows. See *grid pagination* for more information.
- IC-Web editing grids support exporting to CSV with grouping enabled. Editing grids are any grid that appears after clicking add or edit on a row. In these grids, export to email is not available.
- IC-Web grids can be sorted by multiple columns at once. See *multiple column sorting* for more information.
- IC-Web Inspection can be viewed in two layouts, *Default* and *Alternate*. *Default* view contains the Events Details panel in the middle, while *Alternate* view contains the Events Details panel on the right. Choose the layout from the ‘Layout’ dropdown menu on the inspection dock.
- Charts in IC-Web are rendered by a third-party library and will not look identical to charts in NEXUS IC. Charts in IC-Web may be slower to render than in NEXUS IC. IC-Web uses a different set of default colours to NEXUS-IC. To carry over colours from NEXUS-IC to IC-Web you must define a *Colour Axis* in the chart.

11.3.2 Technical Differences

- After 1 hour of inactivity, your IC-Web will disconnect. Also, after 10 minutes (by default) of inactivity over the entire web server, the web server will disconnect. In either case, tap F5 / Refresh to go back to the login prompt.
- A variety of tabs, panels, pop-ups, etc. will briefly show a “Loading” throbber when selected.
- A variety of forms (e.g. Asset Information forms) in NEXUS IC allow in-place editing. In IC-Web, you will instead see an **Edit** button, which will pop up a modal form for you to do the editing in. This is so that when you complete editing, IC-Web can immediately commit your changes to the REST service.

- In some areas, when creating or editing a new item, IC-Web will implement the changes but the changes will not immediately become visible. A banner proposing a refresh will appear and allow the user to refresh the page via hyperlink.
- When another user changes data, NEXUS IC will automatically offer to refresh your local copy. IC-Web will not automatically invalidate stale data.
- Reports in IC-Web can be delivered via email (just as in NEXUS IC) but cannot be generated and launched directly. The up-side is that an IC-Web user does not have to wait for a report to generate before continuing — the IC-Web server will generate and email the report in the background.

11.3.3 Search and Navigation

- NEXUS IC has a Search box at the top right. IC-Web instead has a Search box above the Asset tree, which searches only Asset names. See *Search Differences*.
- Some IC-Web grids are now searchable. Searching is performed slightly different to searching in NEXUS IC. See *Grid Search* for more information.
- URL GET parameters can be used to navigate to sections of IC-Web. See *Navigating via URL* for more information.

11.3.4 Importing

- IC-Web does not support Excel file formatted import sheets. You will need to convert your import file to *csv / tsv / txt*. If your import includes external files (eg. event multimedia files or Library Items), then you must *zip* your import sheet and files first. When you choose the *zip* file, the IC-Web Import Wizard will extract the contents, and confirm the contents with you before proceeding.
- When attempting to upload a zip file with a filesize larger than 500MB, you will receive a warning that it may fail.
- Please note that that importing using IC-Web is only available for Wood hosted clients and the logged in user will require an IC-Web Read/Write license to perform imports.

11.3.5 3D drawings

- 3D drawings are supported via a conversion process.
- Once you are happy with a 3D CAD drawing (you have *set up any desired tags for navigation etc*), send it to us.
- We will convert your CAD file to DAE, a 3D format that works well in web browsers and which is understood by IC-Web.
- You (or we) can then load that file into your NEXUS Library as a Drawing on the same asset in the same Library Category group as your original CAD drawing.
- NEXUS IC will list both files in the drawing panel but only the CAD files renders in 3D; DAE is an unsupported drawing format for NEXUS.
- IC-Web will display the DAE file as a 3D scene.

In 3D drawings in IC-Web, hold left mouse button and drag to rotate, right mouse button and drag to pan, and use mouse wheel or hold middle mouse button and move up/down to zoom.

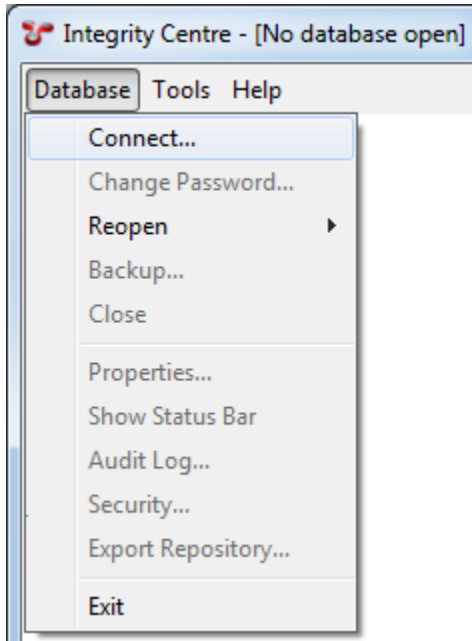
12.1 Database

- *Database → Connect*
- *Database → Reopen*
- *Database → Backup*
- *Database → Subscriber*
- *Database → Expert Systems*
- *Database → Close*
- *Database → Your Profile*
- *Database → Change Password*
- *Database → Audit Log*
- *Database → Security*
- *Database → Properties*
- *Database → Export Repository*
- *Database → Show Status Bar*
- *Database → Exit*

12.1.1 Connect

Database → Connect

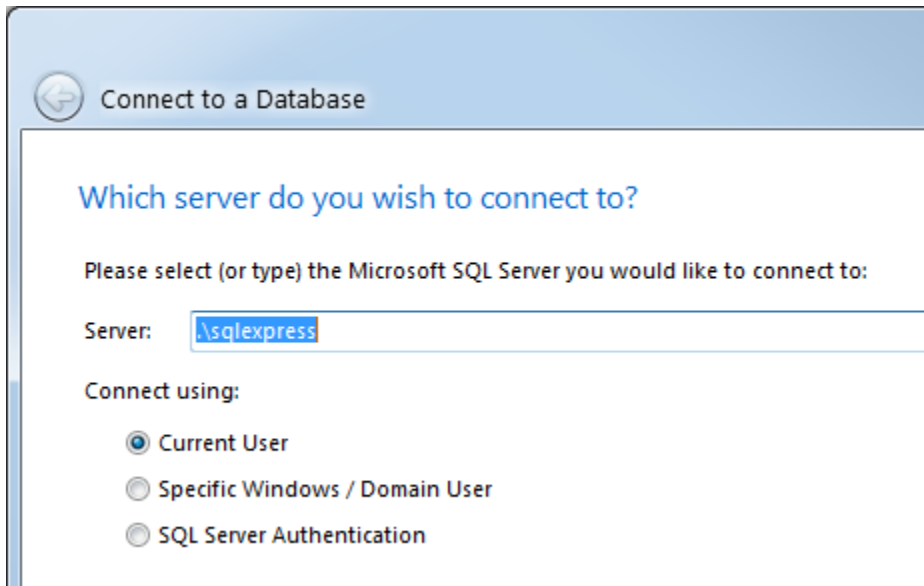
Use this menu option to connect to a database. (If you have connected to this database before, use *Reopen* instead.)



Choose the name of a database server. A database server running on the same machine as IntegrityCentre may be called '.' or 'localhost', or may have a name like '.sqlserver'. Your IT administrator may provide you a database server name.

Under **Connect using**, you will usually use the default setting, **Current User**. This uses your Windows domain credentials to log into NEXUS IC. (NEXUS IC does not look or store a copy of your Windows domain password.)

Click Next.



You can create a new blank database, connect to an existing database, or restore a *Backup*. Click Next.

If this database has a user account with your Windows domain credentials (see *Security*) you should be immediately connected. If not, you will be asked for a NEXUS user name and password (which may not be the same as your Windows domain user name and password).

If this is your first run of NEXUS IC 6, you won't have yet set a restore path, so you will be asked for one. This needs to be a folder that you can read/write, *and* that the SQL Server process can read. This may be a UNC path (like '\\MyServer\MyShare') or if the database server and NEXUS IC are running on the same machine it may be a Windows path (like 'C:\Database Backups').

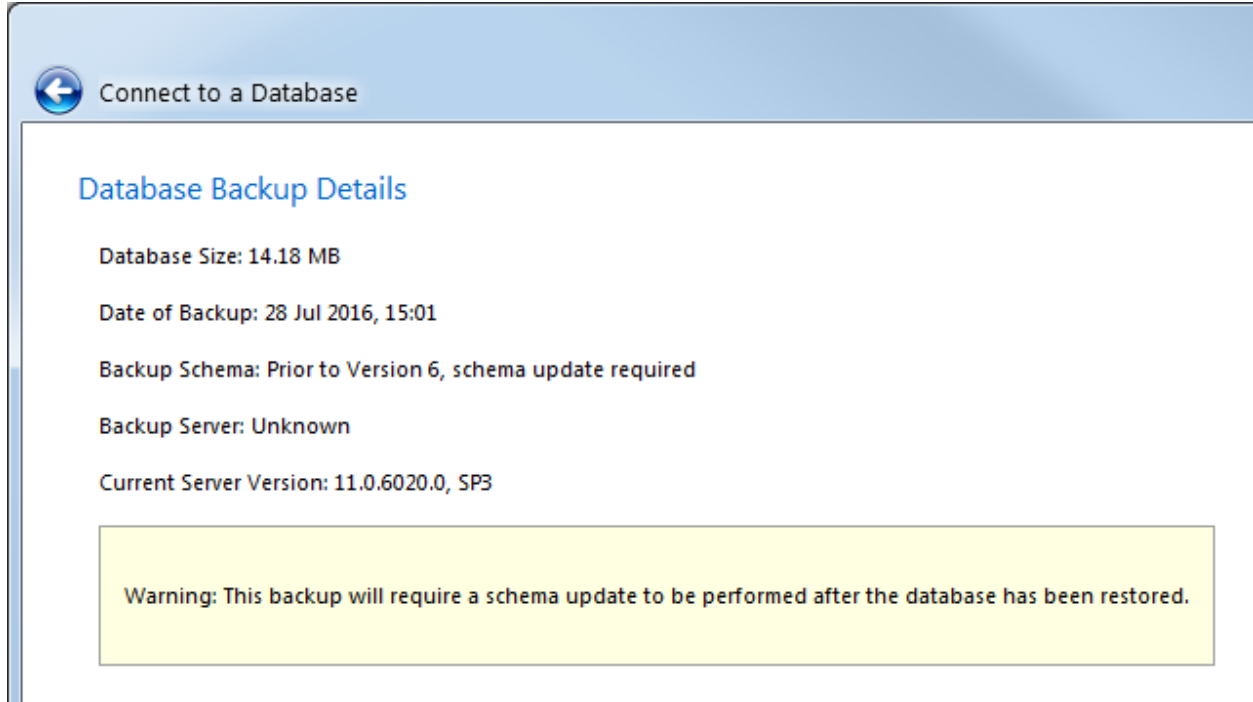
When the path is valid (i.e. it is visible to both Integrity Centre and the database server) the text will go black and the red warning message will disappear.

If you enter a path that is valid for Integrity Centre but *not* the database server, you will see different red error text:

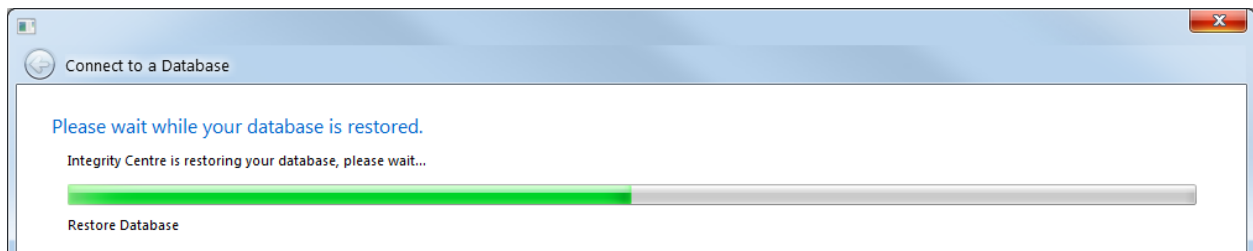
Could not verify the network path "" on the server.

If you are unable to work around this error by choosing an appropriate folder, you probably have a *deployment* problem, relating to SQL Server *service accounts* and/or *permissions*.

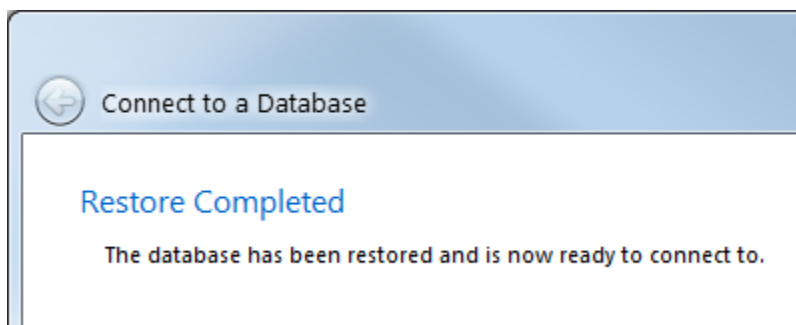
If you have chosen to restore a database from backup, you will be shown details of the backup file. Click Next to begin the restore.



Now watch this progress bar.



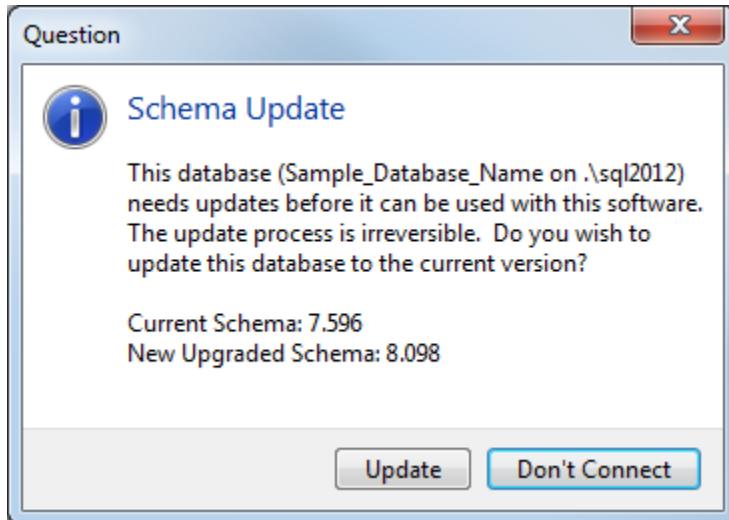
Once NEXUS IC tells you the restore has been completed, click **Connect**.



If a schema update is required, NEXUS IC will ask you if you want to proceed. Schema updates are irreversible —

any old backup files (including the one you just restored from) will continue to exist, but this running copy of the database can never be downgraded, and thus can never again be opened by old copies of NEXUS IC. (This is not a problem when everybody is using the same version of NEXUS IC and you are confident there will never be a need to roll back to an older version. The circumstances that require caution are those where you might be running a newer version than others, or there is a substantial chance that you will want to roll back to an older version.)

Schema 7.596 is NEXUS IC 5; schema numbers that begin with ‘8’ are NEXUS IC 6. Updates from 7.596 may take some time. It’s OK to kick it off in the evening and check the results in the morning — it doesn’t need watching.



Use this menu option to connect to a database. (If you have connected to this database before, use Reopen, described below, instead.) For details, see *Database → Connect*.

12.1.2 Reopen

Choose a database that you have opened in the past from this list to re-open it. If you have filled in Windows domain credentials (see Security, below) you should be immediately connected. If not, you will be asked for a NEXUS user name and password (which may not be the same as your Windows domain user name and password).

12.1.3 Backup

Use this menu item to create a backup. Your IT department may have a system of scheduled backups that make this unnecessary on a regular basis. But from time to time when you are about to do something hard to reverse in a database, such as deleting data, it may be wise to take a backup first.

You will need to supply a Network Path. This path must be accessible to both the database server and to Integrity Centre. This may be a UNC path (like ‘\MyServer\MyShare’) or if the database server and Integrity Centre are running on the same machine it may be a Windows path (like ‘C:\Database Backups’).

When the path is valid (i.e. it is visible to both Integrity Centre and the database server) it will go black — until this point the text will be red. Note that the database server process must have permission to read and write the folder in question — if you can’t get the path to turn black, check the permissions of the user account that the database server service is running under. Similarly, the user account requires read/write permissions to both the share (for UNC paths) and the folder.

The next page lets you select a name for the backup file. The default is usually suitable. Click Next.

Once the backup is made, its name will be changed to include 32 hexadecimal characters at the end. This is an MD5 checksum of the database file. Before restoring (see above) Integrity Centre will check this hash against the contents

of the file, to verify a match. This is useful for protecting against corruption introduced by e.g. copying the database backup to a USB3 hard disk and back onto a new machine. (Windows' own file copy routines do not perform any integrity checks.)

Click the Open Folder button and a Windows Explorer will open with your new backup selected.

12.1.4 Subscriber

Database Synchronisation is based around the concept of Master and Subscriber databases.

A Master database is the primary database of an organisation. A Master database can create one or more Subscriber databases. Changes can be made to the Master database whilst there are active Subscriber databases.

A Subscriber database is created from a Master and can be edited offsite and subsequently synchronised back into the Master database. A subscriber database can only be synchronised with a Master database (i.e. you cannot synchronise two Subscriber databases together).



Create a Subscriber Database

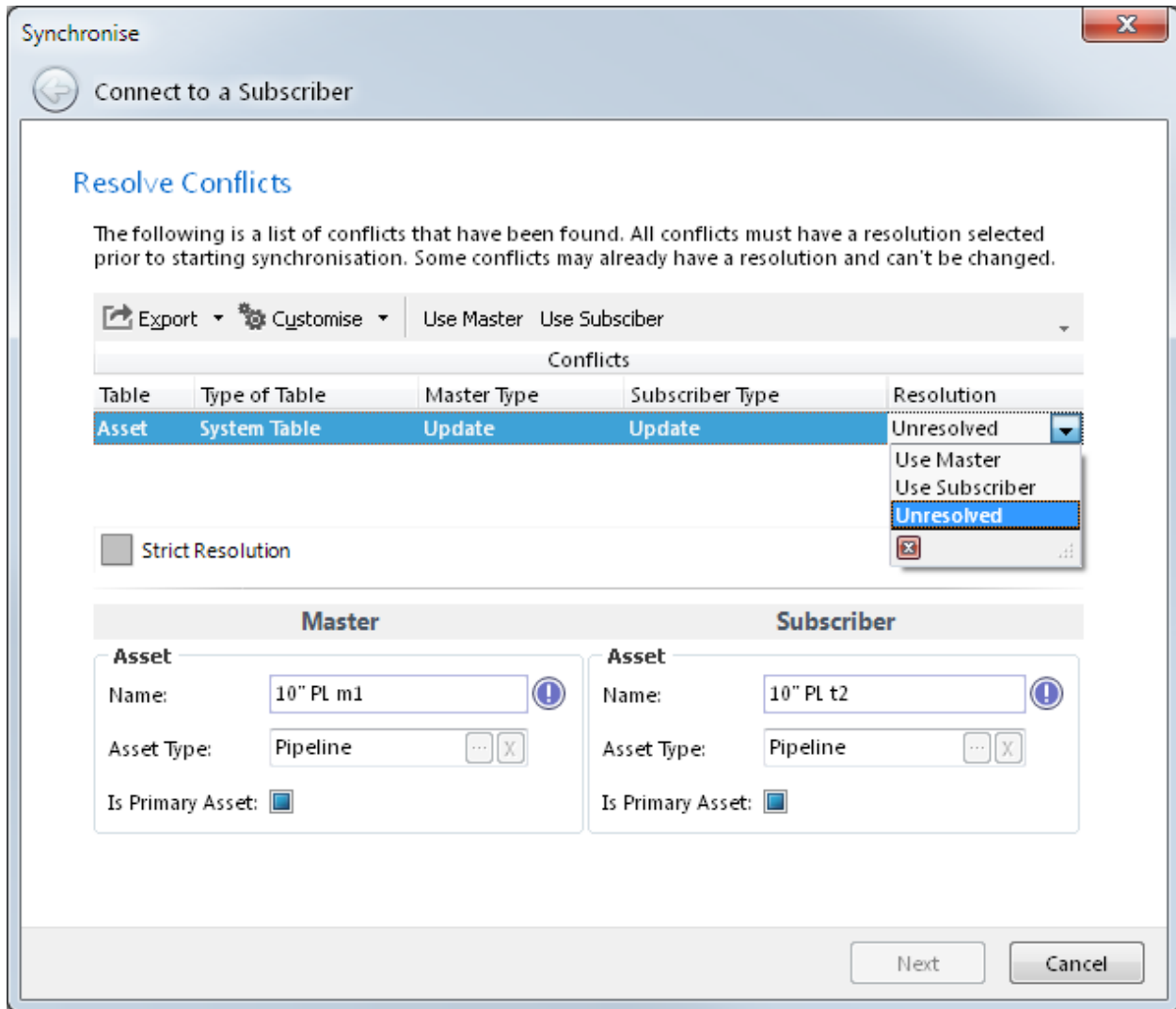
A Subscriber database can either be created as a backup file, or via a direct connection to the offsite MS SQL Server. In most cases, Subscriber databases are created by the Backup File (Manual) method, the backup file is then restored to the offsite MS SQL Server.

To create a Subscriber database, select *Database* → *Subscriber* → *New*, and supply a name for your new subscriber database. NEXUS IC will create the subscriber as a database backup file. Once a Subscriber database has been created, it will appear in *Database* → *Subscriber* → *View*.

Synchronising a Subscriber

All changes made to a Subscriber database need to be synchronised back with the Master database. To synchronise a live Subscriber database, do the following:

1. Ensure that the active database in NEXUS IC is the Master database.
2. Click *Database* → *Subscriber* → *Synchronise*.
3. The *Database* → *Connect* wizard will appear. This is for the subscriber database. If your subscriber is already present on a database server then connect to it. If not, restore it under a *different* name from your main database — if you have the subscriber as a *.nexus-backup file, you must specify a temporary location to restore the backup to so that the synchroniser can work with it. Note that during synchronisation, no other users can be connected to the database.
4. Resolve conflicts if required. In the below picture, an asset has been renamed from '10" PL' to '10" PL m1' in the master, and similarly renamed to '10" PL t2' in the subscriber. The Resolve Conflicts dialog requires that we tell it which change we want to keep. You can click the **Use Master** or **Use Subscriber** buttons to resolve all conflicts at once, and/or resolve conflicts individually. Once you have chosen a resolution for all conflicts, the **Next** button becomes available. Click **Next**, then once the synchronisation is complete, click **Commit**. Other users may now connect to the database again.



Changes made to the following tables in a subscriber will not be synchronised back to the master:

- Email
- Report Schedule (hosted clients only)
- Map Server

Note: Ensure that none of the machines essential to the sync shut themselves down due to power management settings. This includes the NEXUS IC machine and the SQL Server machine. If you are accessing NEXUS IC via RemoteApp, similarly ensure that your client PC will not shut down. If you do lose connection to the RemoteApp instance, you (by default) have 15 minutes to re-establish it (from the same or from a different client machine).

If your network is subject to interruptions, try running NEXUS IC on the same PC that is running your SQL Server.

If your location is subject to power failures, try running NEXUS IC on a laptop.

If you are running Windows 10, try temporarily pausing Windows updates: *Start* → *Settings* → *Update & Security* → *Windows Update* → *Advanced options*, and set a “Pause until” date.

12.1.5 Expert Systems

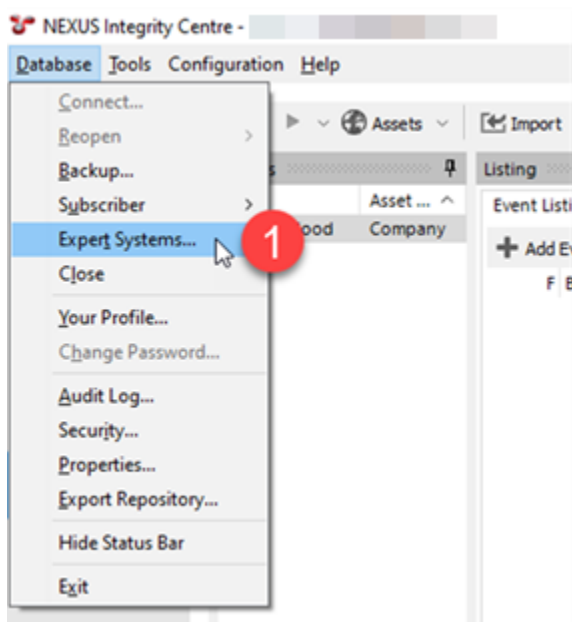
Worked Examples

Port configurations between two databases

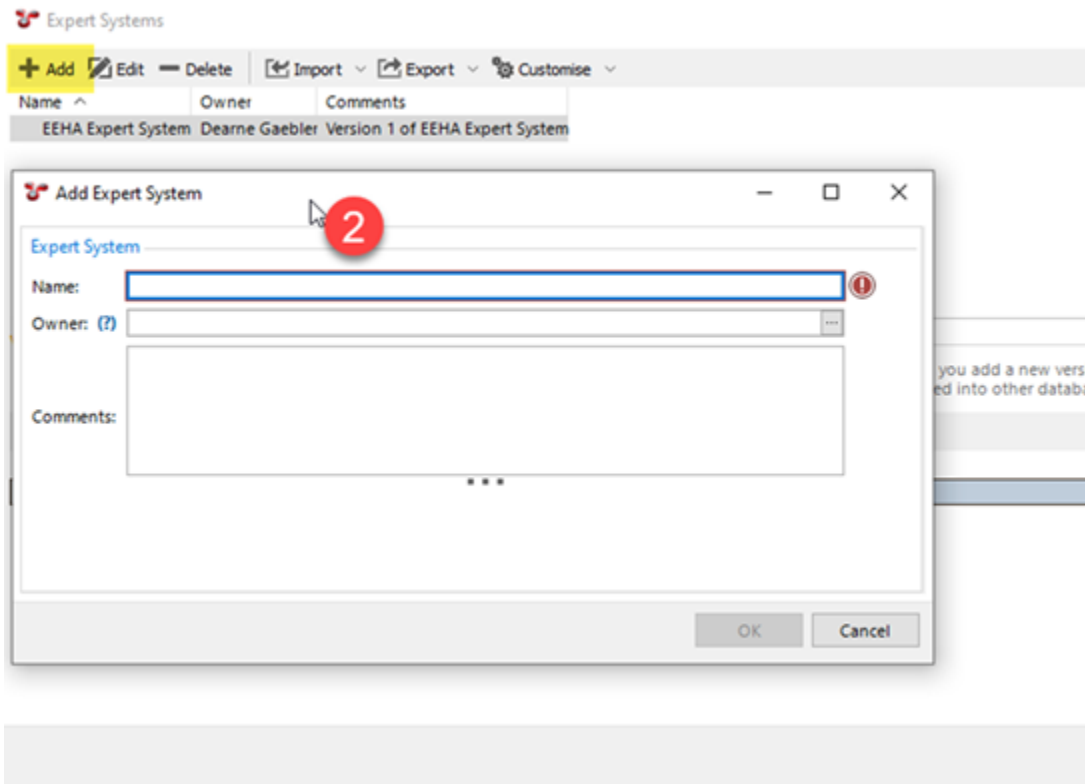
In the following example we will create a Template file from one database and use it to import it into another.

Step 1 - Create an Expert System

Go to *Database* → *Expert Systems* and click on the **Add** toolbar button.



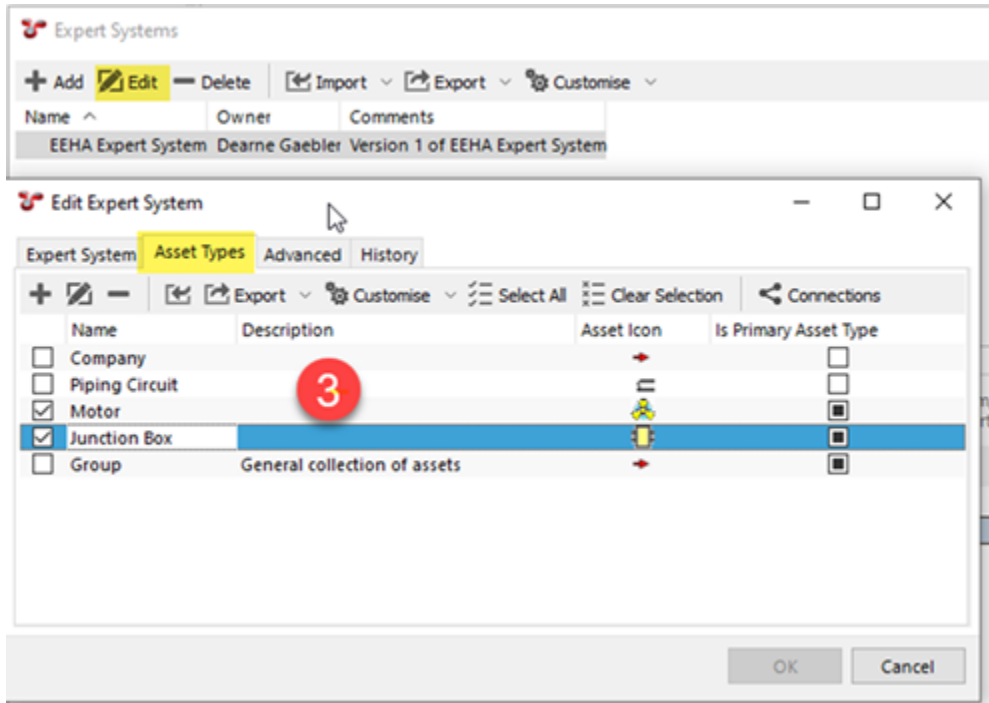
In the **Expert Systems** dialog, enter the Name, Owner and some descriptive text in the Comments field which describes this Expert System configuration.



Step 2 - Choose items to export

There are two main options for choosing which items to include in your Template.

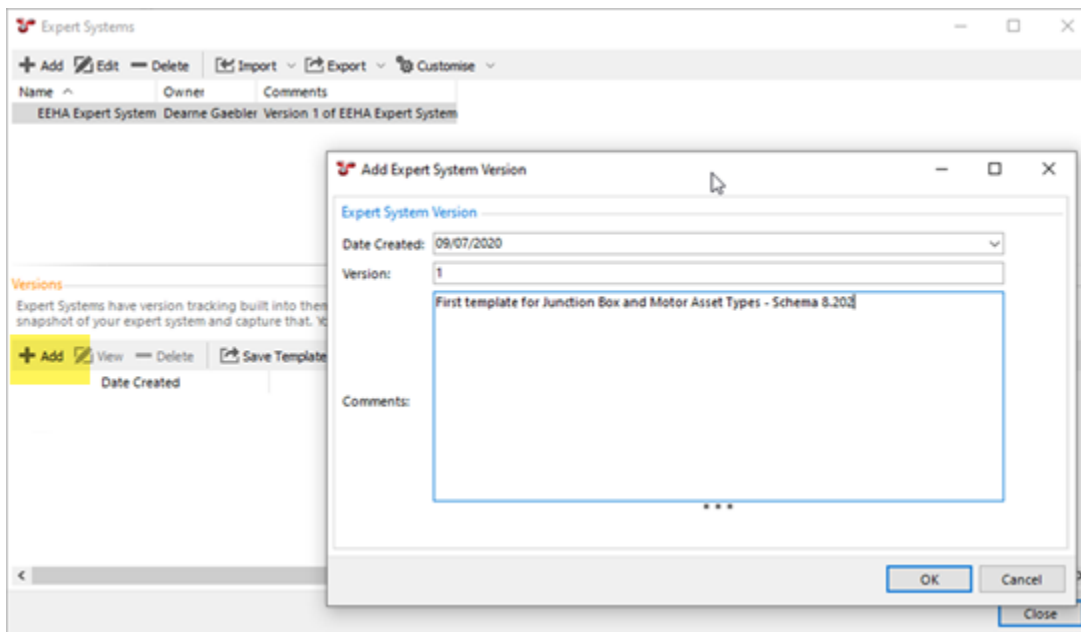
- **Asset Type** - By clicking on any one or more of the asset types means that NEXUS will determine all the associated AIGs, Event Definitions, Functions, Report Templates that are linked to that Asset Type and will include all those items in your template.



- **Advanced** - Choosing the Advanced option allows you to pick and choose which items of this database you want to include in your template. Based on your selection, NEXUS will still ensure that all associated AIGs, Event Definitions, Functions, Report Templates linked to the items you have selected will be included in your template.

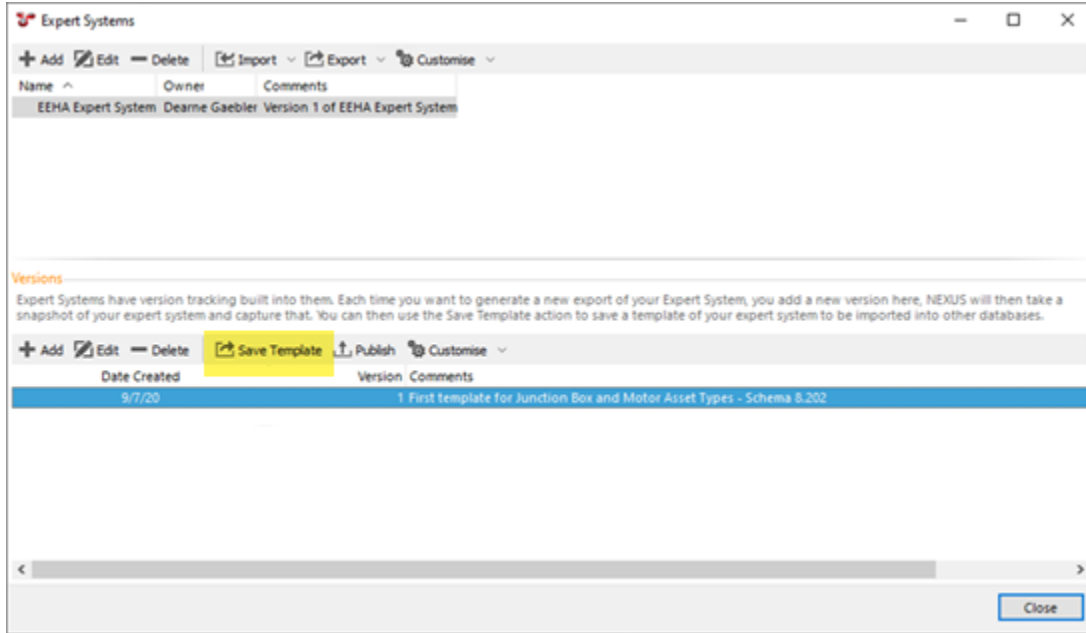
Step 3 - Add a Version

Select the Expert System created in Step 2, click on the **Versions | Add** toolbar button to create a new Version. Note that the Date, Version number is auto-populated. Enter a description for this version in the Comments field, then click on OK to save the Version.



Step 4 - Create the Template

Click on the **Save Template** button in the **Versions** toolbar to create the Template file. You will be prompted to give the file a name and to save it to a folder location.



Step 5 - Import the Template

In the destination database, click on *Database* → *Expert Systems*. Click on **Import** and navigate to the import file.

Publishing and Updating Expert Systems configurations from the internet

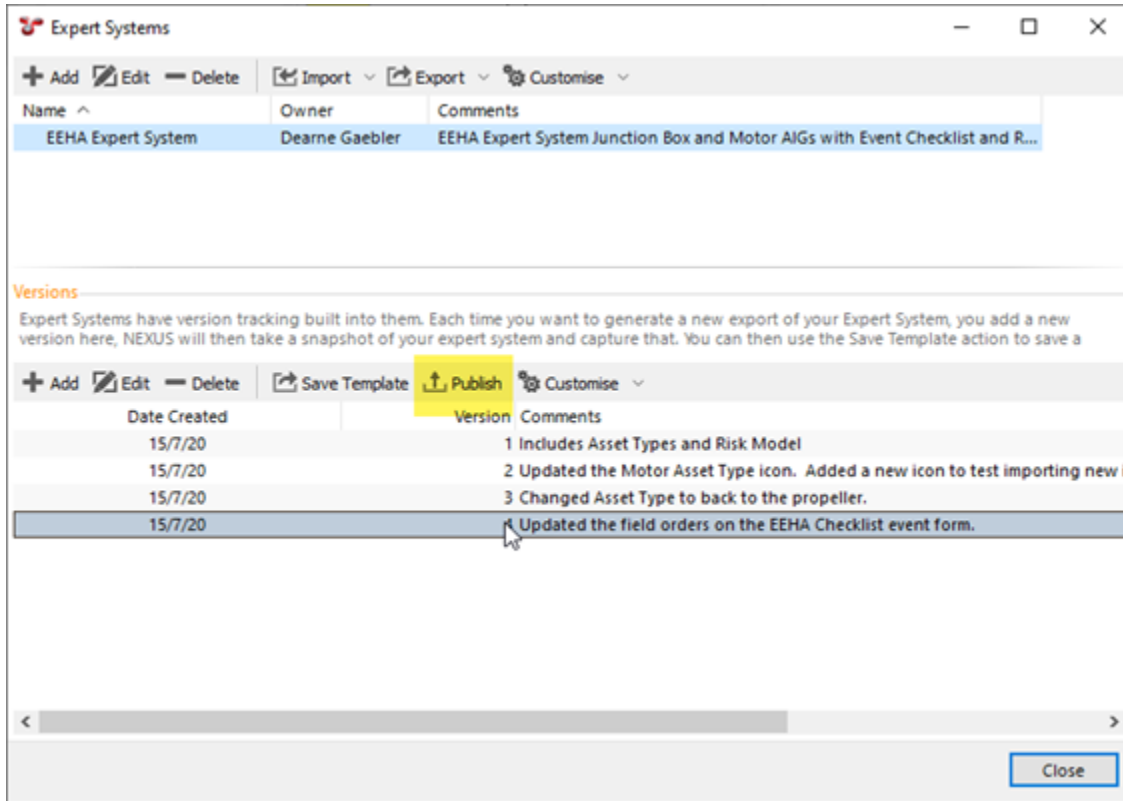
Saving and retrieving Experts System configurations via the internet follows the same process described in Steps 1 to 3 (above), it is only Steps 4 and after which which differ:

What happens when I click Publish?

Note that you will need access to the internet to use this feature. When you click **Publish**, NEXUS locates the corresponding Expert Systems asset in the Wood client management database (or creates a new Expert Systems asset if one does not already exist). It then creates a new Version record against the Expert System storing the database schema version as well.

Step 4 - Publish

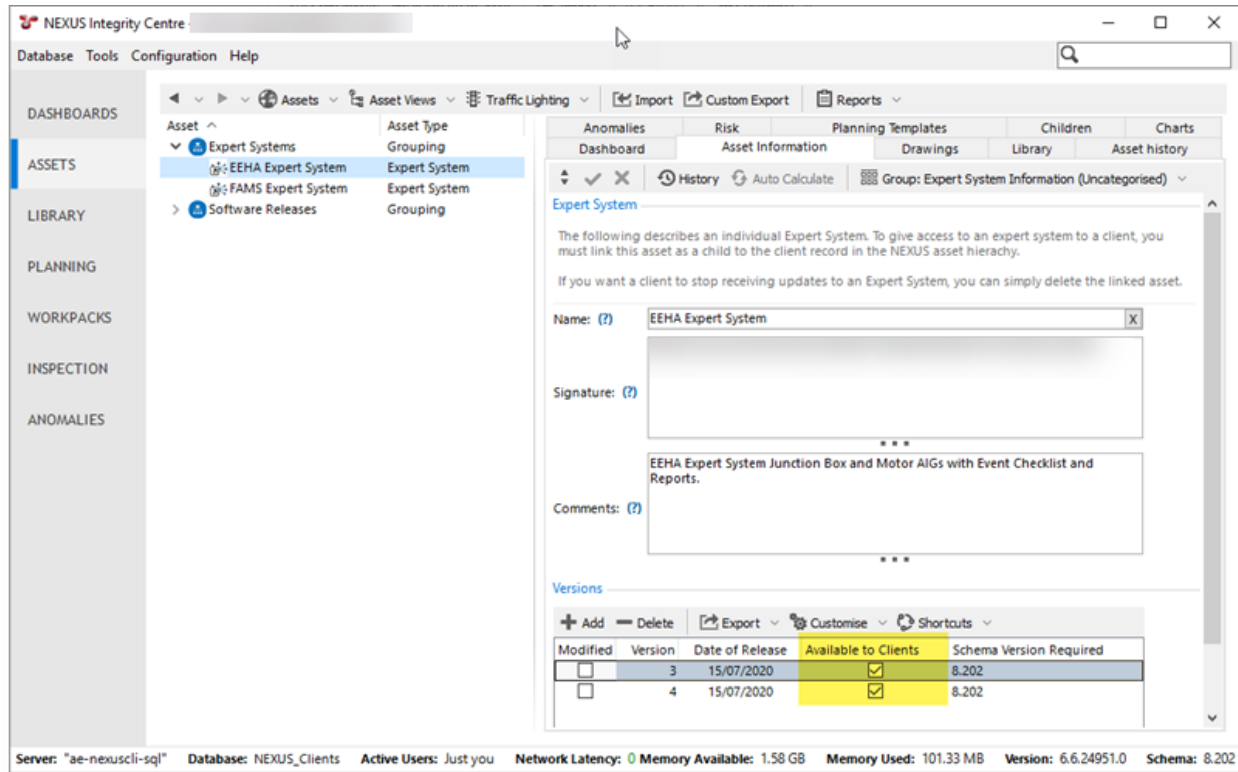
Click on the **Publish** button in the **Versions** toolbar.



Step 5 - Make the new Version available to clients

For any NEXUS database to have access to a published version of an Expert System configuration, the Expert System node in NEXUS_Clients database needs to exist as a child node of the clients database).

In the Wood hosted NEXUS_Clients database, navigate to the Expert System record and check the “Available to clients” check box against the versions which you want clients to be able to retrieve.



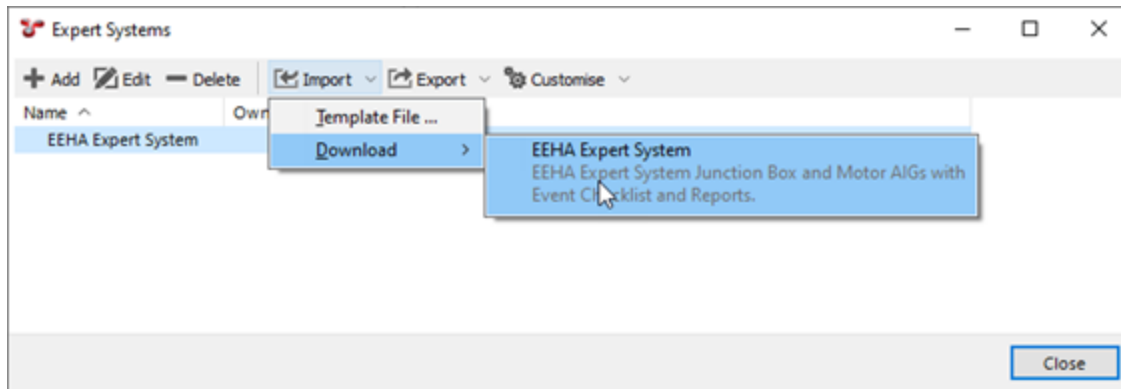
What happens when I Download?

Note that you will need internet access to use this feature. When you click on the **Expert System** from the Download menu, NEXUS retrieves the configuration template via the internet and makes the required changes in the destination database.

Step 6 - Download the Template

In the destination database, click on *Database* → *Expert Systems* → *Import* → *Download*.

This menu will display and make available the latest Expert System revision which is compatible with the schema version of the destination database. If there are no revisions which match the schema version, then no updates will appear for selection. If there are more than one revision of the same schema version, then only the latest revision will appear for selection.



The Expert Systems functionality allows you to export or import asset information groups, event forms, functions, report templates, shortcuts, etc. out of one database and into another.

The concept is that a central library of “base configuration” databases exist for NEXUS clients to subscribe to. The subscription allows for the clients own database to be periodically updated from the base configuration database. An example of this would be the Wood API 581 database which is maintained by a committee of Wood engineers. When new changes are made to the code, the “base configuration” database is updated and the changes to the configuration pushed out to all the subscribers.

This functionality also allows for configuration elements to be ported between databases using Template files without reliance on the subscription model.

Configurations of Asset Types (including Asset Information forms, Global Tables, Risk Models, Event Definitions, Reports, Charts and all referenced Functions) can now be ported/synchronised between NEXUS databases.

Configuration tables which are included as part of the template are:

- Asset Types and asset type icons
- Asset and Sub Asset Information Groups
- Event and Sub Event Definitions
- AIG and Event form and grid layouts
- Anomaly Triggers
- Workflows
- Global Lookup Tables and Items
- Lookup Lists and Items
- Boolean Types
- Unit Groups and Units
- Functions
- Charts
- Risk Models and Risk Charts
- Report Templates

See [Worked Examples](#) for step-by-step guide on how to configure and maintain and deploy Expert Systems configurations between databases.

12.1.6 Close

If you want to open a new database, Close the currently open one first. IntegrityCentre only allows you to have one database open at a time. (If you would like two databases open at once, launch a second copy of Integrity Centre.)

12.1.7 Your Profile

Go here to view and/or change details about your own NEXUS user account. If unit groups (e.g. metric versus US weights and measures) are defined on your database, you can select your preferred unit group here.

Here you can also choose **Favourite Reports**. Tick boxes here, and you will have quick access to the ticked reports via the [Reports](#) toolbar button.

12.1.8 Change Password

To change your own NEXUS password, use this menu option. If you are using Windows credentials, this option is not useful or necessary, and will be greyed out.

12.1.9 Properties

This dialog shows (and allows you to edit) a variety of values specific to your database. These include client name, client logo, a variety of default colours associated with drawings, and a variety of settings associated with 3D drawings.

You only need to set values that are useful to you and your use case.

Name and **Details** are not used anywhere.

Logo can be used in the headings of report templates, and is by default included in the *Dashboards Page* report and the *Dashboards* report.

Secondary Logo is similar, for when you need two different logos in the one database.

User Upgraded identifies the name of the logged in user which instigated the latest database schema update.

Date Upgrade is the date that the latest schema update was performed.

Require History Comment, if checked, means that when changing various data fields, including *Asset Information*, you will be asked to enter a comment describing the reason for the change.

Keep History (days) controls how long that information is retained.

Global Video Path is the root folder or UNC path for all inspection video which may be linked to inspection events in INSPECTIONS. This could also be an Azure SAS URL (<https://docs.microsoft.com/en-us/azure/storage/storage-dotnet-shared-access-signature-part-1>) which links to cloud based storage. See *How does video playback work?*

Temporary Inspection Video Path would normally be populated during offshore inspection campaigns for offline video review and where the video will be local to this instance of NEXUS IC. See *How does video playback work?*

Default Traffic Light Colour – If the currently selected *Traffic Light* does not specify a colour to go with the traffic light's actual value on the asset for a drawing region or button, then that region or button will be shown in this Default Traffic Light Colour.

Known Asset Colour – in *Drawings*, when you select Unknown Asset under Colour, this colour will be shown for drawing regions and buttons where the region or button is connected to an asset. For regions or buttons *not* connected to an asset, **Missing Asset Colour** is used.

Unknown Asset Colour – 3D drawing Layer with an asset, but that asset isn't found in the database.

North Layer Name – Name of the 'True North' layer for 3D drawings.

Asset Serial Number Attribute – in 3D DWGs, you can use a tag in the DWG to specify what asset this is. NEXUS IC will then match that tag to the field you specify in *Configuration* → *Asset Information* → *Configure Asset Features* → *Asset Serial Number* → *Edit*. Here, you are specifying the DWG tag that NEXUS IC will attempt to match on. See *3D Drawing Setup Example* for more information on how to configure 3D Drawings.

Missing Serial Number Colour – if you have specified an Asset Serial Number Attribute and an Asset Serial Number field (both described above), then when NEXUS IC finds an attribute in the DWG but is unable to find an asset with a matching value in the database, it will highlight the asset in the colour you select here.

Grid Size – Size of a grid cell at scale 1 for the 3D drawings.

Grid Colour – Colour of the grid for 3D drawings.

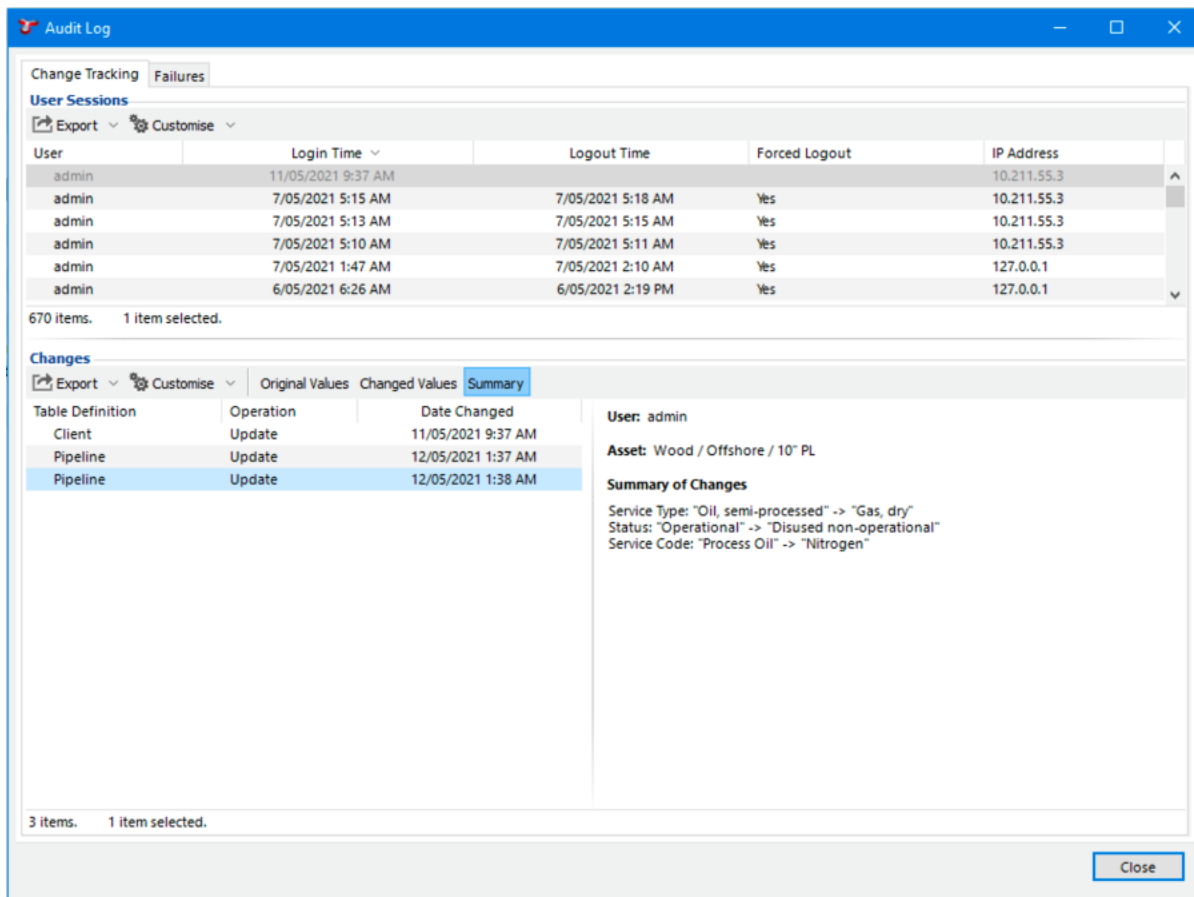
Anomaly Risk Chart – Anomaly Risk Matrix can be defined in *Risk Charts* and then to be selected here to show the open and close anomalies in the defined Anomaly Risk Chart in **Anomalies** screen. **System - Anomaly - Risk Score** function which is a user defined function needs to be set up to calculate the **Risk Score** for any anomaly. The result of this function will be a number that is assigned to each square inside the matrix. The matrix must be defined to only have unique values in in each square.

The **Email** tab contains settings to allow NEXUS IC to send mail (e.g. to email a generated report or the contents of any of the grids). It is recommended that a NEXUS IC email account is set up by your company’s IT team and all email activities are generated from this generic account. Please speak to your IT department for information on the Host, Username, Password, Port and SSL settings.

The **License** tab contains details of your license key. As part of *Software Based Licensing*, this is where you will enter that license information.

12.1.10 Audit Log

Here you can see a list of user sessions. Each time a user logs in, a session is created, with a login time. When they log out, a logout time is recorded.






During a user’s session, they may edit data in the database. The Audit dialog displays a row for each data row they change. The ‘Table Definition’ column shows the name of the table that the change was made in. Some of these tables are ‘System’ tables — for example, if a user moves an asset, you’ll see a record for ‘Asset Location’. Some are ‘user’ tables — for these you will see the name of your Asset Information Group, Event, etc.

Under Changes, you may select and view changes from the list of changes that were made during the selected user session.

The left section lists in tabular form all changes made to a record:

- **Operation** - *Insert* indicates the creation or addition of a record, *Update* indicates that the data was changed from a pre-existing value to a new value, and *Delete* indicates the deletion of a record.
- **Date Changed** - Shows the date and time the change was made in the database. The table is ordered chronologically by default.
- The **Table Definition** column can be added via **Customise** to show which table the change was applied to.

The right section displays the name of the user, the form and the values of each field relevant to the change. Fields within the form that were changed are marked with a  blue highlight. For an ‘Update’, the following tabs will be displayed:

- **Original Values** - Makes visible the values as they were *prior* to the change, with the changed values visible by hovering over the .
- **Changed Values** - Makes visible the values as they were *after* the change, with their original values visible by hovering over the .
- **Summary** - The summary will show all changes within the change record in an easy to read, written format.

For changes with **Operation** type *Insert*, the following tab will be displayed in place of **Original Values**:

- **Form** - Shows the form and field values in the initial state, as it was created.

See also [History](#).

12.1.11 Security

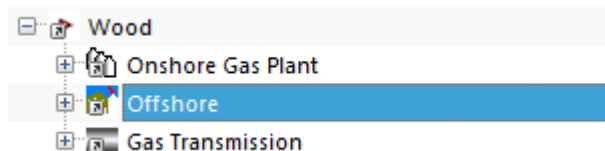
Asset Security

Asset security is a feature that allows even more granular control of access to information than our generic [Security Permissions](#) table does. It allows you to set what assets in your database you want each user to have access to.

Asset security works on the principle that all users have access to everything by default, and then database admins remove access as necessary. Restricting access is as simple as creating an asset view that contains the parts of the hierarchy to be restricted, and then setting appropriate access rules on that asset view. Parts of the hierarchy can appear in multiple views with multiple security rules — the rules will be applied across all of their views.

Example:

Suppose you have the following asset hierarchy:



If you wish to restrict access to the “Offshore” part of the hierarchy by making it visible to Offshore Engineers but block access to Onshore Engineers, you would:

1. Log in as an administrator account.
2. Create a new Asset View — give it a helpful name like “Offshore assets - Offshore Engineers only”.

3. Display the new Asset View by clicking *Asset Views* → *Offshore assets - Offshore Engineers only*.
4. Add a link to the Offshore part of the hierarchy by clicking
 - *Assets* → *Add* → *Linked Asset (with children)*.
 - Select the Offshore asset and click **OK**.
5. Set the permissions on this asset view by clicking
 - *Asset Views* → *Edit* → *Permissions* → *Add*.
 - Now set appropriate permissions for each user group:
 - For Offshore Engineers: set to Read/Write to give them full access.
 - For Onshore Engineers: set to Deny All to block these users.

Now, the Offshore Engineers will have full access to that part of the tree, and Onshore Engineers will have no access. This access will be applied across asset views, so that Onshore Engineers will not be able to circumvent their restrictions by switching to a different asset view. If people who are blocked from assets try to view them, they will see:



In setting up asset level security rules, it is important to note that a user will have the lowest access they have set up.

Common gotchas are:

- Removing a user group’s access from the “Default View” — this gives them no access to any assets (as they now have deny access on all assets).
- Where a user belongs to multiple user groups, and one of the groups has access in one view but another group does not have access — the user will not have access to the assets. The rule is that the most restrictive permission is what’s applied.
- Giving a user Read Only access is the same as Deny Write (in this context).

Asset security also applies to *Library* items. If a library item is *connected* to an asset that the user has no permission to read and/or write, then the user will similarly have no permission to view and/or edit that library item.

Note that asset security is likely to have an impact on performance, because NEXUS IC must look up every asset to check its security before it can be displayed to the user.

Special Permissions - Security


To log in to the database, a NEXUS login must have **Read** permissions (as a minimum) to the Personnel table, so ensure that System Table | Security Permissions is set to **Read** for all users.

Setting **Deny All** on the Special Permission ‘Security’ will disable the *Database* → *Security* main menu item, regardless of what permissions have been set on the Security Permissions tables.

Here you can add/edit/delete users, and can set their permissions. Permissions in Integrity Centre 6 are on a table-by-table basis, rather than on a screen-by-screen basis. For example, if you would like a user to be able to add or delete assets, you should edit the user (or the user’s Group) and give them **Read / Write** permission on the system table ‘Asset’. If you would prefer that this user (or group) only view assets and not add or delete them, give the user (or group) **Read** permission.

Items inherit Security in two ways: from their parent security item, *or* from their corresponding item in all other groups. Each user has their own permissions, plus the permissions of any group they are a member of. ‘Inherited’ mostly means ‘No permissions applied for this security item, for this user/group’. Read and Read/Write are additive. Deny is subtractive and is applied last. To figure out the permission for an item, NEXUS retrieves permissions for the user, and all groups the user is a member of. If there are no resultant permissions set, then NEXUS finds the parent of the item and checks permissions on that. If necessary, a Special Permission will be counted as a parent — for example, if an Asset Information form has no explicit permissions (because it is set to ‘Inherited’), then NEXUS will use the Asset Information special permission.

Finer control over *Asset Security* is available.

- **Set-up SSO** - you can configure a user to use Window domain credentials to log in to Integrity Centre. This is smoother as users will not need to enter a separate password when they start Integrity Centre — instead Integrity Centre will query the domain controller to check the user’s credentials. To configure this:
 1. Edit the user and go to the Login tab.
 2. Click the  button under ‘Windows User’.
 3. In the resulting ‘Select User’ dialog, you may need to click Locations and select Entire Directory.
 4. Type the user’s full or partial Windows login name, and click Check Names, choose the appropriate name from the list and click OK.

Note that Windows domain credentials may not work when you are away from the Windows domain.

Tip: You can always bypass the automatic connection to the database using domain credentials by holding down the Shift key as Integrity Centre starts up.

- **Force Reset** - if you are *not* using SSO, you can force a user to reset their NEXUS password on their next login. (You would typically do this when you have just created a user account and have set a temporary password.) On their next login, the user will be required to enter their old password and then choose a new one before they can proceed.

12.1.12 Export Repository

Use this menu option to export all library items (including drawings) and event multimedia. (In previous versions, this option also exported survey data, but survey data in version 6 is no longer stored in the same way and is therefore not exported from this menu option.)

12.1.13 Show Status Bar

The status bar at the bottom of the main NEXUS IC window shows the database server you are connected to, the name of the database you are connected to, the number of currently connected users, the number of Active Jobs, and an estimate of how fast the connection to this database server is. In addition, the Memory Available, Memory Used, Software Version and Database Schema number are also displayed.

The Active Jobs status bar item refers to the number of imports or reports currently running in the background.

When Memory Available is small compared to Memory Used, you are running low. In this circumstance, NEXUS IC may start clearing parts of its cache in order to avoid running out of memory. You can force a complete emptying of cache by closing the application and restarting.

You can toggle the status bar on/off using the *Database > Hide Status Bar* option.

Note: Job Management Console

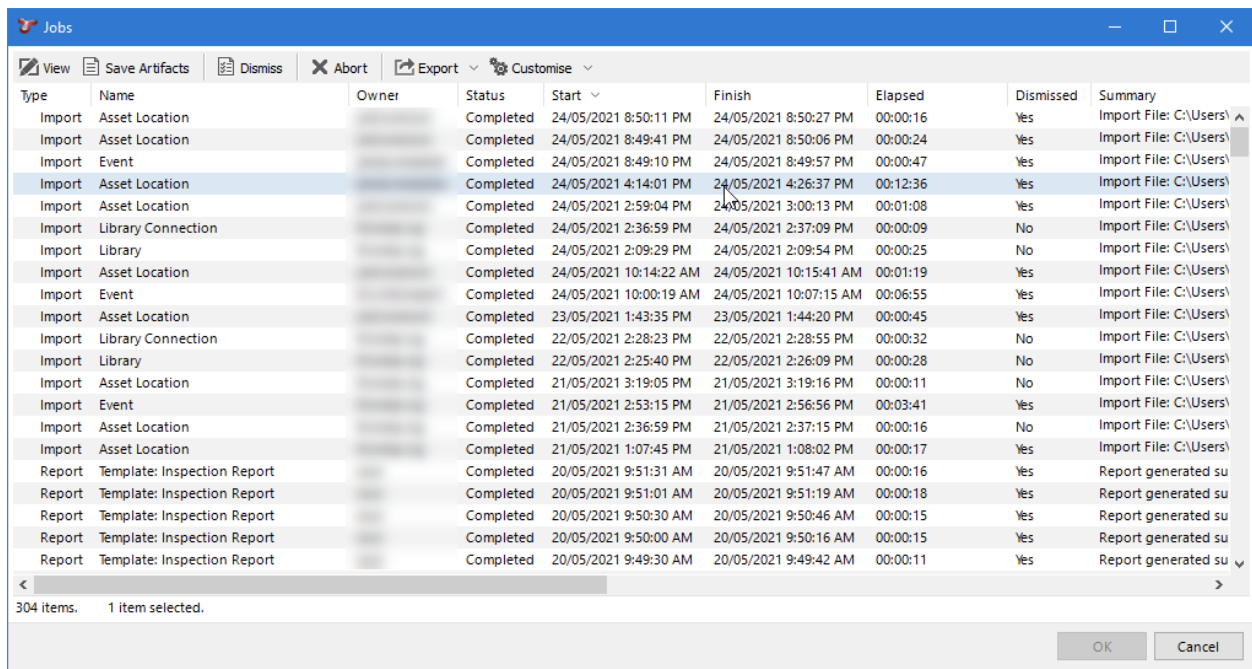
Double-clicking the Active Jobs number in the **Status Bar** will summon the **Job Management Console**. From here you can view more detailed information on each job’s progress, including jobs that are currently running or have been dismissed. A job may include an import or report.

The following items will be shown for each job: Type, Name, Owner, Status, Start, Finished, Elapsed, Dismissed, Summary.

SaaS Clients can have their jobs offloaded for generation on another server. These jobs are visible in the Job Management Console. Reports will be generated in the cloud and downloaded from the Job Management Console after their completion.

The Console’s menu provides the ability to interact with jobs. The behaviour of the menu buttons differ for Reports and Imports. See the table below for a breakdown of the functionality:

	Report Jobs	Import Jobs
View	Allows the user to download the generated report.	Shows the import summary, errors, and/or warnings.
Save Artifacts	Does not have any artifacts.	Allows you to save the source import files (csv or xlsx)
Dismiss	Hides the blue pop-up banner at the bottom of the NEXUS IC window.	Hides the blue pop-up banner at the bottom of the NEXUS IC window.
Abort	Aborts the report job if possible.	Aborts the import job. The import job saves data incrementally, so aborting will only stop further data from being imported into the database.



12.1.14 Exit

Self-explanatory, really.

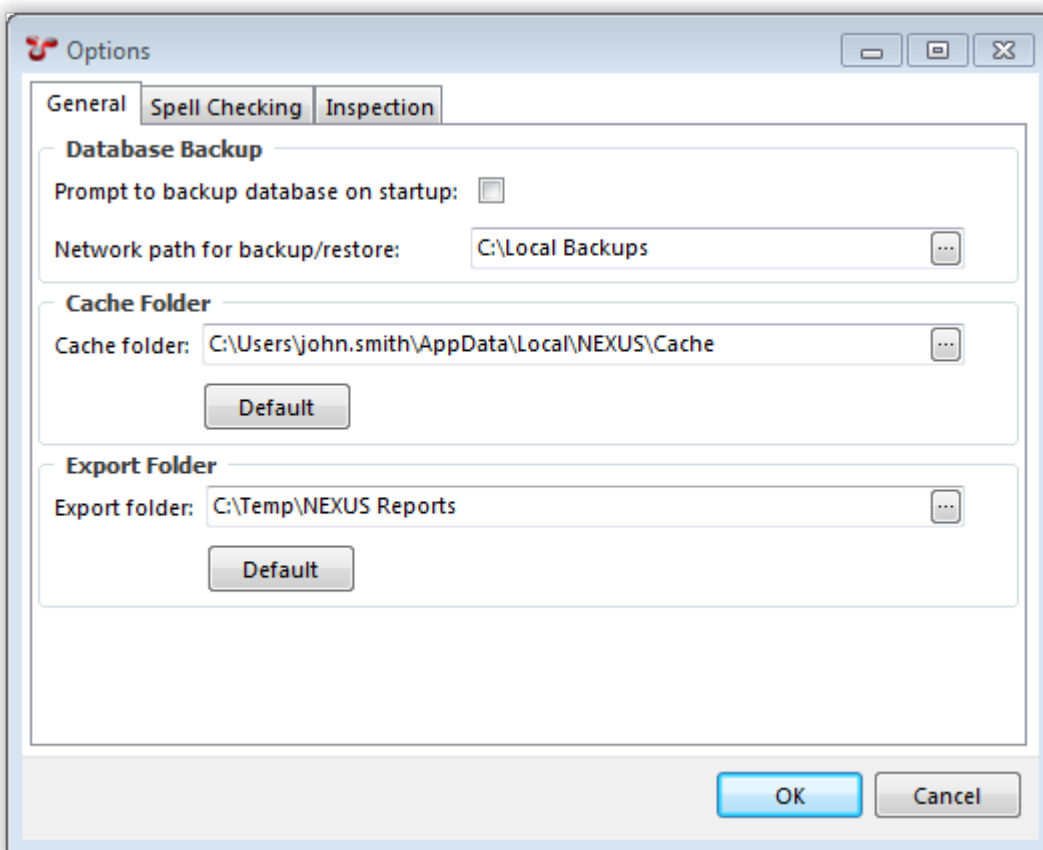
12.2 Tools

12.2.1 Options

All options and settings in this dialog are currently user specific. The options and settings are stored in the windows folder: C:\Users\[USER_NAME]\AppData\Roaming\NEXUS

- **Tools** → **Options** Launches the Options dialog with the following tabbed pages:

General



- **Prompt to backup database on startup** - When checked, the 'Database Backup' wizard will be launched on login.
- **Network path for backup/restore** - This path must be accessible to both the database server and to Integrity Centre. This may be a UNC path (like '\\MyServer\MyShare') or if the database server and Integrity Centre are running on the same machine it may be a Windows path (like 'C:\Database Backups').

When the path is valid (i.e. it is visible to both Integrity Centre and the database server) it will have no border. If the path is invalid, a yellow border will be shown around the field.

Tip: The database server process must have permission to read and write to the folder. If the path is

shown as invalid, check the permissions of the user account that the database server service is running under.

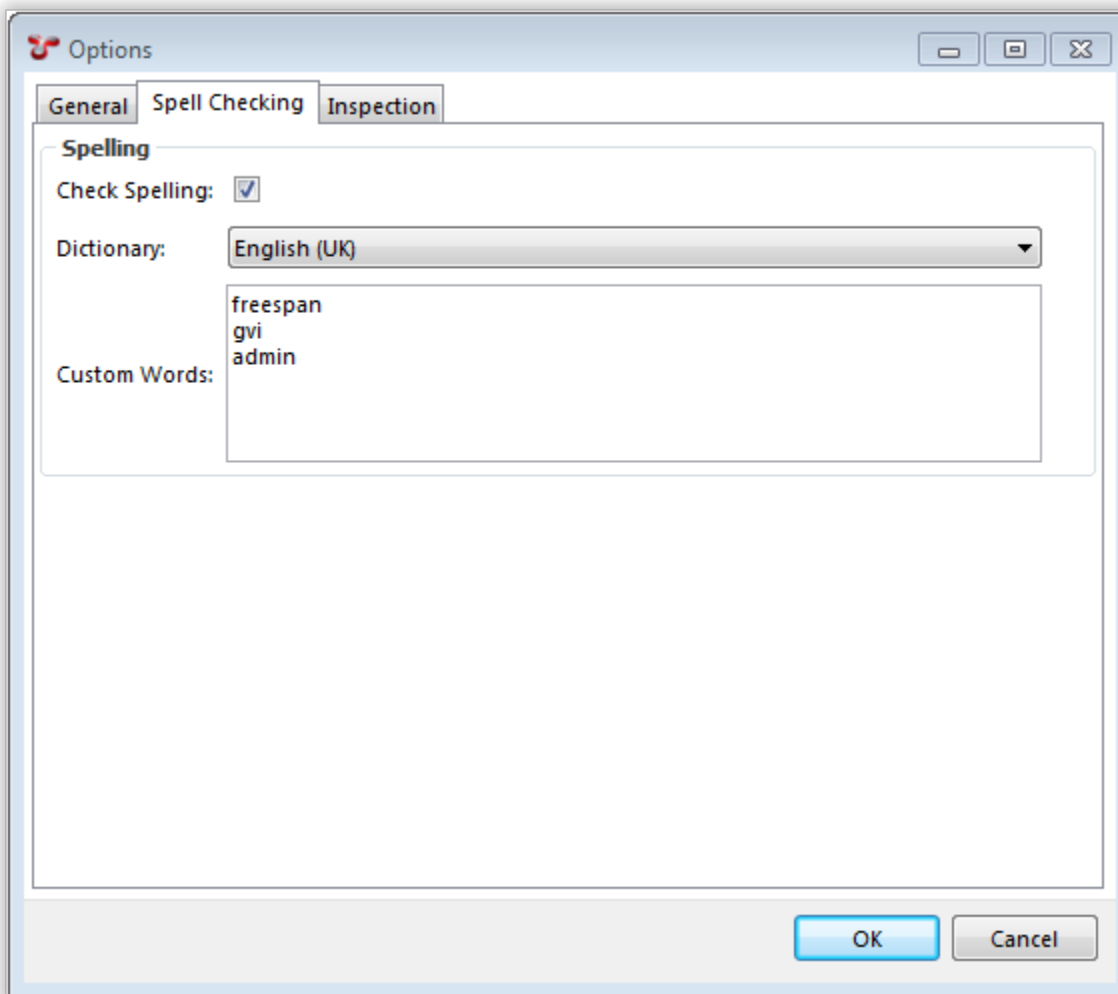
Example valid path:

Example invalid Path:


- **Cache Folder** - Drawings, Library Items and Multimedia images, when retrieved from the database for the first time are saved to this folder.
- **Export Folder** - This is the default path that NEXUS will use when exporting data.

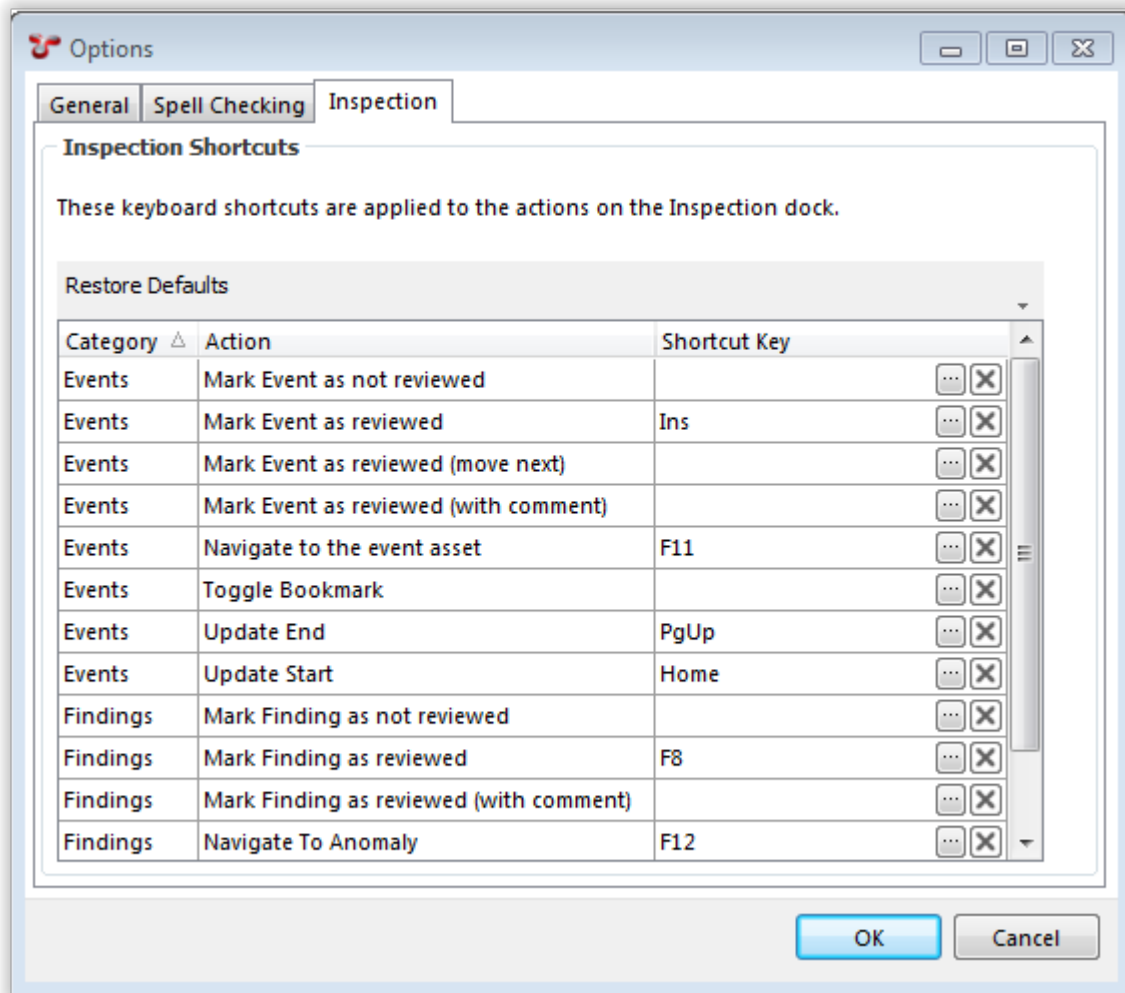
Spell Checking

- **Spelling** - When checked, typed data is spelled checked against the selected Dictionary.
- **Custom Words** - Enter words that should be ignored by the spell checker. Enter one word per line.



Inspection

- Inspection Shortcuts - Inspection shortcuts allow the user to assign Function keys and Numeric Keypad keys to common review actions within the Inspections Review screen. Click on the *Restore Defaults* button to pre-populate common Shortcut Keys. To assign a shortcut key to an Action:
 1. Select the Action.
 2. Click on the  Ellipsis button.
 3. Press the shortcut key (or key combination) that you want to assign to the currently selected action. The shortcut will then be displayed in the grid.



12.2.2 Video...

The **Configuration - Video** dialog lists all parsed video files which exist in the folders defined in the *Database* → *Properties* → *Global Video Path* field and the *Database* → *Properties* → *Temporary Inspection Video Path* folders.

- **Play** launches and attempts to play the selected video file.
- **Open Location** opens a Windows Explorer at the folder location of the currently selected video file. Note that this menu item is only enabled for non-cloud based storage locations.

- **Upload** is used to copy video files from the **Temporary Inspection Video Path** to the **Global Video Path**. This is typically used to copy inspection video returned from an inspection campaign to the master video storage location. The **Upload** process gives the user the option to Delete, Rename, or Retain the local video files (this could be on a USB HDD) after the **Upload** has finished. Additionally, you can elect to encode the video files to the native streamable H.264 file format during the copy process.

If there are videos listed here that no longer exist (for example because you have used Windows Explorer to move or delete them), you should remove them from this list too, using the **Delete** button. *Multi-select* may help here.

12.2.3 Parse Video

Clicking on an item in the **Parse Video** submenu causes NEXUS IC to read video and image files and store their properties (such as start time and duration) in the database. The datetime properties of the video and image files are the links to the events in the *INSPECTION* screen.

- Clicking **Global Video** parses all video and image files in the Global Video Path. (Typically you would use this option onshore.)
- Clicking **Temporary Video** parses all files in the Temporary Inspection Video Path. (Typically you would use this option offshore.)
- Clicking **All Video** parses all files in both those locations.

The parsed videos and images will appear in the *Tools* → *Video...* dialog (see above).

See also *How does video playback work?*

12.3 Configuration

12.3.1 General

Boolean Types

Any Yes / No field can have a Boolean Type assigned to it. By default, each Yes / No field is given the Boolean Type “Yes / No”, but you can add others. For example, if you have a field called “Secure?”, you might add A Boolean Type for the field with values named “Secure” and “Not secure”.

Edit a type to set up its Values. A Boolean type can have two or three values: one for the True state, one for the false state, and an optional third on for the null “neither checked nor unchecked” state. If you want a Boolean field to have just two states, tick the *Required* box for that field.

Chart Templates

Charts and Drawings

You can put a drawing behind a chart template. This is useful when the chart template shows event data — you can show that event data right on a drawing or photo of the asset itself.

You can also show regions (points, lines, shapes) from events on a chart template, and you can show multimedia (photos) on a chart template.

Configuring this involves visiting several different areas of NEXUS IC, so it is documented here, rather than in any specific area.

Configuring an Event Type to include a shape

First, take a database backup.

Then go to *Event Types*. Ensure that a sub-event is created, and that in the bottom half of the configuration dialog it has two numeric fields called X and Y.

Still in *Event Types*, select the event you want to show as a polygon, series of lines, or point on the chart template. In the bottom half of the configuration dialog, ensure that it has a field of type Table Link. Edit this field. On its Field Definition page, ensure that its **Sub AIG/Event** is set to the sub-event you created in the previous step.

On its Field Layout page, look at its Editor Type. If you would like this to show on the chart template as a series of line segments (i.e. as an open curve, good for representing cracks, scratches, etc) select **Graphical Markup (Line)**. If you would like it to show as a point, select **Graphical Markup (Point)**. If you would like it to show as a polygon (i.e. a closed curve), select **Graphical Markup (Region)**.

Configuring the Chart Template to support Drawings and Event shapes

Go to *Chart Templates*. Edit the chart template you want to show events on. Ensure that **Show Drawings** is checked.

Still on that Chart Template, in the bottom half of the dialog, ensure that the Chart Template has a Series for the Event Type that you want to display on the chart. Edit the Series. Ensure that its **Series Type** is set to match the Editor Type that you picked for the Event's Table Link field: **Points** for **Graphical Markup (Point)**; **Polygon** for **Graphical Markup (Region)**; **Polyline** for **Graphical Markup (Line)**. On the Series' Axis page, ensure that it has an X and a Y axis. Edit each Axis. For the X Axis, ensure that the **Parameters (Inputs)** value is set to the X field of the Sub Event. For the Y Axis, similarly ensure it is set to the Y field of the Sub Event.

Configuring a Drawing to support display behind a Chart Template

Go to *Drawings*, click Edit Layers, add a rectangle layer, change its type to Coordinates, set an Asset for that layer, set left/right/top/bottom for that layer.

On the Inspections screen, in the *Charts* pane, select the Chart Template. Click the Drawings button/menu and pick the Drawing from the list.

At least one event must have event shape data on it for the Chart Template to show the Drawing — the Chart Template zooms to Event data, not to the coordinates layer. If that Event's Shape is completely outside the Coordinates you selected for the drawing Layer, the Drawing may not be visible.

Once the image is set up correctly in the Chart Template, it will also show in the Event shape editor.

Photos in Events onto Chart Templates

You can have a multimedia (e.g. a photo) on the event's shape layer. In shape layer editor in *Event Details*, click **Multimedia** then pick photo. You can move and size the photo.

Mouse wheel zoom may not work in the Event shape editor. This is a focus issue related to Windows. Use the magnify+ and magnify- buttons instead.

When you change an Event's shape, the Chart Template may not automatically refresh in 6.0. Click off the asset and back on to force a refresh.

In the top half of the *Configuration* → *General* → *Chart Templates* dialog, you can add, edit and delete chart templates. These templates can then be shown on the *Inspection* screen and in *Report Templates*. In the bottom half of the dialog, you can add, edit or delete series within a chart template.

Add

To add a new chart template, click the **Add** button at the top of the “Configuration - Chart Templates” dialog. Give your new chart template a name.

Available controls whether the chart is available for display in relevant Charts panes on the Assets and Inspection screens. All chart templates are available for use in *Report Templates*, regardless of this setting.

Show Zoom Bar controls whether a mini version of the chart will be shown at the bottom of the chart on the Inspection screen. This is useful if users may be zooming a long way in to the chart (which is often the case on KP-based charts, for example).

Show Drawings is used to show a drawing as the background of the chart. See *Charts and Drawings* for more details.

Show X Axis Title and **Show Y Axis Title** control whether the chart will contain text showing a title for each axis.

Edit

To edit an existing chart template, select it and click **Edit**, or just double-click it.

Series

You can add/edit/delete a chart template’s series either by editing the chart template and clicking on the **Series** tab, or by using the bottom half of the main “Configuration - Chart Templates” dialog.

Add Series

Series

Name:

Series Type:

Colour:

Point Style:

Shaded:

Opacity: (?)

Line Weight:

Statistics

Min/Max:

Average:

Standard Deviation:

Least squares regression line:

Trend Lines

First and Last Points:

Last Two Points:

All Points:

At bottom right is a preview — as you add or edit series, random sample data will display in this preview to show you conceptually what your chart will look like. If you have chosen options that cause the chart to have a legend, the

legend is interactive: you can mouse over a legend item to highlight the corresponding item in the chart, and you can click legend items to toggle the corresponding chart item off/on.

When you add or edit a series, you'll need to give it a name. If your chart has just one series (this is common), you'll often give the series the same name as the chart.

A series also needs a Series Type. Different series types have different properties, which will become visible when you select that type. Available series types are:

- 3D Events,
- 3D Mesh,
- 3D Pipeline,
- Anomaly Trigger,
- Bars,
- Bezier Lines,
- Bubble,
- Contour,
- Donut,
- Gantt,
- Gauge,
- Gauge Indicator,
- Heat Map,
- Histogram,
- Horizontal Lines,
- Lines,
- Pie Chart,
- Points,
- Polygon,
- Polyline,
- Vertical Lines.

Points, **Lines**, and **Bezier Lines** have more options, as shown in the image. If you tick **Shaded**, the area between your line series and the horizontal axis will be shaded in a paler version of the series' colour. If you tick boxes for the various **Statistics** and **Trend Line** items, you will see corresponding lines show on your chart. (**Standard Deviation** shows horizontal lines one deviation above and one deviation below the mean.)

Axis

When you edit a series, you will be able to configure one or more axes for it, by clicking on the **Axis** tab. (This tab isn't visible when you've just added a series — click OK and then **Edit** to make the tab visible.)

Each axis must have a name. If your chart has several series, you may wish to give the X axis the same name in each series, and give the Y axis the same name in each series.

For an X/Y chart you may have two axes, but charts may have more — up to one each of the kinds listed below.

Axis Kind

Available Axis Kinds are:

- X Axis,
- X2 Axis,
- Y Axis,
- Z Axis,

- Z2 Axis,
- Colour Axis,
- Split Chart Axis,
- Split Series Axis.

Conceptually, if you wanted to use some piece of event data to set the Y value of points on your chart, you would add a Series of type Points, and within that you would add an Axis of kind Y Axis, with an axis type of Field, then select the database field you want to use for your Y values. You'd also want to pick something for your X position: you'd add another Axis to your Series, with kind X Axis, and then choose whatever type and other details were appropriate.

Time and KP are both common choices for X Axis field. The X2 Axis is useful for things that cover a span of time or a distance of KP — for example, you could set your X Axis to pull from Event.Start - KP and your X2 Axis to pull from Event.End - KP. (If your chart covers a period of years, the displayed chart will attempt to pick axis ticks on the first day of the month or first day of the year.)

Point, Line and Bezier Lines series have just X and Y axes.

Bubble series similarly have just X and Y axes. If there are multiple points at the same location in a Bubble series, the resulting bubble will be drawn larger.

Vertical Line series have just an X axis. **Horizontal Line** series have just a Y axis.

Bar series have X, X2 and Y axes: X and X2 are used to define the left and right edge of each bar. **Histogram** series have just X and Y: X is used to define the centre of each bar.

Gantt series have X, X2 and Y: X and X2 are used to define the beginning and end of each horizontal Gantt line.

For a **Donut** or **Pie** series, you should use an X Axis to give the name of each pie slice, and a Y Axis to set the size of each slice. (Donut and Pie charts don't really have an X or Y, so we made an arbitrary choice there.) You can also add a Colour series if you like, to give the colour of each slice. (If your chart is representing event counts, Table Definition.Colour might be a good choice.) If you don't specify a Colour series, NEXUS will make up a different colour for each slice.

Tip

Create a *Global Table* to define the Gauge series colour, order and values.

Gauge and **Gauge Indicator** series are designed to be used together. A Gauge series is like the top half of a Donut chart, in a half-circle. Gauge series have X and Y axes: X is used to supply the order entries should be shown in, and Y sets the size of each slice. A colour series is also typically used. The Gauge Indicator series is the needle showing the value on the scale, and has a Y axis for value, plus X for label.

Anomaly Trigger is like a Horizontal Line series. When you specify a value field for this series, NEXUS does not pull data directly from that field; rather, it looks for *anomaly triggers* configured on that field, and shows one horizontal line for each trigger. If there are several different triggers on this field (perhaps with different severities or codes), you will get several different lines. The vertical position of each horizontal line is determined by the trigger value. If there are different trigger values for different horizontal positions (for example, a pipeline might have different allowable span lengths at different KP ranges), you can add an X axis of *type* Auto and NEXUS will behave appropriately.

The **Polygon** and **Polyline** series are very similar — Polygon is a “closed curve”, where we connect the last point back to the first. They are useful where events have defined shapes (e.g. delamination on a concrete wall). See *Charts and Drawings* for more details. Polyline is an “open curve”.

The Pipeline View is a 3D view, and uses the Y Axis to represent the diameter of the pipeline. If you don't set a Y Axis value of some kind, you won't see a pipeline. Because it uses Y for diameter, it uses Z Axis and Z2 Axis to represent distance along the pipeline. As with X and X2, the two different axis types are used to represent the start and end of an item on the “chart”. A **3D Pipeline** series is used to represent the pipeline itself, and has Z and Z2 axes

which represent the start KP and end KP of the whole pipeline. It also has a Y axis, which represents the diameter of the whole pipeline. A **3D Events** series is used to represent events along the pipeline, with:

- Z and Z2 axes representing the start and end of each individual event;
- a Y axis representing the diameter with which that event should be drawn (diameter is inflated slightly “for free”, to make the events stand out from the pipeline);
- a Split Series axis (see below) which is typically used to separate different event types into separate series; and
- a Colour axis, to determine the colour to paint each event.

It also has a **3D Mesh** series, which is used to represent the seabed. The Z axis is used to represent the KP (i.e. the distance *along* the pipeline). The X axis is used to represent the distance *away* from the pipeline. The Y axis is used to represent the vertical distance, to show the actual variation in the seabed.

Contour and **Heat Map** are conceptually similar. Contour can be used to show contour lines for some “height” value, as seen in a topographic map or an isobaric weather chart. Heat Map is similar, but shows the “height” value as a colour axis, instead of as a series of colour lines. You can combine a Contour series and a Heat Map series on a single chart, to give two different representations of the same data.

A **Split Series** axis lets you split data on one series into several series by some field you choose, such as Asset or Workpack. For example, if you have data in several different workpacks, and you’d like each workpack represented on your chart as a separate series, add a Split Series axis, and set its Parameters (Inputs) to Event.Workpack. Similarly, if you’d like to split data from different assets into different series, you would choose Event.Asset for your input. (Splitting by asset is only useful when the user filters to include child assets in their event listing, and has selected an asset that has children — otherwise, all the data in the listing will by definition be from just one asset.) The series will each show separately in the chart legend, and the user can make individual series visible/invisible.

If you have a Split Series axis on a Gantt series, ticking the Gantt series’ **Show Stacked** will show each separate split value in its own vertical space. If you untick Show Stacked, the split series will share vertical space. For example, if your Split Series splits on Event Type, ticking Show Stacked will give a row for each event type; unticking it will combine all event types in one row (but the user may still distinguish event types by colour, and can make individual series visible/invisible).

A **Split Chart** axis works the same way, except that instead of your data appearing as several series on one chart, they will instead appear as a series of charts, one above another. (Any other series on the chart which don’t have a Split Chart axis will appear on all of the split charts.)

You can add a Split Series axis, Split Chart axis or **Colour** axis to almost any chart series. For example, a Split Series axis on a Histogram series will give a stacked bar chart.

Axis Type

Several Axis Types are available:

- Auto,
- Average,
- Calculation,
- Count,
- Field,
- Sum.

The simplest axis type is **Field**: specify a field from a table that you want the chart series to pull data from.

The second simplest is **Calculation**: specify a *function*, and specify inputs for that function. (You could equivalently create that function as a field on your form, and then use the Field type, but sometimes you only want the function in the chart, and you don't want it cluttering up your form.)

Average, **Count**, and **Sum** are all aggregate axis types.

The **Auto** axis type is useful in conjunction with the Solver function element. Suppose you have wall thickness depletion as a percentage, and you want a chart showing how often each percentage occurs. Set up an Auto axis, ranging from 0 to 100, and set up the other axis as a Calculation type. In the function you select for that Calculation axis, include a Solver element. NEXUS IC will call your solver function many times, for different points along your axis range, and those values will get plotted on your chart.

As your Auto axis' range increases, the step size increases, but not proportionately. This means that if you choose a very wide range (1 to 1000000, say) then your Solver function may get called a very large number of times. That may take a long time.

Sensor Clock

When configuring a date/time axis for a chart of sensor data, there's a special case for picking the Clock value. When configuring Clock for an Event table, you can just pick Event.Start Clock and/or Event.End Clock. But Sensor has no analogous "parent" table, so you can't do this. You also can't pick Clock directly from the specific sensor table — although the sensor table has Clock and Asset fields, they don't show in the picker, because they're key fields. (Asset is a foreign key, except of course in the Asset table, where it's the primary key. And keys of type date/time are special — they count as foreign everywhere.)

So set up your other axis first (typically the Y axis), referring to the sensor table data field. Then set up your date/time axis (typically an X axis). Instead of entering a value under **Parameters (Inputs)**, go to **Parameters (Values)** and enter the special value :Clock (including the colon). Click OK. When you come back in to edit this axis, you'll find Clock (without colon) filled in under **Parameters (Inputs)**, showing that NEXUS has understood that you want a Clock field, and has found the relevant sensor table to pick it from.

Load / Save Template

Clicking **Save Template** will save the selected Chart Template and related details to a .chart file. NEXUS IC will find all items related to this Chart Template (asset information forms, event definitions, chart templates, lookup tables, etc), and will present a dialog listing all the dependencies it's found, with a checkbox for each row. Untick any that you don't want saved with your Chart Template.

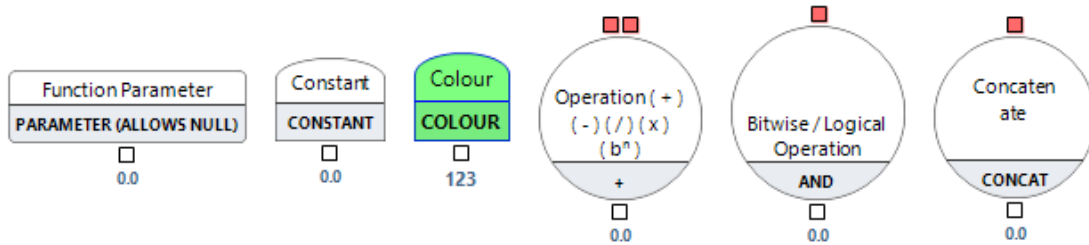
This Chart Template can then be loaded into this or another database via **Load Template**. Note that if the previously saved Chart Template still exists in this database, Load Template will overwrite that existing Chart Template — it will not create a new copy of it. Similarly with any other elements saved in the .chart file: asset information fields, lookup tables, etc.

Company

Company entries can be used to group Personnel (to show what company a given person works for) and Schedules (to show what company will be carrying out a particular scope of work). You should set up Company entries if these groupings are useful to you.

Functions

Function Elements



Function Parameter

A function parameter is an input to the function. For example, in a function that calculates the circumference of a circle given a radius value, you can add a Function Parameter element, that provides the ability to enter a value for the radius. This value is then multiplied by 2 and by the value of pi to calculate the circumference of the circle. When defining a Function Parameter, you need to give it a name and a data type. Function Parameters may be alphanumeric, whole numbers, real numbers, boolean values (true or false), dates, times, or combined date/time values.

If you tick “Allow Null Inputs”, you can specify a Default Value to be used when the input is null.

Constant

Constant function elements are used when a data value is known and will remain the same for every situation where the function is run. When defining a Constant, you need to supply a name for the constant, the value of the Constant and the field type. Constants (like Input function elements) can be alphanumeric, numbers, Boolean values (true or false), or date/time values.

Colour

Colour function elements are like a Constant element, but they are always Whole Numbers. When you edit a Colour, it presents you with a colour picker. Click the arrow to choose a colour from the list, or click the button to choose a custom colour.

Operation

Operation function elements provide data manipulation functions. Operators take input data from various sources such as Input, Constant or Decision elements, or even other system or user-defined functions. You can drag in as many inputs as you like to an Operation.

Addition, Subtraction, Multiplication, Division, Modulus and Power are all arithmetic operations. Note that *Modulus* only works with whole numbers as inputs.

Minimum, Maximum and Average take the minimum or maximum or average of all their inputs. (If some inputs to a *Minimum, Maximum* or *Average* are null, those null inputs will be ignored.)

Coalesce works the same as SQL’s COALESCE operator: if the first input is not null, it will return that first input. If the first input is null, it will look at the second input. It will keep looking along its inputs until it finds one that is not null. If all are null, it returns null.

Any True and *All True* are logical operations. They expect inputs of type Yes/No, and you should set their output type to Yes/No.

For some operations the behaviour with more than two inputs is obvious; for others, less so, and you should experiment to confirm that you understand it.

Bitwise / Logical Operation

These are similar to Operation elements, but carry out bitwise operations. Bitwise / Logical Operation elements can be configured for And, Or, Xor (eXclusive Or), or Not. You should set the Result Type of a Bitwise / Logical Operation to “Whole Number”. They differ from *Any True* and *All True* in that Bitwise / Logical Operations work on all bits of a whole number, rather than just on a yes/no basis. For example, 1010 AND 1001 = 1000; 1010 OR 1001 = 1011; etc.

Concatenate

These are similar to Operation elements, but are designed to concatenate several inputs together (converting them to Alphanumeric if necessary) and give an Alphanumeric as an output. You should set the Result Type of a Concatenate element to “Alphanumeric”.

The Format property can be used to control how values are converted to strings, and how the final concatenated string appears. (Programmers may find this similar to the concept of printf format strings in C.) If the input is a whole number, you can put %d in the format string at the point where you’d like that whole number to appear. If the input is a numeric, you can put %f. You can put other text in the string literally as desired, and to get a % symbol, put %%. So a format string like “There are %d apples, which fill %f%% of the basket” would result in output like “There are 1 apples, which fill 12.34% of the basket”. If your input types don’t match the format string you’ve specified, you’ll get an error message. So in this example we’ve assumed that the first input is a whole number. If it was in fact a numeric, you’d see an error like “Format is invalid for for the inputs.”

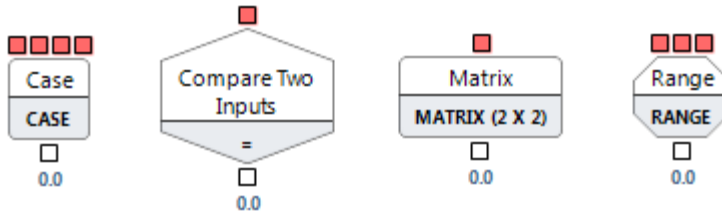
You can put a number between the “%” and the letter to specify the width. If the number turns out to be less characters than the width you’ve specified, it will be padded with spaces. You can put a “.” after that width (or just directly before the “%”) followed by a precision, to specify the number of decimal places for a numeric. So “%2d” might result in output like “ 1”; “%.3f” might result in output like “12.340”.

You can use types other than “d” for Whole Number and “f” for Numeric. Here’s a list:

Type	Output
d	Decimal. Input must be a Whole Number.
u	Unsigned decimal. If input is negative, it will be shown as positive. Input must be a Whole Number.
e	Scientific: you will get output like “1.234E1”.
f	Fixed: you will get output like “12.34”.
g	General: you will get fixed or scientific output, whichever is shorter.
n	Number: you will get a number with thousand separators, like “123,456.78”.
m	Money: you will get a currency output, formatted as specified by your settings in Windows control panel.
s	String. If one of your inputs is a string, you can use “%s” to put it in the format string: “There are %d %s, which fill %f%% of the %s”. If you specify a precision, like “%.3s”, the string will be limited to at most that many characters — any remainder will be truncated.
x	Hexadecimal. Input must be a Whole Number.

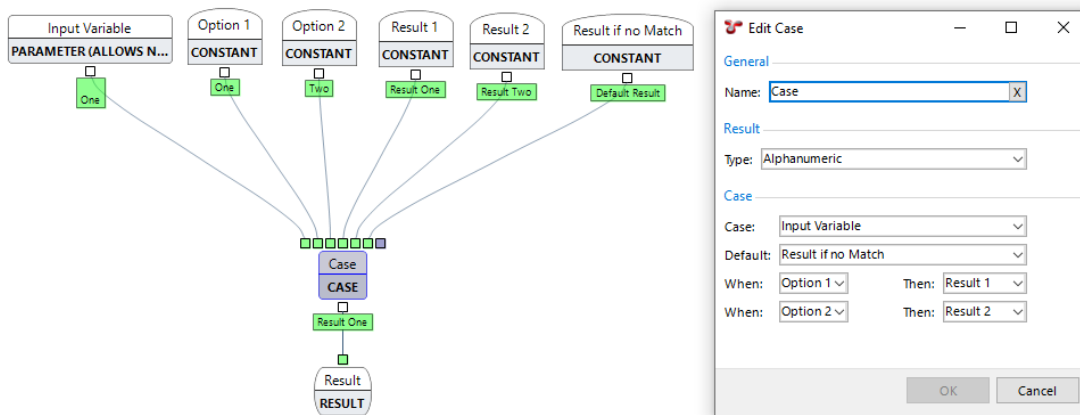
Decision

Decision function elements in the NEXUS IC database are explained below:



Case

Evaluates a list of conditions and returns one of multiple possible result expressions. If the Case input does not equal any of the defined conditions, then the Default is returned. The concept is similar to switch statements in many programming languages, or nested IF functions in Excel.



In the above example, the Case object is configured so that:

- When Input Variable matches Option 1, Result 1 will be output. (This is indeed the path taken in this case.)
- When Input Variable matches Option 2, Result 2 will be output.
- When Input Variable does not match any of the “When” options, the Default, Result if no Match, will be returned.

Compare

Compares two inputs (comparators) and returns one of two values depending on whether the inputs match. Comparisons available in the Compare decision include: Equals (=), Not equals (<>), Greater than (>), Less than (<), Greater Than or Equal (>=), Less Than or Equal (<=).

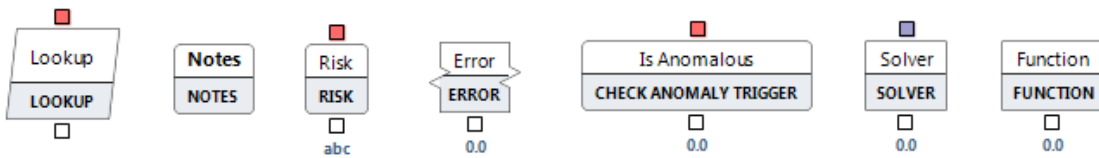
Matrix

Evaluates a number of inputs and returns the looked-up value. You can add more inputs with the **Add Column Input** and **Add Row Input** buttons. If you have several column inputs or several row inputs, they must *all* be matched for that cell to be picked. That effectively means that this is an *n* dimensional matrix. The 2-dimensional case (with one column input and one row input) is the simplest and most common, but if your situation demands more dimensions, add inputs to suit.

When no cells are matched, the Default Value will be used. You should ensure that the result type of the Default Value is the same as the result type of the Matrix.

Range

The Range element is similar to the Case element, except that you specify a range of input values for each case, rather than a single specific value. Range evaluates a numeric input against a series of numeric ranges and returns the found value. For each range, you specify the Lower (\geq) and Upper (\leq) as numeric values, and then choose a Result from the available inputs. A Range element needs at least three inputs: one to supply the Case value that will be used to decide which range is matched (if any); one for the Default Value which will be used if no range is matched, and one to define a result for the first range. If you want more than one range, add more than three inputs. If you want to re-use one input several times, drag that input onto the Range element several times. If multiple ranges match the input, the first matched range will be used, so if your ranges are 1 to 5 and 2 to 6, only inputs of greater than 5 will match the second range.



Lookup

Returns a summarised value from various sources of data within the NEXUS IC database.

So if you wanted to (say) fetch an Asset Information field from an Asset, you could choose that Asset Information field as the **Result Field**, and connect the Asset Input to a Function Parameter which will be fed from Asset. Almost any field from almost any table can be used as the Result Field.

You can also aggregate data from the Result Field by selecting an **Aggregate**: Max, Min, Average, Sum, Standard Deviation or Count. If you select an aggregate, NEXUS IC will make a list of all the results and aggregate as appropriate. For example, if you chose a field from an event form as your Result Field and Min as your Aggregate, then NEXUS IC will look through all the events on that asset, and return the minimum value from that field in that list of events.

If Aggregate is left at None, you should ensure that your filters allow only one value to be returned. If multiple values exist, the Lookup will return the first value it finds.

If the Result Field you select has a Display Type different from its Field Type, then you can set the **Return Type** to be either the Functional Value or the Display Value. The Display Value is usually human-friendly text, whereas the Functional Value is the underlying numeric key value, which may be useful for feeding into subsequent function elements for comparisons, etc.

You can set an **Asset Input**, if the result table you have selected has Asset or Component_ID as a key field (for example, if your Result Field is an Asset Information field). Only use this for Asset or Component_ID — for any other table’s key field, add a **Filter**, as shown below. An Asset Input must have a type of Whole number (not Numeric).

You can set an **Asset Filter**:

- The default, “No Children”, returns results from just the single asset specified by the Asset Input.
- “This Asset and dependent Assets” returns results from the asset specified, and also from that asset’s children, grandchildren, great-grandchildren, etc.
- “Dependant Assets but not this Asset” does almost the same thing, but leaves out results for the asset specified.
- “Immediate Children” returns results from the specified asset’s immediate descendants, but not from the asset itself, nor from any grandchildren, great-grandchildren, etc.
- “Parent Assets” looks up the tree instead of down, returning results from the specified asset’s parent, grandparent, great-grandparent, etc., all the way to the root of the asset tree.
- “Direct Parents” returns results from the specified asset’s immediate parent.

If you are using an Asset Filter option other than “No Children” or “Direct Parents”, you will typically also want to specify an Aggregate.

If an asset appears in multiple Asset Views, it may have different parents and different descendants in different views. These asset filters will match parents and descendants in *all* asset views.

You can also specify a **Workpack Filter**, whose options (Most Recent, All, Specific Workpack) are reasonably self-explanatory.

Filters can be used to filter the list of results that would otherwise be returned to a shorter list (possibly containing exactly one item, thus avoiding the requirement to use an Aggregate). You can drag extra inputs onto the Lookup element for use as Filter inputs.

The first six comparisons (=, <>, >, >=, <, <=) are straightforward.

The various “closest” filters (“closest (either)”, “closest (lower or equal)”, “closest (higher or equal)”, “closest (lower)” and “closest (higher)”) are special. Suppose you want to find the event whose KP is closest to a particular value: for this you would use “closest (either)”. Or suppose you wanted to find the event just *before* this one; i.e. the event with KP closest to a particular value, but lower: for this you would use “closest (lower)”. And similarly, “closest (higher)” would be used to find the next event after a particular KP.

For “highest” and “lowest” you need specify no input; these simply return the single result that has the highest or lowest value in whatever Field you specified in the filter. (Be aware that using an Aggregate of Max or Min is usually faster than using a filter for highest or lowest.)

“contains” lets you search for a substring within an alphanumeric input. You can use “_” and “%” as wildcard characters, with “_” matching any single character and “%” matching several characters, so “abcde” contains “a_c”, and also contains “a%d”.

All filters must be matched for results to be returned; in other words, filters are implicitly connected by ANDs.

Lookup Optimisation

Lookups may be executed a large number of times, so it may be worth configuring them so that NEXUS can best optimise their execution. Aggregates such as “Max” are more efficient than Filters such as “highest”. In Filters comparisons, “=” is better able to be optimised than <, >, <=, >=.

Results may be cached, so subsequent lookups in a particular circumstance may be faster than the first lookup.

When the return value of a function is deterministic, NEXUS IC may cache the result for a given set of inputs. For example if you have a function to add two numbers, 1 plus 2 always equals 3, so NEXUS IC may enter that result into its cache, so that if it has to calculate that same result again in future, it can simply read the value from the cache rather than actually recalculating. If a function contains a Lookup, NEXUS IC will cache the result only if it is confident that the result is deterministic — i.e. a future run of the function with those same inputs will necessarily produce the same outputs. This might not be the case if, for example, your function contains a Lookup that is returning the closest event to a particular date – if any event is added or deleted, or any event’s date is changed, then the Lookup result could change.

You can help NEXUS IC be confident that a function is deterministic (and therefore potentially make your functions run faster) by tucking each Lookup *into its own function*. So if you have a function that contains several Lookups, and that function is running slowly, try putting each Lookup into its own function, and then replacing the Lookups in your main function with calls to the new simple functions you’ve just created. NEXUS IC can now consider caching separately for each function.

In general where time is critical, avoid aggregates across tables, aggregates across fields that reference other tables, and aggregates across slow fields.

For small frequently-used tables (a few hundred rows), all the rows in the table will typically quickly get cached and remain cached for the entire run of the application. If the value changes, cache entries are expired as appropriate, then

re-cached the next time they are requested by a function. NEXUS IC may also clear parts of its cache if it runs low on memory.

Notes

Notes are used when building functions for reference and documentation purposes. Notes are placed in the Function Builder work space. You should use Notes whenever you think a function is not self-explanatory, where you want to refer to a standard, document changes to a function, etc.

Risk

Returns the aggregate risk value for an asset and all its children in a particular asset view.

Error

In version 6, the function builder includes the concept of errors. You can see errors by, for example, dividing by zero or by feeding an element an input of a type it did not expect.

But you can also deliberately include errors. For example, suppose you have a function whose input must not be 0. You can add a comparison which compares that input to 0, and if true, returns the value of an Error element. If you set the Error value inside the Error element to “Oh no! An 0!”, then when the function has its input set to 0, the user will see that error message output.

The advantage of using an Error element is that it can give a textual description to the user explaining what is wrong without changing the output type of the function — the output of the function might still be of type Numeric. This means that if this function’s output is in turn consumed by other functions, those functions will get a Numeric value as they expected. In this way, functions can chain to other functions, while also giving descriptive messages to the user.

Is Anomalous

You can use this element to check, within a function, if a particular event field causes any Anomaly Triggers to fire. Its input should be an event Header_ID.

Solver

The solver element is used within charts to solve for a particular input parameter of a function — see *Chart Template Axis Type* for details.

Electronic Corrosion Engineer (ECE)

If you drop an ECE element into a function, it will call Wood’s proprietary ECE library. Set the **ECE Result Type** to determine which value it will return an estimate for. ECE is a separately licensed feature — contact support@nexusic.com for details.

The **Section Start Fe Concentration** parameter is optional and can be null. When it is null, supersaturated = true. This relates to the dissolved iron concentration in the water at the inlet, which may be low in Fe, or may be supersaturated with iron carbonate. There are two options. The default setting is supersaturated, assuming that the water has been flowing through carbon steel equipment for some distance before entering the flowline: this would be appropriate if the fluids come from a well completed with carbon steel production tubing for example. When most of the water comes

from condensation from water vapour in gas, this setting should be changed to none, which can lead to increased corrosion rates for a short distance at the inlet region. This would be appropriate for a gas overhead line from a separator vessel for example.

Required input parameter units:

- Start Pressure - bar
- End Pressure - bar
- Start Temperature - °C
- End Temperature - °C
- Liquid Holdup - %
- Inlet Pressure - bar
- Inlet Temperature - °C
- Oil Density - °API (API gravity)
- Section Length - m (metres)
- Inside Diameter - m (metres)
- H₂S Concentration - Mole %
- CO₂ Concentration - Mole %
- Percentage Carbon - Mole %
- Chloride - g/l (Grams per litre)
- Acetic Acid - ppmw (Parts per million by weight)
- Bicarbonate - ppmw (Parts per million by weight)
- Gas Production Rate – MMSm³/d (million metric standard cubic metres per day)
- Oil Production Rate - m³/d (Cubic metres per day)
- Water Production Rate - m³/d (Cubic metres per day)
- Fe Concentration - moles/litre

Function

You can embed an entire other function into this function via the Function element. This is the same as dragging in a System Function or User Function — see below.

System Functions

System function elements in the NEXUS IC database can be broken up into Character functions, mathematical functions and other functions. These system functions are pre- defined and explained below:

Character/String Functions

Function	Description	Example of use
ASCII	Returns the ASCII code value of the leftmost character of a character expression.	ASCII('Alphabet') = 65
Chr	Converts an ASCII code to a character.	CHR(65) = 'A'
InStr	Returns the starting position of the specified expression in a character string.	INSTR('CORPORATE FLOOR','OR', 3) = 14 INSTR('CORPORATE FLOOR','OR', 1) = 2
Len	Returns the number of characters of the given string expression.	LEN('Alphabet') = 8
Length	Same as LEN.	LENGTH('Alphabet') = 8
Lower	Returns a character expression after converting uppercase character data to lowercase.	LOWER('Alphabet') = 'alphabet'
LTrim	Returns a character expression after removing leading blanks.	LTRIM(' Alphabet') = 'Alphabet'
Re-place	Replaces all occurrences of the 2nd given string in the 1st string with a 3rd string.	REPLACE('Alphabet','ph','f') = 'Alfabet'
RTrim	Returns a character string after truncating all trailing blanks.	RTRIM('Alphabet ') = 'Alphabet'
Sub-Str	Returns a part of a character expression.	SUBSTRING ('Alphabet',0,6) = 'Alpha'
Upper	Returns a character expression with lowercase character data converted to uppercase.	UPPER('Alphabet') = 'ALPHABET'

Mathematical Functions

Function	Description	Example of use
Abs	Returns the absolute, positive value of the given numeric expression.	ABS(-15) = 15
ACos	Returns the angle, in radians, whose cosine is the given value.	ACOS(.3) = 1.26610367
ASin	Returns the angle, in radians, whose sine is the given value.	ASIN(.3) = .304692654
ATan	Returns the angle in radians whose tangent is the given value.	ATAN(.3) = .291456794
Ceiling	Returns the smallest integer greater than, or equal to, the given numeric expression.	CEILING(15.7) = 16
Cos	Returns the trigonometric cosine of the given angle (in radians).	COS(180 * 3.14159265359/180) = -1
Erf	Gaussian Error function. See https://en.wikipedia.org/wiki/Error_function	ERF(0) = 0
Exp (10^x)	Returns the exponential value of the given numeric expression.	EXP(4) = 54.59815
Exp (e^x)	Returns the exponential value of the given numeric expression.	EXP(4) = 54.59815
Floor	Returns the largest integer less than or equal to the given numeric expression.	FLOOR(15.7) = 15
InvErf	Inverse Gaussian Error Function.	
IsNumber	Returns true if the Alphanumeric input can be converted to a Whole Number.	ISNUMBER("three") = false
IsNumeric	Returns true if the Alphanumeric input can be converted to a Numeric.	ISNUMERIC("three point one four") = false
Ln(x)	Returns the natural logarithm of the given numeric expression.	LN(95) = 4.55387689
Log(x)	Returns the base-10 logarithm of the given numeric expression.	LOG(100) = 2
Log_b(x)	Returns the base-b logarithm of the given numeric expression.	LOG_B(2, 256) = 8
Round	Returns a numeric expression, rounded to the nearest whole number.	ROUND(15.193) = 15
RoundTo	Returns a numeric expression, rounded to the specified length or precision.	ROUNDTO(15.193,1) = 15.2 ROUNDTO(15.193,-1) = 20
Sign	Returns the positive (+1), zero (0), or negative (-1) sign of the given expression.	SIGN(- 15) = - 1
Sin	Returns the trigonometric sine of the given angle (in radians).	SIN(30 * 3.14159265359/180) = .5
SqRt	Returns the square of the given expression.	SQRT(26) = 5.09901951
Tan	Returns the tangent of the input expression.	TAN(135 * 3.14159265359/180) = -1
ToNumeric	Converts the input to a numeric data type. (Use Concatenate to go the other way.)	TONUMERIC('123') = 123 TONUMERIC(TODATE('22 April 2005')) = 38462
Trunc	Returns n truncated to a whole number.	TRUNC(15.79) = 15.7
TruncTo	Returns n truncated to m decimal places. m can be negative.	TRUNCTO(15.79,1) = 15.7 TRUNCTO(15.79,-1) = 10
UnitExample	Used under the hood to provide examples in <i>Configuration</i> → <i>General</i> → <i>Unit Types</i>	

Compare Functions

There are a variety of Compare functions (“Compare A = B”, “Compare A < B”, “Compare (A = B and C = D) or (E in (F, G, H) and I = J)”, etc.) They all compare the various inputs in the way described in the function name.

Date/Time Functions

Function	Description	Example of use
CurrentDate	Returns the current system date.	CURRENTDATE() = <Today’s current date>
CurrentDate-Time	Returns the current system date and time.	CURRENTDATE() = <Today’s current date and time>
DateDiff (Day Of Month)	Returns the difference between the day-of-month of two dates. Returns a whole number from -30 to +30.	DATEDIFF (DAY OF MONTH)(2005-04-22, 2006-06-12) = 10
DateDiff (Days)	Returns the number of days between two dates.	DATEDIFF (DAYS)(2005-04-22, 2006-06-12) = -416
DateDiff (Month of Year)	Returns the difference between the month-of-year of two dates. Returns a whole number from -11 to +11.	DATEDIFF (MONTH OF YEAR)(2005-04-22, 2006-06-12) = -2
DateDiff (Months)	Returns the number of months between two dates.	DATEDIFF (MONTHS)(2005-04-22, 2006-06-12) = -13.667
DateDiff (Years)	Returns the number of years between two dates.	DATEDIFF (YEARS)(2005-04-22, 2006-06-12) = -1.139
Day	Returns the Day part of a date.	DAY(2005-04-22) = 22
LastInspectionDate	Returns the last inspection date for a component.	N/A
Month	Returns the Month part of a date.	MONTH(2005-04-22) = 4
NextInspectionDate	Returns the next inspection date for a component.	N/A
ToDate	Converts the input value to date data type.	TODATE(38462) = 2005-04-22 TODATE(‘22 April 2005’) = 2005-04-22
Year	Returns the Year part of a date.	YEAR(2005-04-22) = 2005

Other Functions

Function	Description	Example of use
IsNull	ISNULL(A, B) returns A if A is not null; or B if A is null. See below for details.	ISNULL(<null>, 10) = 10 ISNULL(30, 10) = 30
Linear Interpolation	Specify Ymin, Ymax, Xmin and Xmax, and for a given Xset, this function will return Yset.	LINEAR INTERPOLATION(0,0, 2,4, 1) = 2
Length	Calculates length from two parameters, i.e. ABS(Param2 - Param1)	LENGTH(5.418 – 6.254) = 0.836
PassThru	Returns parameter value without modifying its display type.	PASSTHRU(‘Alphabet’) = ‘Alphabet’ PASSTHRU(123) = 123

IsNull: The syntax for this function is ISNULL(check_expression, replacement_value), where check_expression is the expression to be checked, and replacement_value is the expression to be returned if check_expression is NULL.

check_expression can be of any type. replacement_value must have the same type as check_expression. Note that an alphanumeric field that contains an empty string is *not* null — to set the field value back to null, click the “X” button at the right of the field.

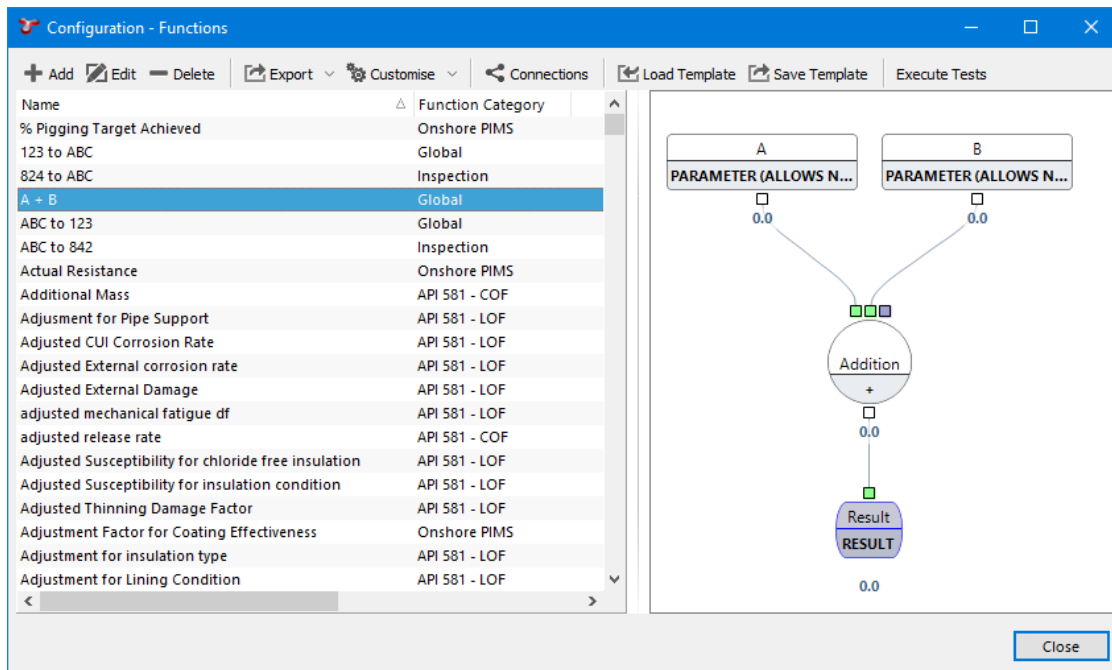
User Functions

User functions are functions that have been defined by the Users. They can be further categorised by type.

Configuration → *General* → *Functions* allows you to create, edit and delete functions.

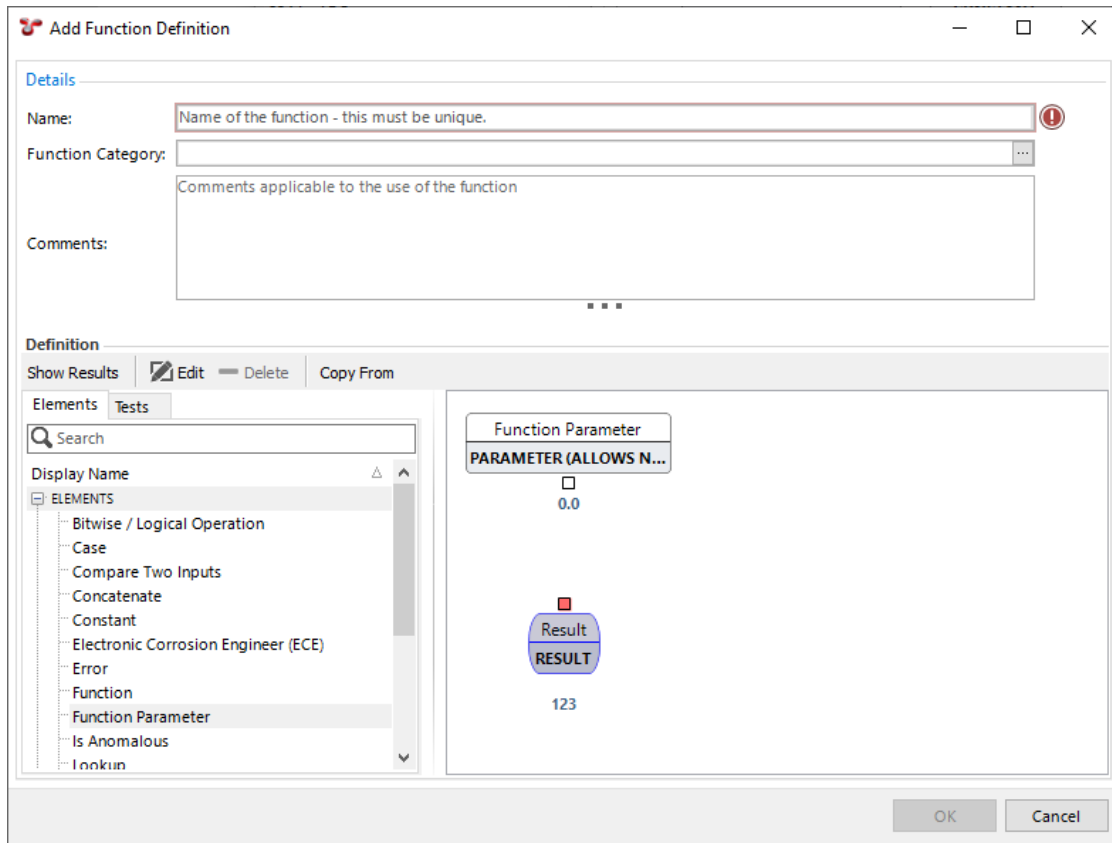
The Functions window enables you to build and edit customised functions which can be used in other areas of NEXUS IC, such as *Asset Information* fields, *Event* fields and *Report Sources*. You can drag and drop elements into the Function Editor, then connect the elements together to define the way in which data flows through your function.

Functions are integral to NEXUS IC. Functions are used within Risk Models (defining models, matrices and parameters), they are also used in Asset Information fields (e.g. corrosion rates, retirement dates, pressures, wall thicknesses etc) and Event Definitions (e.g. functions to calculate remaining wall thickness or span lengths).



Add

To add a new function, click the **Add** button at the top of the “Configuration - Functions” dialog. Give your new function a name and (optionally) a category. In the bottom half of the dialog, click the ‘+’ next to Elements, and drag a Function Parameter from the Elements tree to the design area at the right. (All functions are required to have at least one function parameter.) Drag other elements as desired.



Once elements are in the design are at the right, you can connect two elements by dragging from the output square at the bottom of one element to a second element. Your drag must begin on the source element's output square, but can end anywhere in the target element (not just on its input squares).

You can replace an existing connection by dragging from an output square to the specific input square whose connection you want to replace. You can break an existing connection by dragging it off an input square and dropping it on a blank part of the design area.

You can connect one output to multiple inputs — there is no limit to the number of places you can connect a single output to.

To view “on the fly” values for your function, click the **Show Results** button. You can also enter Input Values at the bottom of the Tests tab. The function will be evaluated using the input values you specify.

If you give an element an input of a type it is not expecting, instead of a green result you will see a yellow error message at the bottom of that element, explaining the type mismatch. You will similarly get yellow error messages for other error cases, such as division by zero. These errors are only visible if the **Show Results** button is selected.

To edit an existing function, click the **Edit** button at the top of the *Configuration* → *Functions* dialog, then proceed as above.

To save the function you're editing, click **OK**.

To delete existing functions, select them in the *Configuration* → *Functions* dialog and click the **Delete** button at the top of the dialog.

See [Export](#) for full description of the Export menu item.

To see if a function is being used elsewhere in the application, click **Connections**.

Functions and function elements in NEXUS IC 6 are unit aware: if you have a function with two inputs leading to an Addition operation, and one function has units in metres while the other has units in millimetres, NEXUS IC will

correctly deduce that one number needs to be scaled by a factor of 1000 before the two numbers are added. (Which direction the scaling happens depends on the output unit you select for the Addition element.) For many function elements, you can select the output unit. (Note that NEXUS IC isn't dimensionally aware: if you divide a length by a time, it won't understand that the result is a velocity.)

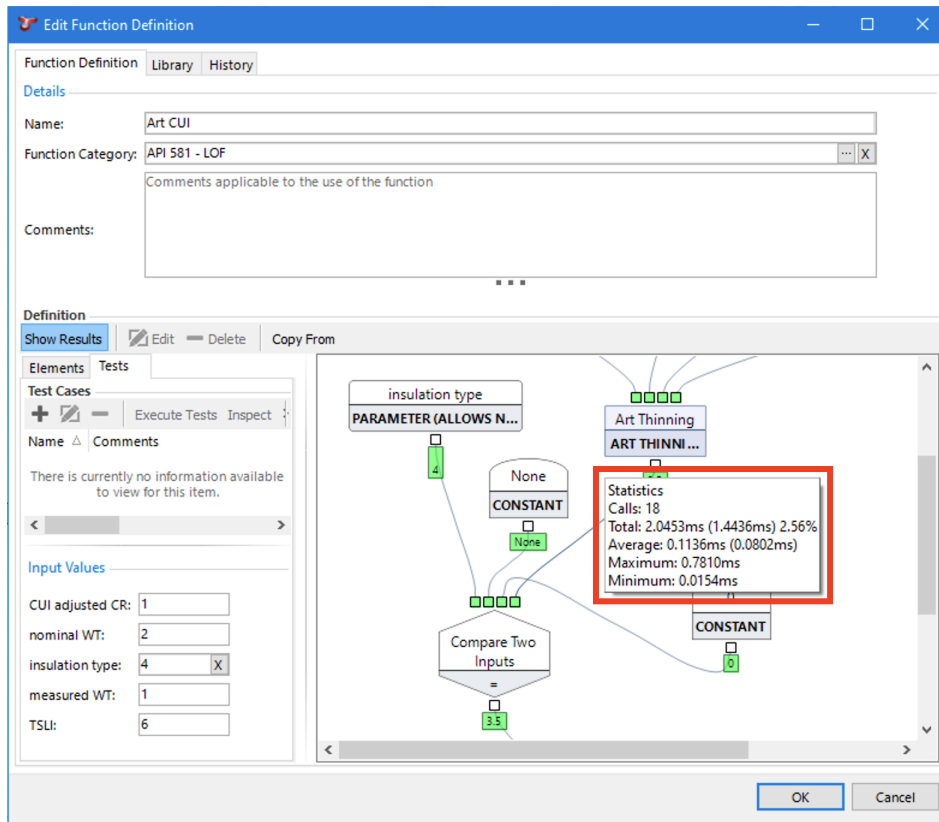
Statistics

Statistics for individual function elements can be shown as a hint when you hover over the item with your mouse. The Statistics include the number of function calls, and the total, average, maximum and minimum time to compute the function. Also included is the time to retrieve function Parameters, and Total including Parameters.

To do this, navigate to Configuration > Functions, and if the function has been called and its results cached, the results will be revealed when hovering over a function element. Selecting a function and clicking **Execute Tests** will call the function. Statistics are also visible when editing a function, by clicking **Show Results**, then hovering over an element.

Name	Function Category	Calls	Total (ms)	Parameters (ms)	Average (ms)	Min (ms)	Max (ms)	Total including Parameters (ms)
Anomaly Count	Reports							
API 580 Matrix Axis Plot	API 580							
Area Equipment Damage or fatalities	API 581 - COF							
Art CUI	API 581 - LOF							
Art Thinning	API 581 - LOF							
ASME B31G - 1991	IC-Finesse	4	6.493	0.045	2.134	0.188	3.976	6.538
ASME B31G - 1991 - Critical Length of Corrosion	IC-Finesse							
ASME B31G - 1991 - Design Pressure	IC-Finesse	4	0.044	0.024	0.017	0.01	0.028	0.068
ASME B31G - 1991 - Non-Dimensional Factor	IC-Finesse	4	0.064	0.037	0.025	0.016	0.041	0.1
ASME B31G - 1991 - Pipeline Parameter	IC-Finesse							
ASME B31G - 1991 - Safety Factor	IC-Finesse	4	0.153	0.012	0.041	0.03	0.062	0.165
ASME B31G - 1991 - Sentence Line	IC-Finesse							
ASME B31G - Anomaly OK?	Onshore PIMS							
ASME B31G - Call to	Onshore PIMS							
ASME B31G - Failure Stress	Onshore PIMS							
ASME B31G - Flow Stress	Onshore PIMS							
ASME B31G - Function Flow	Onshore PIMS							
ASME B31G - Hoop Stress	Onshore PIMS							
ASME B31G - Is Anomaly Acceptable?	Onshore PIMS							
ASME B31G - M factor	Onshore PIMS							
ASME B31G - Safety Factor	Onshore PIMS							
ASME B31G - Sentence Line - Call to	Onshore PIMS							
ASME B31G - Z value	Onshore PIMS							
Assessed Corrosion Rate EXT	Onshore PIMS							

You can also test the performance of a function on specific values by entering Input Values at the bottom of the Tests tab for the function to be evaluated on, before clicking **Show Results** and hovering over the function element.



Nulls

Almost any calculation involving a null will return null. For example, $2 + \text{null} = \text{null}$.

Any comparison involving a null will always return false. This is occasionally a bit subtle: in a Comparison object, if you compare null to null, it will return whatever value you have set for the False case.

(This is in line with accepted IT industry practice for nulls in data.)

There are some exceptions, where the right thing is to produce a numeric value despite the presence of some nulls: if you use an operation object to calculate a Minimum, Maximum, or Average, nulls will be left out and the non-null values will be used to calculate the answer. For example, the Average of 1 and null is 1. (If all inputs are null, a null will of course be returned: the average of null and null is null.)

Tests

You can write test cases for your functions, under the “Tests” tab. Test cases let you test a function as you create it, and storing your tests within the function lets you verify that a function still does what it did when you created it, and let you re-validate a function after changes. When writing tests, you should write at least one that returns a valid result, and if it’s possible for your function to return an *Error*, you should write at least one test for each possible error case.

To generate a test report, navigate to Configuration > Functions, highlight all the functions in the function list to be tested, and select *Execute Tests*. A list of the functions and their test results will be shown in the Function Tests window. The grid will show the columns Name, Comments, Test Result, Actual Result, and Pass/Fail for each function.

Load / Save Template

Clicking **Save Template** will save the selected function and related details to a .function file. NEXUS IC will find all items related to this function (asset information forms, event definitions, chart templates, lookup tables, etc), and will present a dialog listing all the dependencies it's found, with a checkbox for each row. Untick any that you don't want saved with your function.

This function can then be loaded into this or another database via **Load Template**. Note that if the previously saved function still exists in this database, Load Template will overwrite that existing function — it will not create a new copy of it. Similarly with any other elements saved in the .function file: asset information fields, lookup tables, etc.

Global Tables

Global tables allow you to look up data based on another field or fields. Much of their configuration is similar to *Asset Information* or *Event Types*, but the way they are used is quite different.

Suppose we set up a global table with two fields: Number (a numeric), and Name (an alphanumeric), and we add values to the table like below:

Number	Name
1	one
2	two
3	three

Then, if you have an asset information form field called Number, you can look up the matching entry from the global table, and display it on the form. To do this, add an asset information form field of type Global Lookup. Edit that field and set Linked Field to the "Name" field from your global table. On the Function page, you need to set a comparison function — in this simple example you would choose "Compare A=B", and the two parameters you'd set for that function would be the Number field from your global table and the Number field from your asset information form. This works somewhat like a JOIN in a database query: NEXUS will apply the comparison function, and that will cause it to find the global table row that matches your asset field. If the "Number" field on your asset information form has the value "2", then NEXUS will look in your global lookup table, find the row with Number equal to "2", look across that row to find that Name is "two", and will show that in the global lookup field on your asset information form.

Global tables can have more than two fields — we could add a third column to our example giving the name in French. We can also use other comparison functions: there are others with names like "Compare A < B", "Compare A > B", and so on. You can also create your own: if you had three different fields in your asset information form that all had to match the corresponding fields in your global lookup table, you might create a comparison function called "Compare A=B and C=D and E=F". Your comparison function should return the whole number "1" when you want rows to match, and "0" when you want rows to not match. If there are several rows that would return a "1" (you could write a particularly simple-minded comparison function called "Always return 1", for example), then the *first* row that matches will be returned.

Global tables can be useful for storing standardised data — for example, you could have global tables that store things like properties of different materials, piping schedule data, etc.

Note that Global lookup fields are distinct from *Lookup List* fields: lookup lists let the user choose from a drop-down; whereas Global Lookup fields are more like a Calculation, filling in a value without the user taking any action, and without the user being able to later modify that value.

Lookup Lists

Lookup Lists store information used repeatedly throughout the application, ensuring that this data is stored uniformly. Lookup Lists can be referenced from Asset Information fields and Event fields. Lookup Lists are particularly useful

for restricting a subjective assessment to a limited set of predefined values. For example, a Lookup List is an ideal way to ensure consistency in the assessment of a concept like ‘priority’. Defining Lookup list Items High, Medium and Low (with associated values of three, two and one respectively) in a Lookup List called ‘Priority’ can be used to force a choice from a predefined priority schema.

On *Asset Information* forms, *Event* forms and *Global Table* forms, a lookup list field will show as a drop-down, from which the user can pick an item.

Each item in a Lookup List can have a value, a comment, an icon and a item order.

Comment is the descriptive text visible to users in the field on the form.

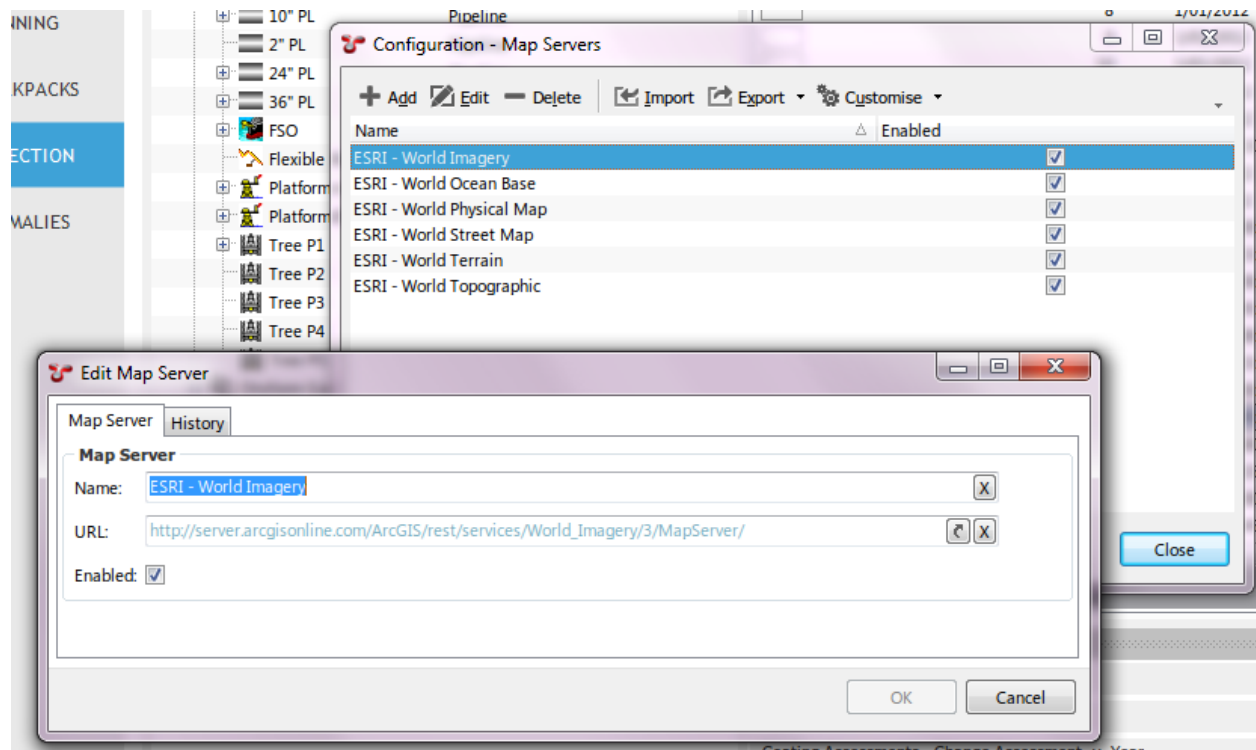
Value is what’s passed to functions that use this lookup list field as an input. If the lookup list item has some sensible numeric value, this is often given in the Value field. For example, if the lookup list is “Anode depletion”, and the first item has a Comment of “0 - 25%”, the Value might be “25”. If the lookup list items don’t have a sensible numerical value, the Value is often set to the same text as the Comment.

Icon is optional. If set, users will see these icons in the field on forms, and in the drop-down list as they are picking an item.

Item Order is also optional. If set, it controls the order that items are shown in in the drop-down list as users pick an item. You can also click the **Item Order** button at the top of the dialog, and ‘Item Order’ dialog will appear. From there, you can move the item with the **Move Up** or **Move Down** buttons available in the toolbar.

Map Servers

Map servers are used by the Map tab in the INSPECTIONS area. If you have your own GIS system, you can add its Tile Server URL here to make your own GIS available in NEXUS IC’s maps tab. Your GIS must offer map tiles in the way NEXUS IC is designed to consume them — contact us for details.



Traffic Lights

Traffic lights display as a coloured dot next to each asset in the *asset hierarchy*. Each traffic light has:

- A Name
- A Description
- A Value Field
- An optional Colour Field, which is an Asset Information field used to give the colour of each traffic light dot.
- An optional Hint Field, which is an Asset Information field used to give the text that is visible when a user hovers the mouse over a traffic-light dot.

If you don't set a Colour Field, you can configure a series of traffic light colours in the bottom half of the dialog. These will then be used to give the colour for the traffic light dot for each asset, by comparing each of these rows to the Value Field for each asset. If your Value Field is numeric, you can use the Min Value and Max Value fields to set the colour. If your Value Field is an alphanumeric, you can use the String Value field to set the colour. The Name you set for each row will be visible in the Traffic Light legend at the bottom of the asset tree. Use the Order field to control the order that items appear in in the legend.

If you don't set a Hint Field, the Value Field is used for the hint text.

It is common to centralise all the Asset information fields you plan to use for traffic lights on the Traffic Light asset information form. This allows you to glance at all the traffic lights for a given asset at once.

(Note that because the Traffic Light field must be calculated for every asset, NEXUS IC may be slower with a traffic light turned on than it is with no traffic light turned on. However, since NEXUS IC caches results, this slowness should only be visible the first time you view a given group of assets.)

Permissions

You can set permissions on traffic lights, to control which users and groups have access to display which traffic lights.

Edit a traffic light, and click on it Permissions tab. Click **Add**. Under User / Group, pick a user or group. Under Permission, set a permission. The user or group you select will now have that permission applied: if you select Read Only or Deny Write, the user (or group of users) will be able to use that traffic light, but not edit it. If you select Read/Write, the user will be able to use that traffic light, and also edit it. If you select Deny All, the user will not be able to select the traffic light for viewing, nor edit it.

Be sure not to deny access to all users, or you'll wind up with a traffic light no-one can delete. See [Security](#) for more on how different permissions interact.

This is an optional feature — if you set no permissions, all users will by default have access to all traffic lights.

Unit Types

Configuration → *General* → *Unit Types* allows you to create, edit and delete unit groups. Unit Types make NEXUS IC unit-aware, and let it offer the user the option of switching units on a field.

The NEXUS IC database comes pre-populated with a standard set of Unit Groups and Units. When a Unit is assigned to an Asset Information field, the value can be converted to any other Unit contained in that Unit Group.

Numeric fields that are defined with a Unit Group appear in the Asset Information form with a blue label. To convert the value to a different unit type, click and select the unit type.

Unit Groups

Configuration → *General* → *Unit Groups* allows you to create, edit and delete unit groups. Unit Groups are a way of quickly switching to different systems of measurement — for example, switching between metric and US weights and measures.

Users can then select their desired units under *Database* → *Your Profile*.

Databases should by default have two unit groups configured: “Metric” and “US Weights and Measures”. To edit one of these groups, select it and click **Edit**. On the Units tab, you can change which units are selected for this unit group. Then, when a user views a field of that unit type, if the default unit for that field is not in the currently selected unit group, that field is instead displayed in the closest unit that *is* in the currently selected unit group. So if a field has an underlying unit of centimetres, and the user has selected the “US Weights and Measures” unit group, that field will instead be displayed in inches.

If you like, you can add extra unit groups: cgs and MKS, Potrzebie, etc.

Providers

Connections allows you to create point-to-point connections to external databases. Connection types shown in the following table:

Definitions

Connection Type	Description
Push	where changes made in NEXUS are sent to the external field, but not vice versa
Pull	where changes made in the external table are pulled into the field in NEXUS.
Push & Pull	where changes made in either the external table or in NEXUS are propagated to the other

There are three steps to setting up a point-to-point connection. They are:

1. Set up the **Provider**
2. Set up the **Tables**; and
3. Set up the **Columns**.

Setting up the Provider

1. Click on *Configuration* → *General* → *Providers*
2. Click **Add** from the Configuration - Providers toolbar.
3. In the Add External Provider dialog, enter a descriptive **Name** for the Provider (eg. MAXIMO)
4. Choose the Provider Type (currently supports Oracle, MSSQL Server and Excel). Based on the Provider Type selected, you will be presented with further options (eg. if you choose Oracle type, then you will need to enter the Oracle Easy Connect String; if you choose Excel type, then you will need to enter the full path to the Excel file; and if you choose MSSQL Server you will be required to enter the Server Address, Database Name and other Authentication information.)

Connections

Setting up the Tables

Source Name

When you are adding a new Table, click on OK after you have chosen the Provider. When you relaunch the dialog, the list of available Sources will be available for selection from a dropdown list.

1. Click on *Configuration* → *General* → *Connections*
2. Click **Add** from the Configuration - Connections toolbar.
3. In the External Table dialog, click on the Ellipsis (⋮) button to choose the Provider set up previously, and enter a **Name** for the Table (eg. Workpack).
4. Enter the **Source Name**, this will be the database table name or for Excel the named table (eg. Workorder).
5. The **Primary Key** is the column or field defined in the External table which will be used to match to field in NEXUS IC which identifies the row to be updated. The values in the chosen field must be unique (eg. Name).
6. Check or uncheck **Allow Insert** determines if NEXUS will insert rows into the External Table or the NEXUS table.

Setting up the Columns

1. Click on *Configuration* → *General* → *Connections*
2. Click **Add** from the bottom toolbar in the **Configuration - Tables** dialog.
3. In the **Add External Field Map** dialog, click on the Ellipsis (⋮) button to choose the Table set up previously.
4. The **External Field Name** will be the name of the Excel column or the name of the field in the MSSQL Server table.
5. The **Primary Key Field** is a column or field defined in the NEXUS IC database which will be used to match to the Primary Key field in the External table.
6. Choose which direction the data is to be passed from the **Sync Direction** dropdown list.
7. Finally, click on the **Internal Field** ellipsis button to choose a field in NEXUS which is mapped to the External field column.

Shortcuts

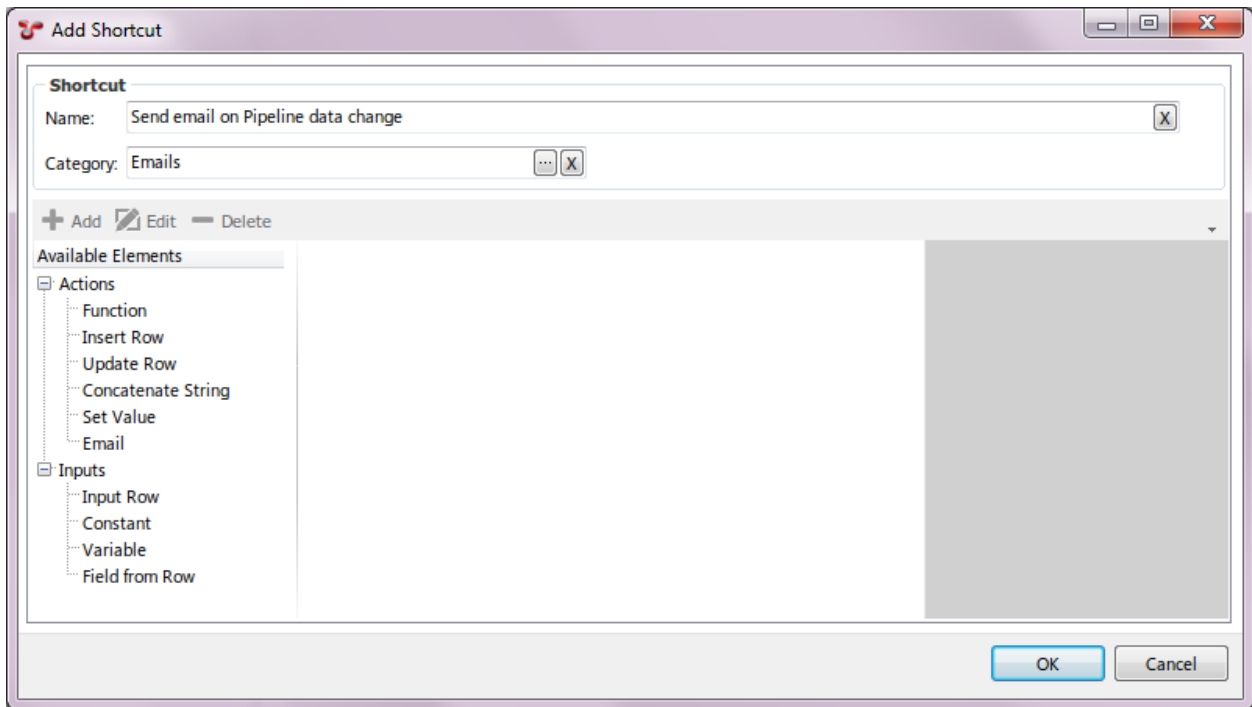
Shortcuts - Worked Examples

Set up a Shortcut to send an email

In the following example we will create a Shortcut which sends an email when data in an AIG is edited and saved.

Step 1 - Create the Shortcut

Go to *Configuration* → *General* → *Shortcuts* and click on the **Add** toolbar button.



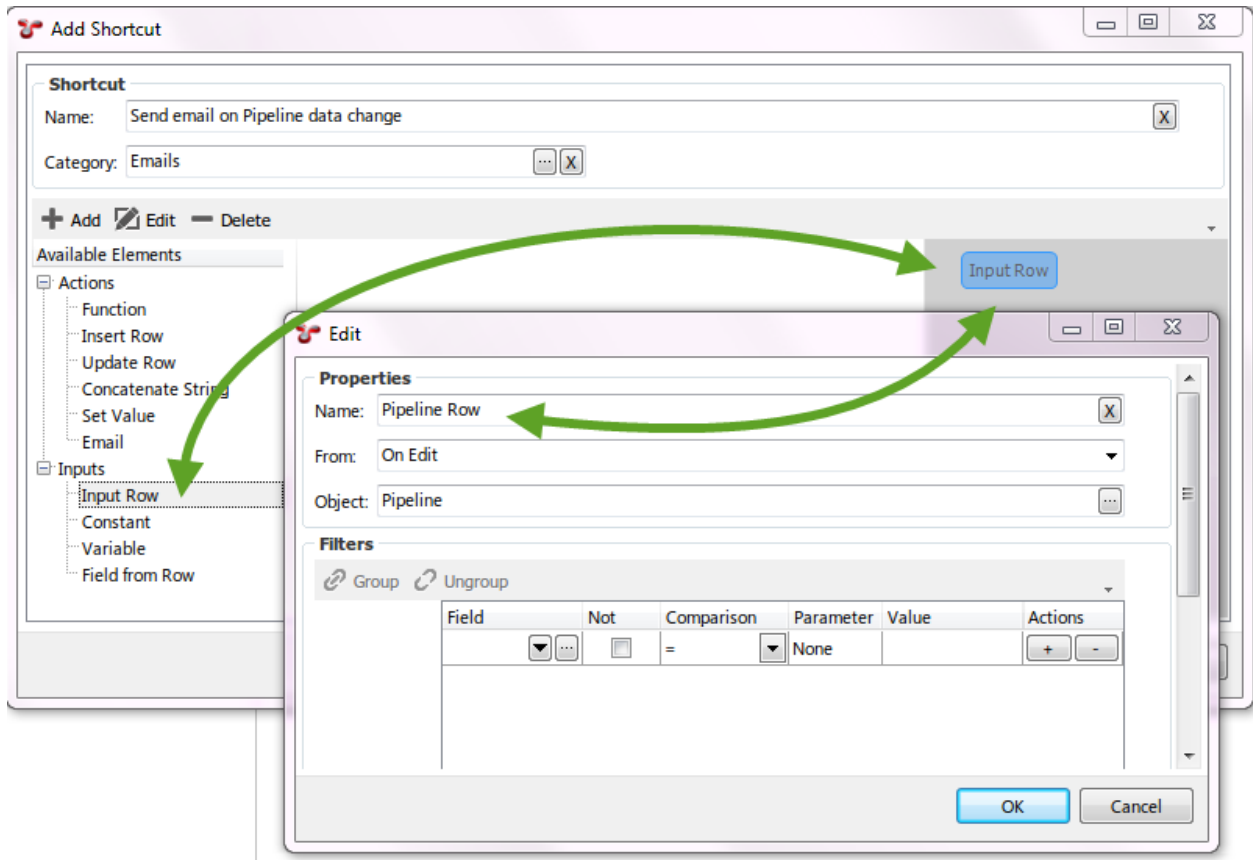
Input requirements for the Shortcut are **Name** (mandatory field) and **Category** (non mandatory field).

Step 2 - Set up the Shortcut Trigger

The trigger for sending the Email is going to be the AIG titled **Pipeline**. So that when any user edits any data in this AIG, an email will be generated and sent to the specified recipient.

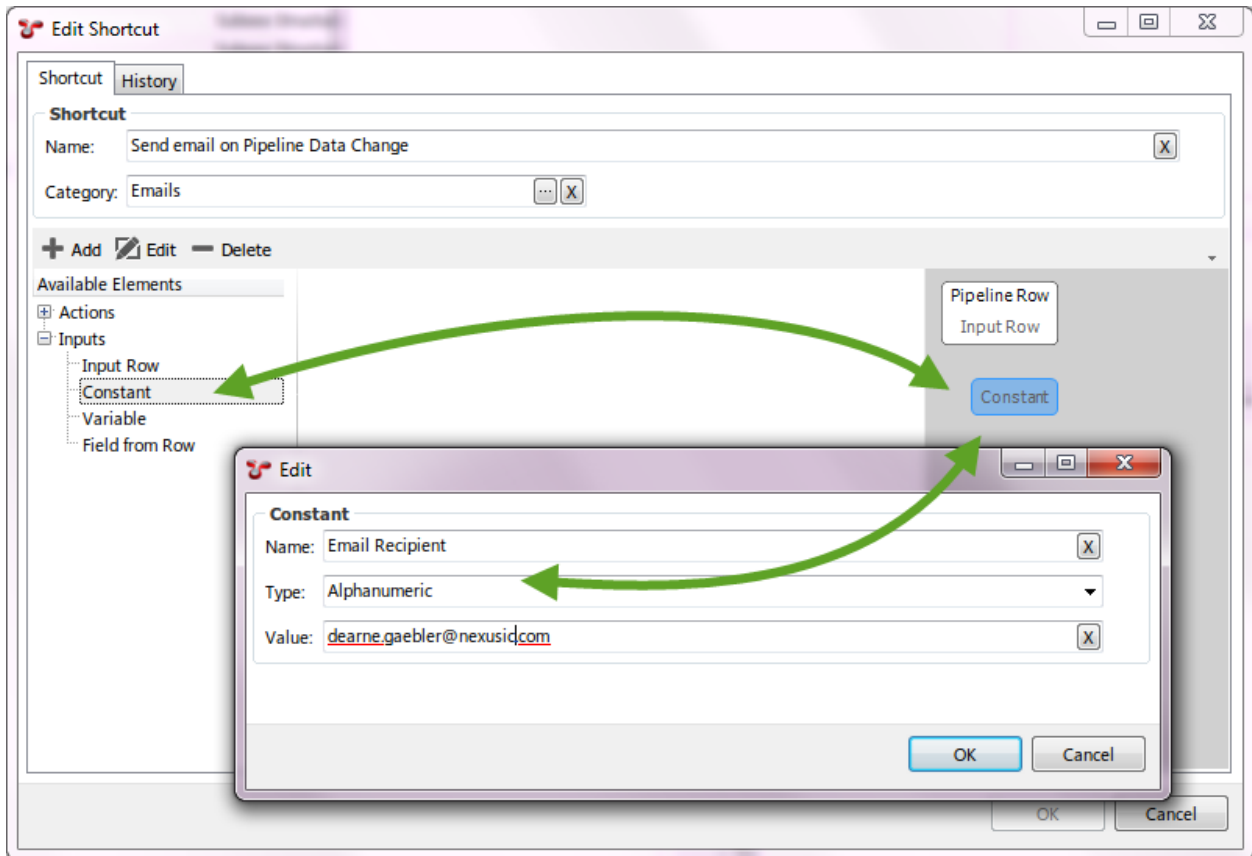
To set up the trigger for the email, we need an **Input Row** element. Click on **Input Row** under the **Inputs** group and drag it into the Shortcut workspace.

Input requirements for the **Input Row** is **Name** (type the name of the triggering AIG here), **From** (choose **On Edit** from the dropdown list) and **Object** (choose the AIG table **Pipeline**).

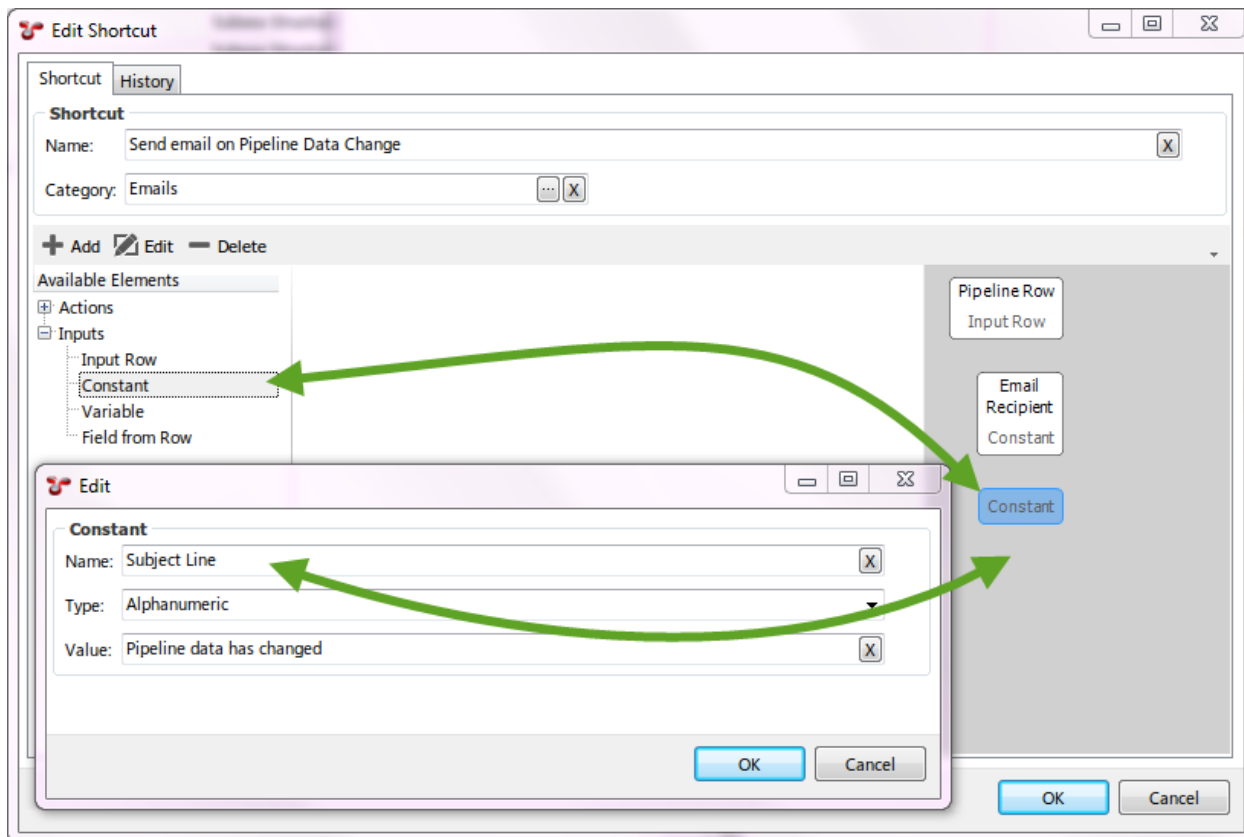


Step 3 - Set up the Email Attributes

We need to define the email Recipient, Subject line and Body text. To do this click on the **Constant** element under the **Inputs** group and drag into the shortcut workspace. Edit the Constant and enter the **Name** (“Email Recipient” so that is identifiable later) and **Value** (your email address) and click **OK**.

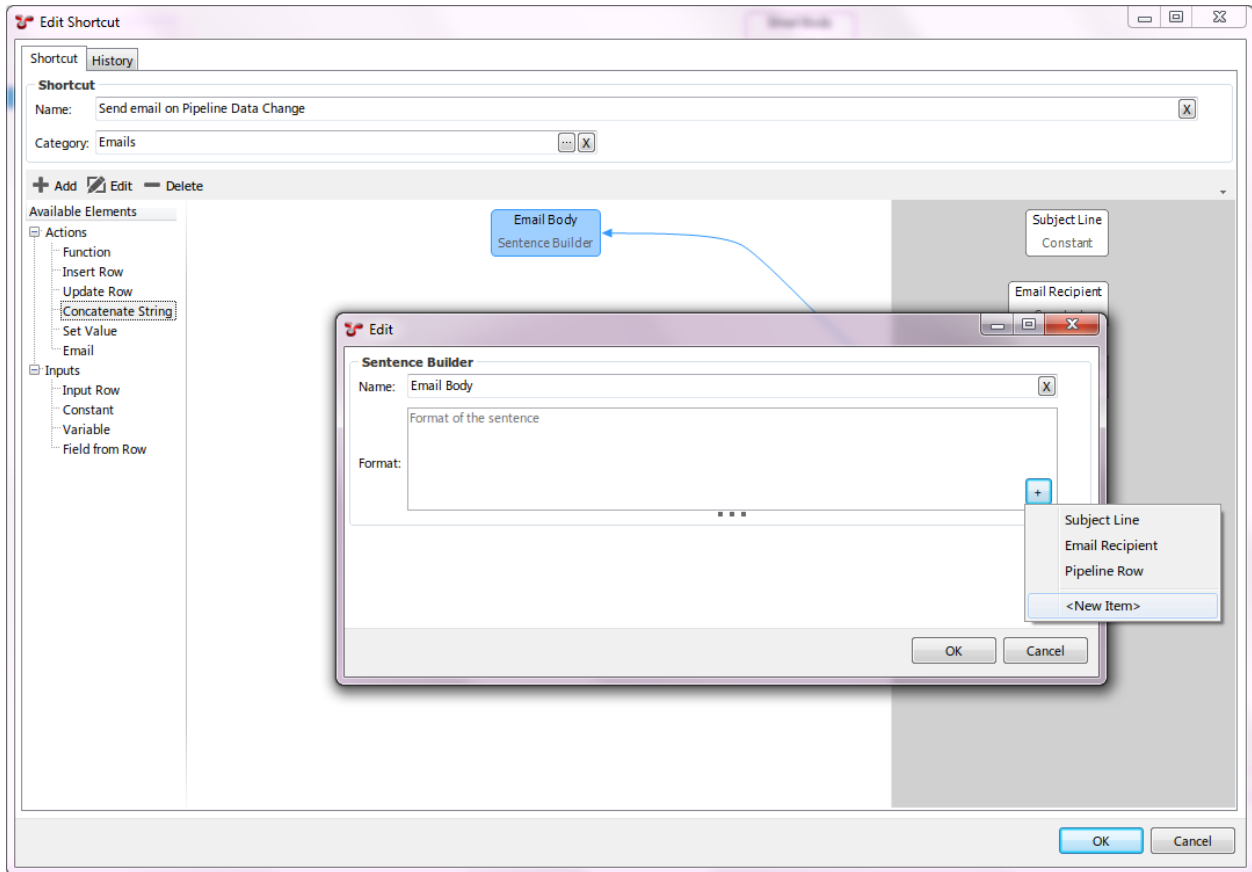


Click on the **Constant** element under the **Inputs** group and drag into the Shortcuts workspace. Edit the Constant and enter the **Name** (“Email Subject” so that it is identifiable later) and **Value** (your email address) and click OK.

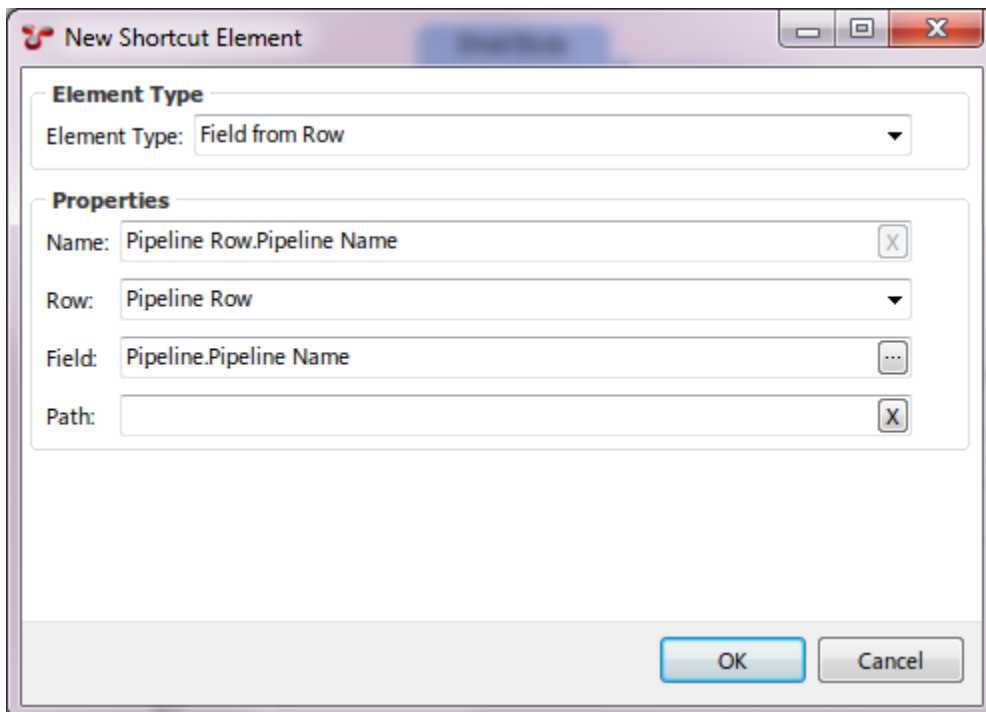


Click on the **Concatenate String** element under the **Actions** group and drag into the Shortcuts workspace. Edit the Sentence builder element and enter the **Name** (“Email Body” so that it is identifiable later).

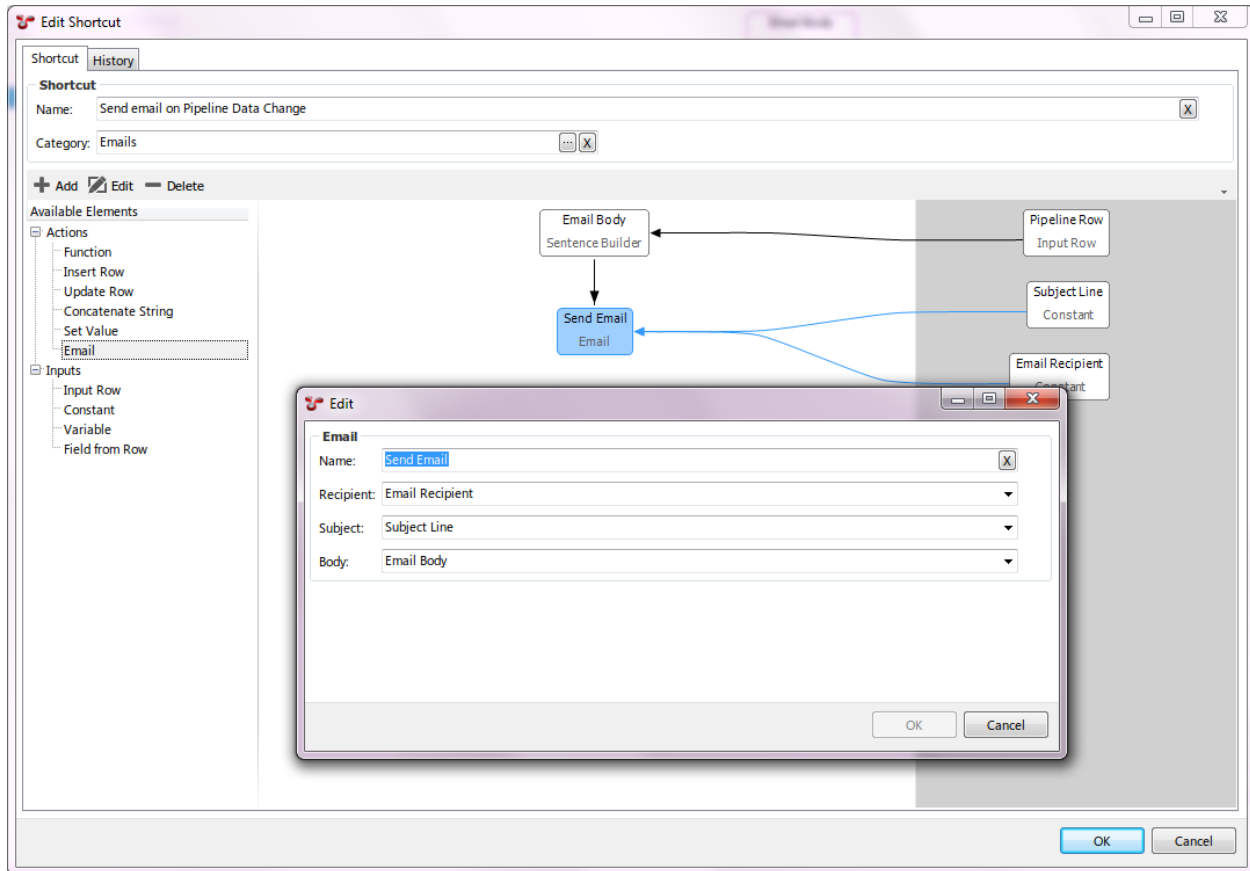
We are going to add text into the email body which is made up of information from the Pipeline AIG, click on the + button in the bottom right hand corner of the control and choose **New Item**.



In the **New Shortcut Element** dialog, choose **Field from Row** as the **Element Type**. The **Name** field will be auto-populated based on your remaining selections. Choose **Pipeline Row** for the **Row** field and **Pipeline Name** as the **Field**.



Finally, click on the **Email** element under the **Actions** group and drag into the Shortcuts workspace. Edit the Email element enter the **Name** (Send Email). Choose **Email Recipient** from the Recipient dropdown, choose **Subject Line** from the **Subject** dropdown and **EmailBody** from the **Body** dropdown.



To test this functionality, change some data in the Pipeline AIG and click save.

Shortcuts are a series of steps all grouped together into one menu item. They can be seen as similar to Excel macros.

Editing a shortcut is analogous to editing a function.

Refer to *Shortcuts - Worked Examples* for a step-by-step guide on configuring Shortcuts.

Note: It is suggested that shortcuts are thoroughly tested prior to use in a Production environment. A shortcut can have a destructive effect on a NEXUS database if not tested properly.

Toolbar

- **Add, Edit, Delete:** *Add / Edit / Delete* Shortcut(s).
- **Export** See *Export* for full description of the Export menu item.
- **Customise** See *Customise* for full description of the Customise menu item.
- **Connections** See *Connections* for information about the Connections toolbar option.
- **Load Template** Loads a previously saved .shortcut template. Note that if the previously saved Shortcut still exists in this database, Load Template will overwrite that existing Shortcut — it will not create a new copy

of it. Similarly with any other elements saved in the template file: asset information fields, functions, etc.

- **Save Template** Saves this Shortcut and related details to a .shortcut file. NEXUS IC will find all items related to this Shortcut (functions, asset information forms, event definitions, chart templates, lookup tables, etc), and will present a dialog listing all the dependencies it's found, with a checkbox for each row. Untick any that you don't want saved with your Shortcut.

Shortcut Categories

Shortcuts can be put into categories. If a shortcut's category matches the name of an existing button menu, then the shortcut menu item will be placed in that menu. For example, if a shortcut is placed in a category called Assets, then on the Assets screen this shortcut will be placed under the Assets menu button on the toolbar. The Inspection screen also has an Assets menu button, so the shortcut would also be placed under the Assets menu on that screen. If the shortcut was instead placed in a category called Asset Views, then on the Assets screen it would be placed under the Asset Views menu button. The Inspections screen has no such menu button, so instead it would be placed under a menu button called Shortcuts.

Shortcuts do show when appropriate on other panels within a screen — for example, shortcuts that act on an asset will appear on the Children panel on the Assets screen. But shortcuts will *not* appear on “Picker” dialogs that work on that type — so if you edit a drawing layer and pick an asset for that layer, you *won't* see shortcuts.

Shortcut Description

The shortcut description is a text field that stores a summary of what the function does and how it may be used.

Shortcut Elements

The shortcut editor contains two types of elements - Actions and Inputs.

These two items are very similar as some inputs may perform an action and some actions may be able to act as an input, but they are categorised and displayed based in the editor based on what their 'primary' purpose is.

Actions

Name	Description
Function	This action executes a NEXUS function, the output of the function can be used as an input into another element.
Update Row	This action is used to update a row in a Business Object
Insert Row	This action is used to create a new row in a Business Object
Concatenate String	This action builds a string using a set of inputs and the result can then be used as an input into another element.
Set Value	This action sets the value of a variable.
Email	This action generates an email.

An Action can have Inputs and outputs. Actions appear in the white centre part of the Shortcut configuration window.

The “Update Row” action can be used to show a dialog to the user, by setting the action's Style to “Allow User to Edit”.

Inputs

Input Row	This forms the basis of where a shortcut exists and is triggered.
Variable	Holds temporary information within the shortcut, used as an input to an action.
Constant	A constant value, used as an input to an action.

Inputs can have an Action. Inputs appear in the grey section on the right-hand side.

An Input’s “From” determines when the shortcut will be available: if the From is set to “On Add” then the shortcut will run every time a row is added to the selected Object (i.e. database table). Similarly with On Edit and On Delete. (In these three cases the shortcut will only execute when the row is added/edited/deleted by our software, be it NEXUS IC, IC-Inspection or the REST service used by IC-Web, IC-Inspector and third parties.) If the From is set to Retrieve Focused Item, the shortcut will appear as a menu option on grids for the relevant Object — e.g. if the Object is the Anomaly table, your shortcut would appear as a menu item on the toolbar above the Anomaly table on the Anomalies screen and on the Assets screen and on any dialog where the user is selecting an anomaly. If the From is set to Prompt User to select Row, then when the shortcut runs, the user will be shown a picker dialog on the appropriate database table. If the From is set to Prompt User to select one or more Row(s), then when the shortcut runs, the user will be shown a picker dialog on the appropriate database table from which they can select one or multiple rows. The entire shortcut will then be run on each row.

The Name you set for your input may be visible as title text on a user selection dialog.

To get your new or edited shortcuts to refresh, you will need to close and re-open your database.

Enabling/Disabling a Shortcut

When a shortcut is created, it will not be available (not seen on menu) until it is enabled via the *Enabled* checkbox under Edit Shortcut. Once enabled, the shortcut will be visible in the Shortcuts dropdown menu. Enabling or disabling a shortcut requires closing and reopening the database for changes to take effect.

Multi-select

You can have multi-selected rows feeding into your shortcut, so the user can select several items in a grid and then run your shortcut. But user selection dialogs launched within the shortcut are single-select. If the user multi-selects and runs a shortcut that has a selection dialog, an **Apply to All** checkbox will appear at the bottom left of the selection dialog. If the user ticks this box, their selection will apply to all (remaining) runs of the shortcut. If they don’t, their selection will be used for this run, and the selection dialog will be shown again for the next run.

Within an input, the “From” option of “Retrieve Focused Item” is inherently multi-select: your shortcut actually gets run once for each selected item.

Boolean Types: open/closed, on/off, etc.,

Chart Templates: for display in the software and in reports,

Company,

Functions: for use in calculated fields, charts, reports, etc.,

Global Tables: lookup data from one field for display in another,

Lookup Lists: create lists for users to pick from,

Map Servers: configure URLs for custom map servers,

Traffic Lights: for use on the asset tree,

Unit Types,

Unit Groups,

Providers: details for connections to external data sources,

Connections: connections to external data sources,

Shortcuts: sequences of actions that users can activate with a single menu item click.

Shortcut Categories.

12.3.2 Assets

Asset Information

Configuration → *Assets* → *Information* allows you to create and configure *Asset Information* forms. Users can then use these forms to record data against assets.

Asset information forms with the same Category will appear grouped together. (Icon, Colour and Shape are not used for asset information forms, though they are for Event forms. ‘Allow Inheritance’ is not yet implemented.)

In the top half of this dialog, you can add, edit and delete forms. In the bottom half, you can add, edit or delete fields within forms.

To add a form, click **Add** in the top toolbar. To edit, click **Edit**. Once you do either of these things, you should see the ‘Table Definition’ dialog. (From NEXUS’s point of view, form data is stored in tables, which is why it gives the dialog that title.)

When you **Add**, you will need to select what type of form you are creating: Asset Information or Sub Asset Information.

An Asset Information form has a one-to-one relationship with an asset: a single asset has a single instance of this particular form. So Appurtenance #23 would have a single Appurtenance form for capturing its details. (That asset might have other forms of other types: Traffic Light, Inspection History, etc.; but it would only have one form of each of the types assigned to it.)

A Sub Asset Information form appears within one of the other four types of form, and can contain multiple records for a single instance of its owning form. For example, a “Licenses” Asset Information form might contain a field showing the date the asset was first licensed, a field showing the date its latest license expires, and a Sub Asset Information form showing the various different licenses the asset has held over time.

Table Definition Dialog

On the Table Definition page you can choose the form’s Name (as it will appear in the user interface), and an optional Description, Category, Icon, Colour and Shape.

If you tick Allow Security, then in the *Database* → *Security* menu, you can control which users (and groups of users) will have what access to this form (no ability to view, ability to view but not modify, or ability to view and modify).

On the Library tab, you can optionally add one or more *Library Items* to this form. This might be useful if you want instructions for filling out the form to be stored in the database.

On the Asset Types page, you can select the asset types for which this form will be available. (By default, no asset types are selected, so this form won’t be available anywhere in the database.)

To move a field up or down in the form or grid, use the **Field Order** button in the Asset Information main toolbar. For example, if you want to place a field between two other fields in the form, select Form ... from the drop down list, then a ‘Form Field Order’ dialog will appear. From there, you can move the field with the **Move Up** or **Move Down** buttons available in the toolbar.

Fields

Forms are only useful if they contain fields. Each field can contain data of a single type (except for fields of type Position Link and Table Link).

To add a field, click **Add**. That will bring up the ‘Add Field Definition’ dialog.

Field Definition

On the Field Definition page, you must give the field a Name and a Field Type. The remainder of the form will change, depending on the Field Type you select.

For Numeric fields, you can specify Unit, Format and number of decimal places or significant figures to display. (This can be helpful if a user chooses to display data in a different unit: an integer number of millimetres might be a non-integer number of inches.)

Global Table Link

A Global Table Link field enables linking of a global table to an AIG. NEXUS-IC will apply filters progressively (guided by the user) until the desired table row is linked to the AIG. The UI should display all values for the selected global table field, in a combo box for the user to select, similar to a lookup list.

When adding or editing a Global Table Link, it will be displayed as a pseudo form. This will be built based on:

- What fields are visible in the Global Table form.
- The order of fields visible in the Global Table form.

For each field, NEXUS IC will display a combo box with the distinct set of values for that field. The first combo box will allow you to choose from all values available to that field. Once this is entered, the second field will be all distinct values from rows where the first field value matches what the user has chosen, and so on. If a field list only contains one value, it will be preselected automatically. This process continues until the user has chosen a value for each combo box, and thus filtered the global table row that will ultimately have its value persisted.

When importing or exporting a Global Table Link, the fields will be represented in the document as data separated by ‘/’ characters. For example:

Asset	Loca- tion.Full Location	Asset Type.Name	Component Damage Global Table Link.Component Damage
Wood		Company	Material / Insulation Failure / Degraded

Note that if a field called ‘Name’ is present in the global table, the values in that column will be used in place of the automated value for Importing, Reporting and displaying in the grid. If a ‘Name’ column is configured, it should be made invisible on the form via the Field Layout options.

See *Worked Example* for more information.

Field Layout

The Field Layout page has various section which control the display of the field in different modes.

Grid

Under **Grid**, you can set **Visible** to determine whether this field will be visible when the form data is viewed as a grid (e.g. on the Children tab for asset forms, or in the Event Listing for events).

You can set **Order** to control the column order within the grid — the column with the lowest Column Order will be at the left of the grid, and so on. (You can also set grid Field Order on the form as a whole — see above.) Grid order is also used to set the order of columns in a Custom Export of *assets* or events.

Text Alignment controls whether this field aligns left, centre or right. If you do not set an alignment, text fields will default to left, numeric fields to right, and date fields to centre.


Caption allows you to have a title on the grid column for this field that is different from the field's underlying name.

Form

Similarly you can set **Visible Form** to control whether the field appears on the form itself.

You can set **Category** to group fields within a form. Setting **Order** controls the order of fields within Categories, and the order of Categories on the form: the Category that contains the field with the lowest Order will be displayed first. Within the Category, the field with the lowest Order will be displayed first. (You can also set form Field Order on the form as a whole — see above.)

Untick **Show Caption** if you want this field to appear *without* a caption next to it on forms.

Set **Columns** to control how wide this field appears on a form: if this is a two-column-wide form, setting this field's Columns to 1 will cause the field plus caption to fill 50% of the width of the form; setting it to 2 will cause it to fill the full width. Forms default to two columns wide, unless you specify otherwise in a Category — edit the Category (click on the  button, then click **Edit**) and set its Columns. While editing the Category you can also set an image or descriptive text to appear at the top of this category. This might be instructions on how to fill in the form, details of how calculations on the form are worked out, etc.

Form Caption allows you to have a title on the form next to the field that is different from the field's underlying name.

Report

Visible controls whether this field will be shown when the table is exported in a report template.

IC-Inspector


Visible means this field will be shown in IC-Inspector. If you set an event field to visible, it will be available to inspectors to fill in. If you set an asset information field to visible, it will be displayed to inspectors above any forms they may be filling out. Use this sparingly: a long list of visible asset information fields will fill the inspector's screen and force them to scroll to reach the form they are trying to fill out.

Order and **Caption** work analogously to those in Grid and Form.

General

Editor Type controls what type of editor the user will see when they edit the value in this field.

If you set **Blank Text**, the text you set will be displayed greyed out whenever the field is empty. (You can see several fields with Blank Text set right here on the Field Layout tab.)

Hint: As you add (or edit) fields, you can see a preview at the lower right of the dialog, showing how the fields will appear on either a form or a grid. Fields that are selected will be shown with a  exclamation mark next to them in the form preview. If the field is a lookup list, you can drop down the lookup list to see its values. (You can also see and edit a lookup list's values when choosing the lookup list: on the "Select Lookup List" dialog, click **Edit**, click **Items**.)

Edit

To edit a field, click **Edit**. That will bring up the 'Edit Field Definition' dialog. (This is the same as Add Field Definition, but has more tabs. This is because a variety of field settings are only available after a field has been created.)

If your field is of type Calculation, there will be a Function tab. This tab will allow you to choose a function for this calculation, and will also allow you to choose parameters for the function. You can either set "Parameters (Inputs)" or "Parameters (Values)" for each parameter. "Parameters (Inputs)" lets you choose some other field as the input for that parameter; "Parameters (Values)" lets you assign a constant. These are mutually exclusive — you can only fill one or the other for each parameter.

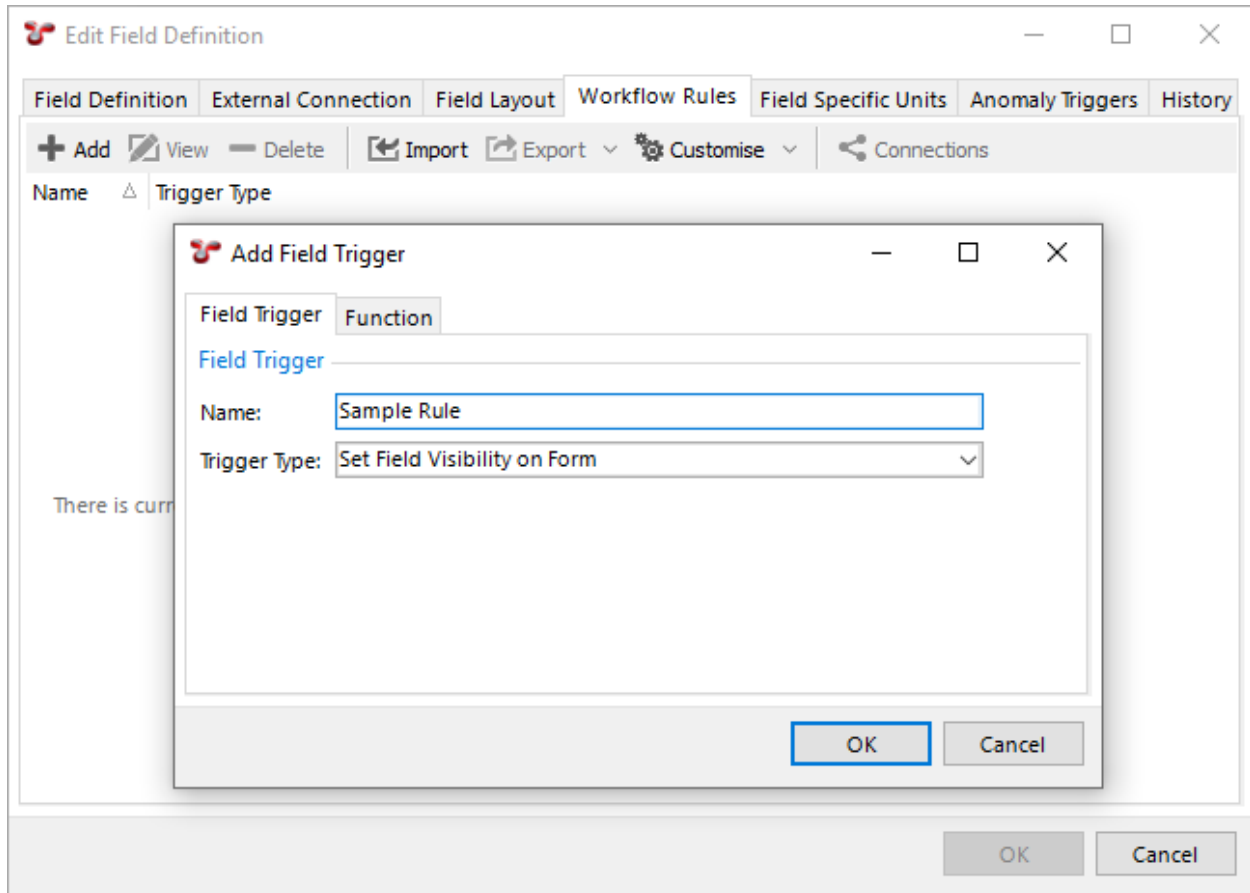
Workflow Rules

Sometimes you want a field's properties to be controlled by other data. If you want, for example, a field to be visible only when some other field is filled in (or vice versa), edit the field and go to the Workflow Rules tab. Click **Add**, and under Trigger Type choose "Set Field Visibility on Form". Then add a function, and parameters for that function. The function should return a Yes/No value. When it returns Yes, the field will be visible, when No, the field will be invisible. Similarly you can use Workflow Rules to set a field as read-only, or to mark a field as required. The remaining trigger type, "Clear Field Value on Form", can be used to automatically empty out a field's value when some condition is met — for example, it can be used to make two fields mutually exclusive, so that users can fill in one field or the other, but not both.

There are a set of system functions that you can use that mean you don't need to create custom functions:

- Compare - Is Null
- Compare - Is Not Null
- Compare A = B
- Compare A <> B

Note that workflow rules are run when forms are viewed interactively, but are not applied during *imports*. If you have ticked the "Required" box on the Field Definition page, this *will* be enforced during imports — rows that are missing required fields will be rejected. But if a workflow rule makes a field required, this will *not* be enforced during imports.



Field Specific Units

This feature works in coordination with *Unit Groups*. Suppose you want Easting and Northing to display in metres, even when US Weights and Measures are selected — you can specify that here. (You’ll need to specify it once for the Easting field, and once for the Northing field.)

Anomaly Triggers

Here you can add anomaly triggers to a field.

When an anomaly trigger is violated, a yellow exclamation mark (⚠) will appear next to the field. You can set lower/upper bounds to be constant values (so a field might trigger if it was outside, say, 1 to 9) or to pull from a field, on this form or on another form. So for example if this field is Measured Wall Thickness, it might trigger if its value is less than Minimum Allowable Wall Thickness.

For *Lookup List* fields, the comparison is done of the lookup list item’s Value, not its Comment. So if you have a lookup list titled “Anode Depletion”, and its first entry has value “25” and comment “0 to 25% depleted”, NEXUS will use the “25” for purposes of determining whether an anomaly trigger should be fired.

For Yes/No fields you can set the trigger to fire on any combination of Yes, No or blank; but you can’t compare to another field.

The **Include Boundary** tickbox controls whether exact matches cause the trigger to fire: if you have set a trigger to “Fail when inside Upper/Lower bounds”, your lower bound is 1 and your upper bound is 9, this is the difference between “ $1 < x < 9$ ” and “ $1 \leq x \leq 9$ ”.

You can optionally give an anomaly trigger a date range. If you set just a Date From, the trigger will apply only to event data from that date forward. If you set just a Date To, the trigger will apply only to event data from that date or earlier. If you set both, the trigger will apply only to event data within the specified range. In this way, you can change triggers to reflect new conditions, without causing spurious warnings on historical data. For example, if you decrease the operating pressure of an asset, this might decrease the minimum allowable wall thickness. Rather than editing the existing anomaly trigger, you can set a “To” date on that old trigger, and add a new trigger with a “From” date.

Caution: In most cases, Findings are generated at the time events are added or *imported*. There are however some scenarios in which the Anomaly Triggers utility should be run manually. These are 1) whenever anomaly triggers are edited; 2) when anomaly triggers exist on a calculation field; 3) before any Finding review sessions; or 4) after a bulk import of event data (particularly when anomaly triggers rely on events other than itself).

Triggers for a field independent of asset are found in NEXUS IC in *Asset Information* and *Event Types*. Anomaly triggers for specific assets can be configured in NEXUS IC by right-clicking on an asset and choosing **Anomaly Triggers...** If you have both an asset-specific and a generic anomaly trigger on the same field, for assets with the asset-specific trigger, only the asset-specific trigger will apply. For assets with only a generic trigger, only the generic trigger will apply. Note that asset-specific anomaly triggers are specific to their asset — they do not automatically apply to an asset’s children.

A trigger can have an anomaly *Code* and a *Severity*, and you can have several different triggers on a single field, with different codes and/or severities. The dialog may also show a preview chart, showing which triggers apply at which

KPs or depths.

(You may need to close and re-open the database for any newly added anomaly triggers to take visible effect.)

Auto-increment Fields

It's possible to set a field to auto-increment. For example, if you wanted each new anomaly you created to automatically have an as-yet-unused anomaly number pre-populated, you would do this by setting the Anomaly Number field to be an auto-increment field. To do this, set the field's Default Value to `@autoinc`. For system tables like Anomaly, you can't do this through the NEXUS IC user interface, so you should ask support@nexusic.com for assistance.

Auto-populate date/time or user name

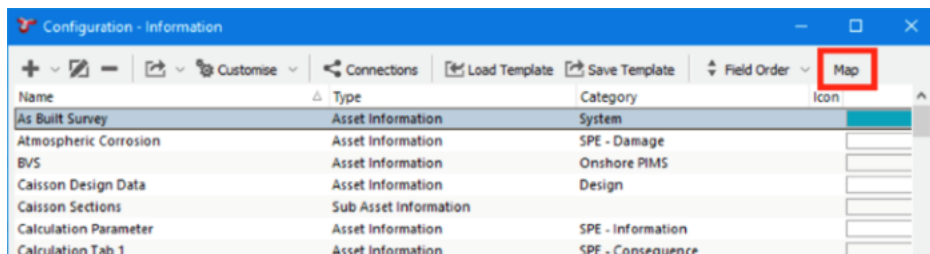
Similar to `@autoinc`, you can set a field to pre-populate with the date/time the record was created by setting its Default to `@now`. This works for any sub-event, AIG or sub-AIG field.

You can also set a field to pre-populate with the logged-in user's name by setting its Default to `@user`. This works for any event, sub-event, AIG or sub-AIG field.

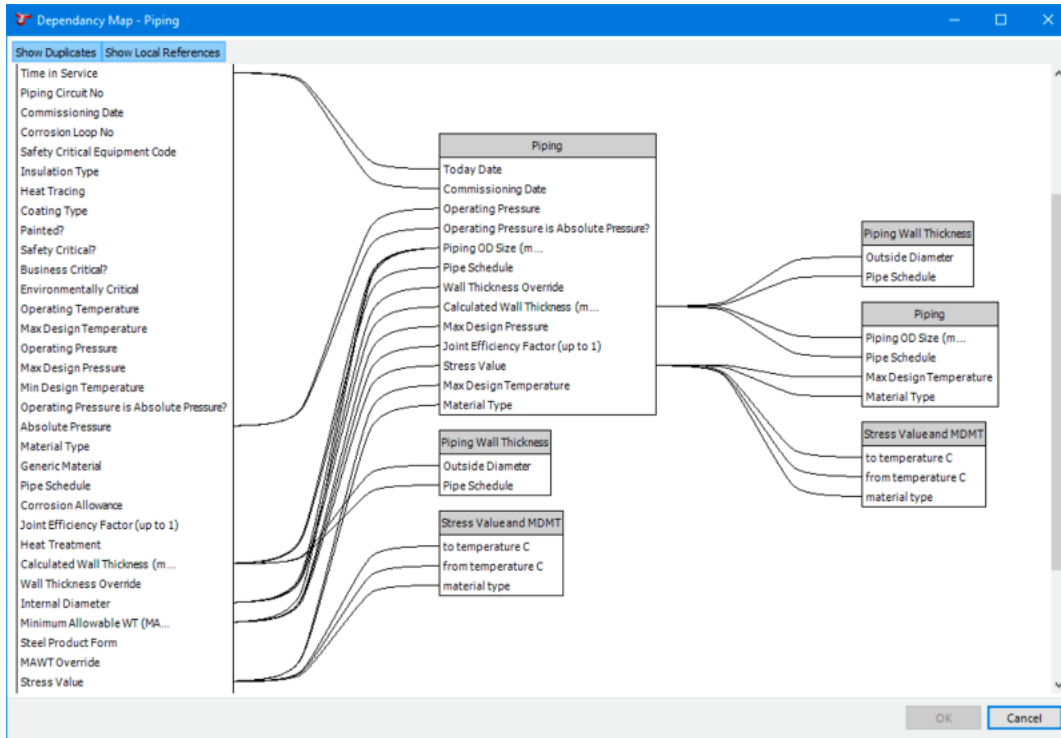
These default values are populated when the row is created. For an AIG, that's when the asset is created. For an event it's when the event is created. For a sub-event or sub-AIG it's when the user clicks the '+' to create the new sub-event or sub-AIG row.

Dependency Map

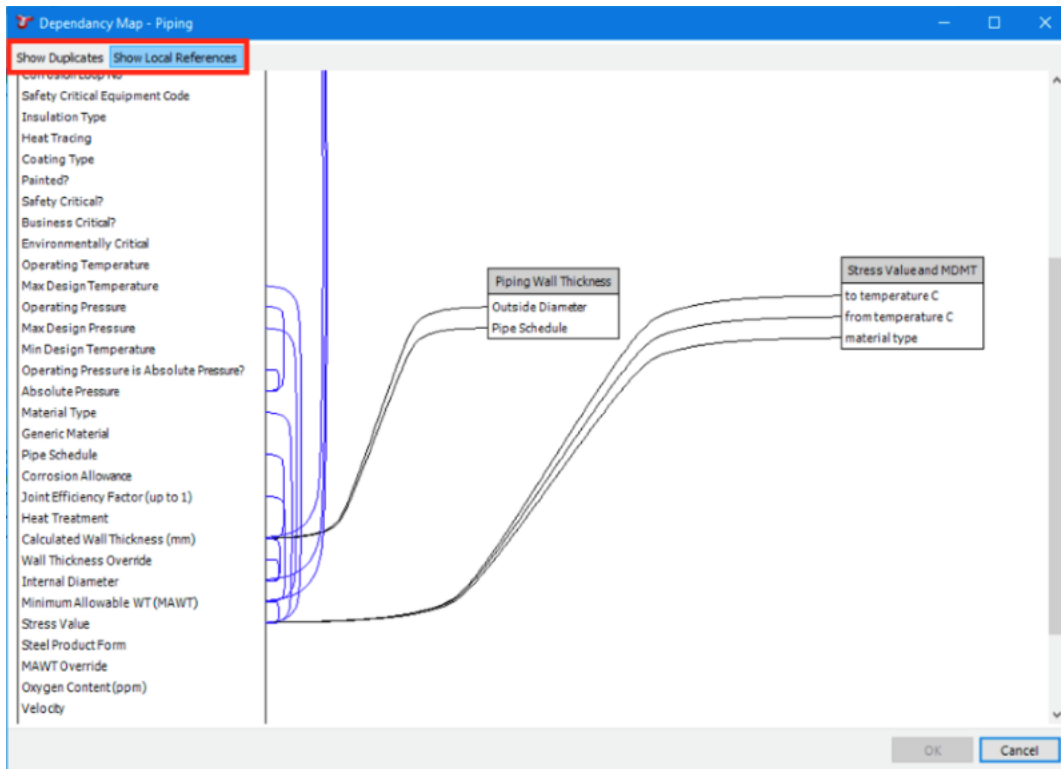
The dependency map is a visual representation of an Asset Information Group or Event Type's dependencies. It can be found under **Configuration > Assets > Information**, or **Configuration > Events > Event Types**, selecting an item from the list and choosing **Map** in the toolbar.



The map is represented as a series of interlinked fields grouped in columns, each column representing the Asset Information Group (or Event Type) to which the fields belong. The map is hierarchically arranged from left to right, with the target Asset Information Group (or Event Type) located on the left-most column, and its dependencies and sub-dependencies located to the right.



The above dependency map shows a link between Absolute Pressure in the Piping Asset Information Group, and Operating Pressure also in Piping. Looking into the field definition of Absolute Pressure, the function uses the Operating Pressure field from Piping (itself). Displaying self-referential dependencies such as these can be switched off by toggling the **Show Local References** button in the map toolbar. Toggling **Show Duplicates** off will show fields only once, so any self-referential dependencies will be displayed as a closed loop on a single column.

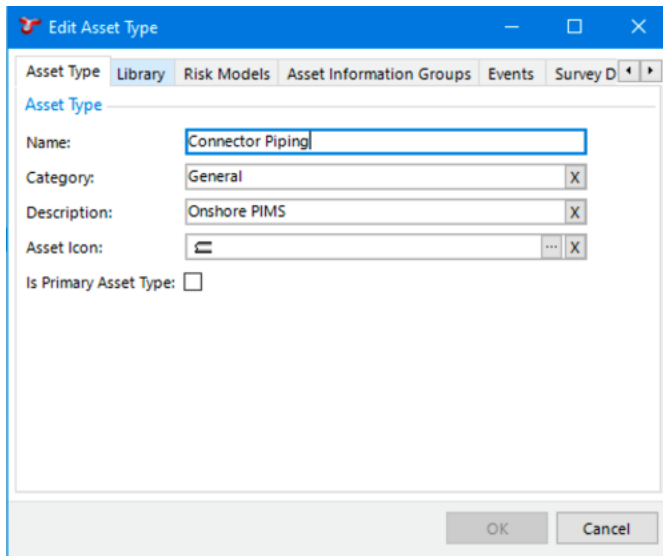


Asset Types

Asset Types are assigned to each asset in the Asset Hierarchy Tree. The Asset Type determines what Asset Information Groups, Event Definitions and Survey Data groups are applicable to particular Assets.

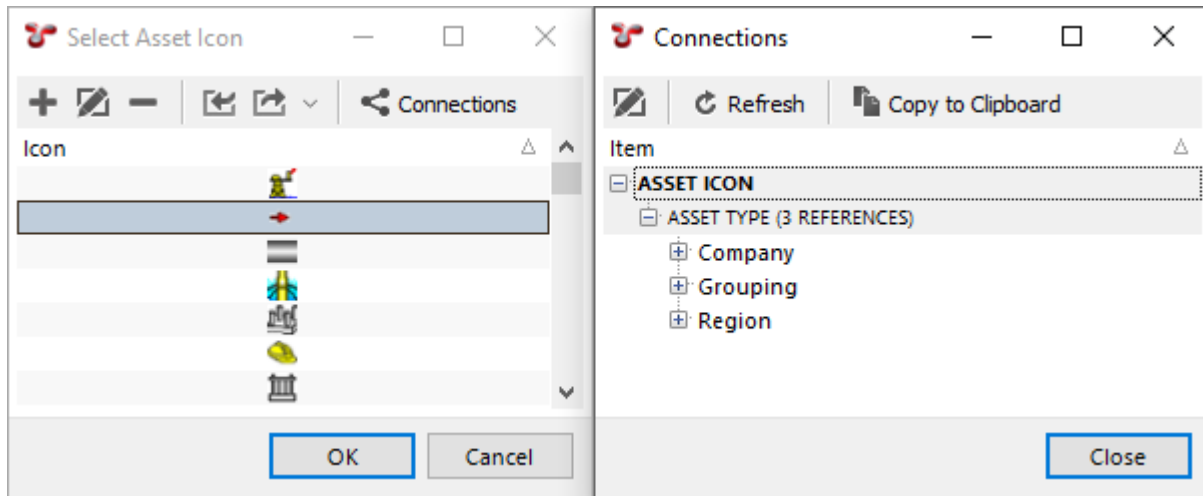
The Asset Type describes the following properties for each individual asset:

- The Name of the asset type
- The Category of the asset type
- The Description of the asset type
- The Asset Icon (16 x 16 pixels) which will represent the asset in the asset hierarchy tree.



If no icon is assigned to an Asset Type, then the default icon will be displayed in the asset hierarchy tree.

When selecting an icon, you can click **Connections** to see what other asset types it is already used on.



Asset Types also have Asset Information forms, Event Types, and Survey Data types assigned to them. If an asset type has an asset information form assigned to it, when you click on an asset of that type, you will see that form (and you will be able to enter and store data for that asset in that form). If an asset type has an event type assigned to it, then

you will be able to create events of that event type on assets of that asset type. If an asset type has a survey data type assigned to it, then survey data of that type can be logged against assets of that type.

Assigning Asset Information Forms

To assign *Asset Information* forms to an Asset Type, do the following:

1. Select the Asset Type from the Asset Types dialog.
2. Click the Edit button on the Asset Types toolbar to launch the Edit Asset Type dialog.
3. On the Asset Information Groups tab page, check the Asset Information Groups to assign to the selected Asset Type.

Assigning Event Types to an Asset Type

To assign *Event Types* to an Asset Type, do the following:

1. Select the Asset Type from the Asset Types dialog.
2. Click the Edit button on the Asset Types toolbar to launch the Edit Asset Type dialog.
3. On the Events tab page, check the Events to assign to the selected Asset Type.

Assigning Survey Data to an Asset Type

To assign a *Survey Data* group to an Asset Type, do the following:

1. Select the Asset Type from the Asset Types window.
2. Click the Edit button on the Asset Types toolbar to launch the Asset Type dialog.
3. On the Survey Data tab page, check the Survey Data groups to assign to the selected Asset Type.

Features

Configure Features to set which Asset Information field is the source for:

- **As Built - Order, As Built - Easting, As Built - Northing:** sub-AIG fields used by the *Map* feature to show an as-built pipeline track.
- **DVR - Relative Folder:** used by IC-Inspection to specify the folder to record video into for each asset.
- **Feature - Start, Feature - End, Feature - Name, Feature - Category:** These fields are now redundant but may be used in the future. Just leave blank.
- **Asset - Abbreviation:** This field is now redundant but may be used in the future. Just leave blank.
- **Asset - Serial Number:** used to connect NEXUS IC assets to elements in a 3D drawing.
- **Coordinates - Datum, Coordinates - UTM Zone:** used by the *Map* feature to fetch real-world maps from OpenStreetMap, ESRI, etc.
- **Asset - Tag:** This field is used to store QR code data. When IC-Inspector scans a QR code or bar code, the task list will be filtered to show only tasks that contain the scanned code.

Sensors

This is the area that was known as Monitored Data in NEXUS IC 5. Sensor data is recorded against assets, at a series of points in time (for example, once per hour).

Here you can configure sensor data forms.

In the top half of this dialog, you can add, edit and delete Sensor forms. In the bottom half, you can add, edit or delete fields within the Sensor forms.

To add a form, click **Add** in the top toolbar. To edit, click **Edit**. Once you do either of these things, you should see the ‘Table Definition’ dialog. (From NEXUS’s point of view, form data is stored in tables, which is why it gives the dialog that title.)

Typically, a Sensor will only have a single numeric field configured. However, if your Sensor data type has more than one field, then the Sparkline chart shown on the Sensors grid will display the data from the field that is ordered first. See *Sensors* for more information on the Sensor Sparkline chart.

Table Definition Dialog

On the Table Definition page you can choose the form’s Name (as it will appear in the user interface), and an optional Description, Category, Icon, Colour and Shape.

If you tick Allow Security, then in the *Database* → *Security* menu, you can control which users (and groups of users) will have what access to this form (no ability to view, ability to view but not modify, or ability to view and modify).

On the Library tab, you can optionally add one or more *Library Items* to this form. This might be useful if you want instructions for filling out the form to be stored in the database.

On the Asset Types page, you can select the asset types for which this form will be available. (By default, no asset types are selected, so this form won’t be available anywhere in the database.)

To move a field up or down in the form or grid, use the **Field Order** button in the Asset Information main toolbar. For example, if you want to place a field between two other fields in the form, select Form ... from the drop down list, then a ‘Form Field Order’ dialog will appear. From there, you can move the field with the **Move Up** or **Move Down** buttons available in the toolbar.

Fields

Forms are only useful if they contain fields. Each field can contain data of a single type (except for fields of type Position Link and Table Link).

To add a field, click **Add**. That will bring up the ‘Add Field Definition’ dialog.

Field Definition

On the Field Definition page, you must give the field a Name and a Field Type. The remainder of the form will change, depending on the Field Type you select.

For Numeric fields, you can specify Unit, Format and number of decimal places or significant figures to display. (This can be helpful if a user chooses to display data in a different unit: an integer number of millimetres might be a non-integer number of inches.)

Global Table Link

A Global Table Link field enables linking of a global table to an AIG. NEXUS-IC will apply filters progressively (guided by the user) until the desired table row is linked to the AIG. The UI should display all values for the selected global table field, in a combo box for the user to select, similar to a lookup list.

When adding or editing a Global Table Link, it will be displayed as a pseudo form. This will be built based on:

- What fields are visible in the Global Table form.
- The order of fields visible in the Global Table form.

For each field, NEXUS IC will display a combo box with the distinct set of values for that field. The first combo box will allow you to choose from all values available to that field. Once this is entered, the second field will be all distinct values from rows where the first field value matches what the user has chosen, and so on. If a field list only contains one value, it will be preselected automatically. This process continues until the user has chosen a value for each combo box, and thus filtered the global table row that will ultimately have its value persisted.

When importing or exporting a Global Table Link, the fields will be represented in the document as data separated by '/' characters. For example:

Asset Location.Full Location	Asset Type.Name	Component Damage Global Table Link.Component Damage
Wood	Company	Material / Insulation Failure / Degraded

Note that if a field called 'Name' is present in the global table, the values in that column will be used in place of the automated value for Importing, Reporting and displaying in the grid. If a 'Name' column is configured, it should be made invisible on the form via the Field Layout options.

See [Worked Example](#) for more information.

Field Layout

The Field Layout page has various section which control the display of the field in different modes.

Grid

Under Grid, you can set **Visible** to determine whether this field will be visible when the form data is viewed as a grid (e.g. on the Children tab for asset forms, or in the Event Listing for events).

You can set **Order** to control the column order within the grid — the column with the lowest Column Order will be at the left of the grid, and so on. (You can also set grid Field Order on the form as a whole — see above.) Grid order is also used to set the order of columns in a Custom Export of *assets* or events.

Text Alignment controls whether this field aligns left, centre or right. If you do not set an alignment, text fields will default to left, numeric fields to right, and date fields to centre.

Caption allows you to have a title on the grid column for this field that is different from the field's underlying name.


Form

Similarly you can set **Visible Form** to control whether the field appears on the form itself.

You can set **Category** to group fields within a form. Setting **Order** controls the order of fields within Categories, and the order of Categories on the form: the Category that contains the field with the lowest Order will be displayed first.

Within the Category, the field with the lowest Order will be displayed first. (You can also set form Field Order on the form as a whole — see above.)

Untick **Show Caption** if you want this field to appear *without* a caption next to it on forms.

Set **Columns** to control how wide this field appears on a form: if this is a two-column-wide form, setting this field's Columns to 1 will cause the field plus caption to fill 50% of the width of the form; setting it to 2 will cause it to fill the full width. Forms default to two columns wide, unless you specify otherwise in a Category — edit the Category (click on the  button, then click **Edit**) and set its Columns. While editing the Category you can also set an image or descriptive text to appear at the top of this category. This might be instructions on how to fill in the form, details of how calculations on the form are worked out, etc.

Form Caption allows you to have a title on the form next to the field that is different from the field's underlying name.

Report

Visible controls whether this field will be shown when the table is exported in a report template.

IC-Inspector


Visible means this field will be shown in IC-Inspector. If you set an event field to visible, it will be available to inspectors to fill in. If you set an asset information field to visible, it will be displayed to inspectors above any forms they may be filling out. Use this sparingly: a long list of visible asset information fields will fill the inspector's screen and force them to scroll to reach the form they are trying to fill out.

Order and **Caption** work analogously to those in Grid and Form.

General

Editor Type controls what type of editor the user will see when they edit the value in this field.

If you set **Blank Text**, the text you set will be displayed greyed out whenever the field is empty. (You can see several fields with Blank Text set right here on the Field Layout tab.)

Hint: As you add (or edit) fields, you can see a preview at the lower right of the dialog, showing how the fields will appear on either a form or a grid. Fields that are selected will be shown with a  exclamation mark next to them in the form preview. If the field is a lookup list, you can drop down the lookup list to see its values. (You can also see and edit a lookup list's values when choosing the lookup list: on the "Select Lookup List" dialog, click **Edit**, click **Items**.)

Edit

To edit a field, click **Edit**. That will bring up the 'Edit Field Definition' dialog. (This is the same as Add Field Definition, but has more tabs. This is because a variety of field settings are only available after a field has been created.)

If your field is of type Calculation, there will be a Function tab. This tab will allow you to choose a function for this calculation, and will also allow you to choose parameters for the function. You can either set "Parameters (Inputs)" or "Parameters (Values)" for each parameter. "Parameters (Inputs)" lets you choose some other field as the input for that parameter; "Parameters (Values)" lets you assign a constant. These are mutually exclusive — you can only fill one or the other for each parameter.

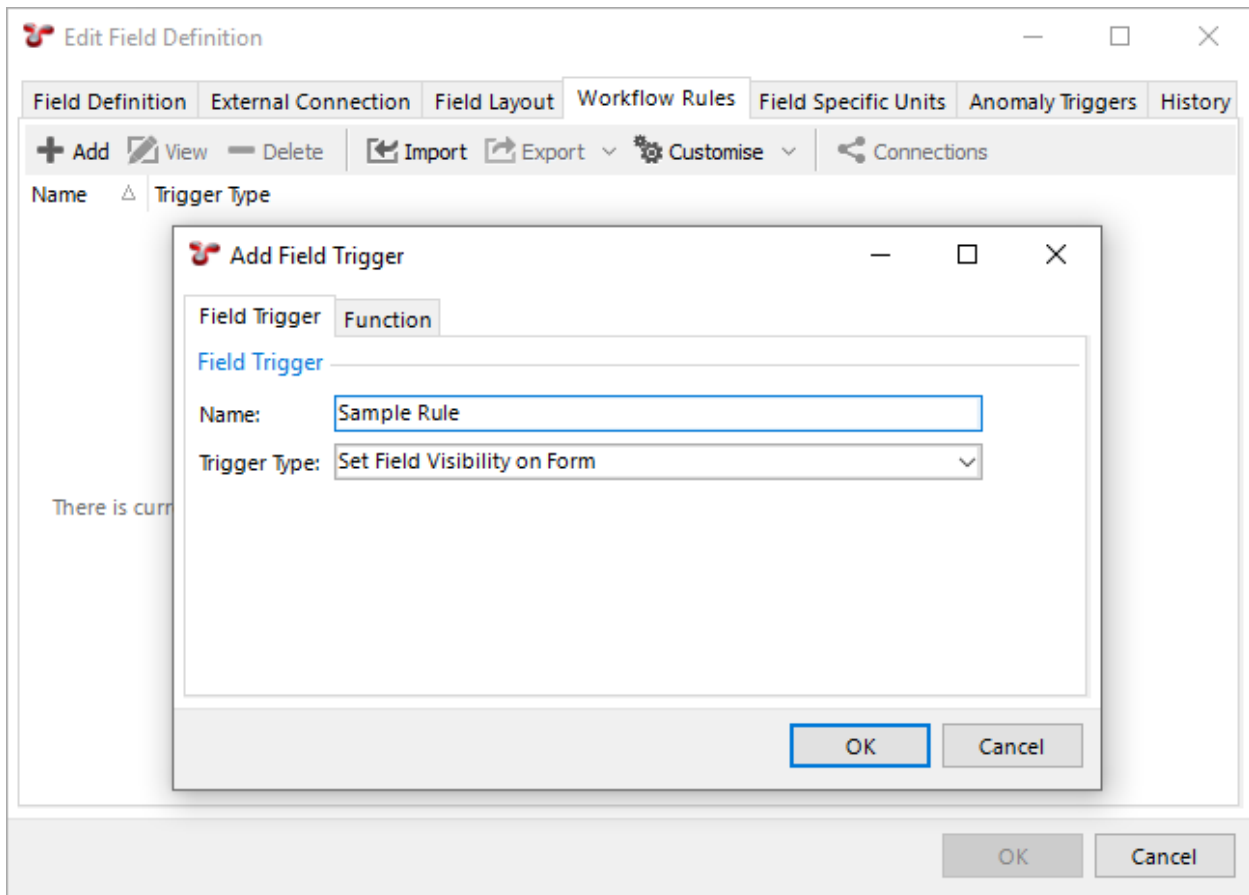
Workflow Rules

Sometimes you want a field’s properties to be controlled by other data. If you want, for example, a field to be visible only when some other field is filled in (or vice versa), edit the field and go to the Workflow Rules tab. Click **Add**, and under Trigger Type choose “Set Field Visibility on Form”. Then add a function, and parameters for that function. The function should return a Yes/No value. When it returns Yes, the field will be visible, when No, the field will be invisible. Similarly you can use Workflow Rules to set a field as read-only, or to mark a field as required. The remaining trigger type, “Clear Field Value on Form”, can be used to automatically empty out a field’s value when some condition is met — for example, it can be used to make two fields mutually exclusive, so that users can fill in one field or the other, but not both.

There are a set of system functions that you can use that mean you don’t need to create custom functions:

- Compare - Is Null
- Compare - Is Not Null
- Compare A = B
- Compare A <> B

Note that workflow rules are run when forms are viewed interactively, but are not applied during *imports*. If you have ticked the “Required” box on the Field Definition page, this *will* be enforced during imports — rows that are missing required fields will be rejected. But if a workflow rule makes a field required, this will *not* be enforced during imports.



Field Specific Units

This feature works in coordination with *Unit Groups*. Suppose you want Easting and Northing to display in metres, even when US Weights and Measures are selected — you can specify that here. (You’ll need to specify it once for the Easting field, and once for the Northing field.)

Anomaly Triggers

Here you can add anomaly triggers to a field.

When an anomaly trigger is violated, a yellow exclamation mark (⚠) will appear next to the field. You can set lower/upper bounds to be constant values (so a field might trigger if it was outside, say, 1 to 9) or to pull from a field, on this form or on another form. So for example if this field is Measured Wall Thickness, it might trigger if its value is less than Minimum Allowable Wall Thickness.

For *Lookup List* fields, the comparison is done of the lookup list item’s Value, not its Comment. So if you have a lookup list titled “Anode Depletion”, and its first entry has value “25” and comment “0 to 25% depleted”, NEXUS will use the “25” for purposes of determining whether an anomaly trigger should be fired.

For Yes/No fields you can set the trigger to fire on any combination of Yes, No or blank; but you can’t compare to another field.

The **Include Boundary** tickbox controls whether exact matches cause the trigger to fire: if you have set a trigger to “Fail when inside Upper/Lower bounds”, your lower bound is 1 and your upper bound is 9, this is the difference between “ $1 < x < 9$ ” and “ $1 \leq x \leq 9$ ”.

You can optionally give an anomaly trigger a date range. If you set just a Date From, the trigger will apply only to event data from that date forward. If you set just a Date To, the trigger will apply only to event data from that date or earlier. If you set both, the trigger will apply only to event data within the specified range. In this way, you can change triggers to reflect new conditions, without causing spurious warnings on historical data. For example, if you decrease the operating pressure of an asset, this might decrease the minimum allowable wall thickness. Rather than editing the existing anomaly trigger, you can set a “To” date on that old trigger, and add a new trigger with a “From” date.

Caution: In most cases, Findings are generated at the time events are added or *imported*. There are however some scenarios in which the Anomaly Triggers utility should be run manually. These are 1) whenever anomaly triggers are edited; 2) when anomaly triggers exist on a calculation field; 3) before any Finding review sessions; or 4) after a bulk import of event data (particularly when anomaly triggers rely on events other than itself).

Triggers for a field independent of asset are found in NEXUS IC in *Asset Information* and *Event Types*. Anomaly triggers for specific assets can be configured in NEXUS IC by right-clicking on an asset and choosing **Anomaly Triggers...** If you have both an asset-specific and a generic anomaly trigger on the same field, for assets with the asset-specific trigger, only the asset-specific trigger will apply. For assets with only a generic trigger, only the generic trigger will apply. Note that asset-specific anomaly triggers are specific to their asset — they do not automatically apply to an asset’s children.

A trigger can have an anomaly *Code* and a *Severity*, and you can have several different triggers on a single field, with different codes and/or severities. The dialog may also show a preview chart, showing which triggers apply at which KPs or depths.

(You may need to close and re-open the database for any newly added anomaly triggers to take visible effect.)

Auto-increment Fields

It’s possible to set a field to auto-increment. For example, if you wanted each new anomaly you created to automatically have an as-yet-unused anomaly number pre-populated, you would do this by setting the Anomaly Number field to be an auto-increment field. To do this, set the field’s Default Value to @autoinc. For system tables like Anomaly, you can’t do this through the NEXUS IC user interface, so you should ask support@nexusic.com for assistance.

Auto-populate date/time or user name

Similar to @autoinc, you can set a field to pre-populate with the date/time the record was created by setting its Default to @now. This works for any sub-event, AIG or sub-AIG field.

You can also set a field to pre-populate with the logged-in user’s name by setting its Default to @user. This works for any event, sub-event, AIG or sub-AIG field.

These default values are populated when the row is created. For an AIG, that’s when the asset is created. For an event it’s when the event is created. For a sub-event or sub-AIG it’s when the user clicks the ‘+’ to create the new sub-event or sub-AIG row.

Risk Charts

Here you can configure risk matrix charts. One chart can be used by several *risk models*.

Risk charts will be displayed on the *Assets* screen, on the *Risk* tab.

When you edit a risk chart, you can change its various properties. “X Axis Granulation” defines how many squares wide the risk chart is; “Y Axis Granulation” sets how many squares tall it is.

Once you've chosen a granulation, you'll want to set Axis Ticks. These are semicolon-separated lists, one for each axis. So if your matrix is 5x5, you might set X Axis Ticks to "A;B;C;D;E" and Y Axis Ticks to "1;2;3;4;5". Or you could use longer descriptive text like "Negligible;Mild;Moderate;Major;Severe", or whatever is mandated by your risk model.

Right-click on a square to set its colour. Choose a predefined colour or choose Custom to get a colour picker dialog.

Left-click on a square and you can set a whole number risk value for that square.

Risk Models

The Risk technology within NEXUS IC provides a powerful framework so that you can configure formalised risk assessment & RBI methodologies (e.g. API 581 BRD, DN- RP- G101, AS 2885.1, AS 4360) or set up custom risk models of any level of complexity (i.e., Corporate risk models, internally workshopped models, or tailored/customised models to suit specific issues or situations).

Here on the *Configuration* → *Assets* → *Risk Models* dialog you can create and configure Risk Models.

(To assign risk model(s) (and corresponding assessments) to an asset, go to *Assets*, select the *Risk* tab, and use the **Assign** button. You can assign more than one risk model to an asset.)

You can see what assets have a particular risk model assigned by clicking on the risk model, then clicking the **Connections** button.


Risk Models can optionally be given a (user-configurable) Model Status and a (user-configurable) Category. (This Category is separate from the Categories discussed below.)


When editing a Risk Model, you are able to restrict which asset types can have access to certain risk models. For example, a Piping risk model only needs to be applied to an asset of type Piping, not an asset of type Generator, so only Piping will be selected in the risk model's Asset Types. This is done by editing the risk model and deselecting all except Piping in the Asset Types window.

The concept of Risk Models is hierarchical: the final Risk value is comprised of n Categories. Each Category value is comprised of n Factors. Each Factor value is comprised of n Calculations, Pass Thrus, Values and Factors.

Each of these entities (Category, Factor, etc.) is displayed in the bottom half of the Configuration - Risk Models dialog in a hierarchical structure tree, with each level expandable and collapsible.

When you create a new risk model (via the **Add** button), it has three top-level categories: Risk, X Value, and Y Value. X Value and Y Value are used to determine the position of the dot on the risk chart: 0 is at the left or bottom of the chart (depending on which axis we're talking about), and 1 is at the right or top. Typically you want a function which puts each likelihood or consequence into its row or column, but you may also want to move to slightly different locations within a risk square based on scenario, so that different scenarios' dots will not all draw over the top of each other.

The other top-level category, Risk, contains your risk model functionality. Beneath Risk you can add Factors, and below Factors you can add Calculations, Pass Thrus, Values and more Factors. Each factor has a Function, which you can access by clicking in the Function cell at the right-hand side of that factor's row in the grid, and then clicking the  at the right of that cell. That function has all of the elements that are children of this factor as inputs, thus allowing you to combine all those inputs in whatever way is appropriate, for use by the next layer up. Ultimately, the function in the Risk element is therefore combining everything below it.

Risk models can pull information from *Asset Information* forms, or from calculations within the risk model, or from Values stored directly within the risk model assessment. If you are using more than one scenario for a single asset, the information that varies from one scenario to another should be stored as Values within the risk model. (You can add scenarios on the *Assets* → *Risk* tab: click **Edit** to edit the assessment, then click  **Scenario**.)

Asset Information: forms for users to enter data against assets,

Asset Types,
Features,
Sensors: forms to log periodic data (temperature and pressure once per minute, etc.),
Risk Charts,
Risk Models.

12.3.3 Planning

Configuration → **Planning**

The various *Configuration* → *Planning* menu items allow you to create, edit and delete Cost Codes, Schedule Types, Task Categories, Task Statuses, Workpack Groups and Workpack Revisions.

Cost Codes

Schedules can be given a Cost Code. This can be useful if it ties in with an external CMMS.

Types

Schedules can be given a Type. This is a non-required field, used for grouping, categorising.

Task Categories

Are used to group *Tasks*. If your database contains different kinds of data, for example some below-water and some above-water data, you might like to create one Task Category for “Above water” and another for “Below water”. Or below water might be separated into “ROV” and “Diver”.

Task Status

Tasks have a Status, for user-defined categorisation. For example, it can contain entries describing why a task could not be completed: item inaccessible, item non-existent, task is a duplicate, etc.

Workpack Groups

Workpacks can be grouped...

Workpack Revisions

... and given a Revision. By default, the grid on the *WORKPACKS* screen is grouped by Revision.

Cost Codes,
Types,
Task Categories,

Task Status,
Workpack Groups,
Workpack Revisions.

12.3.4 Events

Event Types

Configuration → *Events* → *Event Types* allows you to create and configure *event* forms. Users can then use these forms to record event data.

In the top half of this dialog, you can add, edit and delete forms. In the bottom half, you can add, edit or delete fields within forms.

To add a form, click **Add** in the top toolbar. To edit, click **Edit**. Once you do either of these things, you should see the ‘Table Definition’ dialog. (From NEXUS’s point of view, form data is stored in tables, which is why it gives the dialog that title.)

An event’s Icon (recommended size 24 x 17 pixels) is used to represent it in IC-Inspection’s Launch pane. An event’s Colour is used to represent it on charts. An event’s Shape is used to represent it on *charts with drawings*. “Allow Security” controls whether an entry for this event type will be shown in the *Security* dialog. (Category is not used for event forms.)

When you **Add**, you will need to select what type of form you are creating: *Event, Sub Event, Survey Data, Continuous Event*.

Events

Events are for things that represent a single point in time and space, or a short range of time and/or space: a form to capture details about an anode’s current state, for example, would be an event.

Sub Events

A Sub Event appears within one of the other four types of form, and can contain multiple records for a single instance of its owning form. For example, a CP Reading event form might have a sub-event form on it for registering several readings; a Seabed Profile continuous event form might have a sub-event form on it for recording a range of cross-profile depths; etc.

Sub Event types are not supported by IC-Inspector.

Survey Data

A Survey Data form captures information like location (Easting, Northing, etc.), KP, CP (CP Reading, Field Gradient, etc.) and so on. Survey Data such as KP, Easting, Northing, Latitude, Longitude and Elevation is logged into a Survey Set. Each Event has a reference to Survey Set and the positional data contained is retrieved from the Survey Set, matching on the Date Time Stamp in the Survey Set and the Date Time Stamp (Start Clock) of the event. Survey Set data is imported inherently with any *Event Import*. The Inspection data import templates are formatted with the required columns. It is also possible to import Survey Set Data independent of Event records and the following sections describe how this can be achieved. To edit individual survey data points, go to *Configuration* → *Events* → *Survey Sets*.

Continuous Events

A Continuous Event is for capturing periodic data. For example, on a subsea pipeline inspection, you might capture seabed information every n metres. Continuous events do not normally appear in the *Event Listing*, unless you specifically filter for them.

Table Definition Dialog

On the Table Definition page you can choose the form's Name (as it will appear in the user interface), and an optional Description, Category, Icon, Colour and Shape.

If you tick Allow Security, then in the *Database* → *Security* menu, you can control which users (and groups of users) will have what access to this form (no ability to view, ability to view but not modify, or ability to view and modify).

On the Library tab, you can optionally add one or more *Library Items* to this form. This might be useful if you want instructions for filling out the form to be stored in the database.

On the Asset Types page, you can select the asset types for which this form will be available. (By default, no asset types are selected, so this form won't be available anywhere in the database.)

To move a field up or down in the form or grid, use the **Field Order** button in the Asset Information main toolbar. For example, if you want to place a field between two other fields in the form, select Form ... from the drop down list, then a 'Form Field Order' dialog will appear. From there, you can move the field with the **Move Up** or **Move Down** buttons available in the toolbar.

Fields

Forms are only useful if they contain fields. Each field can contain data of a single type (except for fields of type Position Link and Table Link).

To add a field, click **Add**. That will bring up the 'Add Field Definition' dialog.

Field Definition

On the Field Definition page, you must give the field a Name and a Field Type. The remainder of the form will change, depending on the Field Type you select.

For Numeric fields, you can specify Unit, Format and number of decimal places or significant figures to display. (This can be helpful if a user chooses to display data in a different unit: an integer number of millimetres might be a non-integer number of inches.)

Global Table Link

A Global Table Link field enables linking of a global table to an AIG. NEXUS-IC will apply filters progressively (guided by the user) until the desired table row is linked to the AIG. The UI should display all values for the selected global table field, in a combo box for the user to select, similar to a lookup list.

When adding or editing a Global Table Link, it will be displayed as a pseudo form. This will be built based on:

- What fields are visible in the Global Table form.
- The order of fields visible in the Global Table form.

For each field, NEXUS IC will display a combo box with the distinct set of values for that field. The first combo box will allow you to choose from all values available to that field. Once this is entered, the second field will be all distinct values from rows where the first field value matches what the user has chosen, and so on. If a field list only contains one value, it will be preselected automatically. This process continues until the user has chosen a value for each combo box, and thus filtered the global table row that will ultimately have its value persisted.

When importing or exporting a Global Table Link, the fields will be represented in the document as data separated by ‘/’ characters. For example:

Asset Location.Full Location	Asset Type.Name	Component Damage Global Table Link.Component Damage
Wood	Company	Material / Insulation Failure / Degraded

Note that if a field called ‘Name’ is present in the global table, the values in that column will be used in place of the automated value for Importing, Reporting and displaying in the grid. If a ‘Name’ column is configured, it should be made invisible on the form via the Field Layout options.

See [Worked Example](#) for more information.

Field Layout

The Field Layout page has various section which control the display of the field in different modes.

Grid

Under Grid, you can set **Visible** to determine whether this field will be visible when the form data is viewed as a grid (e.g. on the Children tab for asset forms, or in the Event Listing for events).

You can set **Order** to control the column order within the grid — the column with the lowest Column Order will be at the left of the grid, and so on. (You can also set grid Field Order on the form as a whole — see above.) Grid order is also used to set the order of columns in a Custom Export of *assets* or events.

Text Alignment controls whether this field aligns left, centre or right. If you do not set an alignment, text fields will default to left, numeric fields to right, and date fields to centre.


Caption allows you to have a title on the grid column for this field that is different from the field’s underlying name.

Form

Similarly you can set **Visible Form** to control whether the field appears on the form itself.

You can set **Category** to group fields within a form. Setting **Order** controls the order of fields within Categories, and the order of Categories on the form: the Category that contains the field with the lowest Order will be displayed first. Within the Category, the field with the lowest Order will be displayed first. (You can also set form Field Order on the form as a whole — see above.)

Untick **Show Caption** if you want this field to appear *without* a caption next to it on forms.

Set **Columns** to control how wide this field appears on a form: if this is a two-column-wide form, setting this field’s Columns to 1 will cause the field plus caption to fill 50% of the width of the form; setting it to 2 will cause it to fill the full width. Forms default to two columns wide, unless you specify otherwise in a Category — edit the Category (click on the  button, then click **Edit**) and set its Columns. While editing the Category you can also set an image or descriptive text to appear at the top of this category. This might be instructions on how to fill in the form, details of how calculations on the form are worked out, etc.

Form Caption allows you to have a title on the form next to the field that is different from the field's underlying name.

Report

Visible controls whether this field will be shown when the table is exported in a report template.

IC-Inspector


Visible means this field will be shown in IC-Inspector. If you set an event field to visible, it will be available to inspectors to fill in. If you set an asset information field to visible, it will be displayed to inspectors above any forms they may be filling out. Use this sparingly: a long list of visible asset information fields will fill the inspector's screen and force them to scroll to reach the form they are trying to fill out.

Order and **Caption** work analogously to those in Grid and Form.

General

Editor Type controls what type of editor the user will see when they edit the value in this field.

If you set **Blank Text**, the text you set will be displayed greyed out whenever the field is empty. (You can see several fields with Blank Text set right here on the Field Layout tab.)

Hint: As you add (or edit) fields, you can see a preview at the lower right of the dialog, showing how the fields will appear on either a form or a grid. Fields that are selected will be shown with a  exclamation mark next to them in the form preview. If the field is a lookup list, you can drop down the lookup list to see its values. (You can also see and edit a lookup list's values when choosing the lookup list: on the "Select Lookup List" dialog, click **Edit**, click **Items**.)

Edit

To edit a field, click **Edit**. That will bring up the 'Edit Field Definition' dialog. (This is the same as Add Field Definition, but has more tabs. This is because a variety of field settings are only available after a field has been created.)

If your field is of type Calculation, there will be a Function tab. This tab will allow you to choose a function for this calculation, and will also allow you to choose parameters for the function. You can either set "Parameters (Inputs)" or "Parameters (Values)" for each parameter. "Parameters (Inputs)" lets you choose some other field as the input for that parameter; "Parameters (Values)" lets you assign a constant. These are mutually exclusive — you can only fill one or the other for each parameter.

Workflow Rules

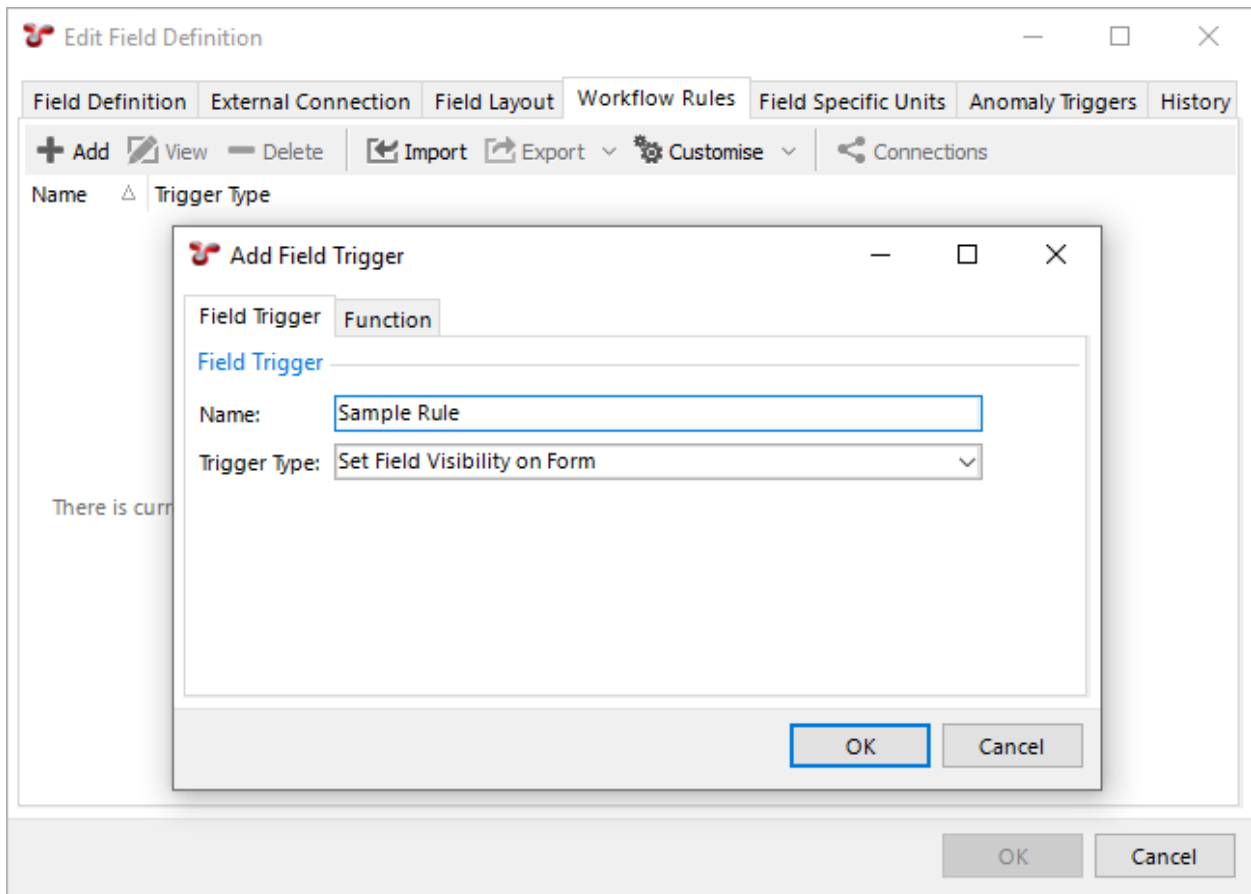
Sometimes you want a field's properties to be controlled by other data. If you want, for example, a field to be visible only when some other field is filled in (or vice versa), edit the field and go to the Workflow Rules tab. Click **Add**, and under Trigger Type choose "Set Field Visibility on Form". Then add a function, and parameters for that function. The function should return a Yes/No value. When it returns Yes, the field will be visible, when No, the field will be invisible. Similarly you can use Workflow Rules to set a field as read-only, or to mark a field as required. The remaining trigger type, "Clear Field Value on Form", can be used to automatically empty out a field's value when

some condition is met — for example, it can be used to make two fields mutually exclusive, so that users can fill in one field or the other, but not both.

There are a set of system functions that you can use that mean you don't need to create custom functions:

- Compare - Is Null
- Compare - Is Not Null
- Compare A = B
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Note that workflow rules are run when forms are viewed interactively, but are not applied during *imports*. If you have ticked the “Required” box on the Field Definition page, this *will* be enforced during imports — rows that are missing required fields will be rejected. But if a workflow rule makes a field required, this will *not* be enforced during imports.



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Auto-populate date/time or user name

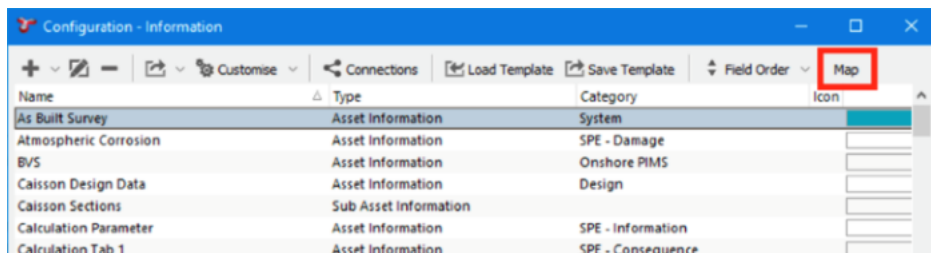
Similar to @autoinc, you can set a field to pre-populate with the date/time the record was created by setting its Default to @now. This works for any sub-event, AIG or sub-AIG field.

You can also set a field to pre-populate with the logged-in user’s name by setting its Default to @user. This works for any event, sub-event, AIG or sub-AIG field.

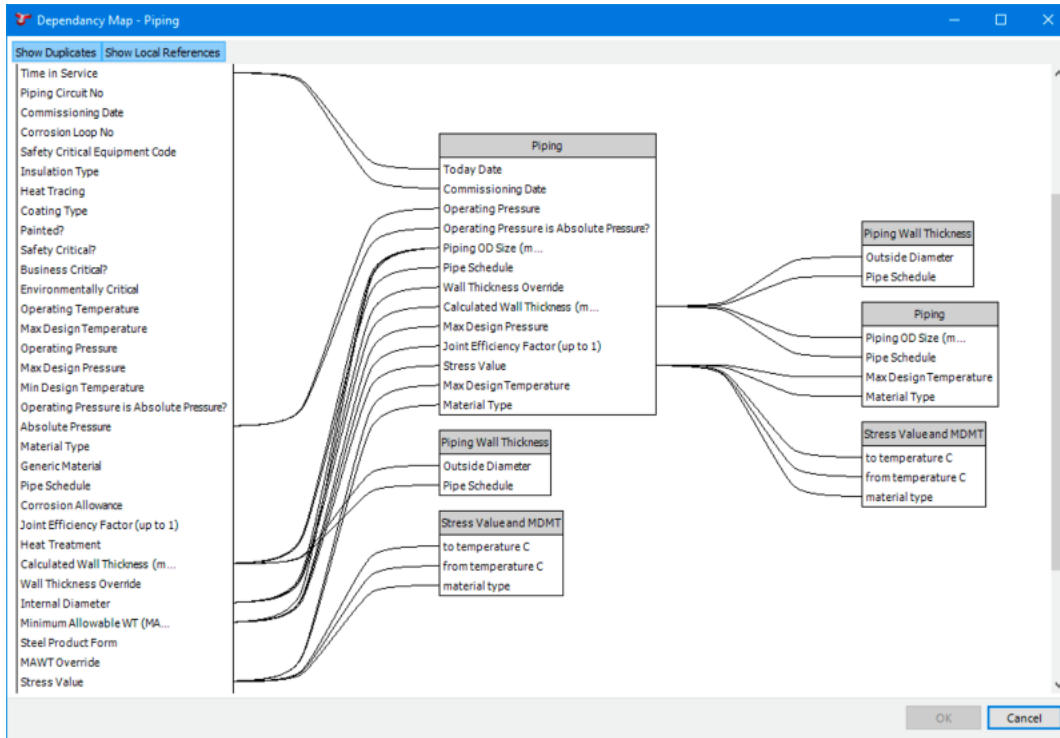
These default values are populated when the row is created. For an AIG, that’s when the asset is created. For an event it’s when the event is created. For a sub-event or sub-AIG it’s when the user clicks the ‘+’ to create the new sub-event or sub-AIG row.

Dependency Map

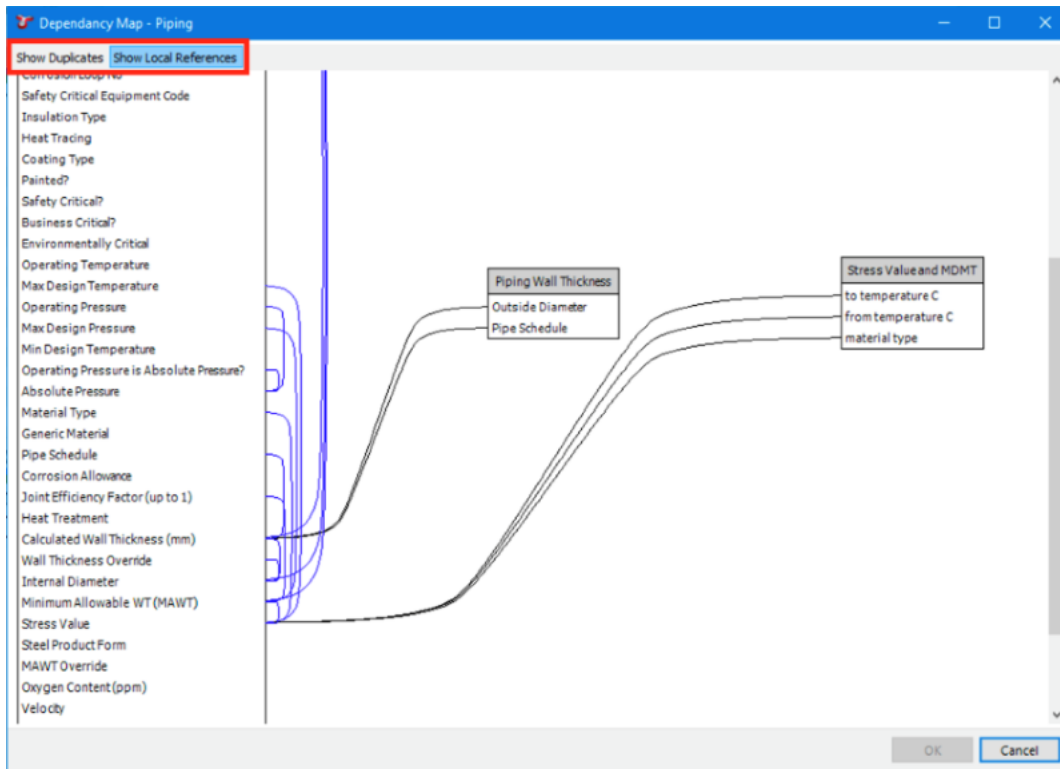
The dependency map is a visual representation of an Asset Information Group or Event Type’s dependencies. It can be found under **Configuration > Assets > Information**, or **Configuration > Events > Event Types**, selecting an item from the list and choosing **Map** in the toolbar.



The map is represented as a series of interlinked fields grouped in columns, each column representing the Asset Information Group (or Event Type) to which the fields belong. The map is hierarchically arranged from left to right, with the target Asset Information Group (or Event Type) located on the left-most column, and its dependencies and sub-dependencies located to the right.



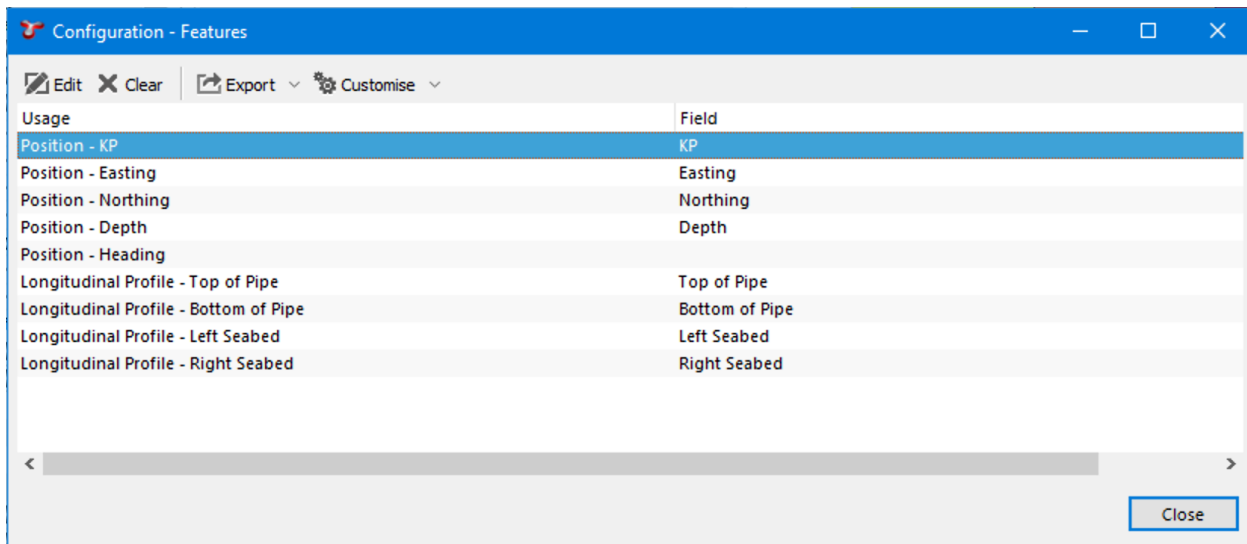
The above dependency map shows a link between Absolute Pressure in the Piping Asset Information Group, and Operating Pressure also in Piping. Looking into the field definition of Absolute Pressure, the function uses the Operating Pressure field from Piping (itself). Displaying self-referential dependencies such as these can be switched off by toggling the **Show Local References** button in the map toolbar. Toggling **Show Duplicates** off will show fields only once, so any self-referential dependencies will be displayed as a closed loop on a single column.



Features

Here you can set which field is the source for various position information, used by the Pipeline View. Usually, you will select Survey fields for the position fields.

- **Position - KP:** Feature used to populate the Start - KP and End - KP fields on the inspection screen, and used in KP-based charts and pipeline charts.
- **Position - Easting:** Feature used to populate Position - Easting field on the inspection screen, and used in the pipeline view chart.
- **Position - Northing:** Feature used to populate Position - Northing field on the inspection screen, and used in the pipeline view chart.
- **Position - Depth:** Feature used to populate Position - Depth field on the inspection screen, and used in the pipeline view chart.
- **Position - Heading:** Feature used to populate Position - Heading field on the inspection screen, and used in the pipeline view chart.
- **Longitudinal Profile - Top of Pipe:** Feature used in the profile chart.
- **Longitudinal Profile - Bottom of Pipe:** Feature used in the profile chart.
- **Longitudinal Profile - Left Seabed:** Feature used in the profile chart.
- **Longitudinal Profile - Right Seabed:** Feature used in the profile chart.



Mutually Exclusive Events

Configuration → *Events* → *Mutually Exclusive Events* allows you to tell NEXUS about groups of events that should not be allowed to run at the same time.

An example would be a Span event and a Burial event: where a pipeline is buried, it cannot be in a span; where a pipeline is in span, it cannot be buried. To represent this, you could create a Mutually Exclusive Group called Span/Burial, and within that group add two event types: Span, and Burial.

This means that when you launch a Span event in IC-Inspection, if there is a Burial event running it will be saved. Similarly if you launch a Burial event while a Span event is open, the Span will be saved.

ROVs

Here you can add/edit/delete ROVs.

ROVs are useful for simultaneous operations in IC-Inspection: whenever you have (or might have) two ROVs in the water at once (or more generally two separate sources of video at once, even if one or more of those sources is not actually a ROV), you should add a ROV for each source. (A single multi-channel source, such as several cameras on one ROV should be represented by just one ROV.)

Each ROV can be associated with one or more *Survey Sets*, which are in turn associated with events.

Then, when NEXUS IC plays back *video* for review, it can play the correct channel(s) of video for that event. Similarly the Pipeline View chart can show correct data.

Survey Sets

Here you can add/edit/delete Survey Sets.

Survey sets are useful for grouping data from a particular inspection. You might have a survey set called “2018 Inspection Campaign”, or you might have a survey set called “Pipeline A 2018 Inspection”.

For each survey set you can select a *ROV*, where appropriate. You should do this if the survey data was captured with a particular ROV/pig/diver/etc., particularly if there were dual operations, with more than one ROV or diver recording survey and/or video simultaneously.

You can *Import* data into Survey Sets from here. Click the **Import** button, then click **Example** to get an example import sheet. Note that for large quantities of data, a text import file (tab-separated value or comma-separated value) is likely to be faster than an Excel import file.

Events get their survey data from a particular survey set based on the event’s date/time — that date/time is looked up in the survey data, and the corresponding survey values (Easting, Northing, depth, etc.) for that date/time are displayed. The threshold for survey matching is +3/-2 seconds: if there is survey data up to 2 seconds before, or up to 3 seconds after the event’s date/time, NEXUS will match that event to the closest survey data point. Thus, if you are importing survey data into NEXUS from an external file (e.g. a track reposition file supplied by a surveyor), you should ensure that the file has data at least once every 4 seconds — that way there will definitely be a suitable data point to match to any event. It’s OK to have gaps in a survey set import, provided there are no events you care about in the time span covered by the gap.

Note: In a single survey set, a single point in time can only have one set of survey values associated with it. If you need two events at the exact same time with different survey values, ensure that they are in different survey sets.

In the bottom part of the dialog, if you click on a day, you will see survey data logged on that day. The grid listing each survey row is linked to the chart: if you click on a survey point in one, it will be highlighted in the other. You can multi-select, too. You can click the **Add** button to add a single survey row, **Edit** to edit the selected row(s), or **Delete** to delete them. Note that any events which were relying on those rows may now not have valid survey data — if there is another row within the +3/-2 second threshold the event will use that instead, but if not, the event may now simply have no Easting, Northing, etc. There is no confirmation dialog or Connections button.

Configuration - Survey Sets

+ Add Edit Delete Import Export Customise Connections

Name ROV Comments

2012 CIPS/DCVG_Gas Transmission

2018 - ILI - WG_GT36@ZONE1

Raw Survey Data

Date	Number of Entries
1/04/2015	16
2/04/2015	286
3/04/2015	582
4/04/2015	823
5/04/2015	762
6/04/2015	391
7/04/2015	597
8/04/2015	1
9/04/2015	1
26/04/2015	1
27/04/2015	1
28/04/2015	1
29/04/2015	1
30/04/2015	1
1/05/2015	2
2/05/2015	1
3/05/2015	1
4/05/2015	1
5/05/2015	1
6/05/2015	1
7/05/2015	1
8/05/2015	1
9/05/2015	1
10/05/2015	1

Clock	KP (km)	Easting	Northing
6/04/2015 4:24:57 PM	133.0067	389798.35	6279532.08
6/04/2015 4:31:25 PM	132.8017	389816.25	6279736.19
6/04/2015 4:36:06 PM	132.677	389823.58	6279860.9
6/04/2015 4:42:55 PM	132.4824	389833.81	6280054.55
6/04/2015 4:43:38 PM	132.4599	389834.32	6280077.12

Close

Event Types: forms to log inspection data,
Features,
Mutually Exclusive Events,
ROVs,
Survey Sets.

12.3.5 Anomalies

Configuration → Anomalies

The various *Configuration → Anomalies* menu items allow you to create, edit and delete Checklists, anomaly and finding Codes, anomaly and finding Code Categories, anomaly Priorities, anomaly Sets, anomaly Severities, and anomaly Statuses.

Checklists

You can tie checklists to Findings, such that when an inspector raises a finding, they are reminded to carry out the items on the checklist.

Codes

Findings and Anomalies can be given a Code, describing their type.

Code Categories

Are used to group Codes. If your database contains different kinds of data, for example some below-water and some above-water data, you might like to create one Code Category for “Above water” and another for “Below water”.

Priorities

Anomalies can be given a Priority.

Sets

Anomalies can be grouped in Sets.

Severities

Anomalies and Findings can be given a Severity.

When you set up *Anomaly Triggers* on fields, you can specify a Severity. You can set several triggers on a single field, with a variety of different severities. If that anomaly trigger is violated on an event field, a finding of that code and severity will automatically be created. Severities let you equate dissimilar problems: you can decide that a problem in one field is of the same severity as a problem in a different field.

Status

Anomalies can be given a Status. This intended to convey the current situation with the anomaly: “Rectified - Closed”, “Not Anomalous - Closed”, “Monitor”, “Temporary Repair”, etc.

Action Status

Anomaly Actions can be given a Status. This intended to convey the current situation with the action. The default action statuses are Approved, Assigned, Completed, Proposed, and Rejected; but you can customise these to meet your needs.

Action Types

Anomaly Actions can be given a Type. This lets you specify an *event type* to be associated with an Action Type. When a Task is created from an Anomaly Action, then the Event Type of the Task is determined by the Event Type associated with the Action Type.

Checklists,
Codes,
Code Categories,
Priorities,
Sets,
Severities,
Status,
Action Status,
Action Types.

12.3.6 Reports and Dashboards

Report Categories

Configuration → *Reports and Dashboards* → *Categories* allows you to create, edit and delete report categories. Categories are a way of grouping report templates.

(see *Report Templates*).

Report Statuses

Configuration → *Reports and Dashboards* → *Statuses* allows you to create, edit and delete report statuses. Statuses are a way of marking reports as e.g. “Work in Progress”, “Final”, etc.

(see *Report Templates*).

Report Templates

Sources

Simple Source

You can edit the Simple Source by double-clicking it. You can choose a table for this Simple Source. The table you choose will obviously depend on the data you want to show: if you want to display GVI event data, you would choose your GVI event table. If you want to display data about events overall, you would choose the Event table. And so on.



Fields



The second tab on the Simple Source dialog is **Fields**. This shows you all the fields in the source you’ve selected, plus any extra columns you may have added. The **Show Local Columns** button controls whether fields in this source are selected.

Filters

The third tab is **Filters**. Here you can control which rows are returned from the table. If Parameter is set to None, you will be able to immediately choose a value.

If this is a string or a numeric or a whole number field, you can simply type a value in.

Some fields are keys to other tables. For example, in the Event table, Asset, Event Type, Survey Set, and Workpack are keys to other tables. If your filter field is a key to another table, you will be given a  button to allow you to pick a value. For example, if your source table is Event, and your filter is on Workpack, clicking the  button will bring up a list of workpacks to pick from. If your Comparison is '=' (equals), you can pick just one item; if your comparison is 'in', you can pick several items by checking the checkboxes next to each desired item.

If the field you want to filter on is in this table, click the  arrow to choose it from the list. If it's not, you can click the  button to pick the field you want from any table. NEXUS IC will figure out a path connecting the Table you selected to the field you have selected. If there is only one such path, NEXUS IC will choose correctly; if there are multiple paths, you may experience unintended behaviour.

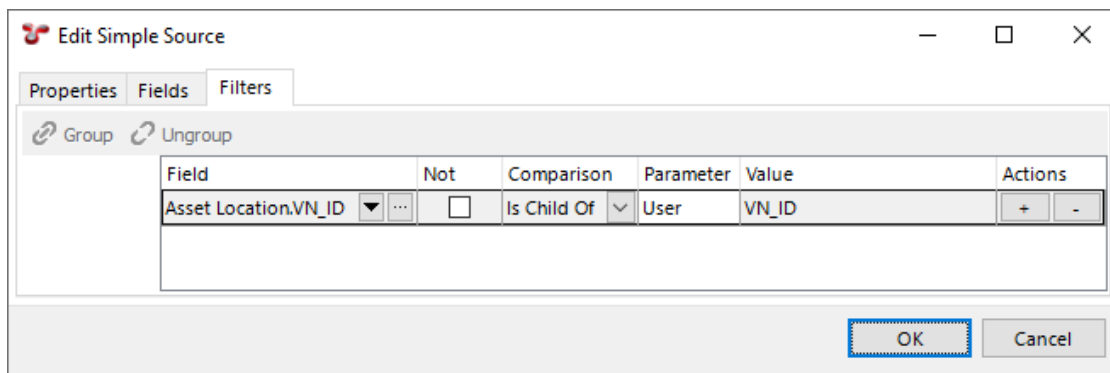
'like' is only applicable to string comparisons: use '%' (percent) to match several unknown characters, and '_' (underscore) to match a single unknown character. For example, Name like _VI would match 'GVI' and 'CVI'; Name like 'PL %' would match 'PL Anode', 'PL Damage', etc.

'<', '>', '<=' and '>=' are only meaningful for numeric and whole number types — their behaviour on key fields are undefined.

If you would like to test whether a key is null, just use '=' as the comparison, and leave the value blank.

If Parameter is set to User, then when the user runs the report, they will be asked for a choice. The equals/in rule described above still applies: if you choose '=' for your Comparison, the user will be able to choose one item; if you choose 'in', the user will be able to choose several items.

Asset selection is a special case: here, the correct field to choose is 'Asset Location.VN_ID', and 'Is Child Of' is added to the Comparison list. An illustration of how to configure a filter to let the user choose a single asset, and have the query report on that asset and its children is shown here:



If you wanted to report on *just* that asset, you would use '=' as the Comparison, instead of 'Is Child Of'. If you wanted to let the user select several assets, you would use 'in' as the Comparison.

Other special cases exist for reports run from the Reports menu button on each screen in NEXUS IC:

Screen	Parameter
Assets	View_Node
Library	Library
Planning	View_Node
Workpacks	Workpack
Inspection	Header / Finding (depending on what is visible)
Anomaly	Anomaly

If you use one of these special parameters, then when a user runs your report template from the appropriate screen, the currently selected item will be pre-populated into the parameter in the report generation wizard. For example, if you set up a report template with an Anomaly parameter, then when the user runs your template from the Anomaly screen, the currently selected Anomaly will be automatically selected in the report wizard.

The Parameter choice of ‘Group’ only has meaning if this Simple Source is inside an Element Group (available from the Available Elements list at the left of the Report Template dialog). If you choose ‘Group’, then this filter will pick its value from the Simple Source used for the Element Group.

Filters can be connected by “All” or “Any” connectors. If you have multiple filters, you’ll see a drop-down appear at the left. If you select All, then all these filter criteria must be met for data to be returned. If you select Any, then if any criterion is met, data will be returned. (All and Any are equivalent to SQL’s AND and OR.) You can construct more complex combinations by grouping rows: use the Shift and/or Ctrl keys on the keyboard and click filters to multi-select. Then click Group. The rows you selected will be joined together into a group with their own Any/All filter, and that group will be connected to other groups with a separate Any/All connector. By choosing your grouping and choosing Any/All as appropriate, you can construct any logical expression you desire. You can ungroup rows by selecting a row within a group and clicking Ungroup.

Union Source

A Union Source lets you join together results from several other Sources, much like SQL’s UNION ALL. In the Union Source, select the sources you’d like to pull data from. Only columns that are common to all selected sources will be passed through to any element that consumes the Union Source. So if you chose two tables, both of which had a Name column, your Union Source would have a Name column.

When configuring a Union Source, ensure that every source being unioned is named differently, otherwise when saving and loading a report template, the sources within the Union Source will not all be retained.

Distinct Source

Sometimes, you want just a subset of a table’s rows, showing each value (or combination of values) just once. (A common reason for this is as the source for an *Element Group*.) Suppose you wanted a list of Task Categories that were actually in use. (This might be different from the full list from the Task Category table.) Create a Simple Source and set its Table to Task. Then create a Distinct Source, set its Source to your simple source, and then select the Category column. Now this Distinct Source is a data source that you can use in an Element Group (or anywhere else) that will have one row for each value of Category found in the Task table.

(Another way of grouping rows is by using a *Pivot Table*.)

Parameter Source

If you want to use parameters chosen by the user in headings, text, etc., add a Parameter Source. (You don’t need one of these to use parameters in simple source *filters*.)

Note: A source without a parent source or table will be displayed with a question mark indicator over its icon. This is an easy way to identify sources that have not been set up or are no longer in use.

Elements

Element Group

Element Groups are used to repeat data for a series of records or to group sections of a report. For example, to tabulate anomalies for a series of workpacks. You can also use the **Conditions** in an Element Group to make the group and all its contents only appear if the conditions are matched.

If you're using this Element Group to repeat data, or if you wish to specify Conditions for it, you'll need to select a Source for it. (It must be a Source *outside* the Element Group.)


If you check the **Repeat Elements** box, all the report elements within this element group will be run once for each row in the source.

The Element Group plays nicely with the **Copy An Element** button on the *Report Template dialog toolbar* — if you suspect you might later wish to copy a group of elements to another spot in this report template or into another report template, put them in an Element Group as you create them, for easy copying later.

Tip

If you check the **Allow user to exclude group** attribute of the Element Group, then when the report is being generated, the user will have the option to exclude the output contained within this group to the report.

For example, you may set up an Element Group which outputs all Isometrics for an asset. This typically takes some time to export, so the user can, if they wish choose NOT to export the Isometrics.

Ticking **Repeat Elements** will also cause the **Action** drop-down to appear. You can select 'All Rows', 'Only rows that match conditions', 'Only rows that don't match conditions', or 'Only when there are no rows'. If you select either of the 'conditions' options, the **Conditions** box will appear. Click its  button to add, edit or delete conditions. Conditions can be on a field in the source, or on the number of rows in the source, or the index of the row, and can compare (=, <, >, <=, >=, <>, contains) to a constant value.

If you configure Sort Column and Sort Order, then when there are multiple values for a group, those values will come out in the order specified. If your source is Workpack, you are sorting on Workpack.Name, and you have workpacks "2017 Inspection", "2018 Inspection" and "2019 Inspection", then they will come out in that order in your report regardless of the order they might have in the underlying database table. If you have ticked **Repeat Elements**, the repeats will be in the specified sort order; if not, but the field is consumed e.g. in a Paragraph or Heading element, then the field's multiple values will all appear at that point in the Paragraph or Heading in the order specified here in the Element Group. (If the field has a single value, sort order is of course irrelevant.)

You can drop elements, including Simple Sources, into the Element Group. In the Filters tab of a Simple Source within an Element Group you can choose a Parameter of Group. This will compare the field you have selected to the value in the current row of the Element Group's Source.

Text (Paragraph)

Text entered into the Content field will be displayed as text in the report output. Use the right-click menu to insert System Fields, Database Fields, Parameters, or set the style of the paragraph text (the **Body style** will be applied by

default).

Comments

This element has no effect on the output report. It is intended for use by report designers to document the report template itself.

Section Heading

This element lets you set up headings in your report. Right-click within the **Content** box to get a list of *styles* and fields, or simply type text. Check the **Include in Table of Contents** checkbox to have this section heading appear in the Table of Contents.

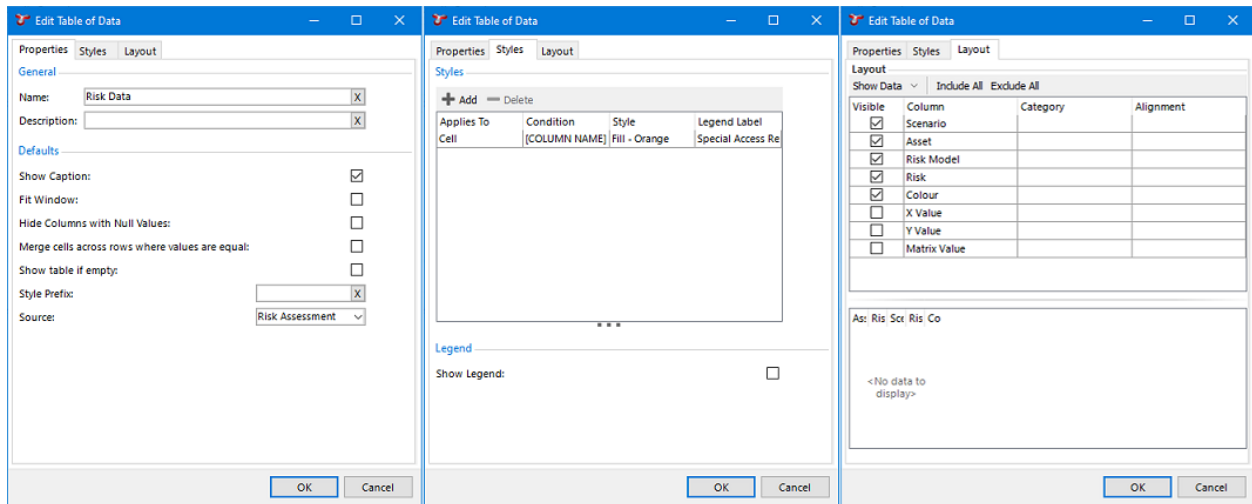
Section Headings are not supported in *Dashboard* reports — use a Text (Paragraph) element instead.

Table of Data

You can edit the Table of Data by double-clicking it, and choose a Source. If you only have one Source in the report template, only one item will be shown on the drop-down list.

If you click OK after selecting a Source, you will see a ‘+’ next to the Table of Data. This shows the Simple Source you have attached to the table. This is really the same object as the Simple Source shown elsewhere in the tree — making changes on one will make changes on the other. If the Simple Source is connected to several tables, *Drawing Details*, *Chart Templates*, or *Risk Charts*, making changes to any one will make changes to all.

Hint: Once you have set up a Table of Data, and have connected it to a Simple Source which in turn has a database Table selected, you have a basic report which can be generated to RTF, HTML, or Excel.



If you give the Table of Data a Name, and check the **Show Caption** checkbox, the table’s name will be shown above the table in the generated report.

If you check the **Fit Window** box, NEXUS will constrain the width of the generated table to the width of the page (in RTF) or the browser window (in HTML). If you uncheck this box, the table should be as narrow or as wide as is needed to display the data. Please note that Microsoft Word’s RTF reader does not respect this setting well. To get

Word to respect the setting, it is necessary to encourage it, for example by clicking **Save As** in Word and choosing .docx as the save format.

If you check **Hide columns with Null Values**, then any column which is entirely empty will be omitted from the output report.

If you check **Merge cells across rows where values are equal**, the report output will minimise repetition of information by merging any adjacent matching cells in the table. Leaving it unchecked will leave adjacent matching cells unmerged.

If you check **Show table if empty**, tables which are empty will show their column names without data in the columns. If left unchecked, empty tables will be entirely omitted from the report.

Style Prefix lets you set a *Style Prefix*.

Layout

The top half of this pane lists all the columns. Tick or untick to make columns visible or invisible. If you place several columns in the same Category, they will be grouped together. Any Category headers will also be visible in the generated report.

If the **Show Data** button is set to **All Data**, NEXUS will display data from the table specified in this table's source, complete with any extra columns you may have added. This can give context and make it easier to understand what the final generated table will look like.

Caution: If the table contains many rows, this may take up to 5 seconds. After this time, NEXUS will stop fetching additional rows, and will display only the rows that it has fetched.

Column ordering

Click on the **Layout** tabbed page in the **Table of Data** dialog to choose which columns you want to appear in your table. Drag and drop the column heading to re-order them in your table.

Click on one or more column headings to sort by that column. Shift-click a column to add it; ctrl-click a column to subtract it from the set of columns we'll sort on. Click (or shift-click) a column a second time to change sort direction.

You can change the width of columns by hovering the mouse over the right edge of the column header, and then either double-clicking or by clicking and dragging the column to a new width. This will change the column widths in the generated report.

Styles

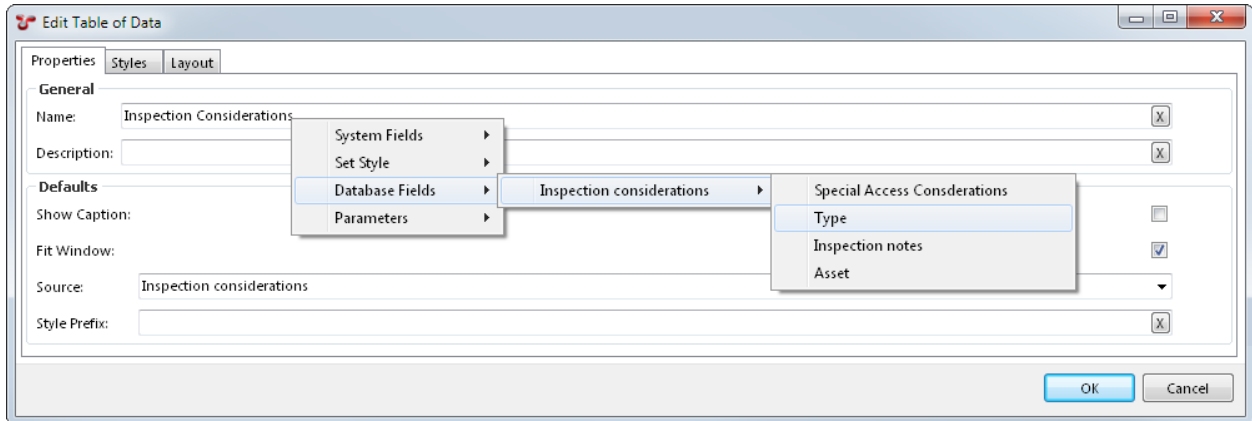
The Styles tab can be used to highlight table cells or rows, use particular fonts, sizes or colours, change spacing, and to change the lines used to draw the table. You can choose a style here to be used when particular conditions are matched.

A style can be applied to a row or to a cell — if you want it to apply to a cell, be sure to set your Condition to include “[COLUMN NAME] equals” in addition to the value you actually want to filter on, in order to restrict the filter to just that cell.

To add/edit/delete styles themselves, drop back out to the Configuration - Templates dialog and click the *Styles* button.

Title Fields

If you right-click in the **Name** field, you will get a pop-up menu similar to the one available in Text or Section Heading elements. You can choose fields from this menu and (assuming that the **Show Caption** box is ticked) these fields will be built into the title of the table in the rendered report. This is particularly useful if the table is inside an *Element Group* with **Repeat Elements** ticked — you can put the value for this particular repeat into the table name. This right-click also works for Vertical Table, Pivot Table, Risk Chart, and Chart **Name** fields.



Vertical Table

The Vertical Table element is like the Table of Data element, but rotated 90 degrees: what would be a column in one is a row in the other. ‘Column headers’ are in the left-most column.

Show Caption, when checked will output the Name of the Vertical Table directly above the Vertical Table.


When output to RTF, **Fit Window** will make the Vertical Table stretch from the left page margin to the right page margin.

If you check **Hide columns with Null Values**, then any output row which is entirely empty will be omitted from the output report.

Style Prefix lets you set a *Style Prefix*. The **Styles** tab lets you set conditional *Styles* for this table.

You can choose how wide the header Column is by setting a **Header Width (%)** value.

Entering 2 or more **Number of Header Columns** arranges the output fields in a form-like layout. This is most commonly used when you are outputting the details of single record. Example shown here:



TAG RISK AND INTEGRITY REPORT

ASSET PROPERTIES			
Commissioning Date	10/08/2013	Design Life (years)	20
Time in Service (Years) (Rounded)	4.05	Corrosion Loop No	PP-PG-CL01
Insulation Type	None	Internal Lining	None
Heat Tracing	None	Coating Type	
Painted?	Yes		

Pivot Table

Pivot tables are conceptually similar to pivot tables in Excel. (If you aren't familiar with those, you may wish to Google for a tutorial.) They aggregate data from many rows of a data source into just a few rows, according to the rules you set up.

As always, you'll need to start by selecting a **Source** for your pivot table element. Then choose one or more **Rows**. For example, if you wanted to see how many tasks were in each workpack, you would set up a Simple Source on the Task table, and in your pivot table you would choose Workpack as the Row field to pivot on. (If you wanted that broken up by task completion, you would choose Workpack and Is Completed as Rows — the table would then contain two rows for each workpack that had both complete and incomplete tasks.) Under **Values**, click **Add**, and select criteria. If you wanted a simple count of tasks, you would choose Task_ID as the Field, Count as the Aggregate, and choose a Name like 'Number of Tasks'. That completes the minimum for a Pivot table element: a Source, a Row Field, and a Values entry.

You can do much more with pivot tables, though: you can have several different Values entries. For example, you might add a second Values entry on Approx Timing, with an Aggregate of Sum, and a name like 'Total Time Estimate'. Each additional Values entry will result in an extra column in the output table.

You can separately choose the Aggregate (Total), which is the value shown under Column Totals or Row Totals (if selected). Often you want the same aggregate for cells within the table and for end-of-row or end-of-column values (for example, for a Value where you've chosen Average, you might want Totals to also be Average, giving a grand mean), but sometimes you want the Total value to have a different aggregate from cells within the table proper.

You can also add entries under **Columns**. If you added, say, Category, under Columns, and your tasks were assigned to different categories, then your output would have one column per category for whatever your Values entry specified. If you add items under both Columns and Values, then it works multiplicatively: if your Tasks fell into five different Categories and you had two different Values, you'd get 10 columns of numbers out. For each Column you select you will get a common table "band" header, and within each band you'll get columns for each Value.

You can also have a more complex source: for example, if you only wanted to see incomplete tasks, you would put a filter in your Simple Source for Is Completed not equal to true. If you wanted to use a single Simple Source to show both *all* tasks and *all completed* tasks, then instead of filtering the Simple Source, you would add an extra *field* to it, with a function that returns 1 if the task is complete and 0 if it is not. Then you would add a Values row to Sum that function.

Under **Values**, you can choose the *Sort Order* by which to sort the aggregate values. This will order the rows of the table by either Ascending or Descending order and will only order by the first column of aggregate values.

There are checkboxes near the top of the Pivot Table element. **Show Caption** does the same thing as for a Table Of Data: it shows the Name as a caption above the table.

Show Column Totals adds an extra row at the bottom of the table showing the aggregate of values in each column. **Show Row Totals** works similarly except that it adds an extra column, with the aggregate of each row. If you have several Values, it will add several columns, one showing the aggregate of each.

Show Zero Values, by default is checked. If unchecked, will replace any values that would have shown “0” with a blank. This makes it easy to spot data in a sparsely populated grid.

Show Rows with all Zero/Blank values, by default is checked. If unchecked, rows which contain all “0” or blanks are not shown. This limits the pivot table to only rows which have aggregate data.

Show Dash instead of “NaN” by default is checked. If unchecked, then “NaN” (Not a Number) will be output as “NaN”.

Fit Window does the same as for a Table Of Data: it will attempt to make the table as wide as the browser window or Word page.

Style Prefix lets you set a *Style Prefix*.

The **Styles** tab lets you set conditional *Styles* for this table. In your Conditions, set Field to [Column Name], Comparison to Contains, and Value to the column name. This is because as far as the pivot table is concerned, it’s not using the underlying data source column — it’s using a new pivot table column with a similar name.

Chart Template

Choose a **Source**. Choose a *Chart Template* which you have already configured. Only Chart Templates relevant to your Source will be available for selection.

For charts with legends: if the legend can appear in a single row at the bottom of the chart, it will. Otherwise, it will attempt to appear at the right-hand side of the chart. But in this case it will only appear if it will take less than a third of the available width. So if you set a relatively narrow chart width (less than 400 or so, depending on the length of text in the legend items), the legend may not appear.

Risk Chart

Choose a Source. Typically, your source for this element will use Risk Assessment as its Table. If you click Show Count, your final risk chart will have a number in each square that has risk results, showing how many risk results are in that square. If not, it will merely have a dot in each square with one or more risk results.

You can also use the Anomaly table as the Source for a Risk Chart. Each anomaly’s Risk Score is used to place it on the diagram. Note that anomalies do not have a Likelihood or Consequence to give them an X/Y position on the diagram — they only have a Risk Score. So if your diagram has several squares with the same Risk Score (as is usually the case), your anomalies will be placed in the left-most such square. That is, risk-assessed assets are placed in a particular square, but anomalies are merely placed in a particular band.

To make this matrix work, you will need to configure *Database* → *Properties* → *Database* → *Anomaly Risk Chart*. You will also need to configure the “System - Anomaly - Risk Score” function.

Multimedia Thumbnails

Choose a Source. Typically, your source for this element will use Multimedia as its Table. Caption may be Name from the Multimedia table, or may be a function column that returns details about the event type and event number.

Repository Field should be Image from the Multimedia table.

The aspect ratio of the thumbnails will reflect the thumbnail dimensions you enter. In order to maintain the aspect ratio of images, only set one dimension, Width or Height, and leave the other dimension as 0 or blank.

Multimedia Thumbnails are not supported in *Dashboard* reports.

Drawing Details

Choose a Source. Typically, your source for this element will use Library as its Table. Caption Field is used for the text underneath the drawing, and may be Name from the Library table, or may be a function column.

Under layers, if you select “Display all layers” or “Display only layers that are associated with assets in asset source”, you can specify a Source, and then specify the fields within that Source to be used for the Asset (i.e. the Component_ID), the Name (such as Asset.Name, or any other field that will be meaningful to the person reading the report), and optionally the Colour.

Page Break

In RTF, in addition to forcing output onto a new page this element lets you set headers and footers for your document. You can select a number of **Columns** for this section of the report. Settings chosen here for Section Columns, Layout, Page Size and Header and Footer persist until the next Page Break element.

In Excel, this starts a new worksheet, with the Name of the page break used for the name of the worksheet. If you put a field in [square brackets] in the page break’s Name, the field will be substituted with its value in the usual way. This is particularly useful if the page break is inside an *Element Group* with **Repeat Elements** ticked — you can put the value for this particular repeat into the page break name.

In HTML, this has no effect.

Section Break

Similar to Page Break above, but will not force a new page and does not let you choose paper size and orientation.

Table of Contents

The Table of Contents element inserts a hyperlinked Table of Contents for the report. In HTML outputs, any section headings will appear with “Back to top” hyperlink.

Table of Contents elements are not supported in *Dashboard* reports.

Toolbar

- **Add, Edit, Delete:** *Add / Edit / Delete* Report Template(s).
- **Load Template** Loads a previously saved .report template. Note that if the previously saved report template still exists in this database, Load Template will overwrite that existing report template — it will not create a new copy of it. Similarly with any other elements saved in the template file: asset information fields, functions, etc.
- **Save Template** Saves this report template and related details to a .report file. NEXUS IC will find all items related to this report template (functions, asset information forms, event definitions, chart templates, lookup

tables, etc), and will present a dialog listing all the dependencies it's found, with a checkbox for each row. Untick any that you don't want saved with your report template.

- **Schedules** See *Schedules* below.
- **Generate** Click to launch the Export Report wizard, to generate your report to RTF, HTML or Excel format.
- **Asset Dashboard** Click this to set the selected report template as the *dashboard*. Only one report template can be set as the dashboard at any one time.
- **Customise** See *Customise* for full description of the Customise menu item.
- **Styles** See *Styles* below.

Schedules

If your database is hosted on a Wood cloud server, you will see the **Schedules** toolbar button. Here you can configure scheduled reports to automatically run periodically, sending the output to users via email. Click **Schedules** to bring up the Scheduled Reports dialog. In this dialog, click **Add** to add a new scheduled report. Add one or more Recipients as a comma-separated list.

Function The *Function* dialog allows you to select a function to determine the report generation's behaviour upon being called at the scheduled time. The function will return either a Yes or No as its result. If Yes, the report is generated and the job is marked as completed. If No, the Report is not generated, and the job is also marked as completed. The function must not have any parameters.

Include Date/Time in Filename To include the Date/Time in the report filename, check the *Include Date/Time in Filename* checkbox. To leave it out from the filename, leave it unchecked.

Example: without Date/Time: test.rtf

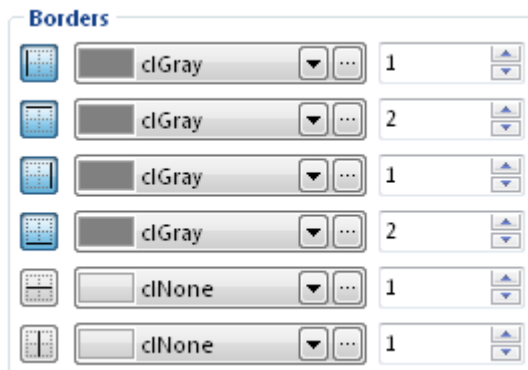
with Date/Time: 2020-10-02 1012 test.rtf

Styles

The Styles dialog lets you define the look and feel of the final report by pre-defining the fonts and colours for the various styles in the report.

To edit the Styles used in reports, click the **Styles** button. Choose the Style to edit from the list box in the left of the dialog and update the font, colours, spacing, alignment and font style.

When defining borders for styles, you must ensure that the border icon is in the "down" state (see below).



Many of these styles are applied automatically to report elements where appropriate. For example, “Table Heading” will get applied to headings in tables (including Category bands); “Table Event Rows” will get applied to even-numbered data rows in tables, etc.

For Pivot tables, the following styles will be automatically applied (if they exist):

- *Table Heading* for headings
- *Table Row Odd & Table Row Even* for odd & even rows
- *Number* for cells that contain numbers
- *Total* for total cells
- *Total Number* for total cells that contain numbers

Styles are applied to Report elements **additively**, meaning default styles are applied first, then overwritten where element styles are embedded in the content field.

Note: Excel reports will ignore many style settings, in favour of using Excel’s own style settings. Excel does not respect the Default Style, but does respect the embedded Style selection in the content.

Note: In an RTF report, if the NEXUS style name matches the name of a style used by default in Word or that appears in your .dotx Word template file, the generated text *will* appear in that Word style, so you can use Word’s styling tools to modify it once the report has been generated.


Note: The Orientation setting, for orientations other than Normal, is poorly supported by many web browsers. It is known to be supported correctly by Chrome and Safari. For RTF reports, Word will correctly draw the text in the Up or Down direction, but will incorrectly calculate the height and width of that text, and therefore you may find vertical text wrapped unpleasantly.

Style Prefix

Table of Data, *Vertical Table* and *Pivot Table* offer a Style Prefix. If you fill this in, the table’s style prefix will be added in front of any style name applied. So if you set a prefix of “Large”, then the table’s heading cells will be styled in “Large Table Heading” instead of just plain “Table Heading”, and so on. This lets you apply different styles to a table or tables. (There is no automatic fallback, so if you specify a style prefix, you should create an appropriate matching set of table styles with that prefix, including as many of “Table Caption”, “Table Heading”, “Table Even Rows”, “Table Odd Rows”, “Total”, “Number”, “Total Number” as you want formatted.)

Configuration → *Reports and Dashboards* → *Templates* allows you to create, edit and delete report templates. These templates can be used to generate reports throughout NEXUS IC.

Report templates (once configured), can be given a Status and a Category. Additional report categories can be configured (see *Report Categories*).

You can mark a particular report template as a Dashboard report: edit the template and tick the **Dashboard Report** box. That template will then be available when users visit the DASHBOARDS area. If you tick Dashboard Report, Section Heading, Multimedia Thumbnails and Table of Contents types will be marked with a  to indicate that these elements will not be displayed in a Dashboard template.

Similarly with Asset Dashboard: set a template as your Dashboard report by right-clicking it and choosing **Asset Dashboard** or by selecting it and clicking the **Asset Dashboard** button, and each time you visit an asset on the Assets screen with the Dashboard tab visible, your selected dashboard template will be executed. (You should ensure that the

template you use does not take long to execute — if it does, you will be waiting every time you change asset with the Dashboard tab visible.) (In order for a Dashboard report to reflect the selected asset in the asset hierarchy, it needs to have *Simple Source* in it which retrieves VN_ID from a User Input Parameter.)

General strategy

In your final report template, you want to present user-visible things like headings, text, tables, drawings, etc. To power these, you will need *Simple Sources* to query data from the database. To power any custom columns in the sources, you will need *functions*.

NEXUS IC's design lets you create these things in whatever order is convenient to you: you can create all your functions first, then your sources, then the user-visible elements; or you can rough out your report in an empty state by starting with the user-visible elements, and *then* go on to create the Simple Sources that underly them, and *then* create the functions needed for those sources. And it's usually easier to work in this latter way: create your report from the top down.

Add/Edit

To add a new report template, click **Add**. You'll have to give your new report a name, and we strongly recommend you give it a *category*.

To edit an existing one, select it and click **Edit**, or just double-click it.

In both cases, you'll be taken to the same dialog.

Report Template dialog

At the top of the dialog, you'll see Name, Status, Category and Comments.

At the left of the dialog, you'll see a view of available elements. This is broken into two parts: *Sources* contains the things you can get data from, and *Elements* contains all the things that you can display in the report. Most elements need a source to get data from. A single source can give data to more than one element.

At the right, you'll see the Report Layout tree showing all the elements currently in the report.

Take a look at some existing templates and you'll see how they're put together.

Often the simplest kind of report you'll want to design contains a single table, displaying data from a single source. To create a report like this, drag a **Simple Source** from 'Available Elements' at left onto the 'Report Layout' element at right, and drag a *Table of Data* (or a *Vertical Table* or a *Pivot Table*) from 'Available Elements' to 'Report Layout'. (In general, you can drag elements onto the root 'Report Layout' element, in which case they will appear at the bottom of your report; or drag them onto another element, in which case they will appear just above that element.)

Report Template dialog toolbar

(As distinct from the overall *Reports dialog toolbar*.)

- **Perform an operation** Perform the selected operation (Add, Edit, Delete, Move Up, Move Down, Copy, Paste) on the element currently selected in the Report Layout tree. Most of these operations are also available by right-clicking on an element in the tree.
- **Copy an element** You can copy an element from elsewhere in this report template, or from another report template, with this button. Note that "child" elements will be brought across too — if you Copy an *Element Group* which contains other elements, all those other elements will be copied in at the same time. Your

new element will have “Copy of” prepended to its name. Filter values may not be fully copied across, so check your Simple Sources’ *Filter* tabs after copying.

- **Parameters** Configure parameters for this report template. Parameters allow the user to specify values for the report. For example, you could add a parameter called Asset View, allowing the user to specify what asset view they would like the template to pull information from. The user can select parameter values each time they interactively run a report. Unlike most other NEXUS dialogs, the Parameters dialog does not have an **Add** button — to add a parameter, simply specify the name of the parameter you would like added in a simple source *filter*. Then come here to the Parameters dialog to adjust other values for your new parameter. *Dashboard* reports should not use parameters. *Asset Dashboard* reports should use a parameter which specifies the asset. NEXUS will automatically supply this value to the template based on the user’s selection in the *Asset tree* when the asset dashboard report is run.
- **Generate** You can generate output from your report template from right here without having to click **OK** and drop back out to the Reports dialog. Your report will be generated with the its previously selected parameter values.
- **Move Up** Move the element selected in the Report Layout tree up by one spot. You can also do this with Ctrl-Up arrow.
- **Move Down** Move the element selected in the Report Layout tree down by one spot. You can also do this with Ctrl-Down arrow.

You can also move items up and down by drag-dropping them within the Report Layout tree. You can also *reparent* items by drag-dropping them onto an *Element Group*.

Categories,

Statuses,

Templates: templates that users can run to generate reports as Word documents, HTML, or Excel.

12.3.7 Caution

Some areas of Configuration are relatively safe to explore. (Although before deleting anything we advise checking for *Connections*.)

But for *Chart Templates, Functions, Connections, Shortcuts, Asset Information, Sensors, Risk Charts, Risk Models,* and *Event Types:* here be dragons, and we advise caution. Before you experiment in these areas, we suggest that you take a database backup.

12.4 Help

- **Help** → **Help** This option will launch the on-line help files from <https://docs.nexusic.com>.
- **Help** → **About** The **About** dialog identifies the version and build number of NEXUS IC that you are currently running. This is important information when you are reporting issues or bugs to Wood. Click on the support@nexusic.com label to launch the default mail program and prepare an email for Wood’s support and bug tracking system.

The Database menu and Help menu are fairly similar between NEXUS IC and IC-Inspection. Other items above primarily describe NEXUS IC.

COMMON FEATURES

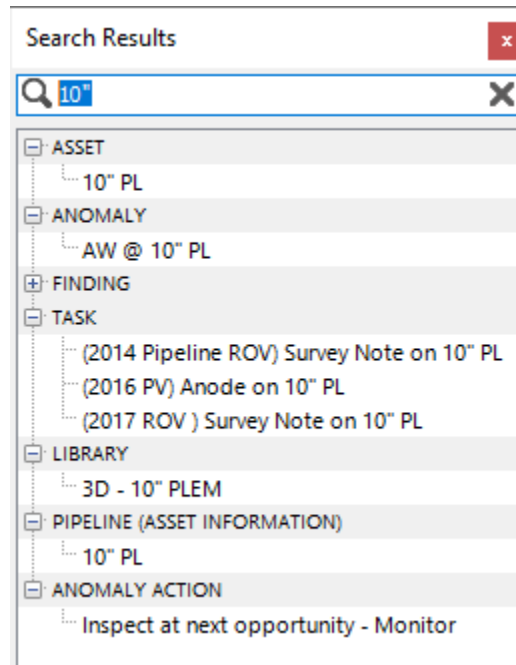
The below topics cover functionality which apply to the grids (and to the grids toolbar) which appear in many different places in NEXUS IC and IC-Inspection.

13.1 Search

At the top right of NEXUS IC's main window is the search box. Type text into this box and press Enter and the Search Results window will be displayed. (This window is non-modal, so you can keep it open and still work with NEXUS IC's main window. Some users like to drag the Search Results window to, say, the bottom left corner of their screen and leave it open until they close NEXUS IC.)

Within the Search Results window, results are broken into categories. Categories are shown in capital letters.

In the example below you can see many categories, including: Anomaly, Asset, Finding and Library.



Categories with many results (such as FINDING above) will initially appear rolled up; categories with only a few results will automatically be expanded.

You can double-click on any result that isn't a category, and NEXUS IC will take you to the appropriate place and give that item focus. For example, if you type part or all of an asset name and press Enter, then double-click the result, NEXUS IC will switch to the *ASSETS* screen and focus the asset in question.

For results which are not available on a main NEXUS IC screen but are available on a *Configuration* window, NEXUS IC will open that dialog window and give the appropriate item focus. If you'd like to go straight to editing the item instead of to its Configuration dialog, hold down the Control key on your keyboard as you double-click.

When NEXUS IC has opened a dialog window to show you a search result, these dialog windows *are* modal, so you won't be able to access the Search Results window until you close the dialog window.

Values in Asset Information forms will not be found by the Search feature — we don't search these because doing so is a little slow. Values in Risk tables may also not be shown.

Anomaly codes and numbers *can* be searched — if you have an anomaly with code AN and number 1, a search for "AN-1" *will* return this anomaly in the search results.

To carry out further searches, type fresh text into either the Search Results window or the Search box, and press Enter.

You can use '_' (underscore) as a wildcard to represent a single character.




13.1.1 Search Differences

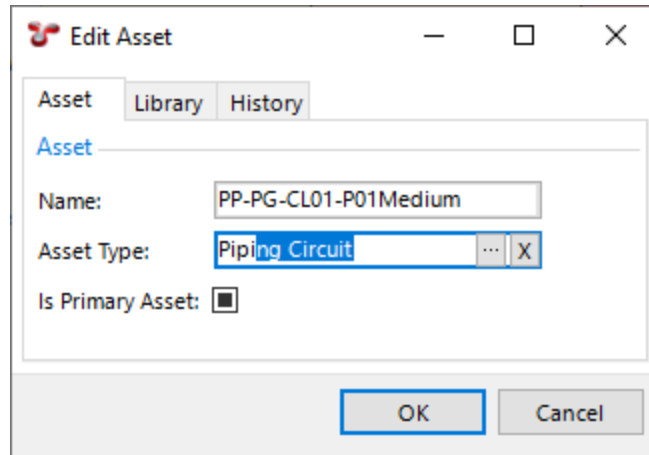
NEXUS IC performs a database-wide search, while IC-Inspection performs a search on a subset of the database. NEXUS IC has a Search box at the top right. IC-Web instead has a search box above the Asset tree, which searches only Asset names.

IC-Inspection searches the following items:

- Assets
- Asset Information
- Sub Asset Information
- Event Templates
- Event Template Groups
- Anomaly Triggers - Only asset based anomaly triggers.
- Tasks - Only if the Task Workpack matches the selected Active Workpack.
- Events - If the event is in the selected Active Workpack, the event will be shown in the 'Event Listing' frame. If the event is not in the selected Active Workpack, the event will be shown in the 'Historical Event Listing' frame.
- Library, ROV, Workpack and Survey Set - These results will open the editor window. There is no Library dock (showing all library items) in IC-Inspection.

13.1.2 Autocomplete

Most places you see a record lookup editor (a text box with a  ellipsis button and  clear button at the right) you can type the first few letters of the entry you want to match, and NEXUS will fill that value, without having to click  and pick a value from the picker dialog.



This method is most suitable when you are certain of the text of the value you want to pick, and where there are not many values with the same first few letters (“Anode 001”, “Anode 002”, etc). For other cases, Find As You Type, below, may be more suitable.

13.1.3 Find As You Type

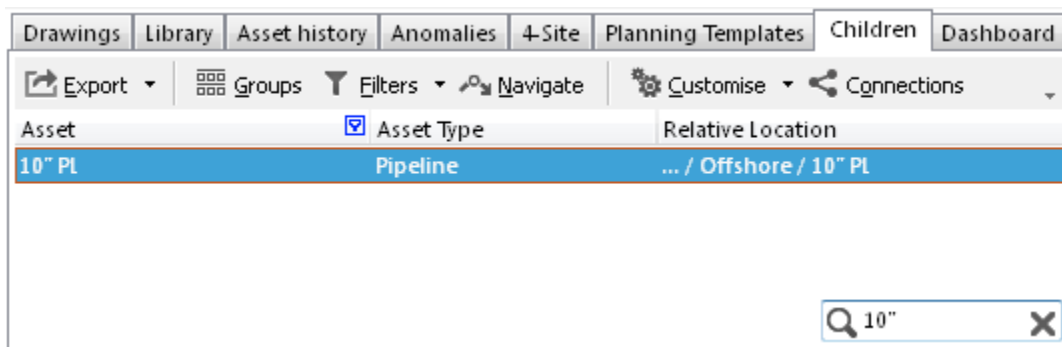
In most grids in NEXUS IC, if the grid has focus and you type on the keyboard, the grid will filter for the text you have typed. For example, if you type “Pipe” (without the quote marks), all rows in that grid that contain “Pipe” will be shown, and other rows will be temporarily hidden.

Find As You Type searches all text fields, which includes the Name column and any other text fields in the grid. It does *not* include any fields of type Lookup List. You can see which fields are included in the search: they have a blue arrow in their column header.

You can dismiss the Find As You Type search box by clicking the **X** at the right of the find box. You can also dismiss it by pressing the Escape key. (But note that if the Find As You Type box doesn’t have focus, and you’re in a dialog, pressing Escape cancels the whole dialog.) You can manually bring up the Find As You Type box by pressing Ctrl-F.

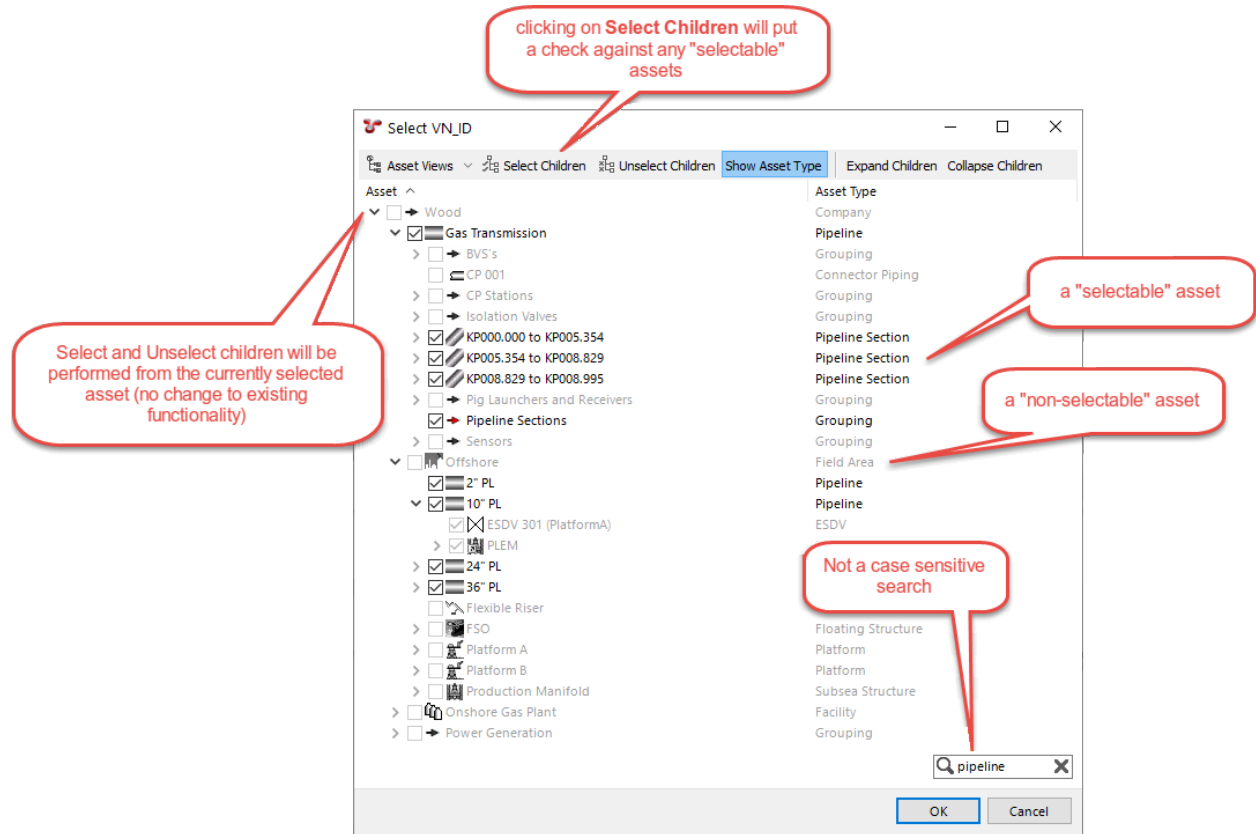
13.1.4 Asset Trees

If you want to use Find As You Type on assets, one way is to go to the *ASSETS* → *Children* tab.



You can also use Find As You Type anywhere an asset tree appears: on the *ASSETS* or *PLANNING* screen, on a picker that asks you to select assets, etc. When filtering a tree, unmatched rows will not disappear — instead, they will grey out. This is so that you can still expand nodes to reach child nodes that may be included in your filter. If the picker is asking you to select *multiple* assets (e.g. *Risk Copy Assessment*, *ANOMALIES Filter* → *Asset*, etc.), then any assets that are not matched in your filter will be unselected. If you click **Select Children**, only assets that match your

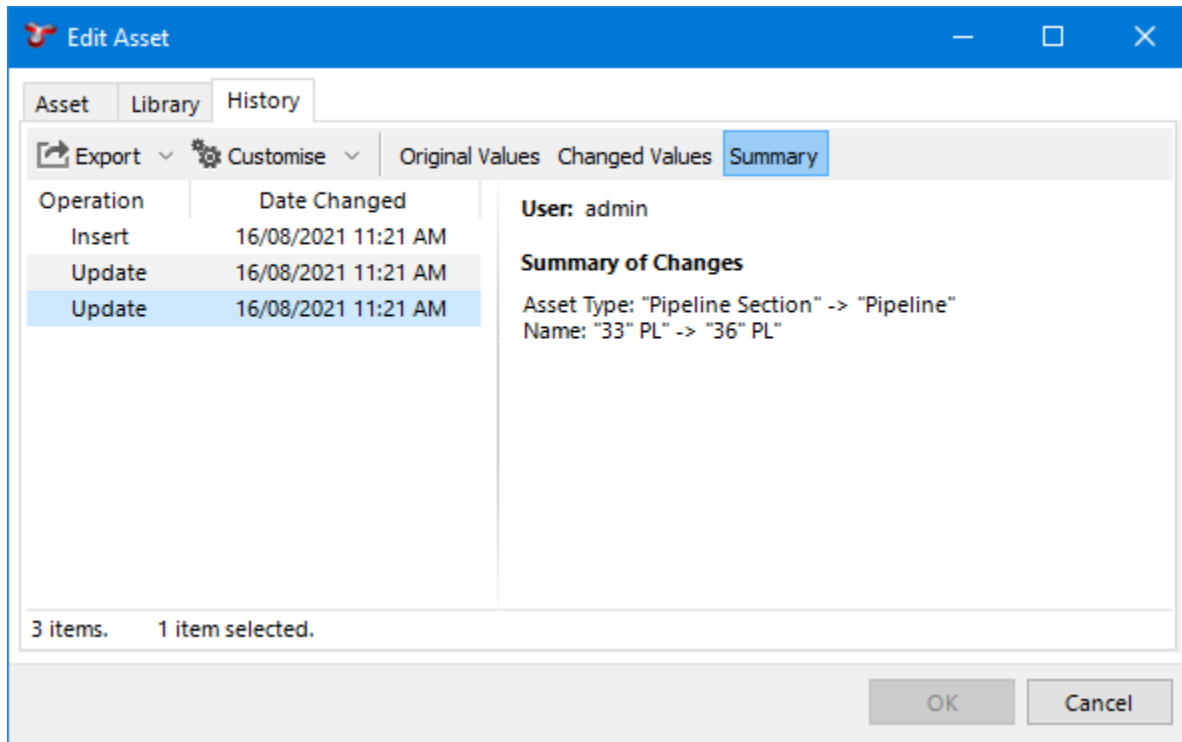
filter will be selected. This provides a handy way to select all assets of a particular type: select your root asset, type the name of the asset type you want to filter for, and click **Select Children**.



See also: *Filtering*.


13.2 History



With each editable dialog, there is a tabbed page titled History which shows all changes made to the record. The History tab is similar to the Changes dialog in the *Audit Log*.



The left section lists in tabular form all changes made to a record:

- **Operation** - *Insert* indicates the creation or addition of a record, *Update* indicates that the data was changed from a pre-existing value to a new value, and *Delete* indicates the deletion of a record.
- **Date Changed** - Shows the date and time the change was made in the database. The table is ordered chronologically by default.
- The **Table Definition** column can be added via **Customise** to show which table the change was applied to.

The right section displays the name of the user, the form and the values of each field relevant to the change. Fields within the form that were changed are marked with a  blue highlight. For an 'Update', the following tabs will be displayed:

- **Original Values** - Makes visible the values as they were *prior* to the change, with the changed values visible by hovering over the .
- **Changed Values** - Makes visible the values as they were *after* the change, with their original values visible by hovering over the .
- **Summary** - The summary will show all changes within the change record in an easy to read, written format.

For changes with **Operation** type *Insert*, the following tab will be displayed in place of **Original Values**:

- **Form** - Shows the form and field values in the initial state, as it was created.

See also *Audit Log*.

13.3 Add / Edit / Delete

Most grids in NEXUS IC have toolbar buttons for Add (+), Edit () and Delete (-).



If there is insufficient space for some or all of the captions, you will see buttons without captions. If you have read-only permissions on the object in question, you will see a View button instead of an Edit button.

Tip: You can use keyboard shortcuts to perform an Add, Edit or Delete action:

- Add - Insert key.
- Edit - Enter key.
- Delete - Delete key.

To use the shortcut keys, ensure that the grid you want to edit has focus. To set focus to a grid, click on a row or empty area inside the grid.

- **+ Add** Add a new item.
- **Edit** Edit the selected item(s) in the grid.
- **- Delete** Delete the selected item(s) in the grid.

Tip: Most grids support multi-edit, which can be used to bulk edit/delete items (See [Multi-Edit](#) for more information).

13.4 Connections

Hint

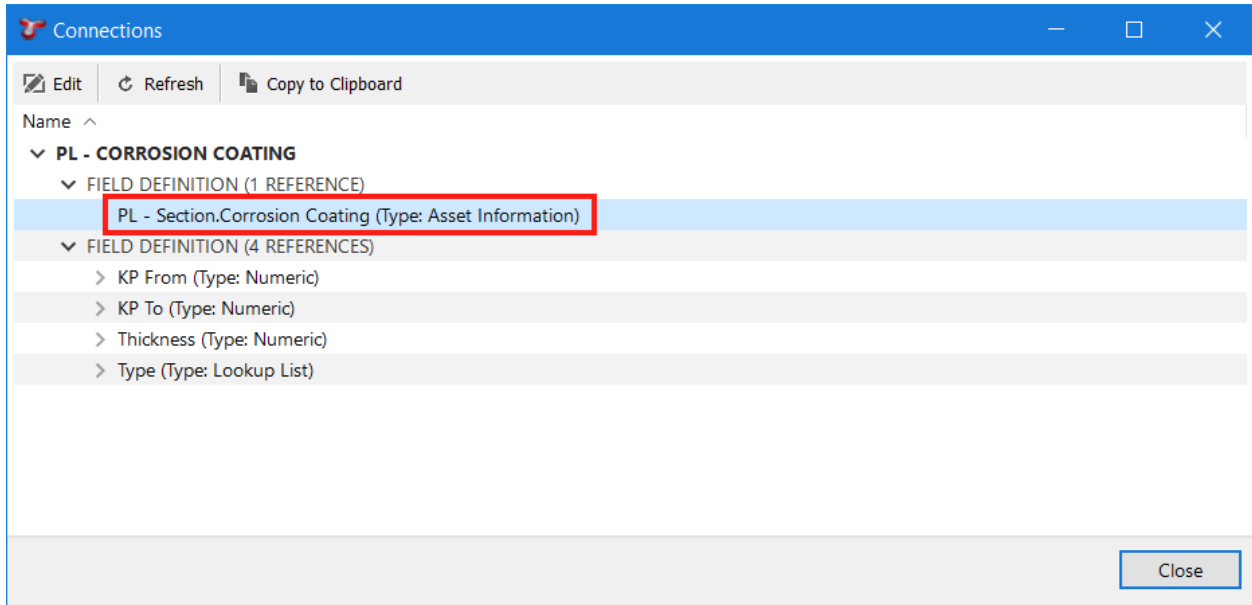
If you are considering deleting an asset (or assets) from the asset hierarchy, we recommend first checking what data might be linked to that asset. To do this, from the ASSETS screen, right click on any asset and choose **Connections** from the pop-up menu. The Connections dialog will appear categorising and listing all data elements which have a reference or connection to the selected asset.

The **Connections** toolbar button shows items that are linked to the active record.

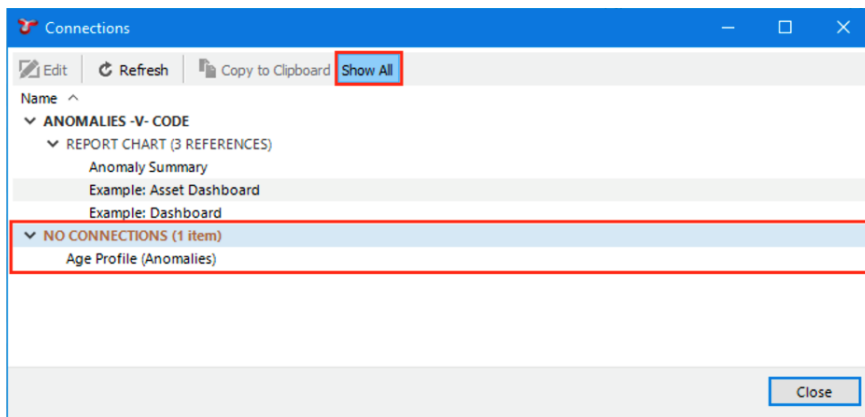
The Connections toolbar only shows items that depend on this item — it does not show the reverse. For example, if you are looking at Connections for an event, it will show Multimedia, Findings, etc, but it will not show the Asset that this event is on, because the event is connected to the asset, not the asset to the event.

You can edit the selected item in the Connections dialog. Click the row, then click Edit. An edit dialog will appear.

Sub Asset Information connections show all field definition nodes in the format of [Table Name].[Field Name]. The exception is if the direction parent is the Field Definition Table, then only [Field Name] will be used. The field definition format is shown outlined in red in the screenshot below.



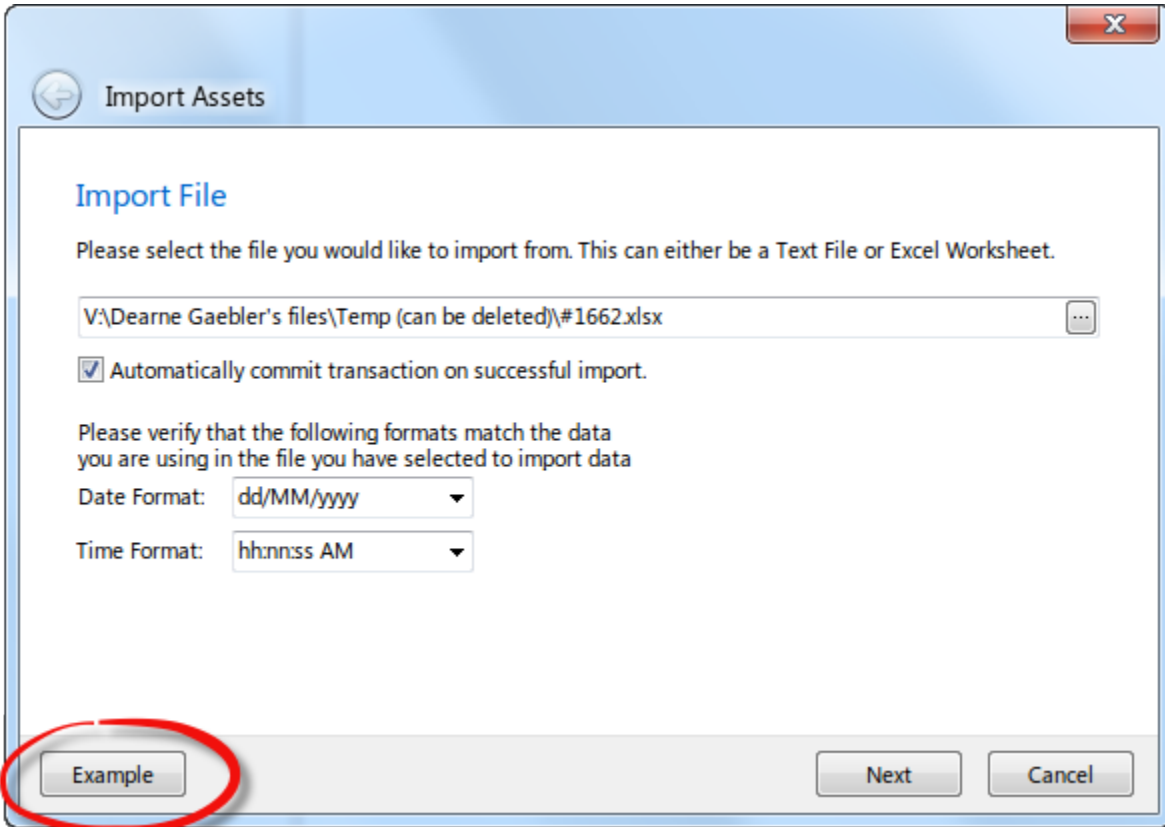
If any selected items have no connections, a Show All button will be visible in the toolbar. Selecting this button will reveal a root node that contains all the connectionless source items. Unselecting the button will hide connectionless items from the connections list. See the image below for the Show All button and results outlined in red.



13.5 Import

The **Import** functionality gives the user the ability to bulk update data stored in the database. There are numerous Import buttons throughout NEXUS IC — the Import button on the *Assets* screen allows you to import assets and Asset Information; the Import button on the *Library* screen allows you to import Library Types; the Import button on the Library tab within the Library screen allows you to import Library items; etc.

The format of the Excel workbook needs to be very specific. It is recommended that you use the Example button (shown below) to generate an Excel template in a format suitable for importing data.



The Import Template generated from the *Example* button will highlight fields which have been flagged as *Required* fields, set up lookup lists and provide information on the format and field type in the grey rows as shown here:

AD	AE	AF	AG	AH	AI	AJ
Piping_Hydrotest Pressure	Piping_Design Life	Piping_Piping Circuit No	Piping_Commissioning Date	Piping_Corrosion Loop No	Piping_Safety Critical Equipment Code	Piping_Insulation Type
Numeric (MPa)	Numeric (years)	Alphanumeric	Date	Alphanumeric	Lookup List	
	Required field	Piping Circuit No, max 50 characters. (Required)	Required field	Corrosion Loop No, max 50 characters. (Required)		
						<ul style="list-style-type: none"> Calcium Silicate Fiberglass Foamglass Mineral Wool None Pearlite Rockwool

Caution: It is important to note that as the Importer is importing rows, the SQL server creates Row and Table Locks. This may mean that to other users accessing NEXUS IC, the application may appear unresponsive. When the import has finished and the data committed, then the Row and Table locks are released and the other users will be able to continue using NEXUS IC as normal.

13.5.1 The Import Wizard

1. **Import Filename** - Navigate to the file which has been prepared for import. Compatible filetypes include .zip, .xlsx (Excel), .csv, and .txt. Zip files will contain the xlsx/csv/txt file plus any additional files, eg. multimedia images or electronic documents for importing into the library. You can tick the checkbox next to **Skip Blank Cells** to stop the importer from overwriting existing data with empty cell data. If it is left unchecked, and the import document contains fields with empty cells, those fields in the database will be overwritten with empty or null data, or be given a default value determined by NEXUS IC.

Tip

For very large imports, saving your Excel file as a .csv and then importing from the .csv may be faster.

2. **Configure Import** - If you would like to make changes to the Destination fields or elect to ignore some fields, then click on the column heading titled **Field:** and choose from the options presented in the pop up menu. Finally, ensure that the correct Asset View is selected from the **Required Fields** selection box and that the number of **Header Rows** and worksheet are correct (by default this will be 1 or 2 rows). Note that if the field type is set to change for an existing field, the import will abort as data loss may occur.

3. **Test Import** - A test is run on the selected file, testing the import for errors. If the test is successful, you may proceed to submit the import job. If the test produced errors, you must rectify the errors in the import file and start the import wizard again. There are some niche edge cases where errors will not be reported during the test, however, generally the test import provides a good indication of whether the import will succeed.

Note

When importing inspection event data, anomaly triggers are checked during the import and findings created automatically from data which falls outside the data bounds.

4. **Submission** - If using a SaaS client, the import job is offloaded to the SaaS server and is started remotely. It is then possible to close the current NEXUS IC session while the active import job continues. If using a non-SaaS client, the import job is executed in the current NEXUS IC session and you may continue using NEXUS IC. Closing the current NEXUS IC session will cancel the active import job. In both cases, the UI will refresh intermittently throughout the import, and there will be delays between the import finishing and final refresh as NEXUS IC does not directly monitor changes. Jobs are visible in the *Job Management Console*, which records the status and history of all import jobs.

5. **Import Details** - The import job banner at the bottom of the window will contain a dropdown menu with the option to dismiss or show details. Clicking 'Details' will show a window that summarises the import, advising the user how many rows have been added to various forms/tables. It is important that you scrutinise this summary to ensure that the import has performed the actions that you expected. What is important to take note of is the total rows for a specific item; i.e. add together the number added and updated and make sure that is equal to the number you expect. If you have multiple rows in your import sheet that update the same row, these rows will be counted by the test import individually, whereas the final import statistics will only show 1 updated row. There is the option to save the summary to file.

Tip: If the importer encounters a completely blank row in an Excel file, it will stop importing at that point, even if there are non-blank rows further down. This can provide an easy way to test an import sheet: set it up, and then after just one or two rows of data, insert a blank. Run the import to see if it's doing what you expect, and if so, delete the blank and run again. Similarly, if the importer encounters a blank column in an Excel file, columns to the right of this will not be imported.

Tip: You can have one ‘Asset Location.Full Location’ column, with levels in the asset hierarchy separated by space slash space, like ‘My Field / My Platform / My Member’, or many ‘Asset Location.Full Location’ columns, with one asset hierarchy level in each. (But you can’t mix the two, with one containing ‘My Field / My Platform’ and a second containing ‘My Member’.)

13.5.2 Sub-rows

Sometimes a single “master” row will have several “detail” rows. For example, an asset information row might have several sub-AIG rows; or an event might have several findings or several multimedia images or both. When this occurs, you should repeat the row, with different “detail” values in each.

For example, if you have several multimedia images to import against a single event, your Excel sheet should have several rows that are identical except for the Multimedia.Name and Multimedia.Image columns. If you have specified an event number, and you use the same event number on each row, NEXUS will only create the event once, but will create several multimedia items. (If you do not specify an event number, NEXUS will instead create several different events with one multimedia item each.)

Tip

You can find the next available event number for a given event type by creating an event of that type using [Add Event](#), noting the event number, then deleting that event. If you want next available event numbers for several event types, create a report template with a Simple Source on table Event and a Pivot Table with a pivot row on Event Type and a value field on Event Number with aggregate Max. Then add 1.

It is also acceptable to leave event fields blank for all except the last row — under the hood, NEXUS is importing each Excel row into the event, and only the last Excel row imported will “stick”. Note that if your event has a finding, you should *not* repeat the finding data on each event row — if you do, NEXUS will create one finding for each Excel row that has finding data filled in.

In some cases you *do* want multiple findings on one event, and in that case you should fill in several rows as appropriate. Similarly for sub-event data or sub-AIG data: if you want several different sub-events or sub-AIG rows imported, you should repeat the event row or AIG row with different sub-event or sub-AIG data in each case. If you are repeating an Excel row for another reason and you *do not* want several sub-event or sub-AIG rows imported, you should fill in sub-event or sub-AIG data in only one of the Excel rows.

13.5.3 Excel

During an import, we communicate with Excel “behind the scenes”: we command Excel to open the file you want to import, and ask Excel what’s in each cell. An upshot of this is that if you use Excel to modify the file while we’re importing it, even if you don’t hit Save, you may confuse the import process. Similarly if you take a variety of other actions: using Save As, closing Excel, etc. If you see error text “Call was rejected by callee”, this is what’s happened: Excel has stopped answering our calls.

Note: It is possible to create new Asset Hierarchies by importing Assets with hierarchy structures that don’t already exist. In doing so, new Parent Assets will be created. In case this is not the desired result, the **Test Import** will throw a warning, for example:

*Line x: Parent Asset “Example Parent” will be created for the location “Wood / Example Parent / 00C-2401A”
“xx new Parent Asset(s) will be added.”*

13.6 Export

The Export toolbar option is common to many screens in NEXUS IC. The Export toolbar option provides the user the option to export the contents of the active grid to Excel, Text or CSV.

The **Export** toolbar button allows the user to choose what format to export the contents of the active grid to.

- *Export* → *Excel*
- *Export* → *Text*
- *Export* → *CSV*

After choosing a format, you have the option to export the contents of the active grid to a file, in which can you will need to navigate to a windows folder location from the **Save As** dialog and click on **Save**, or embed into an email, in which the file will be emailed to the email address of the currently logged in user.

Note: The “Export” button available on grids is different from *ASSETS* → *Custom Export* and *INSPECTION* → *Custom Export*. These buttons launch the Export wizard which allows you to select assets and data types for export.

13.7 Reports

The **Reports** toolbar button enables you to generate a report template which has been configured in the NEXUS IC database.

Report templates (once configured), are saved into a Report Category. Whilst additional report categories can be configured (see *Report Categories*), default Report Categories included with a standard NEXUS IC database are:

1. Anomaly
2. Archived
3. Asset
4. Miscellaneous
5. Risk
6. Schedule
7. Workpack

The dropdown menu on the **Reports** toolbar will display each of the Report Categories, and a sub menu listing each of the report templates assigned to that category.

There are two special categories: **No Category** and **Favourites**. Go to *Database* → *Your Profile* to configure what appears in Favourites.

All reports can be exported to RTF, HTML or Microsoft Excel. The formatting of the report depends on the output form selected. For example, *Page Break* elements do not cause the beginning of a new page in HTML or Excel reports; Excel tables enable Excel’s filtering feature; and so on.

Depending on the layout of the report and filtering options configured in the report, you will be presented with a wizard to generate the report.

Report jobs will be listed in the main_menu.database.job_management_console. Here you can view the progress and history of Import and Report jobs.

Note: By default, you will be required to confirm the output format (File, Email or Shortcut) of the generated document. If you select **File** as the destination, then either confirm the default path and name of the report, or choose another file location and name for the file. If you choose **Email** as the destination, then Email account properties need to be set up. The **Shortcut** format is only available if a suitable *shortcut* is configured.

For information on configuring report templates, see *Report Templates*.

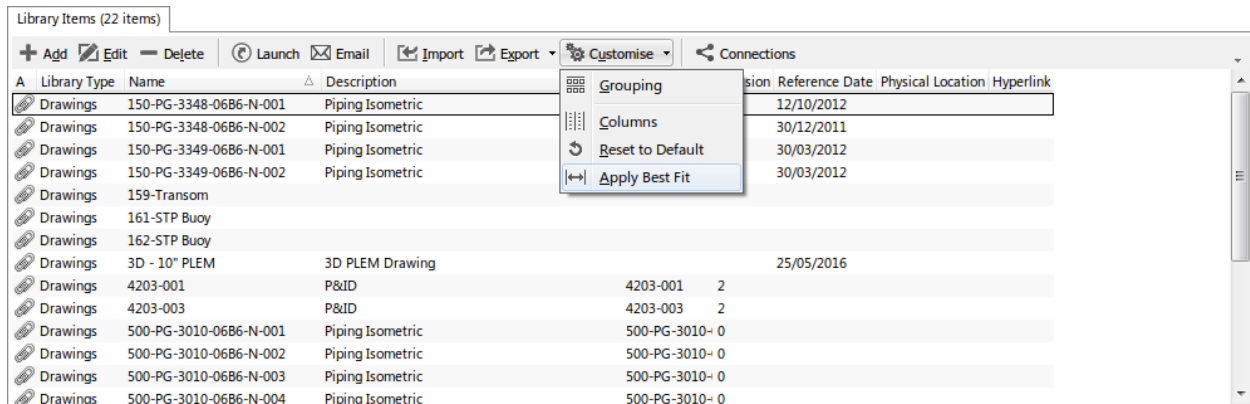
13.8 Customise

The **Customise** toolbar button enables you to define which columns are shown (or hidden) and how to configure the rows for display in the active grid.

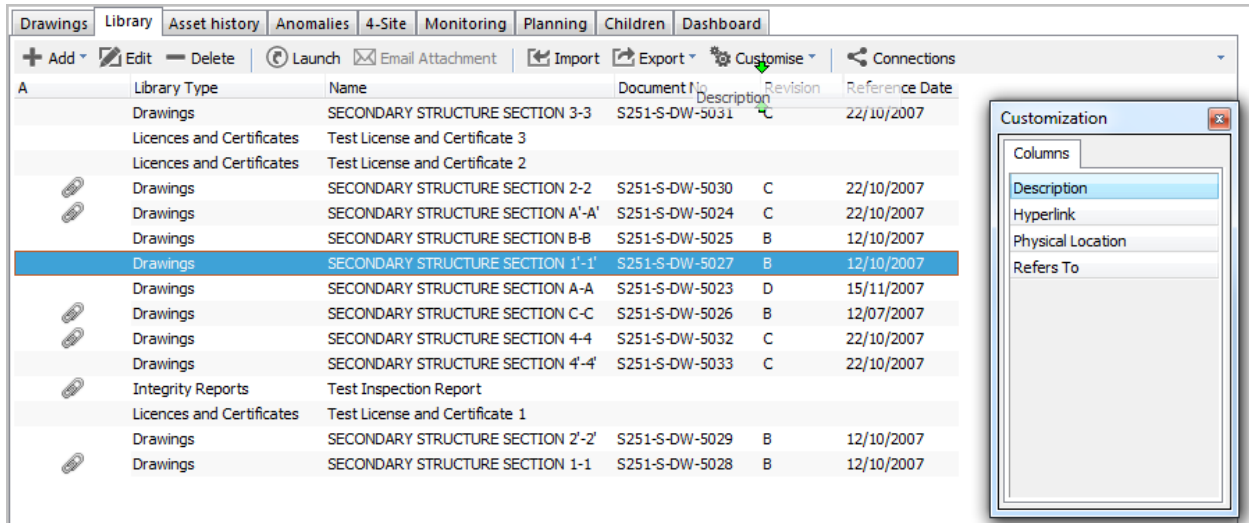
These settings are saved for each user and will be remembered next time that user logs into NEXUS IC.

Note: The settings are saved to a file called Integrity Centre.Settings in C:\Users\[USER_NAME]\AppData\Roaming\NEXUS

- **Customise** → **Grouping** Shows and hides the *Grouping* panel above the grid. When the Grouping panel is visible, column headings can be dragged onto it from the grid. It is also possible to group by multiple columns.



- **Customise** → **Columns** Shows and hides columns in the grid. Drag and drop column headings from the grid into the Customization dialog to hide columns and vice versa to show the columns.



- **Customise** → **Reset to Default** Clicking on this menu item will restore the default columns and column sizes back to the original designed state.
- **Customise** → **Apply Best Fit** As the name suggests, when clicked the visible columns will be resized to fit best within the grid.

13.9 Multi-Edit

Most grids in NEXUS IC provide the user the ability to edit and delete multiple rows in a single action.

13.9.1 Selecting Multiple Rows


1. To select a consecutive group of rows, click the first item, press and hold down the **Shift** key, and then click the last item.
2. To select non-consecutive rows, press and hold down the **Ctrl** key, and then click each item that you want to select.

Sorting, *Filtering* and *Grouping* can be helpful in selecting the rows you want to work on.

13.9.2 Editing Multiple Rows

Once you have selected the rows that you want to edit, then click on the **Edit** toolbar button. This will launch the relevant edit dialog for the active table.

Fields that are unedited will retain their original values for all selected rows (even when the data differs from row to row).

Fields that are edited in this dialog are identified with an  (Undo) icon directly to the right hand side of the edited field.

Clicking on the  (Undo) icon will revert the data back to the original values.

Clicking on **OK** in the dialog will apply all changes to the edited fields for all selected rows.

13.9.3 Deleting Multiple Rows

Once you have selected the rows that you want to delete, then click on the **Delete** toolbar button. This will launch the Question dialog and ask you for confirmation that you want to delete all selected rows. Click on **Delete** to confirm, or **Cancel**.

13.10 Sorting

All grids in NEXUS IC provide the user the ability to sort by one or more columns.

13.10.1 Sorting by a single column

Click anywhere in the column heading to sort by that column. Down arrow indicates descending order, Up arrow indicates ascending order.

13.10.2 Sorting by one or more columns

Shift + Click in any column heading to sort by that column. Down arrow indicates descending order, Up arrow indicates ascending order. Shift + Click in another column to apply a second sort.

13.11 Filtering

All grids in NEXUS IC provide the user the ability to apply one or more column filters.

13.11.1 Applying a column filter

Library Type	Name	Description	Document No	Revision	Reference Date	Physical Location	Hyperlink
Drawings	150-PG-3348-06B6-N-001	(All)	150-PG-3348-06B6-N-001	0	12/10/2012		
Drawings	150-PG-3348-06B6-N-002	(Custom...)	150-PG-3348-06B6-N-002	1	30/12/2011		
Drawings	150-PG-3349-06B6-N-001	(Blanks)	150-PG-3349-06B6-N-001	0	30/03/2012		
Drawings	150-PG-3349-06B6-N-002	(NonBlanks)	150-PG-3349-06B6-N-002	0	30/03/2012		
Drawings	3D - 10" PLEM	3D PLEM Drawing			25/05/2016		
Drawings	4203-001	Field Layout	4203-001	2			
Drawings	4203-003	General Arrangement	4203-003	2			
Drawings	500-PG-3010-06B6-N-001	P&ID	500-PG-3010-06B6-N-001	0			
Drawings	500-PG-3010-06B6-N-002	Piping Isometric	500-PG-3010-06B6-N-002	0			
Drawings	500-PG-3010-06B6-N-003	Platform A Design Criteria and Location Plan	500-PG-3010-06B6-N-003	0			
Drawings	500-PG-3010-06B6-N-004	Vessel Inspection Sketch	500-PG-3010-06B6-N-004	0			
Drawings	500-PG-3010-06B6-N-005	Piping Isometric	500-PG-3010-06B6-N-005	1			
Drawings	500-PG-3300-06B6-N-001	Piping Isometric	500-PG-3300-06B6-N-001	0			
Drawings	FSO General Arrangement	General Arrangement	N/A	N/A			
Drawings	Platform A Design Criteria and Location Plan	Platform A Design Criteria and Location Plan	WG-0098-DC-01	A	1/03/2013		
Drawings	Plot plan		N/A	N/A			
Drawings	Vessel sketch	Vessel Inspection Sketch	N/A	N/A			
Drawings	Wood Group Assets	Field Layout	N/A	N/A			

Hovering over any column heading with the mouse will make the filter icon appear (shown in the above image). Click on the filter icon to display a list of names unique to this column. Check any of the checkboxes to apply that text filter to the column.

13.11.2 Custom Filter

Selecting the **(Custom...)** item from the filter dropdown list launches the Custom Filter dialog. This dialog allows you to specify the filter criteria for a single column consisting of one or two filter conditions. You can also specify the operator for these conditions.

When using the LIKE or NOT LIKE operator, you can use the ‘underscore’ (`_`) and ‘percent’ (`%`) characters to substitute one or several symbols in a string value respectively.

Filters are not remembered between sessions: if you close and re-open NEXUS IC, your filters will be cleared.

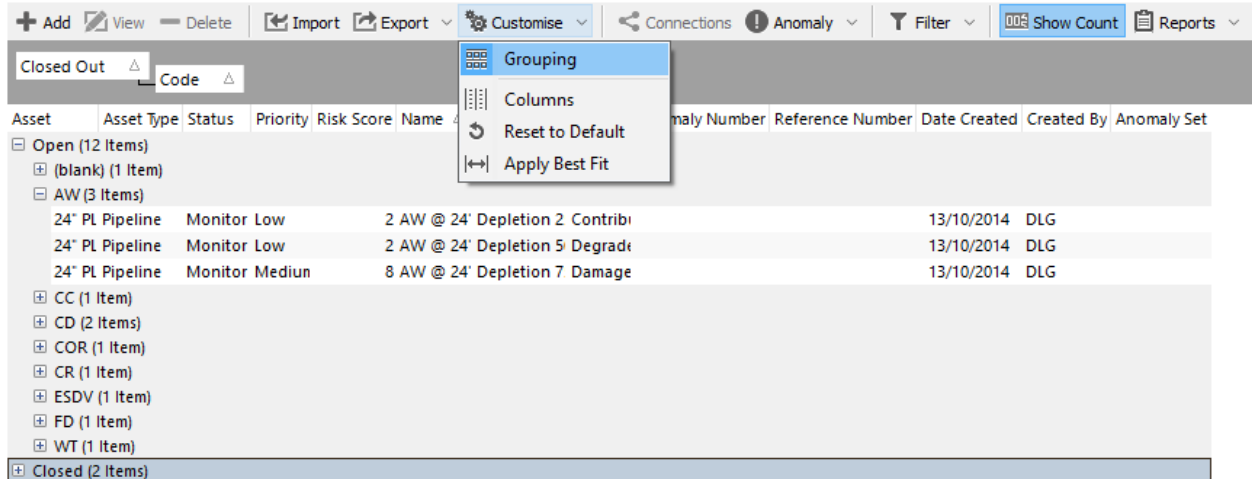
See also: *Find As You Type*.

13.12 Grouping

When the Grouping panel is visible, column headings can be dragged onto it from the grid. It is also possible to group by multiple columns.

Click the Customise button on the toolbar above a grid. If Grouping is selected, you’ll see a dark grey bar at the top of the grid. This bar can contain one or more column headings. In the screenshot below, you can see the default grouping in the *ANOMALIES* screen. You can see that the grid appears as a “tree”, with `[+]` or `[-]` marks at the left of each category. The first level of the tree is the first thing shown in the grey Grouping bar — in this case, Closed Out. The second thing in the Grouping bar corresponds to the second level of the tree, and so on. You can click on “columns” in the grey Grouping header to sort by them or to filter by them. You can drag column headings off the grid and onto the Grouping bar, or back from the Grouping bar onto the headings row of the grid. You can drag items around in the Grouping bar to control which level is first in the tree.

Almost all grids in the software can be grouped in this way.



See also: *Customise, Sorting, Filtering, Find As You Type.*

13.13 Data Validation

A number of data validation rules can be defined to ensure data quality within the NEXUS database. These are applied on the individual data fields contained within “Asset Information” or “Event” forms.

13.13.1 Required

Any data field of any field type can be set to be “Required”. This means that, when adding a new record, this field must be filled before the record can be saved. Typically fields should be set to “Required” when they provide essential information or are used as an input to critical calculations. Required fields are clearly identified on the form.

Piping Calculation Parameter			
Design Properties			
Piping Circuit No:	PP-PG-CL01-P01Medium	Corrosion Loop No:	PP-PG-CL01
Component Type:	Pipe 6"	Piping OD Size (mm):	168.3
Tag Number:	<input type="text"/>	PID:	4203-001
Hydrotest Pressure: (MPa)	<input type="text"/>	Design Life: (years)	<input type="text"/>
Commissioning Date:	10/08/2012	Time in Service: (years)	5.85

Hovering your mouse over the provides the hint: “Design Life is a required field and must have a value specified”

This requirement is also enforced during any data import. The user is unable to proceed with the import until the column with the ‘required’ field is present in the import sheet. Import sheets created by NEXUS identify required fields with a red column in MSExcel.

13.13.2 Maximum & Minimum

Numeric and Whole Number data fields can have Maximum and Minimum values set. This means that, when adding a new record, values in this field must be within range before the record can be saved.

Typically maximum and minimum values should be set to ensure data quality for fields where ranges are consistent for all assets. For example; a percentage field must be between 0 and 100.

Fields with out of range data are clearly identified on the form.

Piping
Calculation Parameter

Design Properties

Piping Circuit No: <input style="width: 90%;" type="text" value="PP-PG-CL01-P01Medium"/>	Corrosion Loop No: <input style="width: 90%;" type="text" value="PP-PG-CL01"/>
Component Type: <input style="width: 90%;" type="text" value="Pipe 6"/>	Piping OD Size (mm): <input style="width: 90%;" type="text" value="168.3"/>
Tag Number: <input style="width: 90%;" type="text" value=""/>	PID: <input style="width: 90%;" type="text" value="4203-001"/>
Hydrotest Pressure: (MPa) <input style="width: 90%;" type="text" value=""/>	Design Life: (years) <input style="width: 90%;" type="text" value="120"/>
Commissioning Date: <input style="width: 90%;" type="text" value="10/08/2012"/>	Time in Service: (years) <input style="width: 90%;" type="text" value="5.85"/>


Hovering your mouse over the  provides the hint: “Design Life must be less than or equal to 90” or “Design Life must be greater than or equal to 0”

13.13.3 Lookup Lists

Look List fields by their very nature enforce selection of valid data and provide consistency.

13.13.4 Anomaly Triggers

Data input onto Event forms are additionally subject to Anomaly Triggers. These are validation checks that define anomalous readings and are used to trigger the automatic creation of Findings of a given type and severity.

When an anomaly trigger is violated, a yellow exclamation mark () will appear next to the field. You can set lower/upper bounds to be constant values (so a field might trigger if it was outside, say, 1 to 9) or to pull from a field, on this form or on another form. So for example if this field is Measured Wall Thickness, it might trigger if its value is less than Minimum Allowable Wall Thickness.

For *Lookup List* fields, the comparison is done of the lookup list item’s Value, not its Comment. So if you have a lookup list titled “Anode Depletion”, and its first entry has value “25” and comment “0 to 25% depleted”, NEXUS will use the “25” for purposes of determining whether an anomaly trigger should be fired.

For Yes/No fields you can set the trigger to fire on any combination of Yes, No or blank; but you can’t compare to another field.

The **Include Boundary** tickbox controls whether exact matches cause the trigger to fire: if you have set a trigger to “Fail when inside Upper/Lower bounds”, your lower bound is 1 and your upper bound is 9, this is the difference between “ $1 < x < 9$ ” and “ $1 \leq x \leq 9$ ”.

You can optionally give an anomaly trigger a date range. If you set just a Date From, the trigger will apply only to event data from that date forward. If you set just a Date To, the trigger will apply only to event data from that date or earlier. If you set both, the trigger will apply only to event data within the specified range. In this way, you can change triggers to reflect new conditions, without causing spurious warnings on historical data. For example, if you decrease the operating pressure of an asset, this might decrease the minimum allowable wall thickness. Rather than editing the existing anomaly trigger, you can set a “To” date on that old trigger, and add a new trigger with a “From” date.

Caution: In most cases, Findings are generated at the time events are added or *imported*. There are however some scenarios in which the Anomaly Triggers utility should be run manually. These are 1) whenever anomaly triggers are edited; 2) when anomaly triggers exist on a calculation field; 3) before any Finding review sessions; or 4) after a bulk import of event data (particularly when anomaly triggers rely on events other than itself).

Triggers for a field independent of asset are found in NEXUS IC in *Asset Information* and *Event Types*. Anomaly triggers for specific assets can be configured in NEXUS IC by right-clicking on an asset and choosing **Anomaly Triggers...** If you have both an asset-specific and a generic anomaly trigger on the same field, for assets with the asset-specific trigger, only the asset-specific trigger will apply. For assets with only a generic trigger, only the generic trigger will apply. Note that asset-specific anomaly triggers are specific to their asset — they do not automatically apply to an asset’s children.

A trigger can have an anomaly *Code* and a *Severity*, and you can have several different triggers on a single field, with different codes and/or severities. The dialog may also show a preview chart, showing which triggers apply at which

KPs or depths.

Fields with out-of-range data are clearly identified on the form.

The screenshot shows a web form with two tabs: 'Details' and 'Survey'. The 'Survey' tab is active. Under the heading 'UT Inspection', there are five input fields:

- Inspection Date:** A dropdown menu showing '22/07/2015'.
- Report No:** A text input field containing 'WG-150-PG-3348-06B6-N_UT001' with a clear button (X).
- Thickness Measured: (mm):** A text input field containing '11.5', highlighted with a yellow border and a yellow warning icon.
- Contractor:** A text input field containing 'XYZ Contractor' with a clear button (X).
- Lowest CML Reading Location:** A text input field containing '3o/c' with a clear button (X).

13.13.5 Data quality alerts

Even with the most rigorous of data validation regimes it is sometimes possible for inaccurate data to be entered. Data quality checks can additionally be established for calculation results by means of Traffic Lights and Reports. For example, a “Remaining Life” traffic light could be configured to shown any negative values as red. Simply turning on the traffic light enables you to spot and investigate any potential data issues.

13.14 Unhandled Exceptions

In many places in NEXUS IC, when something goes wrong you’ll receive a polite message explaining the problem. But occasionally you’ll run into an unhandled error. In this circumstance, NEXUS will show you an “Unhandled Exception” message and will attempt to send a crashlog to our bug tracking server. (No personally identifying information is tracked, and nothing about your usage can be tracked back to you.) If you click the **Details** button, you will see a Windows Explorer window with the .crashlogz file highlighted. This is the same data that is sent to us automatically, but if the computer in question is not connected to the internet, we may ask you to mail us that file.

When you see an “Unhandled Exception” message, it may be helpful to us if you send an email to support@nexusic.com telling us the steps you took that led you to the error dialog. (Some of the time the crashlog alone is enough to tell us exactly where the error lies and how to fix it; sometimes not.) It’s helpful if you do this immediately after you see the error, or if you include enough information for us to figure out which crashlog you are talking about — since the crashlog is anonymised, if you don’t proactively tell us about your problem, we often don’t know who it’s from. Emailing us also lets us reply to you when we’ve fixed the issue so that we can, for example, offer you a new build with the bug removed.

The following topics contain information relating to software deployment, technical and release information.

14.1 Deployment Guide

14.1.1 Hardware and Software Pre-Requisites

Client Software

- **Client Operating System:** Windows 10. x86 (32-bit) and x64 (64-bit), Windows Server 2012 R2 (or higher) supported.
- **ODBC Drivers:** Version 17 required. (<https://www.microsoft.com/en-us/download/details.aspx?id=56567>)
- **Windows Media Foundation:** For clients running Windows Server, then use the 'Add Roles and Features' wizard from the Server Manager. Skip through to 'Features' and select 'Media Foundation'.
- **Desktop Experience:** For clients running Windows Server, then the Desktop Experience feature needs to be installed ([https://technet.microsoft.com/en-us/library/cc772567\(v=WS.11\).aspx](https://technet.microsoft.com/en-us/library/cc772567(v=WS.11).aspx))
- **Oracle Instant Client:** Required on every client machine when one or more Oracle connectors are configured (<http://www.oracle.com/technetwork/database/database-technologies/instant-client/overview/index.html>).

Other Client Software

Other software applications commonly installed on client machines include:

- **Microsoft Excel:** Used for viewing reports which are exported to XLS format. Also commonly used to compile source input files for bulk data imports and updates (CSV or TXT can be used as an alternative).
- **Microsoft Word:** Used for viewing Reports which are exported to RTF format (alternative viewer is WordPad).
- **Any web browser:** Used for viewing Reports which are exported to HTML format.
- **Any PDF reader:** Used for viewing PDF format reference documents which may have been uploaded to the NEXUS IC Library.

Client Hardware

- **Processor:** Core i5 / i7
- **Graphics card:** If 3D support is required then the graphics card must support OpenGL.

- **Memory:** 4GB RAM
- **Hard Disk:** 30GB
- **Video Resolution:** 1280 x 1024 (dual monitors recommended for IC-Inspection)

Network

We recommend network latency is maintained at < 4ms. Latency is displayed in the application status bar, as well as Memory Overhead and Memory used. Tasks within NEXUS can take a varying amount of time (from milliseconds to minutes) depending on complexity. Increased network latency can degrade performance. Some tasks will suffer barely at all from increased latency; some tasks will suffer much more. (Degradation is never worse than linear: double the latency will cause at most double the time to be taken by the application.)

IC-Web Supported Browsers

- Chrome 54.0 or above
- Microsoft Edge 79 or above
- Safari 9.1 or above
- Firefox 53.0 or above. 3D drawings may be slower in Firefox.

IC-Web Server

- **Processor:** Core i5 / i7
- **Memory:** 4GB RAM
- **Hard Disk:** 30GB
- **Server OS:** Server 2012 R2
- **Web server software:** Microsoft Internet Information Services (IIS) 8.5 with ISAPI Extensions;
- **ODBC Drivers:** Version 17 required. (<https://www.microsoft.com/en-us/download/details.aspx?id=56567>)

SQL Server

- **Version:** SQL Server 2012 with Service Pack 4
- **Processor:** Multi-core CPU
- **Memory:** 4GB+
- Separation of System, Database and Transaction Log storage

Internet Connectivity

- *Software Based Licensing* requires access to internet (standard https port 443)
- Automatic Crash Logs requires access to internet (standard https port 443)

14.1.2 Active Directory Groups & Service Accounts

Wood recommend that the following Active Directory Groups and Service Accounts are created in advance of the NEXUS IC software installation process. These Active Directory groups and service accounts enable streamlined management of the security permissions on the database and the database backup location.

Active Directory Groups

SQL Admins AD Group

Note - during SQL Server Setup you should add the **SQL Admins** Active Directory group as an Administrator in the Setup Wizard.

1. Create a new Windows Active Directory group called **NEXUS Backup Folder** (or similar). This group will contain users who will be permitted to perform NEXUS Database Backups using the NEXUS IC software interface.
2. Create a new Windows Active Directory group called **NEXUS Users** (or similar), make it a member of **NEXUS Backup Folder** Active Directory Group. The **NEXUS Users** group will contain all users who require access to NEXUS.
3. If it doesn't already exist, create a new Windows Active Directory group called **SQL Admins**, this group should contain users in your organisation who have been identified as the SQL Administrators.

Service Accounts

1. Create a new service account for running SQL Server called **NEXUS_SQL_Account**. The password on this account should not expire. Add this Service Account to the **NEXUS Backup Folder** Active Directory group and the **NEXUS Users** Active Directory group. When installing SQL Server, choose this account as the account to run the services, including SQL Agent and Browser.
2. For companies deploying **IC-Web**, create a new service account called **NEXUS_Web_Account**. The password on this account should not expire. Add this Service account to the **NEXUS Users** Active Directory Group.

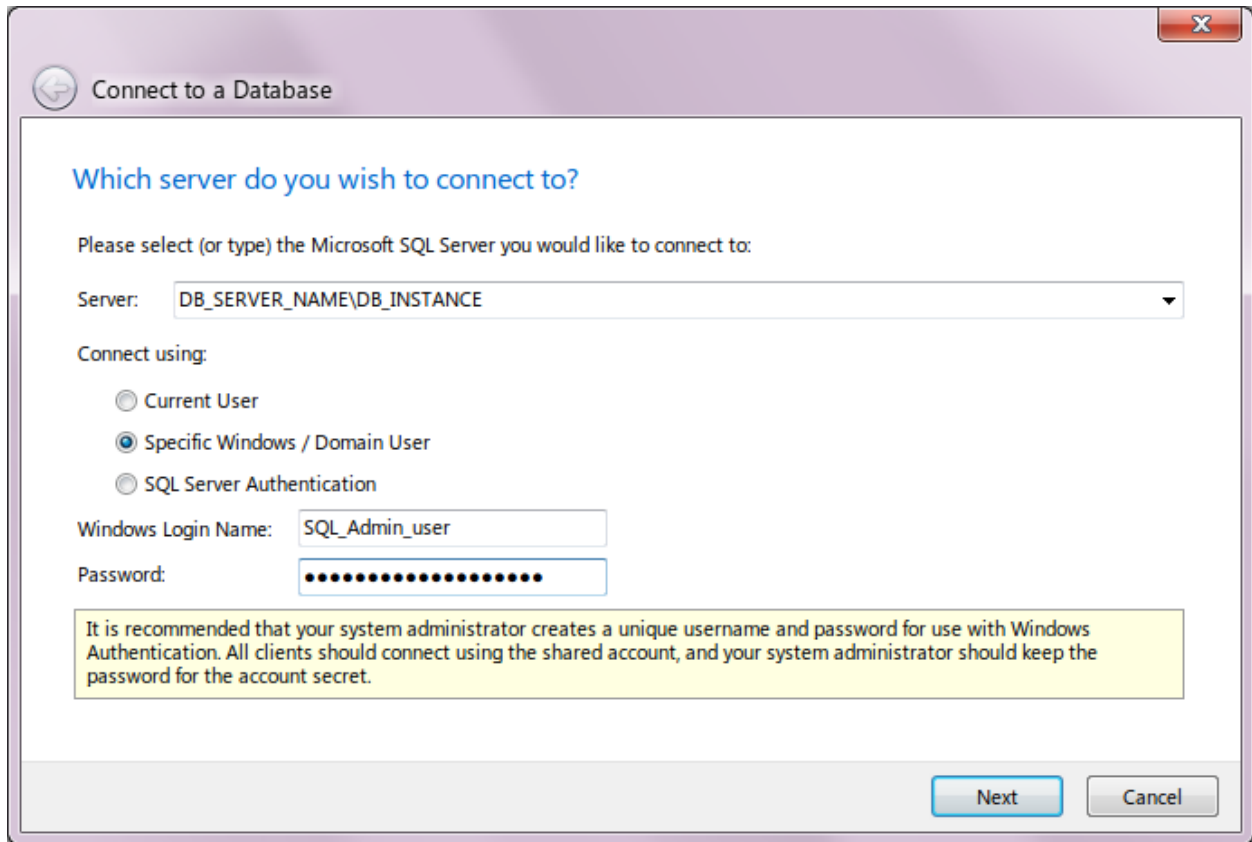
14.1.3 Backup Folder

1. Create a Windows folder called **NEXUS_SQL_Backups** on a file server for storing database backups generated by users and the first time NEXUS database to restore from (it is recommended that this folder location is NOT on the SQL Server itself).
2. Share this folder by granting read/write permissions to the **NEXUS Backup Folder** Active Directory group.
3. Copy the initial NEXUS database backup file into this folder for first time restoration.

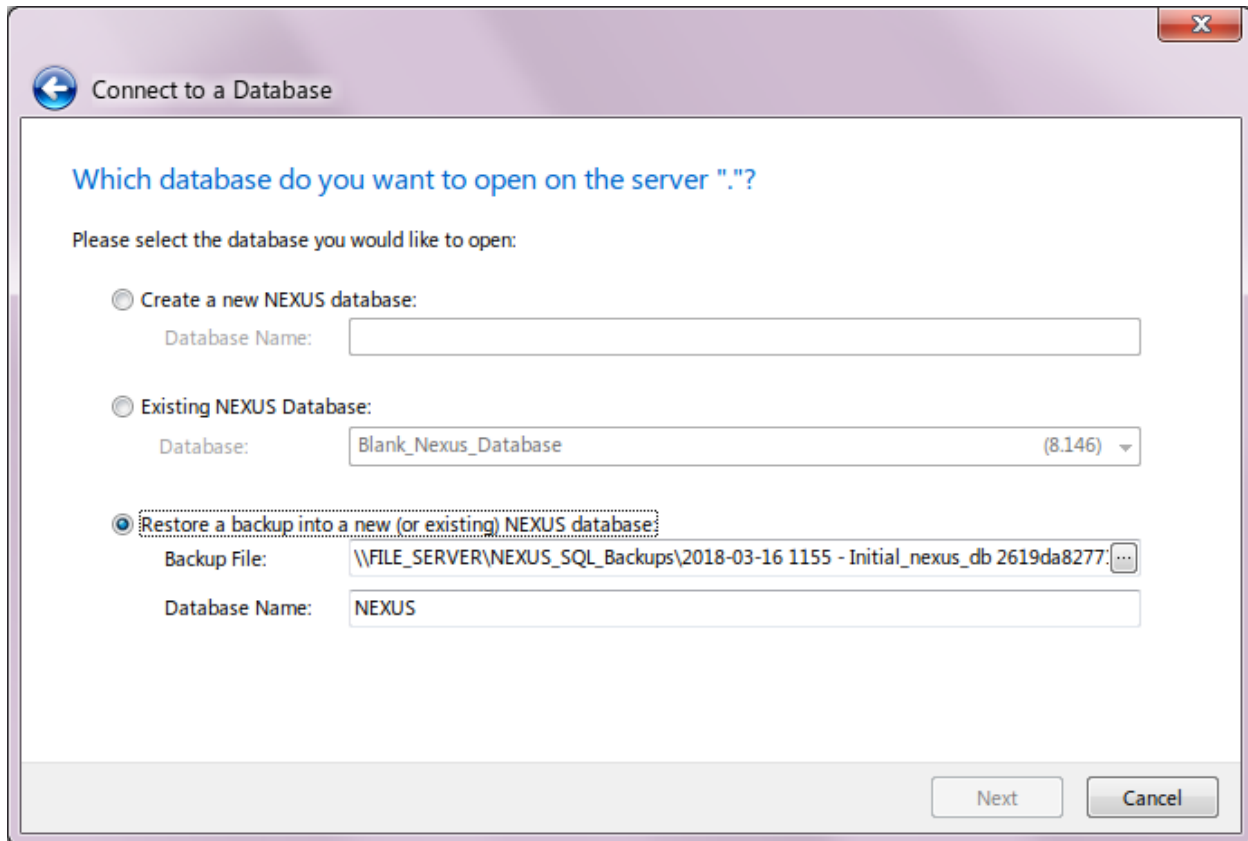
14.1.4 NEXUS Software Installation

1. Select a member of the **SQL Admins** Active Directory group to install NEXUS IC (using the **nexus setup nnnnnnnn.exe** file provided to you by Wood) and ensure that this account is also a member of the **NEXUS Backup Folder** Active Directory group.
 - Genuine NEXUS setup installers are digitally signed by Wood Group Kenny Australia PTY LTD.

- If you are installing via command line, see [the installer manufacturer’s website](#) for details of command line parameters.
2. After installation, launch NEXUS application to launch the Database Connection Wizard.
 3. On the **Which server...** page of the wizard choose **Specific Windows / Domain User** authentication and provide the username and account password of a user in the **SQL Admins** Active Directory Group, then click OK, as shown here:



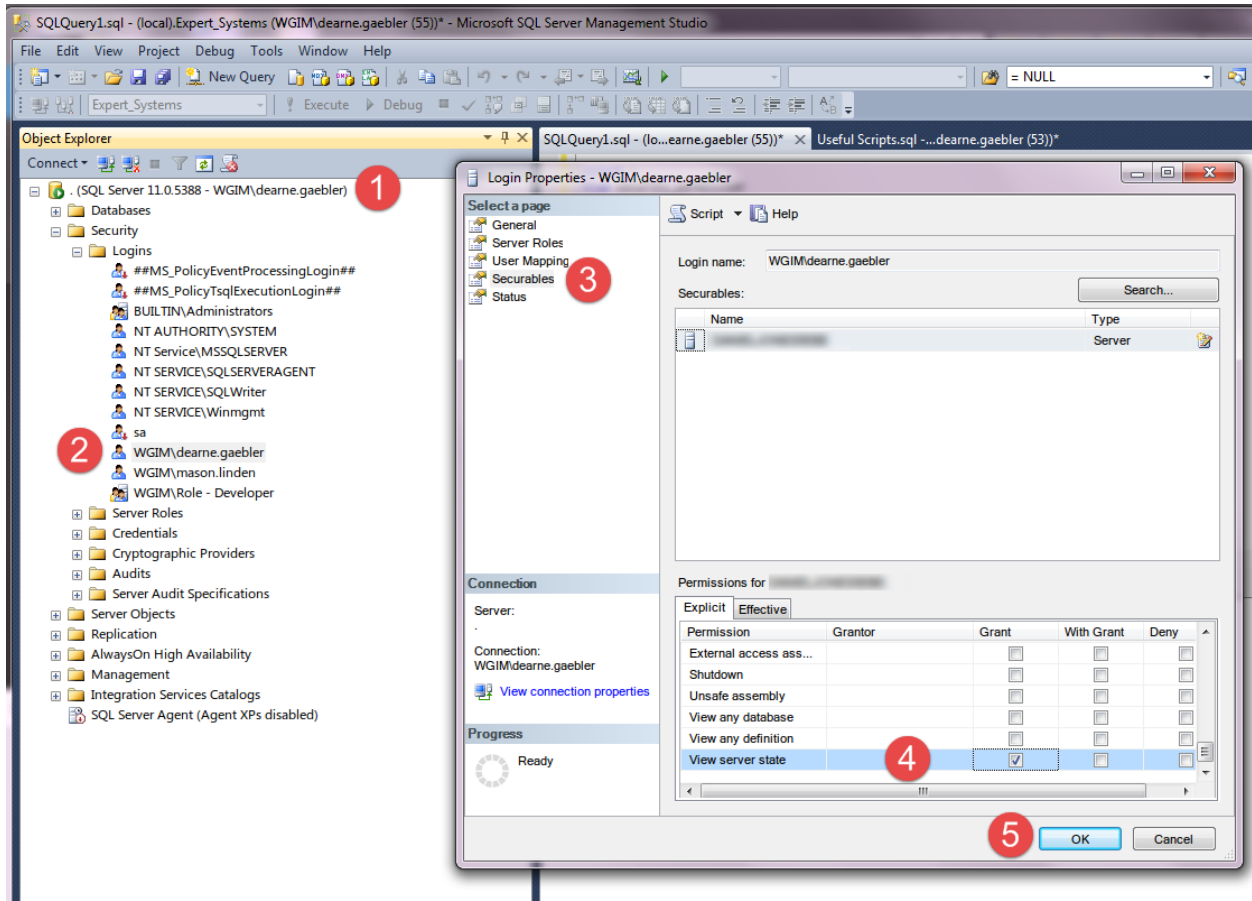
4. In the **Which database...** page of the wizard, enter the full path to the NEXUS backup file. This may be a UNC path (like ‘\FILE_SERVER\NEXUS_SQL_Backups’) or if the database server and NEXUS IC are running on the same machine it may be a Windows path (like ‘C:\Database Backups’).
5. Enter a name for the new database (eg. “NEXUS”), as shown here:



6. Click on **Next** to restore the database and confirm connection to the newly restored database.
7. License prompt will appear. Enter valid license key and press **Request License**

14.1.5 Set up permissions on the Database Server

1. Using SQL Management Studio, navigate to the *Database Server* → *Security* → *Logins*.
2. Add the **NEXUS Users** Active Directory group as a new Login.
3. Under **Server Roles** for the **NEXUS Users** Active Directory group Login, ensure “public” is checked.
4. Under **Securables** for the **NEXUS Users** Active Directory group Login, ensure the Grant permission for “View server state” is checked. This is required for the logged in user to query the active logins to display in the status bar, in addition to determining forced log-offs for Audit Log sessions.



14.1.6 Set up permissions on the NEXUS database

1. Using SQL Management Studio, navigate to the NEXUS database.
2. Add NEXUS Users Active Directory group to the “public” Database Role.
3. Add NEXUS Users Active Directory group to the “db_owner” Database Role.

14.1.7 Deployment Configuration File

On the first run of NEXUS on a particular PC under a particular user account, NEXUS will ask the user for details of the database to connect to: server name, database name (along with options to create a new database or restore a database from a backup file). This can be intimidating to new users. Instead, you can (optionally) supply these details in a databases.xml file, in the same folder as the IntegrityCentre.exe executable. If NEXUS finds this file during startup, it will connect to the named server and database. If SSO is specified for the user, no user interaction is necessary. If SSO is not specified, the user will be shown a NEXUS login dialog, to enter their NEXUS credentials.

The format of the databases.xml file is:

```
<databases Force="[force restricted?]" AdministratorEmail="[email]" allowedExtensions=
↳ "[list]">
  <database server="[server name]" name="[DisplayName]" database="[database name]"
↳ NetworkPath="[backup path]" SkipValidation="[skip validation?]" />
</databases>
```

Force: determines whether users are restricted to only being able to connect to databases listed. If Force is Yes, they will be so restricted; if Force is No, users can use the *Database* → *Connect* menu to choose a different database to connect to. Force defaults to Yes.

AdministratorEmail: the email address shown when users attempt to connect to a database that they don't have access to.

allowedExtensions: a list of file extensions that can be launched by the user e.g. from library items. Defaults to "doc;docx;xls;xlsx;jpg;png;jpeg;bmp;tiff;gif;mpg;mp3;wav;ppt;pptx;txt;pdf;emf;zip;dwg;avi;rtf;mp4;csv;wmv".

If allowedExtensions includes a blank extension (e.g. "doc;docx;") then users can launch library items that are just folders (e.g. "C:\myfolder"). These will be opened in Windows Explorer. A single trailing semicolon in allowedExtensions is insufficient — you must use two, or use two at some other point in the string, e.g. "doc;;docx".

Server: Full SQL server name including instance. e.g. .\sql2012 or sqlserver\sql2012 or . or sqlserver (for the default instance).

Name: Friendly name shown to the user when connecting.

Database: Physical database name.

NetworkPath: provides the path required for the user to perform a database backup. The SQL Service user account needs read/write permissions on this Network share. The users performing backups also need read/write permissions.

SkipValidation: if Yes, NEXUS will not attempt to verify the NetworkPath. This means that non-admin users can still carry out backup and restore operations.

Here's an example file:

```
<databases Force="Yes" AdministratorEmail="support@nexusic.com" allowedExtensions=
↪ "doc;xls">
  <database server="." name="Client Database 1" database="Database1" NetworkPath=
↪ "C:\Backups"/>
  <database server="." name="Client Database 2" database="Database2" NetworkPath=
↪ "C:\Backups"/>
  <database server="." name="Client Database 3" database="Database3" NetworkPath=
↪ "\\server\backupfolder" SkipValidation="Yes"/>
</databases>
```

14.1.8 Troubleshooting

Initial connection to a new database server can stumble at various points. Network connectivity might be a problem, or a firewall might be preventing access, or the database server might not be configured to listen for network connections, or authentication might not be configured correctly.

Firewall 1

Windows firewall, by default, blocks everything. If it is safe for you to turn off the firewall on the database server machine while troubleshooting connectivity issues, you should do so. (If there are several problems, you must have all the problems fixed simultaneously to succeed.) Then, once you have succeeded, configure the firewall to allow SQL Server, and turn it back on.

On the database server machine, to turn the firewall off, go to Control Panel. (On Windows 10, be sure to go to Control Panel, not Settings.) Look for **Windows Firewall**. (There is a search box at the top right — you can type "firewall" into it.) Click it. At the left, you will see **Turn Windows Firewall on or off**. Click this. For each of several locations you see here, select "Turn off Windows Firewall (not recommended)". (Note that you should not do this if you believe that you are connected to a network that might contain anything malicious.) Click **OK**. Remember that later you will need to turn these back on (or at least back into the state you found them in).

Network Connectivity

On the machine running NEXUS IC, open a cmd prompt. (Click the Windows **Start** button, type `cmd`, press Enter.) Ping the database server machine:

```
ping machinename
```

or:

```
ping ipaddress
```

If the machine responds, this is good: it means that you have basic connectivity to the database server machine. If you see “request timed out”, you do *not* have connectivity. See your local TCP/IP guru for assistance.

Anti-virus

If you are using a third-party firewall, anti-virus, anti-malware, “optimiser”, “cleaner”, etc. product, we recommend disabling it while troubleshooting. (Windows Defender is fine.)

SQL Server Configuration Manager

On the database server machine, open Computer Management: click the Windows **Start** button, type `manag` and click on **Computer Management**. In the tree at left, expand **Services and Applications**. You should see one or more entries for **SQL Server Configuration Manager**. (There will be more than one if you have more than one SQL Server installed on this machine.) Fully expand each of these (for example by clicking on each one and then pressing the numeric * key on the keyboard). (Size the window larger as required.)

For each entry that mentions “Protocols”, click on it. Ensure that “TCP/IP” is set to Enabled in each case. (Right-click and choose **Enable** as necessary.)

If you enabled any, you will see a message telling you that you’ll need to restart the service. Once you’ve gone through the list, if you enabled any, click on **Services** in the tree at the left. Scroll down to SQL Server in the list. (You may need to set the Name column wider.) (You may have several SQL Servers in the list.) Right-click on each and choose **Restart**. (Note that this may interrupt any users who were using those database servers.)

Allow remote connections

In SQL Studio, right-click on the database server name in the Object Explorer at the left. Choose Properties. Go to the Connections page. Ensure “Allow remote connections to this server” is ticked. (It is ticked by default, so you’re just checking that no-one’s changed it.)

No default instance

If your SQL Server is set up with an instance name like “SQLEXPRESS”, “SQL2012”, etc., and does *not* have a “default” instance (i.e. one without an instance name) then when requests come in on the default port (1433), none of your instances may be listening. You can fix this by re-installing the database server as the default instance, by installing an additional database server as the default instance, or by reconfiguring the ports your existing server instance is listening on:

<https://docs.microsoft.com/en-us/sql/database-engine/configure-windows/configure-a-server-to-listen-on-a-specific-tcp-port?view=sql-server-2017>

Firewall 2

Configure the firewall to allow inbound connections to your SQL Server executable(s):

<https://docs.microsoft.com/en-us/sql/sql-server/install/configure-the-windows-firewall-to-allow-sql-server-access?view=sql-server-2017>

<http://go.microsoft.com/fwlink/?LinkId=94001>

Permissions

Set up permissions on the Database Server

Firewall 3

Now that you have fixed your connectivity issues (hopefully) or have temporarily admitted defeat and are returning to a secure state, it's time to turn the firewall back on. Once again, go to Control Panel, then to Windows Firewall. At the left, you will see **Allow a program or feature through Windows Firewall**. Click it. If there is a button marked **Change Settings**, and it is enabled, click it.

Click **Allow another program...** Click **Browse**. Browse to the folder that contains your sqlservr.exe. This might be a path like `C:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL\Binn`. This path may vary with your SQL Server version. In particular, x86 versions will be in "Program Files (x86)". Select `sqlservr.exe` and click **Open**. Click **Add**.

The list of allowed programs and features should now contain an entry like "SQL Server Windows NT - 64 Bit" (or similar). There may be two or three columns to the right of it, with checkboxes for Domain, Home/Work (Private), and Public (or just Private and Public). The process we have just stepped through should have ticked the required boxes.

Now click **Turn Windows Firewall on or off** and turn the firewall back on for each of the several locations. Check that you still have database connectivity: in NEXUS IC click *Database* → *Close*, then *Database* → *Reopen* and ensure the database can still be connected to.

A guide to setting up NEXUS IC on-premise, including best practice security recommendations:

1. Ensure that the minimum *Hardware and Software Pre-Requisites* are installed and available
2. Create required *Active Directory Groups & Service Accounts*
3. Set up the *Backup Folder*
4. *NEXUS Software Installation*
5. *Set up permissions on the Database Server*
6. Set up the NEXUS single sign-on accounts. Refer to *Security* section for instructions on *SSO* configuration.
7. Optionally set up a *Deployment Configuration File*.
8. If you run into problems, see the *Troubleshooting* guide.

14.2 Technical Information

14.2.1 Command-Line Switches

You can launch NEXUS IC with various command-line switches. The NEXUS IC executable is named 'IntegrityCentre.exe'. This can be useful when launching NEXUS IC from a Windows Explorer shortcut, or when configuring a RemoteApp icon.

Screen

If you use a command-line switch beginning with '-dock=' and ending with a screen name, NEXUS IC will launch with that screen open. Valid screen names are 'Dashboards', 'Assets', 'Library', 'Planning', 'Workpacks', 'Inspection', and 'Anomalies'. They are case-insensitive.

Example usage to launch the Anomalies dock:

```
IntegrityCentre -dock=Anomalies
```

Disable Single Sign-On

If you have previously logged in to a NEXUS database using domain credentials, then on subsequent runs you will be automatically logged in again with those credentials. You can either select *Database* → *Close*, or you can run NEXUS IC with the command-line switch '-DisableSSO'.

Usage:

```
IntegrityCentre -DisableSSO
```

Disable Library screen and Export Repository menu item

You can use command-line switch /iad to prevent NEXUS IC displaying the *LIBRARY* screen or *Database* → *Export Repository*.

Backup and Restore

You can use command-line switches to tell NEXUS IC to backup or restore a database. This may be useful, for example, for automated backups of a live database, or automated refreshing of a sandpit database.

Example usage for a backup:

```
IntegrityCentre /backup /sql=MySQLServer /db=MyDatabase /username=admin /  
↪password=admin /path="C:\Database Backups"
```

Example usage for a restore:

```
IntegrityCentre /restore /sql=MySQLServer /db=NewDatabase /path="C:\Database_  
↪Backups\MyDatabase.nexus-backup"
```

If you are overwriting an existing database, you must additionally supply credentials, to demonstrate that you have the appropriate authority to overwrite:

```
IntegrityCentre /restore /sql=MySQLServer /db=NewDatabase /path="C:\Database_  
↪Backups\MyDatabase.nexus-backup" /username=admin /password=admin
```

Debugging and Tracing

NEXUS IC logs information to a file called `IntegrityCentre_Trace.log` located in:

```
C:\Users\[USER_NAME]\AppData\Roaming\NEXUS
```

You can control how verbose that logging is with any of the following switches: ‘-error’, ‘-warning’, ‘-informational’, ‘-debug’, ‘-debug1’, ‘-debug2’, ‘-debug3’, or ‘-debug4’. These are ordered here from least verbose to most verbose. The default is ‘-informational’.

Example usage to log informational messages:

```
IntegrityCentre -informational
```

Example usage to log debug, informational and warning messages:

```
IntegrityCentre -debug
```

Example usage to log error messages and everything less verbose:

```
IntegrityCentre -error
```

Note that you should only use debug switches if instructed to do so by Wood technical support, as they can significantly impact performance. If you start NEXUS IC with a debug switch, you will see a dialog reminding you of this.

Launching with credentials

Logging in with predefined username and password.

Example usage for login:

```
IntegrityCentre /dbuser=username /dbpass=pA55w0rd
```

If, in the *Database → Connect* wizard you have selected “Specific Windows / Domain User”, the dbuser and dbpass you specify will be passed to SQL Server as domain credentials.

If you would like to connect to the database using SQL Server Authentication, then use the /sqlauth switch along with the username and password. Example usage for login:

```
IntegrityCentre /dbuser=username /dbpass=pA55w0rd /sqlauth
```

The user will still be given a login prompt allowing them to provide NEXUS credentials, which will determine which NEXUS user account will be used to identify any changes they make to the database.

14.2.2 Database Schema Diagram

[Click to download a copy of the latest core database schema diagram pdf](#)

Change History

8.209

- Added Comp_Type.Category
- Added Action.Is_Due
- Added Anomaly.Assigned_To_ID
- Renamed Anomaly.Created_By to Anomaly.Created_By_ID
- Added Anomaly.CV_ID

8.208

- Added Report_Schedule.SU_ID

8.207

- Increased Session.IP_Address to 45 characters

8.206

- Added Security_Hash.Session_ID

8.205

- Added Visible and Order (IC-Inspector) to Field Definition as passthru
- Changed Personnel.Email to be 254 characters
- Added Category to Scenario
- Added RBI_Model_Comp_Type table
- Added Filter_Order to Workflow_Filter

8.204

- Added Server_Job table
- Added Est_Timing_FD_ID and Requires_Shutdown_FD_ID to LTIP_Task
- Added Allow_Adhoc to LTIP_Task
- Added Enabled to Workflow
- Added LinkTD_ID to Field_Def
- Added Include_Timestamp to Report_Schedule

8.201

- Increase Workpack.Abbreviation to 15 characters

8.199

- New chart series types
- Added Function_Definition.ReadOnly
- Added Approval.Link_ID
- Added Active_Inspection.Is_Inspecting

8.198

- Increased size of Library.Name to 100 characters

8.196

- Added Layer.Auto_Layer_Id

8.195

- Added Expert_System.Signature
- Added Expert_System_Row.Manual
- Added Task.Retasked_Same
- Added Task.Is_Held

8.194

- Added Form_Caption, Visible_Mobile, Mobile_Order and Mobile_Caption to Field_Layout
- Added LTIP.WPG_ID and LTIP.Revision_ID
- Added Series.Opacity
- Added Chart.Available
- Added Layer.Relative_Asset
- Change Action.Created_By and Assigned_To to FK's to Personnel
- Added Table_Def.Allow_History
- Added Finding.Status
- Added LTIP_Task.Instructions_FD_ID
- Added Bound.Include_Bounds
- Added Report_Schedule.FD_ID
- Added Overlay_Value.Legend_Order
- Added Finding.Finding_Number
- Added Finding.Has_Comments
- Added Export_System, Expert_System_Row, and Expert_System_Version tables.

8.193

- Added Table_Def.Auto_Calculate field

8.191

- Added Keepalive to Report_Schedule

8.188

- Added Field_Def.Require_Unique and Field_Def.Unique_FD_ID
- Added Task.Reference_Number
- Added Line Weights for Series
- Added Planning Task.Asset_Location

8.187

- Added Library.Force_2D
- Added Bound.Date_From, Bound.Date_To

8.186

- Added Workflow_Item_Input.Attribute_Name
- Added Approval, Approval_Note and Approval_Field tables
- Added Client.Secondary_Logo

8.185

- Added Asset_Location to Task, Finding, Event, Anomaly
- Added Asset_Location to Library_Conn
- Added Asset_Location to Component
- Added RS_ID to Report_Template, and Report_Status table
- Added Unit.Description
- Added Workpack.Event_Count

8.184

- Added Report_Schedule.Status

8.181

- Removed Report_Template.IsWelcomePage
- Renamed Report_Template.IsDashboard to Is_Asset_Dashboard
- Added Chart.Show_X_Axis_Title and Chart.Show_Y_Axis_Title

8.180

- Renamed function GetDate to 'Current Date/Time', added 'Current Date'.
- Removed Range Event Type.

8.179

- Removed Report_Template.Last_Generation_Time
- Added new Report_Generation table.

8.178

- Added FP_ID to Workflow_Item_Input.

8.177

- Changed Report_Part.Name to 200 characters.
- New calculated fields for Library_Conn and Library.

8.176

- Added Allow_Adhoc (bit) to Task.
- Added Adhoc_Complete (bit) to Task.
- Added Report_Favourite table.
- Added Dashboard_Report (bit) to Report_Template.
- Added Supports_Dashboard (bit) to Report_Part_Type.
- Added Schedule_Repeat table.
- Added Report_Schedule table.

8.174

- Added Map_Server table.

8.173

- Added Expiry (datetime) field to Repository_Data table.
- Added Text_Align table and TA_ID (int) field to Field_Layout table.
- Added Allow_Add (bit) to Form_Page table.

14.2.3 Software Based Licensing

Software based licensing is supported in v6.2 and higher. The NEXUS application contacts the software license server using the standard HTTPS protocol. All information is encrypted in transit between your computer and the NEXUS License Server.

Upgrading from HASP to Software Based Licensing

In order to change from the physical HASP based license protection to the new software based licensing system:

1. Contact support@nexusic.com to create a software license key for your organisation. This will be a 13 digit key and will be emailed to you.
2. Disable the existing NetHASP dongle/key by renaming the NETHASP.ini file (this is located in the same folder as the integritycentre.exe).

Authenticating the Software Based License

- Launch NEXUS.
- When you connect to the database the first time, you will be prompted to enter the license key. This is in the *Database* → *Properties* → *License* dialog, then click on **Request License**.

The screenshot shows the 'Properties' dialog box with the 'License' tab selected. The dialog contains several input fields: 'License Key: (?)', 'Type:', 'User Count:', 'Expiry: (?)', and 'Request:'. The 'Request:' field contains a button labeled 'Request License', which is highlighted with a red rectangular box. Below the input fields is a section titled 'Named Users' with a table showing license usage for different modules.

Module	Used	Available	Total
NEXUS IC		...	
IC-Web (Read/Write)		...	

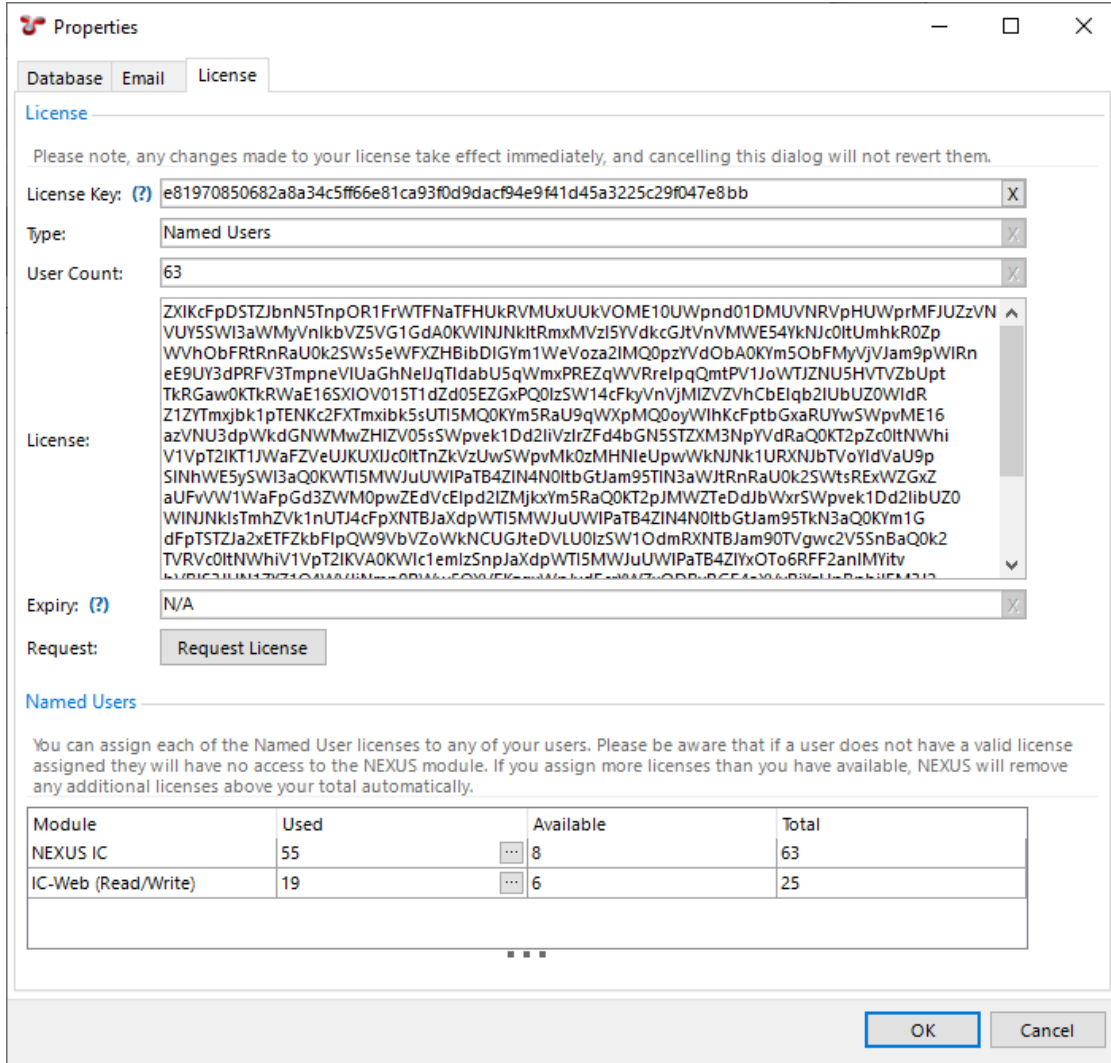
At the bottom of the dialog are 'OK' and 'Cancel' buttons.

NEXUS then communicates with the **NEXUS License Server** via the internet and retrieves license information associated with your implementation including:

- Server Name
- Database Name

- License type
- Number of concurrent licenses available to your organisation
- [GRACE PERIOD] in days. This defaults to 30 days.

This information is then stored (encrypted) in the database, and is shown here:



Subsequent License Validations

What if...

No one launches NEXUS for more days than the grace period?


The next time NEXUS is launched, it will contact the **NEXUS License Server** to authenticate and re-set the grace period.

Each time a user launches the NEXUS application, it will contact the **NEXUS License Server** to authenticate the license stored in the database against the license issued from the server. Upon successful connection and authentication the grace period is re-set.

If NEXUS is unable to contact the **NEXUS License Server** for some reason (external internet connection is not available for example), then NEXUS will still run providing the license has been authenticated within the last [GRACE PERIOD] days.

If there are issues with license renewals, see *Troubleshooting*.

Named Users

If you are using Named Users licensing, a Named Users section will appear at the bottom of the window. You will need to click the  button in the Used column and assign a NEXUS IC license to at least one user. Users who are not selected will get a message saying that they are not authorised. This includes the user account that you are logged in under when you set up this license.

If you assign more licenses than you have available, NEXUS will remove any additional licenses above your total automatically.

Re-authentication

The only circumstances under which re-authentication is required is when the database name OR the database server name is changed.

Note: Your validation is tied to your database server name. If the database server name changes, the license will show as invalid. This can happen if you have two different client executables (NEXUS IC, IC-Inspection, etc.) connecting to the same server under different names. For example, one might be connecting to a server named “.” while the other is connecting to a server named “127.0.0.1” or “localhost” or “192.168.0.1” or “databaseservername”. If this happens, ensure that all clients are using the same database server name, and validate the license again.

Offshore use

Software licensing is designed with offshore use in mind. A couple of things to be aware of:

- If your offshore spread is not connected to the internet, before you leave internet range you should connect a single workstation to the internet (e.g. by hotspotting it to a mobile phone), and start NEXUS IC on that workstation. That will allow NEXUS IC to validate the license. This will ensure that you have your full grace period. If you will be out of internet contact for more than [GRACE PERIOD] days, please contact support@nexusic.com, and we will (normally) be able to temporarily increase your grace period.
- When you back up your database from one server and restore it to another, you will be asked to re-validate the license, and you will need to temporarily connect a workstation to the internet to do this. Typically this occurs during mobilisation, but may also occur in case of catastrophic failure of the primary database server. (Complete failure of a database server is rare.)

Troubleshooting

“Only X days left in grace period” warning when using Windows 7

When using Windows 7, the license grace period cannot be authenticated and reset because TLS 1.0 and SSL 3.0 are required by NEXUS IC, but not enabled by default on Windows 7. This will cause a warning to appear with the number of days left until the user’s license expires.

To enable grace period renewal, you will need to manually enable TLS 1.0 and SSL 3.0. Follow the steps [here](#).

14.2.4 NEXUS Administration Tasks

The following sections describe common administration tasks around the deployment and maintenance of NEXUS IC.

Regular Backups

Daily scheduled SQL backups should be performed by an SQL Maintenance job. Retention policy is at your discretion.

Ad-hoc Backups

Standard NEXUS users can take backups as and when required using *Database* → *Backup* menu item. Backups are recommended prior to imports or large scale database changes.

Database Restore

Database restores must be performed by the NEXUS SQL Admin. We recommend using the NEXUS application to perform database restore of the proprietary **.nexus-backup** (or **.aimbak** for older versions) files. If restoring from the daily backup then restore should be performed using SQL tools. Confirm that the User Group has [dbowner] permissions on any restored databases.

Restore a database

- **Set up a shared network folder** which is accessible to both the database server and to NEXUS IC. This may be a UNC path (like ‘\MyServer\MyShare’) or if the database server and NEXUS IC are running on the same machine it may be a Windows path (like ‘C:\Database Backups’). Copy the NEXUS IC database backup file into this folder.

Restoring the NEXUS IC Database to the SQL Server

You may not have sufficient permissions to create databases on the SQL Server, in this instance, you will need to engage with your SQL Administrator in order to restore the database using SQL Management Studio (or similar)

Add a user

There are two steps to adding a new user to the NEXUS database:

1. In Active Directory, add user to **NEXUS Users Group**
2. In NEXUS IC, go to *Database* → *Security* and add a new user, entering name and email address. On the **Login** tab use the SSO dialog to link the user to their AD account. (Alternatively there is an **Active Directory Import** option for SSO users). On the **Member of** tab, assign the user to the appropriate NEXUS Security group.

Edit a user’s NEXUS permissions

In NEXUS IC, go to *Database* → *Security* and on the **Member of** tab select the appropriate security group for the user.

Remove a User

Although it is possible in NEXUS we do NOT recommend deleting a user because this will delete all audit history associated with that user. To disable a user:

1. In NEXUS IC, go to *Database* → *Security* and edit the user profile. On the **Login** tab uncheck the **enabled** checkbox.
2. In Active Directory, remove the user from the NEXUS Users Group (or disable the user account).

Refresh or Update Software License

If the database name or SQL server name change then the NEXUS licensing will become invalidated. To refresh the license navigate to *Database* → *Properties* and the **License** tab. Enter the unique license key, overwriting whatever text is presently there. Press the **Request License** button. License information will be retrieved over the internet within a minute or so.

14.2.5 REST Service Specifications

The REST service provides a API with the ability to add, edit, get and delete information stored in a NEXUS IC database. These REST service ensures all request are made through the NEXUS Storage engine which allows security and cohesion to be maintained and respected within the NEXUS database data.

Usage

```
ICWeb.dll/web/?requestType=REQUESTTYPE [&hash=HASHTOKEN] [&extra_options=EXTRA_OPTIONS]
```

Required Parameters

- **requestType** - The type of request
- **hash** - A valid pre-authenticated security token is required for every request except RequestType=getSecurity requests.
- **extra_options** - Are optional additional settings which can be used to change, filter or may be required for certain request types. (see Specific Parameters for RequestTypes below)

requestType

This is a string, it specifies the REST request type. Valid options for this are as follows:

- **getSecurity**: this is used to authenticate a username and password and get a security token for future requests.
- **setSecurity** : this is used to change an already authenticated users password.
- **getData** : this is essentially the same as a Select query on a NEXUS IC metatable
- **setData** : this is essentially the same as an update query on a NEXUS IC metatable.
- **insertData** : this is essentially the same as an add query on a NEXUS IC metatable.
- **deleteData** : this is essentially the same as a delete query on the NEXUS IC metatable.
- **getTrafficLight** : this is used to get traffic light specific requests
- **getChart** : this get either the chart list if no extra parameters are sent with this request or the chart data itself

- `emailData` : used to email Library items to the current user. **[Deprecated - use *Get Repository Item*]**
- `getObject` : used to just return a metatable's `metaData`, rows will always be empty.
- `getVersion` : returns the version and schema for the NEXUS database. This requires no parameters and doesn't require authentication

hash

In is a hash token provided to the user and used in order to prove credentials are valid for subsequent requests. The hash is generated on the server and will expire after 60 minutes of inactivity. To get a hash token you must perform a `requestType=getSecurity` request. When performed if the request is successful the result will contain valid hash token which can be used to prove credentials on all subsequent requests.

Specific Parameters for RequestType

For each type of request, there are a set of valid parameters to allow NEXUS to process the request correctly.

setData

- `metatable` : the `Table_Def` "Name" field string or the `TD_ID` value of the Table from `Table_Def`.
- `filter` : is a JSON object string used to return only a filtered subset of data from a metatable (further details below). This must ensure that only one row is returned. If your filter returns multiple rows, you will get back an error saying "More than one result".
- `rows`: JSON array containing the data to update the row with. The format of the value of each row is determined by the `metaData` part of any request to this metatable.

getData

- `metatable` : the `Table_Def` "Name" field string or the `TD_ID` value of the Table from `Table_Def`
- `filter (optional)` : is a JSON object string used to return only a filtered subset of data from a metatable (further details below)
- `sortJson (optional)`: is a JSON object with property attribute which is the field to sort on, and direction attribute which is ASC or DESC, of the data set returned
- `start (optional)`: the row from which to start returning data from
- `limit (optional)`: the number of rows from the starting row for which to return data
- `resultFormat (optional)`: the type of object the requester wants returned (defaults to JSON)
- `maxSize (optional)`: Used in conjunction with `resultFormat=thumbnail` argument to specify the max size (either height or width depending on source aspect ratio) of the thumbnail image returned
- `addAigData (optional)`: special request used to get multiple AIG associated with Components, specifically used for the Child screen in IC Web -> Asset -> Children panels

insertData

- `metatable` : the `Table_Def` "Name" field string or the `TD_ID` value of the Table from `Table_Def`
- `rows`: JSON array containing the data to be inserted, supports multiple rows. The format of the value of each row is determined by the `metaData` part of any request to this metatable

```
[
  { "TD_ID": 336, "Workpack_ID":3, "Workpack_Name": "2015 ROV" },
  { "TD_ID": 335, "Workpack_ID":2, "Workpack_Name": "ESDT" }
]
```

deleteData

- metatable : the Table_Def “Name” field string or the TD_ID value of the Table from Table_Def
- filter : is a JSON object string used to return only a filtered subset of data from a metatable (further details below)

getTrafficLight

- trafficLightKey : Set the traffic light id to either pull Component data or legend data
- componentIds (optional): If set the request will return traffic light data if blank it will return the legend data

getSecurity

- username : Specifies the username for authentication
- password : Specifies the password for authentication

setSecurity

- password : Specifies the password for authentication
- newPassword : Used to set a new password value for an already authenticated user

getChart

- chartId (optional): The chart id of the chart you want from the list of charts. chartId and rowId are required for chart data.
- rowId (optional): he currently focused row’s primary key. chartId and rowId are required for chart data

emailData (Deprecated)

- metatable : the Table_Def “Name” field string or the TD_ID value of the Table from Table_Def.
- filter : is a JSON object string used to return only a filtered subset of data from a metatable (further details below). This filter must ensure only one row is returned. If your filter returns multiple rows, you will get back an error saying “More than one result”.

getObject

This is identical to “getData” request but returns no rows. Its primary use is to retrieve the metaData for a NEXUS metatable.

getVersion

No parameters

Filter

Filters are a JSON array, each array item consists of a JSON object with either 1 or 2 elements. There must be an element called “method” and depending on the method value it may be necessary to have a second element called “params”. The filter is made up one or more these objects, these represent a pseudo SQL where statement and allow you to build complex queries to return data.

Examples

```
[
  {
    "method": "where",
    "params": {
      "field": "Workpack_ID",
      "compareType": "ctGreaterEqual",

```

(continues on next page)

(continued from previous page)

```

        "value": 353
      }
    }, {
      "method": "and"
    }, {
      "method": "isNull",
      "params": {
        "field": "Name"
      }
    }
  ]

```

Filter Method Types

The method element determines the type of this filter item

- **where** This is a normal condition check and requires the params `FieldName`, `CompareType` and `FieldValue` to be specified.
- **and** combines conditions requiring left and right to be true.
- **or** combines conditions requiring either the left or the right to be true.
- **openNesting** Represents a leading bracket i.e. "(" and does not require a params attribute.
- **closeNesting** Represents a trailing bracket i.e. ")" and does not require a params attribute but can only be present if there is a preceding `openNesting`.
- **not** The inverse of the next defined valid filter object (where, isnull, isnotnull) in the array and does not require a params attribute.
- **isNull** True if the field's value is null, requires param `FieldName` to be set.
- **isNotNull** True if the field's value is not null, requires param `FieldName` value to be set.
- **sort** Sorts the result set by the fields specified - Requires field and value parameters; value is either "ASC" or "DESC". Sort can also be done as a separate request arguments - see "Sort" below.
- **distinct** Ensures the result set contains unique rows. No parameters required.

Methods available for View_Node

`View_Node` is used for the asset tree and as such has 2 special commands which can be used on it:

- **childrenOf** Returns all child assets of selected item in viewnode, params must have the `FieldName` = "VN_ID" and `FieldValue` needs to be set to the object you want to find the children of
- **parentOf** Returns all parents assets of selected item in viewnode, params must have the `FieldName` = "VN_ID" and `FieldValue` needs to be set to the object you want to find the parents of

Params

Params is a JSON object containing 1-3 attributes. Allowed attributes are: "field", "comparetype", "value":

```

{
  "field" : "Name",
  "compareType" : "ctEqual"
  "value" : "Test Value"
}

```

Params is only sometimes required depending the method called - see Methods types above

field

Specifies the NEXUS metatable field on which you wish to perform the filter on. It must be an alphanumeric string in quotes and match a field name in the NEXUS schema.

value

This is a single value or array of values, this can be of type alphanumeric, number, float, boolean. The type of value specified must match the underlying type of the field.

Dates are represented as strings and must be formatted in 24 hour time in the following format: `yyyy/mm/dd hh:mm:ss`.

Boolean are either “true”, “false” or “null”.

If the `compareType` is `ctIn` then the value may also be an array of integers.

compareType

`CompareType` actually relates directly to the NEXUS Metatable type `TCompareType`. It can be any of the following:

- **ctEqual** For when `FieldName = FieldValue`
- **ctLess** For when `FieldName` is less than `FieldValue`
- **ctGreater** For when `FieldName` is greater than `FieldValue`
- **ctLessEqual** For when `FieldName` is less than or equal to `FieldValue`
- **ctGreaterEqual** For when `FieldName` is greater than or equal to `FieldValue`
- **ctLike** For when `FieldName` is like `FieldValue` - NB `FieldValue` can contain SQL wildcard character ‘%’
- **ctIn** For when `FieldName` is contained with `FieldValue` - NB in this case `FieldValue` is a JSON array of integers

sort

Usage:

```
sort=[{"property": "FIELDNAME", "direction": "ASC|DESC"}]
```

FIELDNAME : = a field in the NEXUS metatable that you want to sort on. **ASC|DESC** : the sort direction either ‘ASC’ or ‘DESC’ for ascending and descending respectively.

Ie `ICWeb.dll/web/?requesttype=getdata&metaData=Header&sort=[{"property": "Northing", "direction": "ASC"}]` returns all Header business object data and sorts it ascending on the Northing field.

start and limit

If you have a large data set returned it can be beneficial to get just a subset of rows from the data. You can do this by appending the URL variables `start` and/or `limit` to any of the requests listed above:

```
start=x  
limit=y
```

Where `x` and `y` are numbers

- `x` = the start row (with 0 being the first row)
- `y` = the maximum number of rows to display starting from `X` (0 = all rows)

e.g.

`ICWeb.dll/web/?requesttype=getdata&metaData=Header&limit=200` – will return Header data from the first row entry to the 200th entry

`ICWeb.dll/web/?requesttype=getdata&metaData=Anomaly?start=20&limit=50` – will return rows 21 to 71 of the Anomaly table

If you request a start value above the number of data rows available you will get an empty array. If you request a limit higher than is the remaining rows from the start row you will get all the remaining data, starting from the start value. By default start and limit are 0 so if not defined this returns all data rows.

resultFormat and maxSize

Format type can be set if you wish for something other than JSON to be returned. Allowed types are as follows:

- **json** - This will return a JSON text object and is the default if the format argument is left off.
- **icon** - This will specify the icon image used in `Comp_Icon` or `Boolean_Value` table
- **image** - This will return a single image or binary file
- **binary** - Same as image
- **thumbnail** - This is the same as image but returns a max 200 pixel thumbnail of the image file. You can include “MaxSize” parameter with this request which will change the max size to something other than 200 pixels.

If request type image or binary you can supply an option parameter “imagefield” - this contains the fieldname in the NEXUS metatable that contains the image data. If imagefield is left off the request then the NEXUS metatable must contain a field called “UNC” which contains the image or binary data (i.e. the Repository metatable).

trafficLightKey and componentIds

`trafficLightKey` is the unique Traffic Light ID used to indicate which traffic light system the requester wants data about. `TrafficLightKey` is required for any `requestType=getTrafficLight`. If the `ComponentIDs` parameter is also set in the request then the request returns all Traffic Light data values for those `componentIds` will be returned. If omitted then the Traffic Light Legend data is returned instead. `componentIds` is a `jsonArray` string

Authentication

Almost all requests can only be performed once a user is authenticated. The user is authenticated by performing a Request “`requestType=getSecurity`”. In order for that authentication request to be successful you must pass in a “username” and “password” parameters. If the values of these 2 parameters matches values in the database a unique hash token will be returned back to the requester. From that point on, all requests requiring authentication should then use the returned hash token as the value of the “hash” parameter in subsequent requests. You can also change your password via the `setSecurity` requestType. To do this you must first authenticate. Once authenticated then are required to send a request with `requestType=setSecurity` which must include a authenticated hash, your existing password as a “password” parameter and the new password in a “newPassword” parameter. If successful you will get a success response back. See [getSecurity](#) above.

Tip: If Single Sign On (SSO) is enabled on your account your username must be in the format `username@domain`. e.g. - `joe.bloggs@mycompany.com`

Returned JSON results

The results returned from a query have a number of attributes. “Success” is a boolean and is always returned it will be true if the request was in the correct format. It will be false if the syntax or attributes passed have caused an error; if it is false there will also be a “msg” attribute returned with the error message. e.g.

```
{
  success: false,
  msg: "Unknown meta table "Ta". Could not find table name in meta tables."
}
```

Successful results are returned with the success attribute, a metaData attribute, RowCount attribute and Rows attribute. Please note that RowCount will return the total number of results available not the total number returned in the JSON. This is because you can use the “limit” to return less than all results (see *Starting Row and Limit* above).

rows

rows is an array of all the values returned from the data base, if no results are found it will be an empty array. Each element in the Rows array is a JSON object containing a “value” attribute and possibly a “display” attribute. Value is the raw data from the database and will always be present, Display will be present if it is different from the value. Display is used for things that are lookups into other sections of NEXUS. For example if your results return Component_ID this is the Unique ID of a single component in the database but the Name of that component is more useful to the users so as a result the data will be returned like this:

```
"rows" : [{
  "Component_ID": {
    "value": 364,
    "display": "Tanks"
  },
  "CT_ID": {
    "value": 21,
    "display": "Pressure Tank"
  }
}, {
  "Component_ID": {
    "value": 369,
    "display": "Wharf 22"
  },
  "CT_ID": {
    "value": 52,
    "display": "Temporary Wharf"
  }
}]
```

This allows you to display user friendly names to users but also gives you the true value if this is a primary or foreign key to perform future queries on a selected item. This is useful as you need to use “value” value if you wish to use this field in a filter. IE - using the example above if you wanted all results where the CT_ID = “Pressure Tank” you would need to use 21 as the “value” in your filter request for CT_ID not the “Pressure Tank”.

metaData

The Metatable attribute contains information describing the data returned. It contains the following properties:

- “defaultField” : this is the name of the field whose value you can use to display to represent the entire row’s data as a single entry.
- “totalProperty” returns the value of the Counter of the number of rows returned (this is mostly for ExtJS and is likely to disappear in future revisions)
- “root” show the attribute which contains the data values - again this was for ExtJS and is likely to disappear in future revisions
- “fields” contains an array of every field that will be returned and includes information about those fields. See below.

fields

Fields have the following attributes:

- **FieldName**: This is the field name
- **FieldTitle**: This is the User friendly field name or the displayable name for things like fields or column title
- **Comments**: User defined comments about a field - can be used in tool tips
- **FieldType**: This is an integer representing what data type the field is stored in; see below for a list of types
- **FieldSize**: When displayed in NEXUS this is the size of the field used in characters
- **EditorType**: This is an integer representing what data type the field is shown as when it is being changed. Not used yet.
- **IsForeignKey**: Boolean if this links to another Table in NEXUS
- **IsPrimaryKey**: Boolean if this is the tables primary key field
- **Format**: the data/time format if applicable
- **DefaultFormat**: the data/time format if applicable
- **DisplayFieldType**: This is an integer representing what data type you should display this data as; See below for a list of types
- **Category**: Data is sometimes lumped into groups for display. If set this will contain the name of the group this field belongs to
- **CategoryColumns**: How many columns this category has.
- **CategoryAlignTop**: not implemented yet
- **FormOrder**: Integer describing the order of the field in the form
- **FormColumns**: The number of fields per line to display if displaying as a form
- **VisibleForm**: Boolean which indicates if this fields should be shown or hidden from the user on a form
- **ShowCaption**: If a caption should be shown
- **GridOrder**: Integer describing the order of the field in the grid
- **BlankText**: The default value to display if it is a blank field
- **VisibleGrid**: Boolean which indicates if this field should be shown or hidden from the user on a grid
- **AllowImport**: not implemented yet

- **AutoValue:** If this is auto incrementing field (mostly used for primary keys)
- **HasDefaultValue:** If this field has a default value.
- **PreventEditing:** not implemented yet.
- **UpperValue:** If a numeric value this contains the highest value this number can be
- **LowerValue:** If a numeric value this contains the lowest value this number can be
- **Link_ID:** For Passthru fields, contains the Table_Def key for the table this links to.
- **FD_ID:** The Unique Field ID of this field in the NEXUS system
- **LL_ID:** The Lookup List ID if this field is a NEXUS Lookup List field
- **Required :** If the field is a required field
- **BooleanType :** If the field is a boolean field type
- **GridCaption :** The caption to display for the column when in a grid.

FieldType and DisplayFieldType values:

- 1 : Alphanumeric
- 3 : Whole Number
- 5 : Boolean
- 6 : Numeric
- 7 : Currency
- 9 : Date
- 10 : Time
- 11 : DateTime
- 15 : Image
- 16 : Memo (long text)
- 17 : Guid
- 18 : Passthrough
- 37 : Lookup List
- 38 : Sub AIG
- 39 : Position Link
- 40 : Calculation
- 42 : Global Lookup

EditorType and DisplayEditorType values:

- 1 : Combo Box
- 2 : Radio Group
- 3 : Edit Box
- 4 : Number Edit
- 5 : Checkbox
- 6 : Form
- 7 : Grid
- 8 : Date

9 : Time
 10 : Date and Time
 11 : Calculated
 12 : Memo
 13 : Record Lookup
 14 : Graphic
 15 : Repository
 16 : Color Combo
 17 : Shortcut
 18 : Markup Point
 19 : Markup Line
 20 : Markup Region

Request Examples

Return all data from the Header metatable: *ICWeb.dll/web/?metatable=Header&requestType=getData&hash={9112936E-F2A1-4B64-BC71-90C0725A8004}*

Return all data from the Table which is defined in Table_Def with the TD_ID = 436:
ICWeb.dll/web/?metatable=436&requestType=getData&hash={9112936E-F2A1-4B64-BC71-90C0725A8004}&filter=[{"method": "where", "params": {"field": "TD_ID", "compareType": "ctEqual", "value": 436}}]

Return all data from header metatable where Workpack_ID is greater than or equal to 353 and Event_No is equal to 2:
ICWeb.dll/web/?metatable=Header&requestType=getData&hash={9112936E-F2A1-4B64-BC71-90C0725A8004}&filter=[{"method": "where", "params": {"field": "Workpack_ID", "comparetype": "ctGreaterEqual", "value": 353}}, {"method": "and", "params": {"field": "Event_No", "comparetype": "ctEqual", "value": 2}}]

Expanded out the filter JSON Looks like this

```
[
  {
    "method": "where",
    "params": {
      "field": "Workpack_ID",
      "comparetype": "ctGreaterEqual",
      "value": 353
    }
  },
  {
    "method": "and"
  },
  {
    "method": "where",
    "params": {
      "field": "Event_No",
      "comparetype": "ctEqual",
      "value": 2
    }
  }
]
```

Return all data from the Anomaly metatable where Component_ID is 353 and the KP is greater than 2, or Name has the string
ICWeb.dll/web/?metatable=Anomaly&requestType=getData&hash={9112936E-F2A1-4B64-BC71-90C0725A8004}&filter=[{"method": "opennested"}, {"method": "where", "params": {"field": "Component_ID", "comparetype": "ctGreaterEqual", "value": 353}}, {"method": "where", "params": {"field": "Name", "comparetype": "ctContains", "value": "string"}}]

Expanded the JSON Looks like this:

```
[
  {
    "method": "opennested"
  },
  {
    "method": "where",
    "params": {
      "field": "Component_ID",
      "comparetype": "ctEqual",
      "value": 353
    }
  },
  {
    "method": "and"
  },
  {
    "method": "where",
    "params": {
      "field": "KP",
      "comparetype": "ctGreater",
      "value": 2
    }
  },
  {
    "method": "closenested"
  },
  {
    "method": "or"
  },
  {
    "method": "where",
    "params": {
      "field": "Name",
      "comparetype": "ctLike",
      "value": "%pipeline%"
    }
  }
]
```

Return data from data from rows 53 to 57 of the Anomaly business objects where Component_ID is 353 and the KP is greater than 2
 ICWeb.dll/web/?metatable=Anomaly&requestType=getData&hash={9112936E-F2A1-4B64-BC71-90C0725A8004}&start=52&filter=[{"method":"opennested"}, {"method":"where","params":{"field":"Component_ID","comparetype":"ctEqual","value":353}}, {"method":"and"}, {"method":"where","params":{"field":"KP","comparetype":"ctGreater","value":2}}, {"method":"closenested"}, {"method":"or"}, {"method":"where","params":{"field":"Name","comparetype":"ctLike","value":"%pipeline%"}}

The filter expanded out :

```
[
  {
    "method": "opennested"
  },
  {
    "method": "where",
    "params": {
      "field": "Component_ID",
      "comparetype": "ctEqual",
      "value": 353
    }
  }
]
```

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```

},
{
  "method": "and"
},
{
  "method": "where",
  "params": {
    "field": "KP",
    "comparetype": "ctGreater",
    "value": 2
  }
},
{
  "method": "closenested"
},
{
  "method": "or"
},
{
  "method": "isnull",
  "params": {
    "field": "Name"
  }
}
]

```

Reports

Usage

```

ICWeb.dll/web/generateReport?key=KEY&format=FORMAT&recipient=EMAIL&hash=HASHTOKEN
ICWeb.dll/web/getReportParams?key=KEY&hash=HASHTOKEN

```

Description

The *generateReport* and *getReportParams* requests can be used to have NEXUS email generate and email a report to someone.

URL Parameters

- **key** - This is the report template id of the NEXUS report
- **format** - This is the file format the report will be in
- **recipient** - This is the single email address of the recipient to receive the report. (optional - if omitted will use the email address of the account making the request)
- **hash** - The authenticated hash token the server has provided you with from a *getSecurity* request

Format Specifics

format - Can be:

- rtf** - For rich text formatted file
- html** - For a zip containing hyper text markup language files
- xlsx** - For an Excel formatted file

Request Body Parameters

If a call to `getReportParams` returns any rows then the report requires parameters to be inputted from the user. These must be passed via the `generateReport` request in the body of the request in JSON format. The format of this JSON should be a JSON object containing an attribute for each report parameter. The attribute should have the same name as the “parameterName” returned from the `getReportParams` and the value of the element be either a single value representing the value or for multiselect report parameters it may be an array of integers.

Request Responses

`getReportParams`

`getReportParams` will return a JSON similar to the ones outlined above (See Returned JSON results). The fields returned in the `metaData` contain the following attributes:

- blankText** - Helper text for the user if the field is blank
- columns** - The number of columns this field takes up in a wizard form
- displayName** - The title of this report parameter to display to the user
- editorType** - The editorType (see EditorType above)
- fieldType** - The fieldType (see FieldType above)
- foreignTable** - If this field represents a link to another table, this will contain the name of the table this is linked to
- isNull** - If this can be null
- multiSelect** - If this value can be an array of multiple values
- order** - the order of this field in the report wizard
- parameterName** - the name of the report parameter.

The “rows” returned in the response will contain a single row with a element for each “parameterName” the value of each element will be last values a user used for this report.

`generateReport`

`generateReport` will simply return `{ "success" : true }` if success.

If not successful it will return an error response with an appropriate message.

Video List

Usage

```
ICWeb.dll/web/getVideoList?eventId=HEADER_ID&hash=HASHTOKEN
```


Description

This call returns JSON containing a list of video files associated with an event.

URL Parameters

- **eventId** - This is the Header ID of an event
- **hash** - The authenticated hash token the server has provided you with from a `getSecurity` request. See [Authentication](#)

Results

The resulting request returns the rows from the Video_File metatable in the same format as the `requestType=getData` format above.

Export Grid

Usage

```
ICWeb.dll/web/exportGrid?metatable=METATABLE&format=csv|txt&emailResult=true|false&
↪fields=FIELDS&filter=FILTER&hash=HASHTOKEN
```

Description

This call will return either a CSV or txt file containing the data of a metatable if a particular format is defined by the FIELDS parameter.

Required URL Parameters

- **metatable** - This is either a string or integer which is the NEXUS metatable name or Table_ID of a NEXUS metatable.
- **format** - This has to be either `csv` or `txt` depending on the format you want the returned file to be in.
- **emailResult** - A string begin either `true` or `false` representing a Boolean value. This indicated if you want the file returned or your want the server to just email the file and return if the email request was successful.
- **fields** - This is a string representing an array of ordered fields that you want included in the data. i.e. `&fields=["Name", "CV_ID", "Status"]`
- **hash** - The authenticated hash token the server has provided you with from a `getSecurity` request. See [Authentication](#).

Optional URL Parameters

- **filter** - A filter for the data included in the file. Format and use is identical to when you `getData`. See [Filter](#) above

Results

The resulting request can return 2 different responses depending on if emailResult = “true” or “false”.

- If emailResult = true and the request is successful the response returns a response with a status 200 with the text {success: true}.
- If emailResult = false and the request is successful the file will be return (either a CSV or TXT file depending on what is specified in the format parameter)

Note: the hash parameter will determine the user making the request and if you request the file be emailed then the requesting user must have an email address specified in their NEXUS account information or else you will get an error.

Get Repository Item

Usage

```
ICWeb.dll/web/getRepositoryItem?emailResult=true|false&filter=FILTER&hash=HASHTOKEN
```

Description

This call returns a repository item to the requester. It will be will return in the response or via an email depending on the setting of the *emailResult* parameter.

Required URL Parameters

- **emailResult** - A string beginning with either *true* or *false* representing a Boolean value. This indicated if you want the file returned or you want the server to just email the file and return if the email request was successful.
- **hash** - The authenticated hash token the server has provided you with from a getSecurity request. See *Authentication*
- **filter** - A filter to identify a single row from the Repository metatable. The filter must ensure that one and only one result is returned or else you will get an error. Format and use is identical to when you getData. See *Filter* above

Results

The resulting request can return 2 different response depending on if emailResult = “true” or “false”.

- If emailResult = true and the request is successful the response returns a response with a status 200 with the text {success: true}.
- If emailResult = false and the request is successful the repository file will be returned as the response.

Note: the hash parameter will determine the user making the request and if you request the file be emailed then the requesting user must have an email address specified in their NEXUS account information or else you will get an error.

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Version

Returns the current REST service version and Database schema.

HTTP Request

```
GET /icweb.dll/version
```

URI Parameters

None

Responses

Name	Type	Description
200 OK	<i>Version</i>	OK

Version

Contains the REST service version and database schema.

Name	Type	Description	Optional
version	String	Version and build of REST service.	No
schema	String	Database schema version	No

Example

Request

```
GET /icweb.dll/version
```

Response

```
{
  "version": "6.6.35223.0",
  "schema": "8.198"
}
```

Login

Validates the supplied credentials, and if valid returns a *hash* to be used on subsequent REST api requests.

HTTP Request

```
GET /icweb.dll/security/login
Authorization {type} {value}
```

URI Parameters

Name	In	Re-quired	Type	Description
type	Header	Yes	String	Style of authorization. This can be one of either BASIC, APIKEY, TOKEN.
value	Header	Yes	String	This is the base 64 encoded authorization key, it is a string containing username:password for BASIC, apiKey for APIKEY, or the emailToken for TOKEN.

Responses

Name	Type	Description
200 OK	<i>SecurityHash</i>	OK
401		An attempt was made to validate an invalid token/apiKey/username and password.

SecurityHash

Contains the temporary hash that can be used with subsequent REST api calls.

Name	Type	Description	Op-tional
hash	String	Temporary security hash, that can then be used in subsequent REST api requests, expires 60 minutes after last use.	No
id	Integer	Key associated with the user that this hash is associated with.	No
username	String	Username associated with the user that this hash is associated with.	No
license	String	Type of license the user has assigned to them. Possible values are 'write' or 'readonly'	No
allowPasswordChange	Boolean	True if this user's accounts password can be changed by the end user	No

Example

Request authentication via a users username and password.

Request

```
GET /icweb.dll/security/login
Authorization BASIC YWRtaW46cGFzcmQ=
```

Note 'YWRtaW46cGFzcmQ=' is the BASE64 encoded equivalent to the string 'admin:password'

Response

Response

```
{
  "hash":
  ↪ "E05DEB57605BA82CD1A0C130B38C7BC1415BA094B28D73B03577B7CAB438834E6B680B437C85A65CA796AB6E7DC854555
  ↪ ",
  "id": 4,
  "username": "admin",
  "license": "write",
  "allowPasswordChange": false
}
```

Logout

Invalidates the hash passed so that it can no longer be used for any subsequent requests.

HTTP Request

```
GET /icweb.dll/security/logout?hash={hash}
```

URI Parameters

Name	In	Required	Type	Description
hash	Url	Yes	String	hash to be logged out/invalidated.

Responses

Name	Type	Description
200 OK		OK
404		An attempt was made to invalidate an invalid hash.

Example

Invalidate a valid hash token.

Request

```
GET /icweb.dll/security/logout?
↪ hash=E05DEB57605BA82CD1A0C130B38C7BC1415BA094B28D73B03577B7CAB438834E6B680B437C85A65CA796AB6E7DC854
```

Response

200 OK

Business Objects

Retrieves information about a business object.

HTTP Request

```
GET /icweb.dll/bo/{tableName}
```

Additionally you can lookup a business object by it's key, this is useful when you only have the key from a `foreignTableId` field from within *BusinessObjectField*

```
GET /icweb.dll/boByKey/{keyValue}
```

URI Parameters

Name	In	Re-quired	Type	Description
tableName	Path	Yes	String	tableName of the business object to be returned
keyValue	Path	Yes	Integer	key value of the business object to be returned, this can be obtained from <i>BusinessObjectField</i> foreignTableId

Responses

Name	Type	Description
200 OK	<i>BusinessObject</i>	OK
404 Not Found		Business object with specified tableName was not found.

BusinessObject

The business object result type, describes a business object, henceforth referred to as meta table.

Name	Type	Description	Optional	Default
key	Integer	Key value for this meta table, unique	No	
tableName	String	Table Name for this meta table, used to generate REST requests	No	
name	String	Display / Friendly name for this meta table	No	
description	String	Description of this meta table, omitted if null	Yes	
category	String	Category of this meta table, omitted if null	Yes	
tableTypeId	Integer	Id value of the type of meta table, omitted if null	Yes	
tableType	String	Name of the table type, omitted if null	Yes	
defaultNameField	String	Field Name of the field that should be used as the display name for rows in this object	No	
uniqueFieldName	String	Field Name of the field that contains the unique row identifier	No	
permissions	String	Permissions the user has on the BO. None / Read / Write	No	
categories	<i>BusinessObjectFieldCategory</i>	Array of Business Object Field Categories, defines all the visible categories	Yes	
fields	<i>BusinessObjectField []</i>	Array of Business Object Fields, defines all fields in Business Object.	Yes	

BusinessObjectField

The business object field result type, describes a field in a business object, henceforth referred to as meta field.

Name	Type	Description
name	String	Default display name of the field
fieldName	String	Field Name used in REST requests
fieldTypeId	Integer	Type of data the field stores in the database. See <i>Field Types</i>
displayFieldTypeId	Integer	The display type of the field type, this may differ to fieldTypeId, for example fieldTypeId is Integer and displayFieldTypeId is String
editorTypeId	Integer	Type of control that should be used to allow the user to edit raw data for this field
displayEditorTypeId	Integer	Type of control that should be used to allow the user to edit the display value of this field
fieldSize	Integer	Maximum size of a string field
comments	String	Long comments describing use of the field
defaultValue	String	Contains the default value that should be given to this field when creating a new object
required	Boolean	Defines if the can be set to 'null'.
lowerValue	Float	Defines the absolute minimum value for an Integer/Float field
upperValue	Float	Defines the absolute maximum value for an Integer/Float field
format	String	Defines the display format for a field
preventEditing	Boolean	Prevent the user from editing the value in this field, only valid for native field types
category	String	Category of the field, used to group like categories into 'groups'
blankText	String	Value displayed in edit field, when the field value is null
formColumns	Integer	Number of columns the field should consume on the form
formVisible	Boolean	Is the field visible on the form
formOrder	Integer	Order of the field when displaying as a form
formCaption	String	Caption used as the form caption
formShowCaption	Boolean	Should the caption be shown for the field on the form. Visible by default.
gridVisible	Boolean	Is the field visible on the grid, True, visible by default, False, not visible, null, not applicable
gridOrder	Integer	Order of the field when displaying as a grid

Table 1 – contin

gridCaption	String	Caption used as the grid caption
mobileVisible	Boolean	Should the field be visible for mobile style UIs
mobileOrder	Integer	Order of the field when displaying on a mobile UI.
mobileCaption	String	Caption used as the field caption for mobile UI's. If not defined, use Name.
booleanTypeId	Integer	The display type for Boolean fields
isBooleanTypeImage	Boolean	Is the above display type for boolean fields an image.
foreignTableId	Integer	The key for the foreign meta table this field refers to.
subTableId	Integer	The key for the sub event/aig table this field refers to. Only valid when field ty
unitId	Integer	The key for the unit assigned to this field, only relevant for Float fields.
lookupListId	Integer	The key for the lookup list assigned to this field
isLookupListImage	Boolean	Is the display type for the lookup list.
multiValue	Boolean	If this field is a PassThru field, it may be a one-to-many relationship, in which
nestedField	<i>BusinessObjectField</i>	If this field is linked to another business object field, such as PassThru or Glob
businessObjectName	string	If this is a nested field, then the Business Object Name will be included here to

BusinessObjectFieldCategory

The business object fields category type, describes a category for a field, used when displaying the fields in a form, and optionally in a grid.

Name	Type	Description	Optional	Default
name	String	Display name of the category.	No	
alignTop	Boolean	Determines if the fields are positioned above the control, or to the left.	Yes	No
comments	String	Comments/Description that is displayed at the top of the category group, before any fields.	Yes	undefined
columns	Integer	Number of columns of fields to display in categories.	Yes	2
hasImage	Boolean	Determines if the category has an image that should be displayed at the top of the category group.	Yes	No
imageUrl	String	Specifies the relative Url to retrieve the image data for the category image, only valid if hasImage is Yes.	Yes	undefined
allowQuickFilter	Boolean	Specifies whether the filter allows quick filter searching in tables.	Yes	No

Example

Request

```
GET /icweb.dll/bo/Workpack
```

Response

```
{
  "key": 136,
  "tableName": "Workpack",
  "name": "Workpack",
```

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```

"defaultNameFieldName": "Name",
"uniqueFieldName": "Workpack_ID",
"category": "Work Scoping",
"tableTypeId": 11,
"tableType": "System Table",
"permissions": "write",
"categories": [{
    "name": "Budget"
}, {
    "name": "Status"
}, {
    "name": "Timing"
}],
"fields": [{
    "name": "",
    "fieldName": "Guid",
    "fieldTypeId": 17,
    "editorTypeId": 3,
    "formVisible": false,
    "gridVisible": false
}, {
    "name": "Workpack_ID",
    "fieldName": "Workpack_ID",
    "fieldTypeId": 3,
    "editorTypeId": 4,
    "fieldSize": 4,
    "formColumns": 1,
    "formVisible": false,
    "gridVisible": false
}, {
    "name": "Workpack Group",
    "fieldName": "WPG_ID",
    "fieldTypeId": 3,
    "displayFieldTypeId": 1,
    "editorTypeId": 13,
    "fieldSize": 4,
    "formColumns": 2,
    "formOrder": 1,
    "foreignTableId": 138
}, {
    "name": "Cost Code",
    "fieldName": "CC_ID",
    "fieldTypeId": 3,
    "displayFieldTypeId": 1,
    "editorTypeId": 13,
    "fieldSize": 4,
    "category": "Budget",
    "formColumns": 1,
    "formOrder": 20,
    "gridVisible": false,
    "foreignTableId": 31
}, {
    "name": "Revision",
    "fieldName": "Revision_ID",
    "fieldTypeId": 3,
    "displayFieldTypeId": 1,
    "editorTypeId": 13,

```

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```

        "fieldSize": 4,
        "category": "Status",
        "formColumns": 2,
        "formOrder": 5,
        "foreignTableId": 97
    }, {
        "name": "Name",
        "fieldName": "Name",
        "fieldTypeId": 1,
        "editorTypeId": 3,
        "fieldSize": 50,
        "required": true,
        "formColumns": 2
    }, {
        "name": "Abbreviation",
        "fieldName": "Abbreviation",
        "fieldTypeId": 1,
        "editorTypeId": 3,
        "fieldSize": 10,
        "formColumns": 2,
        "formOrder": 2,
        "gridVisible": false
    }, {
        "name": "Actual Start",
        "fieldName": "Actual_Start",
        "fieldTypeId": 9,
        "editorTypeId": 8,
        "fieldSize": 16,
        "category": "Timing",
        "formColumns": 2,
        "formOrder": 7
    }, {
        "name": "Description",
        "fieldName": "Description",
        "fieldTypeId": 1,
        "editorTypeId": 3,
        "fieldSize": 100,
        "formColumns": 2,
        "formOrder": 3,
        "gridVisible": false
    }, {
        "name": "Read Only",
        "fieldName": "ReadOnly",
        "fieldTypeId": 5,
        "editorTypeId": 5,
        "fieldSize": 1,
        "required": true,
        "category": "Status",
        "formColumns": 2,
        "formOrder": 6,
        "booleanTypeId": 9
    }, {
        "name": "Personnel",
        "fieldName": "SU_ID",
        "fieldTypeId": 3,
        "displayFieldTypeId": 1,
        "editorTypeId": 13,

```

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```

        "formColumns": 1,
        "formVisible": false,
        "gridVisible": false,
        "foreignTableId": 86
    }, {
        "name": "Task Time",
        "fieldName": "Task_Time",
        "fieldTypeId": 40,
        "displayFieldTypeId": 6,
        "editorTypeId": 11,
        "displayEditorTypeId": 4,
        "category": "Timing",
        "formColumns": 1,
        "formOrder": 8,
        "gridVisible": false
    }, {
        "name": "Work Hours (per day)",
        "fieldName": "Hours_Per_Day",
        "fieldTypeId": 6,
        "editorTypeId": 4,
        "category": "Timing",
        "blankText": "Number of effective work hours per day.",
        "formColumns": 1,
        "formOrder": 9,
        "gridVisible": false
    }, {
        "name": "Duration (Estimated)",
        "fieldName": "Estimated_Duration",
        "fieldTypeId": 40,
        "displayFieldTypeId": 6,
        "editorTypeId": 11,
        "displayEditorTypeId": 4,
        "category": "Timing",
        "formColumns": 1,
        "formOrder": 10,
        "gridVisible": false
    }, {
        "name": "Duration (Contingency)",
        "fieldName": "Duration_Contingency",
        "fieldTypeId": 6,
        "editorTypeId": 4,
        "category": "Timing",
        "blankText": "Enter a value to add a contingency to the estimated_
↔duration",
        "formColumns": 1,
        "formOrder": 11,
        "gridVisible": false,
        "unitId": 36
    }, {
        "name": "Duration (Override)",
        "fieldName": "Override_Duration",
        "fieldTypeId": 6,
        "editorTypeId": 4,
        "category": "Timing",
        "blankText": "Enter a value to override the estimated duration",
        "formColumns": 1,
        "formOrder": 12,

```

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```

        "gridVisible": false,
        "unitId": 36
    }, {
        "name": "Actual End",
        "fieldName": "Actual_End",
        "fieldTypeId": 40,
        "displayFieldTypeId": 9,
        "editorTypeId": 11,
        "displayEditorTypeId": 8,
        "category": "Timing",
        "formColumns": 2,
        "formOrder": 13
    }, {
        "name": "Day Rate",
        "fieldName": "Day_Rate",
        "fieldTypeId": 6,
        "editorTypeId": 4,
        "category": "Budget",
        "blankText": "Used to calculate cost based on day rate",
        "formColumns": 1,
        "formOrder": 14,
        "gridVisible": false
    }, {
        "name": "Cost based on Day Rate",
        "fieldName": "Cost_Day_Rate",
        "fieldTypeId": 40,
        "displayFieldTypeId": 6,
        "editorTypeId": 11,
        "displayEditorTypeId": 4,
        "category": "Budget",
        "formColumns": 1,
        "formOrder": 15,
        "gridVisible": false
    }, {
        "name": "Costs (Fixed)",
        "fieldName": "Fixed_Cost",
        "fieldTypeId": 6,
        "editorTypeId": 4,
        "category": "Budget",
        "formColumns": 1,
        "formOrder": 16,
        "gridVisible": false
    }, {
        "name": "Cost (Total)",
        "fieldName": "Total_Cost",
        "fieldTypeId": 40,
        "displayFieldTypeId": 6,
        "editorTypeId": 11,
        "displayEditorTypeId": 4,
        "category": "Budget",
        "formColumns": 1,
        "formOrder": 17,
        "gridVisible": false
    }, {
        "name": "Cost (Override)",
        "fieldName": "Override_Cost",
        "fieldTypeId": 6,

```

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```

        "editorTypeId": 4,
        "category": "Budget",
        "blankText": "Enter a value to override the calculated total cost",
        "formColumns": 1,
        "formOrder": 18,
        "gridVisible": false
    }, {
        "name": "Final Estimate",
        "fieldName": "Cost",
        "fieldTypeId": 40,
        "displayFieldTypeId": 6,
        "editorTypeId": 11,
        "displayEditorTypeId": 4,
        "category": "Budget",
        "formColumns": 1,
        "formOrder": 19,
        "gridVisible": false
    }, {
        "name": "Asset",
        "fieldName": "Component_ID",
        "fieldTypeId": 3,
        "displayFieldTypeId": 1,
        "editorTypeId": 13,
        "formColumns": 2,
        "formOrder": 4,
        "gridVisible": false,
        "foreignTableId": 30
    }, {
        "name": "Tasks",
        "fieldName": "Task_Count",
        "fieldTypeId": 3,
        "editorTypeId": 4,
        "formColumns": 1,
        "formVisible": false
    }, {
        "name": "Task Breakdown",
        "fieldName": "Task_Breakdown",
        "fieldTypeId": 1,
        "editorTypeId": 3,
        "formColumns": 1,
        "formVisible": false,
        "gridVisible": false
    }
}

```

Get Row

Retrieve a single row from a business object. The result can be used to display or update the row.

HTTP Request

```
GET /icweb.dll/bo/{tableName}/{keyValue}?calculateValues={true|false}
```

URI Parameters

Name	In	Re-quired	Type	Description
tableName	Path	Yes	String	Table Name of the business object
keyValue	Path	Yes	Integer	Id of the row to be returned, if you specify 0 as the key value (this can't exist) then getRow returns you a blank row with the default values for all fields populated, ready to be used to insert a new row.
calculateFields	Path	No	Boolean	This can be used to disable returning calculated fields. By default this is true, if you supply false, then no calculated fields will be returned.

Responses

Name	Type	Description
200 OK	<i>TableData</i>	OK
404 Not Found		No row found for specified keyValue

TableData

Contains the row data for the requested row for the specified business object.

Name	Type	Description	Optional	Default
key	Integer	Key value for this business object, unique.	No	
stamp	String	Stamp for this row set, can be used to re-request the data or request the next page of data. If omitted row set can't be paged or re-requested.	Yes	
startRow	Integer	Starting row for this set of paged data.	Yes	0
pageSize	Integer	Number of rows in each page of data.	Yes	100
totalRows	Integer	Number of rows total across all pages, this value may change on subsequent page retrievals if modifications are made by other users.	Yes	null
rows	<i>TableRow</i> []	Array of fields/values. Fields are defined by the <i>BusinessObject</i> .	Yes	Any field not specified is assumed to be null.

TableRow

The business object data row, describes a row of data in a TableData result set. The fields that are defined in TableRow are based on the *BusinessObject*.

Note: The fields are dynamic and can change. Each and every NEXUS database may have slightly different fields in the System Tables. The custom tables (Asset Information, Events etc) may differ significantly between databases, and can change between calls to the REST service if the users are actively making changes. It is expected that any client

consuming data from the NEXUS REST service is able to cope with this. Either by ignoring additional fields in the TableRow or by assuming a field value is null if the field does not exist.

Name	Type	Description	Optional	Default
{fieldName}	Any	Contains the value for the specified field, see <i>BusinessObjectField</i> . If this is a non-stored field, then this will contain the display value.	Yes	If a field is omitted, it is because the fields value is null.
{fieldNameError}	Error	If the field is in an error state, then an error object is returned.	Yes	

Error

The error object, contains a single value for the error message

Name	Type	Description	Optional
error	string	Error string to be shown to the user	No

Example

Request

```
GET /icweb.dll/bo/Workpack/4
```

Response

```
{
  "rows": [{
    "Guid": "{35809A21-9174-4B56-AD5F-F3930DE24A2D}",
    "Workpack_ID": 1,
    "Name": "2015 ROV Inspection",
    "Actual_Start": "2015-05-15T00:00:00.000Z",
    "Description": "Annual 2015 full field rov inspection",
    "ReadOnly": false,
    "Task_Time": 0,
    "Hours_Per_Day": 12,
    "Estimated_Duration": 0,
    "Actual_End": "2015-05-15T00:00:00.000Z",
    "Total_Cost": 0,
    "Cost": 0,
    "Component_ID": 1,
    "Task_Count": 0
  }],
  "key": 136
}
```


Get Row Field

Retrieve a single field value from a row from a business object. The result is not JSON encoded, and is the literal value.

HTTP Request

```
GET /icweb.dll/bo/{tableName}/{keyValue}/{fieldName}?format={format}
```

URI Parameters

Name	In	Re-quired	Type	Description
tableName	Path	Yes	String	Table Name of the business object
keyValue	Path	Yes	Integer	Id of the row to be returned
fieldName	Path	Yes	String	Field Name within the business object
format	Path	No	string	Format of results. Possible values are value or png, but depends on the field type. Only FT_CALC supports png.

Responses

Name	Type	Description
200 OK	<i>Literal Value</i>	OK
404 Not Found		No row found for specified keyValue
404 Not Found		Field fieldName not found in tableName

Literal Value

The response contains the literal value of the field. The content type in the response header describes the type of content returned.

Example

Retrieve the name of a workpack.

Request

```
GET /icweb.dll/bo/Workpack/4/Name
```

Response

```
Content-Type: text/plain
2015 ROV Inspection
```

Example

Retrieve the icon for an Asset

Request

```
GET /icweb.dll/bo/Comp_Icon/4/Icon
```

Response

```
Content-Type: image/png
{binaryData}
```

Get Rows

Retrieve a 0 or more rows from a business object. This can either return all rows, or rows that match a specified filter.

HTTP Request

```
GET /icweb.dll/bo/{tableName}/
```

URI Parameters

Name	In	Re-quired	Type	Description	De- fault
tableName	Path	Yes	String	Table Name of the business object	
startRow	Query	No	In- te- ger	Starting row to be returned, when using paged datasets this sets the first row returned.	0
pageSize	Query	No	In- te- ger	The number of rows in each page. Determines the maximum number of rows to return in the requests, starting at startRow.	100
pageWithKey	Query	No	In- te- ger	Returns the page of data, that contains the specified key value in pageWithKey.	
stamp	Query	No	String	Specifies the existing result set to return more rows from. This must come from a prior request.	

Request Headers

Name	Re-quired	Type	Description
X-NEXUS-Filter	No	<i>BusinessObjectFilters</i>	Filter that should be used to select rows. If this is not specified, then all rows are returned.
X-NEXUS-Sort	No	<i>BusinessObjectSort []</i>	List of fields and direction to sort the resulting dataset.

Responses

Name	Type	Description
200 OK	<i>TableData</i>	OK

BusinessObjectFilters

Specifies the filter that should be used to return rows.

Name	Type	Description	Optional	Default
operator	string	Specifies the type of operator used to join filters together. There are two possible values: <ul style="list-style-type: none"> • and • or 	Yes	and
where	<i>BusinessObjectFilter</i>	List of filters to be used	Yes	
nested	<i>BusinessObjectFilters</i>	Nested list of filters to be used	Yes	

BusinessObjectFilter

Specifies a single filter.

Name	Type	Description	Optional	Default
field	string	Name of the field to apply a filter on.	No	
method	string	Filter method: <ul style="list-style-type: none"> • eq Equals • lt Less Than • gt Greater Than • le Less than or Equal • ge Greater than or Equal • like Like (Use % characters as wildcard matching) • in In (Use items) • pa Parents Of • ch Children Of 	Yes	eq
value	string	String representation of the filter value. (Ignored when the method is in)	Yes	null
items	Integer[]	List of values to be used when method is in.	Yes	null
not	boolean	Inverts the method, ie eq becomes not eq, in becomes not in	Yes	False

BusinessObjectSort

Specifies a sort, defines a field and direction to sort by.

Name	Type	Description	Optional	Default
field	string	Name of the field to sort on	No	
ascending	boolean	Specifies the order to sort, when true sort is in ascending order, when false descending order.	Yes	True

Example (Lookup_Item)

Return Lookup Items for Lookup List with LL_ID of 4. Page Size is set to 5, so the first response only returns 5 rows.

Request

```
GET /icweb.dll/bo/Lookup_Item/?pageSize=5
```

Request Header

```
X-NEXUS-Filter: {"where":[{"field": "LL_ID", "value": "4"}]}
```

Response

```
{
  "pageSize": 5,
  "startRow": 0,
  "totalRows": 12,
  "rows": [{
    "Guid": "{A348BB1B-4DD4-494A-8A26-51746F2BE1A8}",
    "LL_ID": 4,
    "LI_ID": 506,
    "Value": "0",
    "Comments": "Item 0",
    "Item_Order": 0
  }, {
    "Guid": "{049D6A48-DFFF-4C37-8C91-5EF4C4C26BDA}",
    "LL_ID": 4,
    "LI_ID": 507,
    "Value": "1",
    "Comments": "Item 1",
    "Item_Order": 1
  }, {
    "Guid": "{01AB1DDC-5909-434A-A441-CFB592FC2960}",
    "LL_ID": 4,
    "LI_ID": 508,
    "Value": "2",
    "Comments": "Item 2",
    "Item_Order": 2
  }, {
    "Guid": "{8975DF1F-C06B-4B43-ADA1-5E549F846B3E}",
    "LL_ID": 4,
    "LI_ID": 509,
    "Value": "3",
    "Comments": "Item 3",
    "Item_Order": 3
  }, {
    "Guid": "{D601759D-C2D5-4DBD-856A-EC2063138443}",
    "LL_ID": 4,
    "LI_ID": 510,
    "Value": "4",
    "Comments": "Item 4",
    "Item_Order": 4
  }
  ],
  "key": 67
}
```

Example (Lookup_Item)

Return Lookup Items for Lookup List with LL_ID of 4 and (Item_Order < 5 OR Item_Order > 10). Page Size is set to 5, so the first response only returns 5 rows.

Request

```
GET /icweb.dll/bo/Lookup_Item/?pageSize=10
```

Request Headers

```
X-NEXUS-Filter: {"where": [{"field": "LL_ID", "value": "4"}], "nested": [{"operator":
↪ "or", "where": [{"field": "Item_Order", "method": "lt", "value": "5"}, {"field": "Item_
↪ Order", "method": "gt", "value": "10"}]}]}
X-NEXUS-Sort: [{"field": "LL_ID", "ascending": false}]
```

Response

```
{
  "pageSize": 10,
  "startRow": 0,
  "totalRows": 12,
  "rows": [{
    "Guid": "{DE2042D6-D988-43B2-9097-3BE8130DE9A7}",
    "LL_ID": 4,
    "LI_ID": 506,
    "Value": "0",
    "Comments": "Item 0",
    "Item_Order": 0
  }, {
    "Guid": "{13C2D078-B8E7-4A77-BF2C-15EF131618DB}",
    "LL_ID": 4,
    "LI_ID": 507,
    "Value": "1",
    "Comments": "Item 1",
    "Item_Order": 1
  }, {
    "Guid": "{4BD34909-E95A-413C-BD43-6936BF1D5728}",
    "LL_ID": 4,
    "LI_ID": 508,
    "Value": "2",
    "Comments": "Item 2",
    "Item_Order": 2
  }, {
    "Guid": "{918A854C-718C-4AA1-AC98-4C781F4985B9}",
    "LL_ID": 4,
    "LI_ID": 509,
    "Value": "3",
    "Comments": "Item 3",
    "Item_Order": 3
  }, {
```

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```

        "Guid": "{B3234C2F-3C0C-46CD-B125-715DDC686786}",
        "LL_ID": 4,
        "LI_ID": 510,
        "Value": "4",
        "Comments": "Item 4",
        "Item_Order": 4
    }, {
        "Guid": "{EEE0268D-B3F3-45F7-B8CE-A88989C9A1BB}",
        "LL_ID": 4,
        "LI_ID": 517,
        "Value": "11",
        "Comments": "Item 11",
        "Item_Order": 11
    }, {
        "Guid": "{080A5FC0-DF25-44DE-896F-25EB95B28E74}",
        "LL_ID": 4,
        "LI_ID": 518,
        "Value": "12",
        "Comments": "Item 12",
        "Item_Order": 12
    }, {
        "Guid": "{ABFDFC1C-8C31-4DC7-A0AE-0A3174A0C30F}",
        "LL_ID": 4,
        "LI_ID": 519,
        "Value": "13",
        "Comments": "Item 13",
        "Item_Order": 13
    }, {
        "Guid": "{4758598E-5008-4008-A4A6-0EB4697D98C9}",
        "LL_ID": 4,
        "LI_ID": 520,
        "Value": "14",
        "Comments": "Item 14",
        "Item_Order": 14
    }, {
        "Guid": "{7010FCB9-E0DC-409B-8C4F-2A6B81769852}",
        "LL_ID": 4,
        "LI_ID": 521,
        "Value": "15",
        "Comments": "Item 15",
        "Item_Order": 15
    }
  ],
  "key": 67
}

```

Example (complex expression)

For following filter:

((Field_A = Column_A AND Column_B = Value_B) OR (Column_C = Value_C AND Column_D = Value_D))

the syntax is:

```

{
  "operator": "or",

```

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```
"nested": [
  {
    "operator": "and",
    "where": [
      {
        "field": "Column_A",
        "value": "Value_A"
      },
      {
        "field": "Column_B",
        "value": "Value_B"
      }
    ]
  },
  {
    "operator": "and",
    "where": [
      {
        "field": "Column_C",
        "value": "Value_C"
      },
      {
        "field": "Column_D",
        "value": "Value_D"
      }
    ]
  }
]
```

The above expression has been unpacked onto multiple lines and indented for easy reading; you will of course need to deliver the expression in a single X-NEXUS-Filter.

Create / Update Row

Create a new row or update an existing row in a business object.

HTTP Request

Create:

```
PUT /icweb.dll/bo/{tableName}/{keyValue}?calculateValues={true|false}
```

Update:

```
POST /icweb.dll/bo/{tableName}/{keyValue}?calculateValues={true|false}
```


URI Parameters

Name	In	Re-quired	Type	Description
tableName	Path	Yes	String	Table Name of the business object
keyValue	Path	Yes	Integer	For PUT (create) use 0, for POST (update) use the existing primary key value.
calculateValues	Path	No	Boolean	This can be used to disable returning calculated fields. By default this is true, if you supply false, then no calculated fields will be returned.

Request Body

This contains fields and values for the new/updated row. For simplicity, you should only include fields that have a value other than null. You should also exclude any non-stored field, as these will be ignored.

Name	Type	Description	Optional	Default
{fieldName}	Any	Should contain the new value for the specified field, see <i>BusinessObjectField</i> .	Yes	You can omit a field if the value is null.

Note: If a field has a default value, then if you want to set the value of that field to null, you must include the field in the request body with a null value. If you omit the field then the new row will have the default value inserted.

Responses

Name	Type	Description
200 OK	<i>TableData</i>	OK
403		An attempt was made to set a value for a read-only field.

Example

Request

```
PUT /icweb.dll/bo/Workpack/0
```

Request Body

```
{
  "Name": "2015 ROV Inspection",
  "Actual_Start": "2015-05-15T00:00:00.000Z",
  "Description": "Annual 2015 full field roV inspection",
  "ReadOnly": false,
```

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```

"Component_ID": 1
}
    
```

Response

```

{
  "rows": [{
    "Guid": "{35809A21-9174-4B56-AD5F-F3930DE24A2D}",
    "Workpack_ID": 1,
    "Name": "2015 ROV Inspection",
    "Actual_Start": "2015-05-15T00:00:00.000Z",
    "Description": "Annual 2015 full field roV inspection",
    "ReadOnly": false,
    "Task_Time": 0,
    "Hours_Per_Day": 12,
    "Estimated_Duration": 0,
    "Actual_End": "2015-05-15T00:00:00.000Z",
    "Total_Cost": 0,
    "Cost": 0,
    "Component_ID": 1,
    "Task_Count": 0
  }],
  "key": 136
}
    
```

Delete Row

Delete a single row from a business object.

HTTP Request

```

DELETE /icweb.dll/bo/{tableName}/{keyValue}
    
```

URI Parameters

Name	In	Required	Type	Description
tableName	Path	Yes	String	Table Name of the business object
keyValue	Path	Yes	Integer	Id of the row to be deleted

Responses

Name	Type	Description
204 No Content	Row Deleted	The server successfully processed the request, but is not returning any content.
404 Not Found		No row found for specified keyValue
500 Error	<i>Error</i>	An error occurred details in Error object.

Example

Request

```
DELETE /icweb.dll/bo/Workpack/4
```

Response

204 No Content

Request Cookie Token

Requests the REST service generates a single use token to be emailed to the user to then request a permanent access token.

HTTP Request

```
GET /icweb.dll/security/requestCookieToken?{parameters}
```

URI Parameters

Name	In	Required	Type	Description
email	Query	Yes	String	Email address of existing user.

Responses

Name	Type	Description
200 OK		OK
404		An attempt was made for an unknown email address.

Example

Request

```
GET /icweb.dll/security/requestCookieToken?email=joe.bloggs@nexusic.com
```

Response

200 OK

Validate Cookie Token

Validates a generated single use token, and if valid, responds with a permanent token lasting 90 days for subsequent authorisation.

HTTP Request

```
GET /icweb.dll/security/validateCookieToken?{parameters}
```

URI Parameters

Name	In	Required	Type	Description
token	Query	Yes	String	Single-use token

Responses

Name	Type	Description
200 OK	<i>SecurityToken</i>	OK
401		An attempt was made to validate an invalid token.

SecurityToken

Contains the permanent security token

Name	Type	Description	Optional
token	String	Permanent security token, that can then be used in subsequent REST api requests, expires in 90 days.	No

Example

Request

```
GET /icweb.dll/security/validateCookieToken?
->token=C45CB5E015A81801327672766615578D6B4C37D69BBB43D74C9A3E4907676CD1C53EADC408A6B41B2B58DD3A6B50
```

Response

```
{
  "token":
->"E05DEB57605BA82CD1A0C130B38C7BC1415BA094B28D73B03577B7CAB438834E6B680B437C85A65CA796AB6E7DC854555"
->"
}
```

Post Blob

Post a blob to the REST service, that can then be used in subsequent operations, such as adding library items, multi-media, and importing.

HTTP Request

```
POST /icweb.dll/postBlob
```

URI Parameters

None

Request Body

This contains the binary data for the blob.

Responses

Name	Type	Description
200 OK	<i>Blob</i>	OK
403	Not authorised	An attempt was made to upload a blob when you do not have permissions.
404.13	File exceeds maximum IIS size.	An attempt was made to upload a file larger than the IIS setting. See: https://msdn.microsoft.com/en-us/library/ms689462%28VS.90%29.aspx

Blob

The Blob object, contains information about the uploaded Blob.

Name	Type	Description	Optional
ExpirationDate	Date Time	Date and Time the blob will expire and be removed from the server if it has not be persisted using another REST api.	No
Guid	string	Unique Identifier for this blob	No
md5	string	MD5 checksum for this blob to ensure that the server received the blob correctly, you should check this against your local md5 and if it does not match, re-post the blob using another request.	No

Example

Request

```
POST /icweb.dll/postBlob
```

Request Body

binary data

Response

```
{
  "expiry": "2018-11-01T00:05:13.000Z",
  "guid": "{69EA081E-84ED-4504-B15D-14BC7A020E49}",
  "md5": "cf894da06f793ed73d841c72dd0bfde3"
}
```

Request

The *guid* can then be used to insert a row in Repository, passing the *guid* for the *File_Data* field.

```
PUT /icweb.dll/bo/Repository/0
```

Request Body

```
{
  "UNC": "file.pdf"
  "File_Data": "{69EA081E-84ED-4504-B15D-14BC7A020E49}"
}
```

Response

```
{
  "rows": [{
    "Guid": "{71DEE3A8-5BD9-4651-8807-3213A67AFF4E}",
    "Repository_ID": 1152,
    "Cached": false,
    "File_Checksum": "9a990adf862d59c4a21e5d12e8ef8f5c",
    "UNC": "20191122_113302.jpg",
    "File_Size": 4504068,
    "RD_ID": 213
  }],
  "key": 96
}
```

Get Function Object

Get information about a NEXUS function from the REST service, that can then be used to call the function via REST to execute.

HTTP Request

```
GET /icweb.dll/function/{functionName}
```

URI Parameters

Name	In	Re-quired	Type	Description
functionName functionKey	Path	Yes	String Integer	Specify the function name or function key to be returned.

Responses

Name	Type	Description
200 OK	<i>FunctionObject</i>	OK
403	Not authorised	An attempt was made to access a function when you do not have permissions.

FunctionObject

The Function object, contains information about the function.

Name	Type	Description	Op-tional
name	string	Name of the function.	No
key	Integer	Key value for this function, unique.	No
resultTypeId	Integer	Result type of the result from executing this function. See <i>Field Types</i> .	No
parameters	<i>FunctionParameter</i> []	List of parameters for this function.	No

FunctionParameter

The Function Parameter object, contains information about each parameter in a function.

Name	Type	Description	Op-tional	De-fault
name	string	Name of the parameter	No	
parameterTypeId	Integer	Result type of the result from executing this function. See <i>Field Types</i>	No	
allowsNull	Boolean	If this parameter allows a null input value	Yes	Yes

Example

Request

```
GET /icweb.dll/function/Compare A = B
```

Response

```
{
  "name": "Compare A = B",
  "key": 57,
  "resultTypeId": 5,
  "parameters": [{
    "name": "A",
    "parameterTypeId": 0
  }, {
    "name": "B",
    "parameterTypeId": 0
  }]
}
```

Execute Function

Execute a NEXUS function.

HTTP Request

```
POST /icweb.dll/function/{functionName}/?format={format}
```

URI Parameters

Name	In	Re-quired	Type	Description
functionName functionKey	Path	Yes	String In- teger	Specify the function name or function key to be executed .
format	Path	No	String	Possible values are value or png. value is the default if omitted, and ensures the result of the function is returned. If png is specified then the result will be a png containing the function preview with results.

Request Body

This contains parameters and their values to use to execute the function. For simplicity, you should only include fields that have a value other than null.

Name	Type	Description	Op- tional	Default
{parameterName}	Any	Should contain the new value for the specified field, see <i>FunctionParameter</i> .	Yes	You can omit a parameter if the value is null.

Responses

Name	Type	Description
200 OK	<i>FunctionResult</i>	OK
200 OK	image/png	An image containing the function layout with results
403	Not authorised	An attempt was made to access a function when you do not have permissions.

FunctionResult

The Function result, contains the result of the function execution, or if an error occurred the message.

Name	Type	Description	Optional
state	string	State of the function call, ok or error.	No
value	Any	If state is ok then this will hold the result of the function execution.	Yes
message	String	If state is error then this will contain the error message returned from the function.	Yes

Example

Request

```
POST /icweb.dll/function/Compare A = B/
{
  "A": 5,
  "B": 3.4
}
```

Response

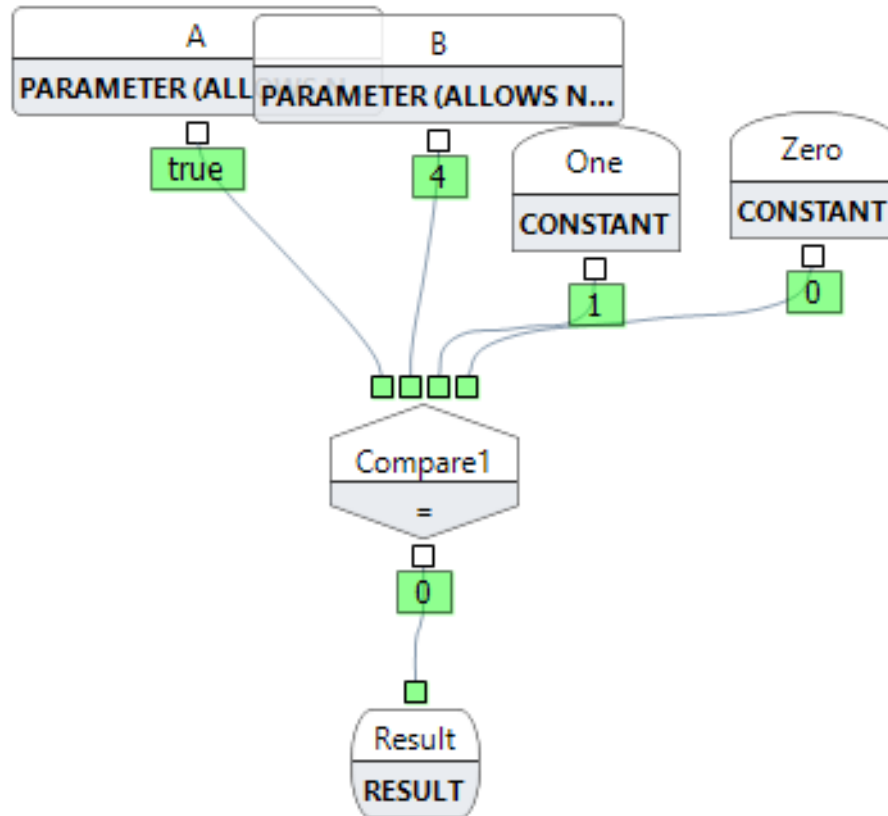
```
{
  "state": "ok",
  "value": false
}
```

Request

```
POST /icweb.dll/function/Compare A = B/?format=png
```

```
{
  "A": true
  "B": 4
}
```

Response



Dashboards

Generate the data required to display a dashboard, response data contains all information required for displaying the dashboard. The response may be quite large, depending on the dashboard that is requested. Charts especially may contain a large number of points.

HTTP Request

```
GET /icweb.dll/dashboard/{key}
```

URI Parameters

Name	In	Required	Type	Description	Default
key	Path	Yes	Integer	Key associated with dashboard.	

Responses

Name	Type	Description
200 OK	<i>Dashboard</i>	OK
404 Not Found	String	Dashboard identified by <i>key</i> was not found.

Dashboard

Contains the data associated with a dashboard, there is a `name` as well as a list of elements, each element identifies an element in the dashboard, these elements are extensible, and can be customised by the user within NEXUS IC itself.

Name	Type	Description	Optional
<code>name</code>	string	Name of the dashboard	No
<code>elements</code>	<i>Dashboard Element</i> []	List of elements in the dashboard.	No

Dashboard Element

Specifies an element in the dashboard, each element contains some base configuration, but each element also contains a `data` element, and the contents of this JSON object is based entirely on the `type` of dashboard element. Those elements that you don't understand can be skipped and not displayed.

Name	Type	Description	Optional
<code>caption</code>	string	Caption used for the dashboard element.	No
<code>type</code>	string	Specifies the type of element this represents. <ul style="list-style-type: none"> • table <i>Table Element</i> • chart <i>Chart Element</i> • paragraph <i>Paragraph Element</i> • section <i>Section Element</i> • image <i>Image Element</i> 	No
<code>data</code>	object	Contains the data associated with the element, this is dependant on the element type defined in <code>type</code>	No

Table Element

Contains the data for a table, a table can be either a normal table, a vertical table or a pivot table. A table may not have any columns, categories or rows, but will have at least `columns` or `rows` defined. It is assumed that the columns and rows are in matched order, so the first item in each `TableRow` is the value for the first column.

Name	Type	Description	Optional	Default
<code>sourceBusinessSubject</code>	String	If there are source rows for <i>Table Row</i> entries, then this will contain the name of the business object that the key values are from.	Yes	null
<code>columns</code>	<i>Table Column</i> []	Contains a list of columns for the table.	Yes	
<code>categories</code>	<i>Table Category</i> []	Contains a list of optional categories for the table columns, generally this are output above the columns, grouping them together.	Yes	
<code>rows</code>	<i>Table Row</i> []	Contains the rows of data for the table.	Yes	

Table Column

Name	Type	Description	Optional	Default
<code>caption</code>	String	Caption for the column.	No	
<code>alignment</code>	String	Specifies the way the caption should be align, center, right, left.	Yes	left

Table Category

Name	Type	Description	Optional	Default
<code>caption</code>	String	Caption for the column.	No	
<code>spanColumns</code>	Integer	Number of columns this category spans.	Yes	1
<code>alignment</code>	String	Specifies the way the caption should be align, center, right, left.	Yes	left

Table Row

Name	Type	Description	Optional	Default
<code>cells</code>	<i>Table Cell</i> []	Contains the data for each of the cells of the <i>Table Row</i> .	No	
<code>sourceKey</code>	Integer	Contains the primary key for the source row applicable to this <i>Table Row</i> .	Yes	null

Table Cell

Name	Type	Description	Optional	Default
value	String	Contains the value for the column, if a datetime, contains an ISO 8601 formatted date/time. If the time is 00:00:00 it should be omitted from display.	No	
alignment	String	Specifies the way the caption should be align, center, right, left	Yes	left
sourceBusinessObject	String	If there are source rows for this <i>Table Cell</i> then this will contain the name of the business object that the key values are from.	Yes	null
sourceKey	Integer []	Contains 0 or more primary key values for the source rows applicable to this <i>Table Cell</i> .	Yes	null

Image Element

Contains an embedded image, with a caption, should be displayed to the end-user with no interactivity.

Name	Type	Description	Optional	Default
type	String	Mime Type of format of image.	No	
image	String	Base64 encoded imaged	No	

Chart Element

Specifies the data that is produced when the dashboard element is a chart, a chart can be rendered as either a table of data or a chart itself, decision should be made by the client. A chart element may contain more than 1 Chart, if more than one is output then the Charts will take on the same structure, they will just contain a differing set of data.

Name	Type	Description	Optional	Default
charts	<i>Chart</i> []	1 or more charts defined in this Chart Element.	No	

Chart

Contains a the data for a single chart, for the Chart Element. Each chart can have 1 x and y axis, and then 1 or more series. Eachs series will have a specific type, such as bar, line etc and contain the data for that series.

Name	Type	Description	Optional	Default
x-axis	<i>Chart Axis</i>	Defines the x-axis for this chart.	No	
y-axis	<i>Chart Axis</i>	Defines the y-axis for this chart.	No	
series	<i>Chart Series</i> []	Defines the y-axis for this chart.	No	
zoomBar	Boolean	Determines if a zoombar is visible.	Yes	No

Chart Axis

Chart Axis defines the specific axis for a chart, such as title and format of data.

Name	Type	Description	Optional	Default
title	String	Title for the axis.	Yes	null
autoScale	Bool	Specifies whether this axis should auto-scale to fit the data.	Yes	True
scale	Float	When autoScale is False, then this contains the scale at which the axis should display the data.	Yes	null
format	String	Specifies the type of data in the axis, float, int, datetime, string.	No	
granulation	Integer	Where this is a risk chart, this specifies the number of sections on the axis that have defined ticks.	No	
labels	String[]	Specifies the labels of each section on the axis, used in conjunction with granulation.	No	

Chart Series

Contains the data for each chart series. A chart series is visually defined by the *type* that determines how the series points should be displayed to the user.

Name	Type	Description	Optional	Default
type	String	Type of Series, point, line, bezier, bar, gantt, verticalLine, horizontalLine, pie, disjointedLine, histogram, shadedSection, polygon, minMax, average, standardDeviation, trendFirstLast, trendLastTwo, trendAll, leastSquares, heatMap	No	null
name	String	Name of the series, to be shown in any legend.	Yes	null
colour	String	Web Colour	Yes	null (use series colour)
points	<i>Chart Point</i> []	Contains the series points to be displayed in the chart series.	No	
opacity	Float	0 to 1 determining the opacity of the point, 0 is completely transparent, 1 is not transparent at all.	Yes	1
pointStyle	String	Style of points for series that have points, circle, square, diamond, cross	Yes	null
border	Bool	For points, should a border be painted.	Yes	True
pointSize	Number	Size of points, in pixels.	Yes	1
displayPoints	Bool	For line series, do we show points for each point on the line.	Yes	False
shaded	Bool	Should the space between the line and where X = 0, be shaded.	Yes	False
showMesh	Bool	For heatMap and contour series, should a mesh be shown.	Yes	False
ganttStyle	String	For Gantt charts, should it be painted as <i>line</i> or <i>bar</i> .	Yes	bar
shadeIn	String	For shaded section series, should the shading occur between the bound lines, or outside the bounding lines.	Yes	False
gradient	Float	For trend line chart series, this specifies the gradient of each line, if 0, then the trend line is horizontal.	Yes	0

Chart Point

Contains the data for each series point. Depending on the series type, it may contain different fields

Name	Type	Description	Optional	Default
opacity	Float	0 to 1 determining the opacity of the point, 0 is completely transparent, 1 is not transparent at all.	Yes	1
label	String	Point Label	Yes	null
id	Number	Unique key for this series for the point	Yes	0
colour	String	Web Colour	Yes	null (use series colour)
x	Float	X-Value	Yes	null
y	Float	Y-Value	Yes	null
z	Float	Z-Value	Yes	null
x2	Float	Secondary X-Value	Yes	null
y2	Float	Secondary Y-Value	Yes	null
z2	Float	Secondary Z-Value	Yes	null
coordinates	Coordinate []	Polygon series require an array of X,Y points to plot the polygon.	Yes	null

Coordinate

Simple array of X,Y coordinates for polygon series.

Name	Type	Description	Optional	Default
x	Float	X-Value	Yes	null
y	Float	Y-Value	Yes	null

Paragraph Element

A paragraph element contains text, generally it does not have a title for the dashboard element, the text may be formatted. It may contain 1 or more paragraphs within it.

Name	Type	Description	Optional	Default
text	<i>Paragraph Text</i> []	Contains the values for the paragraph.	No	

Paragraph Text

Specifies text within a paragraph, including any styling.

Name	Type	Description	Optional	Default
value	String	Contains a text string for a paragraph.	Yes	
color	String	Contains a web colour in #AARRGGBB form.	Yes	
alignment	String	Alignment, left, center, right.	Yes	left
text-bold	Bool	Determines if the text is bold.	Yes	False
text-underline	Bool	Determines if the text is underlined.	Yes	False
text-italic	Bool	Determines if the text is italic.	Yes	False
text-size	Bool	Determines the point size of the text	Yes	

Section Element

Specifies a new section starts in the elements, allowing the section to define the number of columns the elements are displayed in

Name	Type	Description	Optional	Default
columns	Integer	Number of columns the elements should be split into. Columns are consumed, top to bottom, left to right.	Yes	1

Example

Generate and return the dashboard for the dashboard identified by the key of 3

Request

```
GET /icweb.dll/dashboard/3
```

Response

```
{
  "name": "Test Dashboard",
  "elements": [{
    "type": "section",
    "data": {
      "columns": 2
    }
  }, {
    "type": "table",
    "caption": "Workpack Listing",
    "data": {
      "columns": [{
        "caption": "Name"
      }, {
        "caption": "Description"
      }, {
        "caption": "Read Only"
      }, {
        "caption": "Actual Start",
        "alignment": "right"
      }, {
        "caption": "Hours (per day)",
        "alignment": "center"
      }, {
        "caption": "Workpack Group"
      }
    ],
    "rows": [{
      "cells": [{
        "value": "Workpack A"
      }, {
        "value": "This is the description for WA"
      }
    ]
  }
]
```

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```

        }, {
            "value": "No"
        }, {
            "value": "2019-08-26T00:00:00.000Z",
            "alignment": "right"
        }, {
            "value": "8",
            "alignment": "center"
        }, {
            "value": "Group A"
        }
    ]
}, {
    "cells": [{
        "value": "Workpack B"
    }, {
        "value": "This is the description for WB"
    }, {
        "value": "No"
    }, {
        "value": "2019-08-26T00:00:00.000Z",
        "alignment": "right"
    }, {
        "value": "6",
        "alignment": "center"
    }, {
        "value": "Group B"
    }
    ]
}
}, {
    "type": "paragraph",
    "data": {
        "text": [
            {
                "value": "The above table displays all workpacks.\r",
                "color": "#0055FF3A",
                "alignment": "center",
                "text-bold": true
            },
            {
                "value": "There should be 2 workpacks in this test."
            }
        ]
    }
}, {
    "type": "image",
    "caption": "Drawing Details",
    "data": {
        "type": "image/png",
        "image": "iVBORw0KGgoAAAANSUh..."
    }
}
}

```

Report Details

Request information about a report, including the parameters the report requires to be executed.

Only available to hosted SaaS clients

HTTP Request

```
GET /icweb.dll/report/{key}
```

URI Parameters

Name	In	Required	Type	Description	Default
key	Path	Yes	Integer	Key associated with report.	

Responses

Name	Type	Description
200 OK	<i>Report</i>	OK
404 Not Found	String	Dashboard identified by <i>key</i> was not found.

Report

Contains the information associated with a report.

Name	Type	Description	Optional
name	string	Name of the report	No
parameters	<i>Parameter</i> []	List of parameters that the report requires.	No

Parameter

Specifies a parameter for a report, a report may have 0 or more parameters, these parameters contain information on allowing the user to select or enter an appropriate value.

Name	Type	Description	Optional	Default
parameterName	string	Name of the parameter.	No	
displayName	string	Display caption used when displaying the parameter to the user for them to enter/select a value.	No	
order	integer	Display order of the parameter.	No	
columns	integer	The number of display columns that this column consumes, report parameters should be displayed in a 2 column form.	No	1
blankText	string	Text that can be used, in a greyed-out embedded in the control for the parameter.	Yes	
fieldType	Integer	Field Type of the parameter, determines what data can be entered by the user.	No	
editorType	Integer	Editor that should be used for the parameter.	No	
foreignTable	Integer	If this is a foreign key, then this specifies the table that should be used to provide a selection dialog.	Yes	
multiSelect	Boolean	Does this parameter allow multiple values to be selected.	No	No

Example

Retrieve the name and parameters for the report identified by the key of 3

Request

```
GET /icweb.dll/report/3
```

Response

```
{
  "name": "Test Report",
  "parameters": [{
    "parameterName": "Component_ID",
    "displayName": "Asset",
    "order": 0,
    "columns": 1,
    "fieldType": 3,
    "editorType": 13,
    "foreignTable": "Component",
    "multiSelect": true
  }, {
    "parameterName": "Workpack_ID",
    "displayName": "Workpack",
    "order": 0,
    "columns": 1,
    "fieldType": 3,
    "editorType": 13,
    "foreignTable": "Workpack",
  }
}
```

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```
    ]
}
```

Report

Submit a job to generate a report template.

Only available to hosted SaaS clients

HTTP Request

```
POST /icweb.dll/report/
```

URI Parameters

Name	In	Re-quired	Type	Description	De- fault
reportTemplateKey	Body	Yes	Integer	Key associated with report.	
outputType	Body	No	String	Format that the report should be generated in, json, html, xlsx, rtf are accepted types.	json
recipients	Body	No	String	List of comma separated email address to send the report to, if omitted then the report isn't emailed and is available for download.	
embedHtml	Body	No	Boolean	If outputType is 'html' and recipients contains a valid email address, then this determines whether the html report is sent as the body of the email (true) or as an attachment (false).	False
subject	Body	No	String	Subject used in the email generated if the report is sent to recipients.	

Responses

Name	Type	Description
200 OK	serverJob	Report job created, response contains information on the job.
400	Validation Error	Configuration provided for report is invalid, further information on what part was invalid is provided.
404	Not found	The specified reportTemplate was not found.

Example

Ask the server to generate the report identified by the key of 3, using the values of the passed parameters

Request

```
POST /icweb.dll/report
```

```
{
  "reportTemplate": 3,
  "outputType": "html"
  "parameters": [{
    "parameterName": "Component_ID",
    "value": [4, 3]
  }, {
    "parameterName": "Workpack_ID",
    "value": 35
  }
  ]
}
```

Response

```
{
  "id": "{7945AE0D-BB7D-4D7C-AF68-175C74CF02D5}",
  "percentComplete": 0
}
```

Import

Contents

Asks the server to enumerate the files in a compressed zip file that was uploaded for importing.

Only available to hosted SaaS clients

HTTP Request

To retrieve files in an archive:

```
POST /icweb.dll/import/contents/{file}
```

Request Body

Contains information on how to parse the import file to detect the columns.

Name	Required	Type	Description	Default
file	Yes	String	Specifies the import file previously uploaded.	

Responses

Name	Type	Description
200 OK	<i>Files</i>	Contains a list of files found in the uploaded file.
400	Validation Error	Configuration provided for import is invalid, further information on what part was invalid is provided.
404	Not found	The blob id was not found.

Files

The Files object, contains a list of files in the uploaded archive.

Name	Type	Description	Optional
<i>files</i>	string []	List of files found in the uploaded archive.	No

Detect Columns

Asks the server to detect the columns in the import sheet, the server will attempt to match each column with an associated business object field. A base business object needs to be specified.

Only available to hosted SaaS clients

HTTP Request

To retrieve detected columns from import file:

```
POST /icweb.dll/import/columns
```

Request Body

Contains information on how to parse the import file to detect the columns.

Name	Re-quired	Type	Description	De-fault
file	Yes	String	Specifies the import file previously uploaded.	
files	Yes	String[]	Specifies a number of import files that have previously been uploaded. This can be used instead of <code>file</code> where there are multiple zip files (exceeding 500mb) to allow larger uploads.	
fileName	No	String	If the import file was a zip file, this specifies a file within the zipfile that is used as the import file. (Where multiple zipfiles are specified in <code>files</code> this file can be in any of them)	
businessObject	Yes	String	The base business object for the server to use to perform column detection with. The server will attempt to match columns in this table first.	
headerRows	Yes	Integer	The number of rows that relate to column headers in the import file.	1
delimiter	Yes	String	Column delimiter	‘;’
qualifier	Yes	String	String qualifier to denote start/end of strings, possible values, ‘quote’, ‘doubleQuote’, ‘none’	quote
consecutiveAsOne	No	Boolean	Treat consecutive delimiter as a single delimiter.	False
columnMaps	No	Column Map []	Contains a list of desired column mappings as a starting point for the detection of further columns, and/or receiving a list of required fields for these mappings.	[]
ignoreColumns	No	integer[]	List of column indexes from source file that should be ignored.	Yes
ignoreBlanks	No	Boolean	Lets the importer know whether to ignore blank cells from the import sheet and not modifying existing data, or (the default) when a blank is found, to set the existing data to null.	False

Responses

Name	Type	Description
200 OK	Import Columns	Contains a list of columns detected in the import sheet, mappings that are detected based on those columns as well as required fields.
400	Validation Error	Configuration provided for import is invalid, further information on what part was invalid is provided.
404	Not found	Either the blob id was not found or the businessObject specified was not found.

Import Columns

The Import Columns object, contains information about the auto-detected columns from the import sheet, as well as a list of column maps to business object fields that have been detected.

Name	Type	Description	Optional
sourceColumns	<i>Source Column</i> []	List of columns detected	No
columnMaps	<i>Column Map</i> []	List of column maps detected	No
requiredFields	<i>Required Field</i> []	List of fields that are required to be provided, either via a static value, or a mapping for the import, based on other fields that have been mapped.	Yes
ignoreColumns	<i>Integer</i> []	List of column indexes from source file that should be ignored.	Yes
preview	<i>Source Row</i> []	Contains at most 50 rows from the source row, converted to a json object.	No
commonFields	<i>Common Category</i> []	This contains a list of common fields that can be used as a destination for column mappings.	No

Source Column

The source column object, contains information about the columns detected in the import sheet.

Name	Type	Description	Optional
columnIndex	<i>Integer</i>	Column index, 0 is the first, left-most column.	No
columnName	<i>String</i>	Name of the column that was detected from the header rows, where there are no header rows in the import sheet, this will be blank.	Yes

Column Map

Contains information to map a column in the import sheet, with a business object field.

Name	Type	Description	Optional
businessObjectName	<i>String</i>	Name of the business object	No
fieldName	<i>String</i>	Field name of the field to map this column to.	No
path	<i>String</i>	Path to join from the base businessObject to the destination businessObject. Effectively when businessObject is not in the base table, NEXUS may not be able to correctly determine a path to the destination field. path helps NEXUS decide on the best path to join between the businessObjects.	Yes
columnIndex	<i>Integer</i>	Column index, 0 is the first, left-most column.	Yes
staticValue	<i>Any</i>	This will provide a static value for the business object to be imported with, use this instead of a columnIndex to provide the same value to be imported for each row created in the business object.	Yes
optional	<i>Boolean</i>	Determines if this field mapping should create a row, a new row won't be inserted if it only contains values for 'optional' field mappings, default value is False.	Yes

Required Field

Contains information about fields that are required to be provided, either by a column mapping or static value for the import to succeed.

Name	Type	Description	Optional
businessObject	string	Name of the business object	No
fieldName	string	Field name of the field to map this column to.	No
isMapped	Boolean	Specifies if a mapping exists for this field, default <code>False</code>	Yes

Source Row

Contains a preview of up to 50 rows from the source row, as parsed using the submitted settings.

Each column will have a property in the JSON object, the name of the JSON pair will be `columnX`, where X is a zero based index, and the value will be of type `string` and contain the raw characters from the source file.

Common Category

Contains a list of categories, and a list of business objects and fields for each category.

Name	Type	Description	Optional
category	string	Name of the category of business objects.	No
businessObjects	commonObject []	Details on each business object in this category.	No

Common BusinessObject

Contains a reference to a business object, and a list of fields in that business object that can be chosen as a destination field map for importing.

Name	Type	Description	Optional
name	string	Display Name of the business objects.	No
businessObject	string	Name of the business objects.	No
fields	commonField []	Details on field that can be imported to in this business object.	No

Common Field

Contains a reference to a field in a business object.

Name	Type	Description	Optional
fieldName	string	Field Name	No
name	string	Display Name of the field, not returned if it is the same as <code>fieldName</code> .	Yes
path	string	Path helper for the import, to return if this column is provided.	Yes

Import

Import data into 1 or more tables from a previously posted blob, the blob must be a text file containing data in a tabulated format, such as TSV or CSV.

Only available to hosted SaaS clients

HTTP Request

To start a new import job:

```
POST /icweb.dll/import
```

To retrieve detail on an existing import job, see *Job Status*

URI Parameters

Name	In	Re-quired	Type	Description
fileId	Path	Yes	String	Specifies the import file previously uploaded.
fileName	Path	No	String	If the import file was a zip file, this specifies a file within the zipfile that is used as the import file.

Request Body

This contains parameters for how to import the the data from the blob.

Name	Type	Description	Optional	Default
file	String	Contains an identifier previously returned by a <i>Post Blob</i> call.	No	
fileName	String	Where the blob is a compressed zipfile containing multiple files, this is the name of the actual text file containing the import data.	Yes	null
businessName	String	Name of the primary business object that the import is to be performed on. This forms the basis of the rows in the text file, other objects can be mapped using column mappings.	No	
dateFormat	String	Date format used when converting dates in the import sheet, acceptable values: 'dd/MM/yyyy', 'MM/dd/yyyy', 'yyyy/MM/dd', 'dd-MM-yyyy', 'MM-dd-yyyy', 'yyyy-MM-dd'.	Yes	yyyy/mm/dd
timeFormat	String	Time format used when converting times in the import sheet, acceptable values: 'hh:nn:ss AM', 'HH:nn:ss', 'HH:nn:ss.zzz', 'hh:nn AM', 'HH:nn'.	Yes	HH:nn:ss
timeZone	String	Timezone offset of date/times when being imported, a shift will be performed to convert it to UTC for Date & Time fields, Date or Time fields won't have any conversion performed.	Yes	0
headerRows	Integer	The number of rows that relate to column headers in the import file.	Yes	1
delimiter	String	Column delimiter	Yes	,
qualifier	String	String qualifier to denote start/end of strings, possible values, 'quote', 'doubleQuote', 'none'	Yes	quote
consecutiveDelimiters	Boolean		Treat consecutive delimiter as a single delimiter.	False
startRow	Integer	Start row of data to import, row numbers start at 0, after the header rows. So if there are 2 header rows, and the 3rd line in the file is the first data row, that is considered row 0.	Yes	0
endRow	Integer	End row of data to import, omit this field to import until the end of rows. The importer determines the end of rows by either the end of file, or a blank line.	Yes	
columnMaps	Map Column Map []	List of columns for the import sheet, mapping to business object fields. This is optional, and recommended that you rely on the auto-detect columns, and only pass column maps you want to override in the detection.	Yes	
ignoreColumns	Integer[]	List of column indexes from source file that should be ignored.	Yes	
ignoreBlank	Boolean		Lets the importer know whether to ignore blank cells from the import sheet and not modifying existing data, or (the default) when a blank is found, to set the existing data to null.	False
test	Boolean	Run a test of the import as a job.	Yes	False

Responses

Name	Type	Description
200 OK	serverJob	Import job created, response contains information on the job.
400	Validation Error	Configuration provided for import is invalid, further information on what part was invalid is provided.
404	Not found	Either the blob id was not found or the businessObject specified was not found.

Example

Example to submit an import job for the Task business object.

Request

```
POST /icweb.dll/import
```

Request Body

```
{
  "file": "{69EA081E-84ED-4504-B15D-14BC7A020E49}",
  "businessObject": "Task",
  "qualifier": "quote",
  "dateFormat": "dd/mm/yyyy",
  "timeFormat": "HH:mm:ss"
}
```

Response

```
{
  "id": "{7945AE0D-BB7D-4D7C-AF68-175C74CF02D5}",
  "percentComplete": 0
}
```

An example to detect the columns in a CSV file, using Header as the base business object.

```
POST /icweb.dll/importColumns`
```

Request Body

```
{
  "file": "{A29C4D22-214C-4DD6-9ED1-8F7FE084E1AA}",
  "fileName": "Rest - Multi Header - Events - Multimedia.csv",
  "businessObject": "Header",
  "headerRows": 1
}
```

Response

```

{
  "columnMaps": [{
    "businessObject": "View_Node",
    "fieldName": "Full_Location",
    "columnIndex": 0
  }, {
    "businessObject": "View_Node",
    "fieldName": "Full_Location",
    "columnIndex": 1
  }, {
    "businessObject": "Comp_Type",
    "fieldName": "Name",
    "path": "Component",
    "columnIndex": 2
  }, {
    "businessObject": "Workpack",
    "fieldName": "Name",
    "columnIndex": 3
  }, {
    "businessObject": "Table_Def",
    "fieldName": "Name",
    "path": "TD_ID",
    "columnIndex": 4
  }, {
    "businessObject": "EVT_Span",
    "fieldName": "Length",
    "columnIndex": 5
  }, {
    "businessObject": "SDT_STD_KP",
    "fieldName": "KP",
    "path": "Start_Clock_SD_ID",
    "columnIndex": 6
  }, {
    "businessObject": "SDT_STD_KP",
    "fieldName": "KP",
    "path": "End_Clock_SD_ID",
    "columnIndex": 7
  }, {
    "businessObject": "Multimedia",
    "fieldName": "Name",
    "columnIndex": 8
  }, {
    "businessObject": "Repository",
    "fieldName": "UNC",
    "path": "Multimedia",
    "columnIndex": 9
  }
  ],
  "sourceColumns": [{
    "columnName": "Asset Location.Full Location",
    "columnIndex": 0
  }, {
    "columnName": "Asset Location.Full Location",
    "columnIndex": 1
  }, {

```

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```

        "columnName": "Asset.Asset Type",
        "columnIndex": 2
    }, {
        "columnName": "Workpack.Name",
        "columnIndex": 3
    }, {
        "columnName": "Event.Event Type",
        "columnIndex": 4
    }, {
        "columnName": "Span.Length",
        "columnIndex": 5
    }, {
        "columnName": "Start - Survey - Pipeline.KP",
        "columnIndex": 6
    }, {
        "columnName": "End - Survey - Pipeline.KP",
        "columnIndex": 7
    }, {
        "columnName": "Multimedia.Name",
        "columnIndex": 8
    }, {
        "columnName": "Multimedia.Image",
        "columnIndex": 9
    }
    ],
    "requiredFields": [{
        "businessObject": "View_Node",
        "fieldName": "CV_ID"
    }, {
        "businessObject": "EVT_Span",
        "fieldName": "Header_ID",
        "isMapped": true
    }, {
        "businessObject": "Multimedia",
        "fieldName": "Name",
        "isMapped": true
    }
    ],
    "commonFields": [{
        "category": "Event",
        "businessObjects": [{
            "businessObject": "EVT_Span",
            "name": "Span",
            "fields": [{
                "fieldName": "Length"
            }
            ]
        }
        ]
    }, {
        "category": "Continuous Event",
        "businessObjects": [{
            "businessObject": "EVT_Pipeline_Profile",
            "name": "PL - Profile",
            "fields": [{
                "fieldName": "Top_Of_Pipe",
                "name": "Top of Pipe"
            }
            ]
        }
        ]
    }
    ]

```

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```

    }, {
      "fieldName": "Bottom_Of_Pipe",
      "name": "Bottom of Pipe"
    }, {
      "fieldName": "Left_Seabed",
      "name": "Left Seabed"
    }, {
      "fieldName": "Right_Seabed",
      "name": "Right Seabed"
    }
  ]
}
]
}, {
  "category": "Sub Event",
  "businessObjects": [{
    "businessObject": "SET_Cross_Profile",
    "name": "PL - Cross Profile",
    "fields": [{
      "fieldName": "Header_ID"
    }, {
      "fieldName": "X"
    }, {
      "fieldName": "Y"
    }
  ]
}
]
}, {
  "category": "System Table",
  "businessObjects": [{
    "businessObject": "Commentary",
    "name": "Commentary",
    "fields": [{
      "fieldName": "Header_ID",
      "name": "Event"
    }, {
      "fieldName": "Notes"
    }
  ]
}, {
  "businessObject": "Signoff",
  "name": "Event Review",
  "fields": [{
    "fieldName": "Signed",
    "name": "Date \\/ Time"
  }, {
    "fieldName": "Description"
  }, {
    "fieldName": "SU_ID",
    "name": "Personnel"
  }
]
}, {
  "businessObject": "Finding",
  "name": "Finding",
  "fields": [{

```

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```

    }, {
      "fieldName": "Finding_ID",
    }, {
      "fieldName": "Header_ID",
      "name": "Event"
    }, {
      "fieldName": "Anomaly_ID",
      "name": "Anomaly"
    }, {
      "fieldName": "Bound_ID",
      "name": "Trigger"
    }, {
      "fieldName": "Code_ID",
      "name": "Code"
    }, {
      "fieldName": "Is_Bound",
      "name": "Is Auto Generated"
    }, {
      "fieldName": "Remedial_Action",
      "name": "Remedial Action"
    }, {
      "fieldName": "Anomaly_Required",
      "name": "Anomaly Required"
    }, {
      "fieldName": "Severity_ID",
      "name": "Severity"
    }, {
      "fieldName": "Reason"
    }, {
      "fieldName": "Is_Finding_Reviewed",
      "name": "Is Finding Reviewed"
    }, {
      "fieldName": "Finding_Number",
      "name": "Finding Number"
    }, {
      "fieldName": "Has_Comments",
      "name": "Has Review Comments"
    }
  ], {
    "businessObject": "View_Node",
    "name": "Asset Location",
    "fields": [
      {
        "fieldName": "CV_ID",
        "name": "Asset View"
      }, {
        "fieldName": "Component_ID",
        "name": "Asset"
      }, {
        "fieldName": "Is_Dynamic",
        "name": "Is Dynamic"
      }, {
        "fieldName": "Dynamic_Filter",
        "name": "Dynamic Filter"
      }
    ]
  }
}

```

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```

        }, {
            "fieldName": "Elevation"
        }
    ], {
        "businessObject": "SDT_STD_KP",
        "name": "Survey - Pipeline",
        "fields": [{
            "fieldName": "KP"
        }
    ]
}, {
    "businessObject": "SDT_STD_NORM",
    "name": "Survey - Standard",
    "fields": [{
        "fieldName": "Easting"
    }, {
        "fieldName": "Northing"
    }, {
        "fieldName": "Depth"
    }, {
        "fieldName": "Elevation"
    }
    ]
}
]
}, {
    "preview": [{
        "Column0": "Pipelines",
        "Column1": "10\" Production Pipeline",
        "Column2": "Flexible Pipe",
        "Column3": "2012 ILI Inspection",
        "Column4": "Span",
        "Column5": "0.012",
        "Column6": "3.56",
        "Column7": "3.61",
        "Column8": "Logo",
        "Column9": "Logo.png"
    }, {
        "Column0": "Pipelines",
        "Column1": "10\" Production Pipeline",
        "Column2": "Flexible Pipe",
        "Column3": "2012 ILI Inspection",
        "Column4": "Span",
        "Column5": "0.0253",
        "Column6": "3.77",
        "Column7": "3.78",
        "Column8": "",
        "Column9": ""
    }, {
        "Column0": "Pipelines",
        "Column1": "10\" Production Pipeline",
        "Column2": "Flexible Pipe",
        "Column3": "2012 ILI Inspection",
        "Column4": "Span",
        "Column5": "0.0043",

```

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```

        "Column6": "4.8",
        "Column7": "4.93",
        "Column8": "WGIM",
        "Column9": "wgim.bmp"
    }, {
        "Column0": "Pipelines",
        "Column1": "10\" Production Pipeline",
        "Column2": "Flexible Pipe",
        "Column3": "2012 ILI Inspection",
        "Column4": "Span",
        "Column5": "0.122",
        "Column6": "7.12",
        "Column7": "7.35",
        "Column8": "",
        "Column9": ""
    }, {
        "Column0": "Pipelines",
        "Column1": "10\" Production Pipeline",
        "Column2": "Flexible Pipe",
        "Column3": "2012 ILI Inspection",
        "Column4": "Span",
        "Column5": "",
        "Column6": "7.42",
        "Column7": "7.85",
        "Column8": "",
        "Column9": ""
    }, {
        "Column0": "",
        "Column1": "",
        "Column2": "",
        "Column3": "",
        "Column4": "",
        "Column5": "",
        "Column6": "",
        "Column7": "",
        "Column8": "",
        "Column9": ""
    }
}

```

Job Status

Request information about a job, including current progress.

Only available to hosted SaaS clients

HTTP Request

```
GET /icweb.dll/jobStatus?id={Id}
```

URI Parameters

Name	In	Re-quired	Type	Description
id	Path	Yes	String	Specifies the job to retrieve the serverJob object for, containing the current progress.

Responses

Name	Type	Description
200 OK	serverJob	OK
404 Not Found	String	Job identified by <i>id</i> was not found.

Server Job

The Server Job object, contains information about the import job that was just started.

Name	Type	Description	Op-tional
id	string	Unique Identifier for this import job, can be used to request updated information on status.	No
percentComplete	integer	0 - 100 percent complete of rows in import job.	Yes
summary	string	Contains a summary of the import job, thus far.	Yes
status	integer	Current status of the job, 1 = Waiting to Start, 2 = Starting, 3 = Running, 4 = Completed, 5 = Failed, 6 = Paused	No

Example

Retrieve the job status, with the id of '{FAAF7FBC-0475-45ED-A148-02238E75C395}'.

Request

```
GET /icweb.dll/jobStatus?id={FAAF7FBC-0475-45ED-A148-02238E75C395}
```

Response

```
{
  "id": "{FAAF7FBC-0475-45ED-A148-02238E75C395}",
  "percentComplete": 35,
  "summary": "",
  "status": 3
}
```

Job Content

Request the content from a completed job, some jobs may not provide any content.

Only available to hosted SaaS clients

HTTP Request

```
GET /icweb.dll/jobContent?id={id}
```

URI Parameters

Name	In	Re-quired	Type	Description
id	Path	Yes	String	Specifies the job to retrieve the content for. The content will be returned, pay important attention to the response type.

Responses

Name	Type	Description
200 OK	Binary / Text - see mime type of response.	OK
404 Not Found	String	Job identified by <i>id</i> was not found.

Example

Retrieve the job content, with the id of '{FAAF7FBC-0475-45ED-A148-02238E75C395}'.

Request

```
GET /icweb.dll/jobContent?id={FAAF7FBC-0475-45ED-A148-02238E75C395}
```

Response

```
content-type: application/json
content-disposition: attachment;filename="report.json"

{
  "elements": [{
    "type": "table",
    "caption": "Table of Data",
    "data": {
      "sourceBusinessObject": "Task",
      "columns": [{
        "caption": "Asset "
      }, {
```

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```

        }, {
            "caption": "Event Type"
        }, {
            "caption": "Workpack"
        }
    ],
    "rows": [
        {
            "sourceKey": 1,
            "cells": [
                {
                    "value": "Test Asset"
                }, {
                    "value": "GVI"
                }, {
                    "value": "Workpack A"
                }
            ]
        }, {
            "sourceKey": 2,
            "cells": [
                {
                    "value": "Test Asset"
                }, {
                    "value": "GVI"
                }, {
                    "value": "Workpack B"
                }
            ]
        }
    ]
}, {
    "type": "paragraph",
    "data": {
        "text": [
            {
                "value": "Report generated in 00:00:01"
            }
        ]
    }
}
]
}
}

```

REST Examples

The following are some examples of different interactions with the REST service using Powershell commands.

Note: It is suggested that interactions with the REST API are thoroughly tested prior to use in a Production environment. Modifying data directly via the REST APIs can have a destructive effect on a NEXUS database if not tested properly.

Authenticating

The following provides an example of how to authenticate against the REST API using powershell. This is required before any other interaction with the REST API.

```
$baseUri = "https://{icWebUrl}/data/icweb.dll/"
$loginUri = $baseUri + "security/login"

# API Key from the user account in NEXUS. We need to base64 encode it for the
→authentication request.
$apiKey = {apiKey}

$apiKeyBytes = [System.Text.Encoding]::UTF8.GetBytes($apiKey)
$apiKeyEncoded = [System.Convert]::ToBase64String($apiKeyBytes)

# Build "Authorization" header for login request.
$headers = New-Object "System.Collections.Generic.Dictionary[[String],[String]]"
$headers.Add("Authorization", "apikey " + $apiKeyEncoded)

# Login to the REST API, result is JSON containing the authentication hash.
$hash = Invoke-RestMethod -method GET -uri $loginUri -Headers $headers
```

Request a list of Rows

Following on from the above authentication, we now have a valid *hash* to be able to query other items from the REST API. The below requests all rows from the Workpack business object.

```
# Base BO REST API
$boUri = $baseUri + "bo/"

# Build the URI to request all the rows from the Workpack business object.
$uri = $boUri + "Workpack/" + "?hash=" + $hash.hash
$workpackJson = Invoke-RestMethod -method GET -uri $uri

# Output the list of Workpacks
$workpackJson.rows | Format-Table -Property Workpack_ID, Name
```

Note: If there are more than 100 rows in the workpack table you will need to make subsequent requests to retrieve the rest of the rows.

Request a list of rows with a filter

If you wanted to only return a list of workpacks where the Revision is set to “Planning” we would do that using a filter.

```
# Create filter object
$filter = @{
    where =
    @(
        @ {
            field = "Revision_ID.Name"
            value = "Planning"
        }
    )
}
```

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```

    )
}

# Convert filter object to Json.
$filterJson = $filter | ConvertTo-Json

# Add the filter as a X-NEXUS-Filter http header.
$headers = New-Object "System.Collections.Generic.Dictionary[[String],[String]]"
$headers.Add("X-NEXUS-Filter", $filterJson)

# Build the REST uri for the Workpack business object and Invoke the REST method.
$uri = $boUri + "Workpack/?hash=" + $hash.hash
$workpacks = Invoke-RestMethod -method GET -uri $uri -Headers $headers

# Output the list of workpacks
$workpacks.rows | Format-Table

```

Generate a Report Template

The following generates a report template and emails it to a specified person.

```

# Base report REST URI
$reportUri = $baseUri + "web/generateReport"

# Set the recipient for the report email/
$recipient = "joe.bloggs@nexusic.com"

# Set the report format to RTF - You can use HTML and XLSX as well.
$format = "RTF"

# Set the report template key to 16, this specifies the report template to generate.
$reportTemplate = "16"

# Generate Report Template with ID of 16, using RTF format and email it to a specific
↳ person.
$uri = $reportUri + "?key=" + $reportTemplate + "&format=" + $format + "&recipient="
↳ + $recipient + "&hash=" + $hash.hash
Invoke-RestMethod -method POST -uri $uri

```

Insert a New Row

The following creates a new Workpack, setting the initial values of that Workpack.

```

# Build an object that contains the specified values for Name, Actual_Start,
↳ Description and ReadOnly
$workpackRow = @{}
    Name = "2015 ROV Inspection"
Actual_Start = "2015-05-15T00:00:00.000Z"
Description = "Annual 2015 full field roV inspection"
ReadOnly = $false
}
$body = $workpackRow | ConvertTo-Json

```

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```
# Build the URI to request all the rows from the Workpack business object.
$uri = $boUri + "Workpack/0?hash=" + $hash.hash
$newRow = Invoke-RestMethod -method PUT -body $body -uri $uri

# Output the the new Workpack row
$newRow.rows | Format-Table -Property Workpack_ID, Name
```

Updating an existing Row

Following on from the insert, we can use the row in `$newRow.Rows` to then update the name of the workpack and abbreviation.

```
# Update Workpack Abbreviation and Name
$workpackRow = @{
    Abbreviation = "2015_ROV"
    Name = "2015 - Annual ROV Inspection"
}
$body = $workpackRow | ConvertTo-Json

# Build the URI - must include the Workpack_ID from the new row so the REST api knows,
↳ what row we are updating.
$uri = $boURI + "Workpack/" + $newRow.rows[0].Workpack_ID + "?hash=" + $hash.hash
$updatedRow = Invoke-RestMethod -method POST -body $body -uri $uri

$updatedRow.rows
```

Getting information on a Function

```
$functionName = "Compare A = B"
$functionUri = $baseUri + "function/"

# Build the URI - must include the Workpack_ID from the new row so the REST api knows,
↳ what row we are updating.
$uri = $functionURI + "/" + $functionName + "?hash=" + $hash.hash
$function = Invoke-RestMethod -method GET -uri $uri

$function
```

The REST service provides an API consisting of a set of HTTP endpoints(methods) with the ability to create, retrieve, edit, or delete access to information stored in a NEXUS IC database. The REST service ensures all request are made through the NEXUS Storage engine which allows security and cohesion to be maintained and respected within the NEXUS database data.

Components of a REST API request/response

1. The **request URI**, which consists of: `{uri scheme} :// {uri host} /icweb.dll/{resource-path} ? {query-string}`
 - URI scheme: Indicates the protocol used to transmit the request. This is either http or https. We highly recommend using https in your deployments.

- `URI host`: Specifies the domain name or IP address of the server where the REST service endpoint is hosted, such as `sample.nexusic.com`
- `Resource path`: Specifies the resource or resource collection, as detailed below in the API
- `Query string (optional)`: Provides additional parameters as required.

2. HTTP request message header fields:

- A required HTTP method (or verb), which tells NEXUS what type of operation you are requesting. The NEXUS REST service support GET, PUT, POST, and DELETE.
- Optional additional header fields, as required by the specified URI and HTTP method. For example, an Authentication token that can be used for client authorization.

3. An Optional HTTP request message body, to support the URI and HTTP operation. For POST or PUT operations, the request body is required to have a MIME-type of `application/json`.

4. A HTTP status code, this may be from the 2xx, 4xx or 5xx codes. Each service will indicate what possible returns are available.

5. Optional HTTP response message body, MIME-encoded response objects are returned in the HTTP response body, such as a response from a GET method that is returning data. All results are return in the format JSON.

Authentication

There are 3 authentication options available using *Login*:

1. Username/password request
2. API Key, that is associated with *any* user account with NEXUS, this provides permanent access until the API Key is changed in NEXUS
3. Email based login, that provides the capability for the REST api to email a request token to the user, this is then used to have the REST api issue a token lasting 90 days.

All three of these authorization methods, issue a temporary HASH that expires 60 minutes after the last request.

Once the HASH is received from a valid authorization request to the server, this must be specified in subsequent requests via a `query string` parameter.

```
GET /icweb.dll/bo/?hash={value}
```

Examples

Extensive examples of using the REST API with powershell scripting are available in the below topic.

REST Examples

API Reference

<i>Login</i>	<i>Logout</i>	<i>Business Objects</i>	<i>Get Row</i>
<i>Get Row Field</i>	<i>Get Rows</i>	<i>Create / Update Row</i>	<i>Delete Row</i>
<i>Request Cookie Token</i>	<i>Validate Cookie Token</i>	<i>Post Blob</i>	<i>Get Function Object</i>
<i>Execute Function</i>	<i>Version</i>	<i>Import</i>	<i>Report Details</i>
<i>Job Status</i>			

Field Types

Name	Value	Native/JSON Type	Display Field Type
FT_STRING	1	string	string
FT_NUMBER	3	integer (whole number)	integer
FT_NUMERIC	6	float	float
FT_BOOLEAN	5	bool	bool
FT_CURRENCY	7	float	float
FT_DATE	9	string (iso 8601 date/time)	string
FT_TIME	10	string (iso 8601 date/time)	string
FT_DATETIME	11	string (iso 8601 date/time)	string
FT_POSITION	39	string (iso 8601 date/time)	string
FT_LOOKUP	37	integer	string
FT_IMAGE	15	binary	binary
FT_MEMO	16	string	string
FT_PASSTHRU	18	non-stored	based on field type of the destination field. (this is recursive)
FT_GUID	17	string	string
FT_TABLE	38	non-stored	not-visible
FT_CALC	40	non-stored	based on result type of assigned function.
FT_GLOBALTABLE	42	non-stored	based on field type of global field.

1. NEXUS provides support for a number of *Command-Line Switches*.
2. The latest version of the *Database Schema Diagram* can be downloaded.
3. Visit the *Software Based Licensing* page to understand the mechanics of the solution.
4. Common *NEXUS Administration Tasks* are detailed here.
5. *REST Service Specifications*.
6. *REST Service Specifications v2.0*.
7. *How does video playback work?*
8. A PDF version of these Help pages can be downloaded from: <https://docs.nexusic.com/6.8/nexus.pdf>

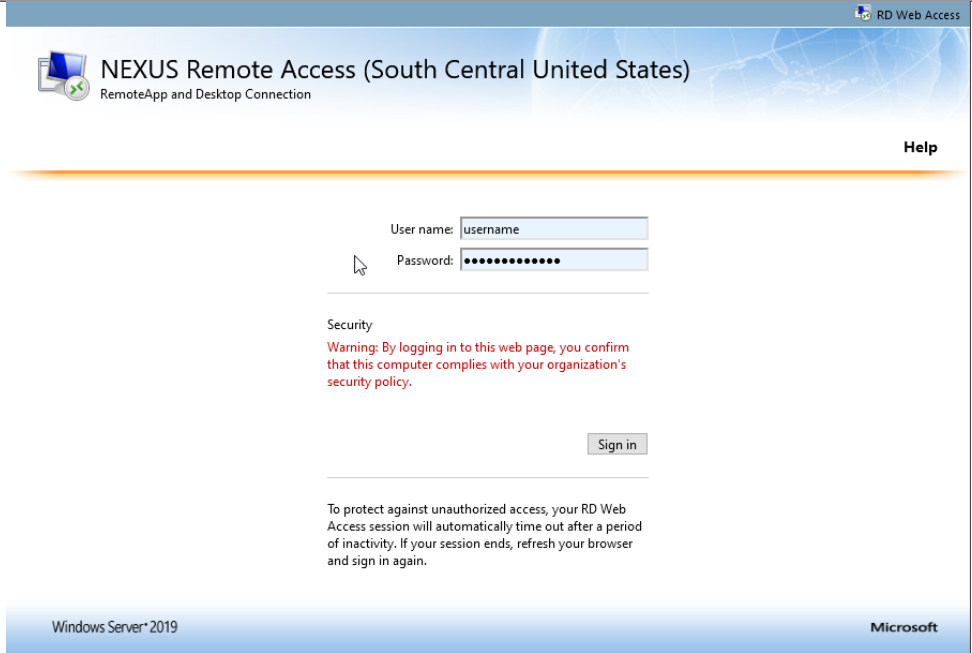
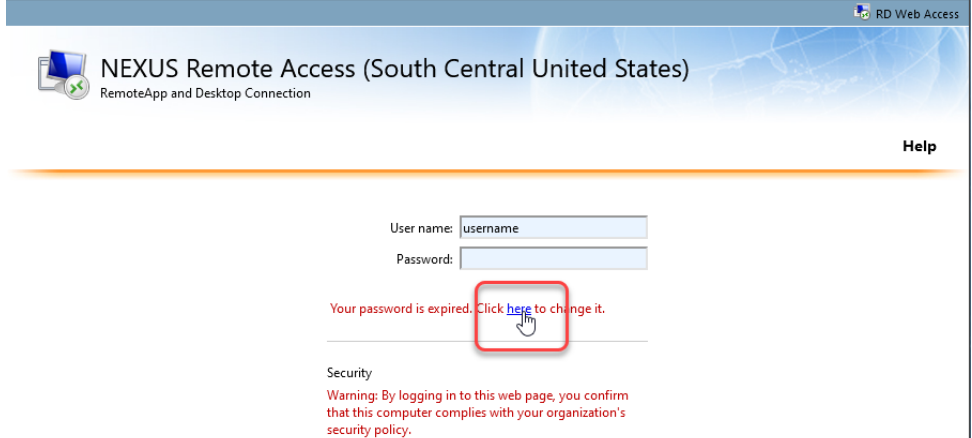

14.3 Software as a Service (SaaS)

14.3.1 NEXUS IC, IC-Web & IC-Inspector SaaS logins

If your NEXUS IC instance is hosted by Wood, the following guides to logins apply.

If your NEXUS IC instance is *not* hosted by Wood, parts of the guides may still be applicable.

NEXUS IC Remote App login

<p>1. Click URL to launch in browser</p>	<p>For APAC : https://remote-ae.nexusic.com For UK : https://remote-uks.nexusic.com For US : https://remote-scus.nexusic.com</p>
<p>2. For first time logins, enter Username only and the temporary password provided to you by the NEXUS support team:</p>	 <p>The screenshot shows the NEXUS Remote Access login page. At the top, it says 'NEXUS Remote Access (South Central United States) RemoteApp and Desktop Connection'. There are input fields for 'User name' (containing 'username') and 'Password' (masked with dots). Below the fields is a 'Sign in' button. A security warning is displayed: 'Warning: By logging in to this web page, you confirm that this computer complies with your organization's security policy.' At the bottom, there is a note: 'To protect against unauthorized access, your RD Web Access session will automatically time out after a period of inactivity. If your session ends, refresh your browser and sign in again.'</p>
<p>For returning users, skip straight to step 7.</p>	 <p>The screenshot shows the NEXUS Remote Access login page. The 'User name' field contains 'username' and the 'Password' field is empty. A red box highlights a message: 'Your password is expired. Click here to change it.' with a mouse cursor pointing to the 'here' link. Below this is the same security warning and session timeout notice as in the previous screenshot.</p>
<p>430</p>	<p>Chapter 14. General</p>  <p>To protect against unauthorized access, your RD Web Access session will automatically time out after a period</p>


Mac OS NEXUS IC login

Download the [Microsoft Remote Desktop app](#) from the Mac App Store. Then follow the above steps.

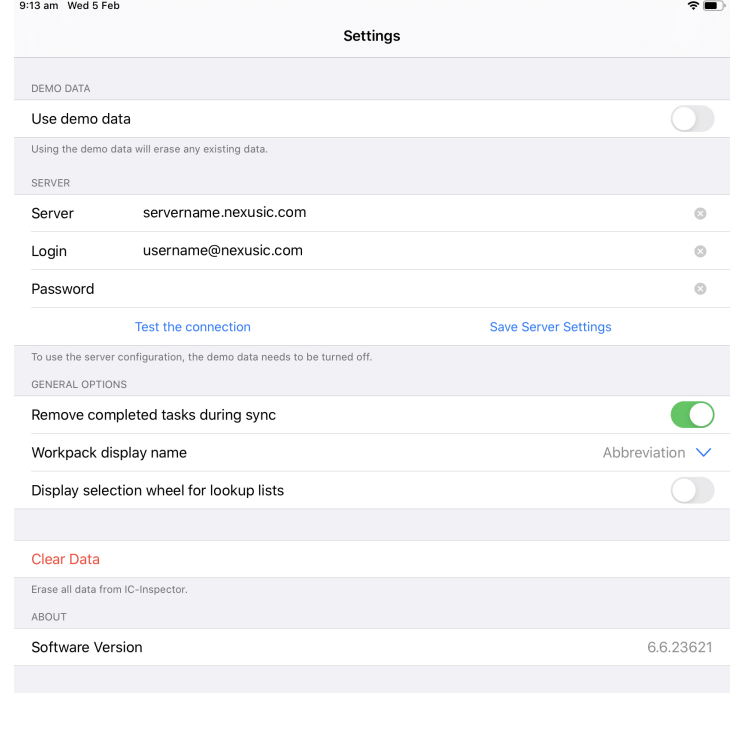
iOS/iPadOS NEXUS IC login

- Download the [Microsoft Remote Desktop app](#) from the App Store.
- Launch the app.
- At the bottom right, tap +.
- Choose **Workspace**.
- Enter the appropriate URL as from step 1 above; i.e. for APAC, enter <https://remote-ae.nexusic.com>.
- Tap **Next**.
- Enter `nexusic\username`, and your password.

IC-Web login

<p>1. Enter the IC-Web URL.</p>	
<p>2. Enter <code>username</code> as <code>user-name@nexusic.com</code> and your password.</p>	

IC-Inspector login

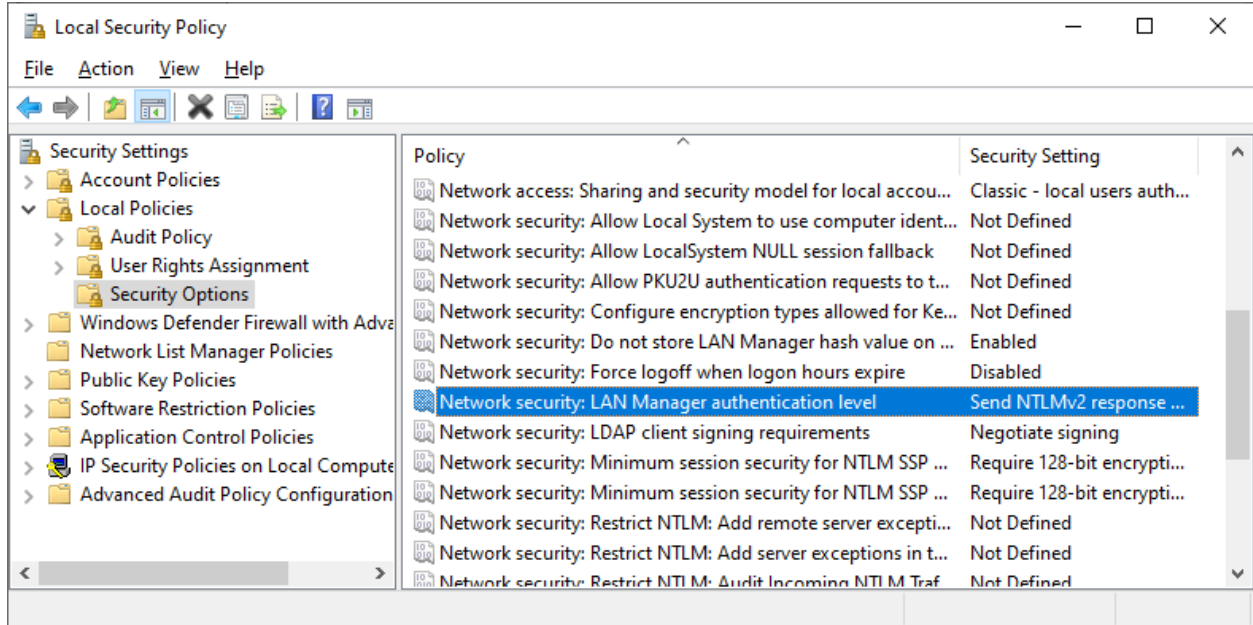
<p>1. Enter the Server name as normal.</p>	
<p>2. Enter username as user-name@nexusic.com and your password.</p>	

14.3.2 Troubleshooting

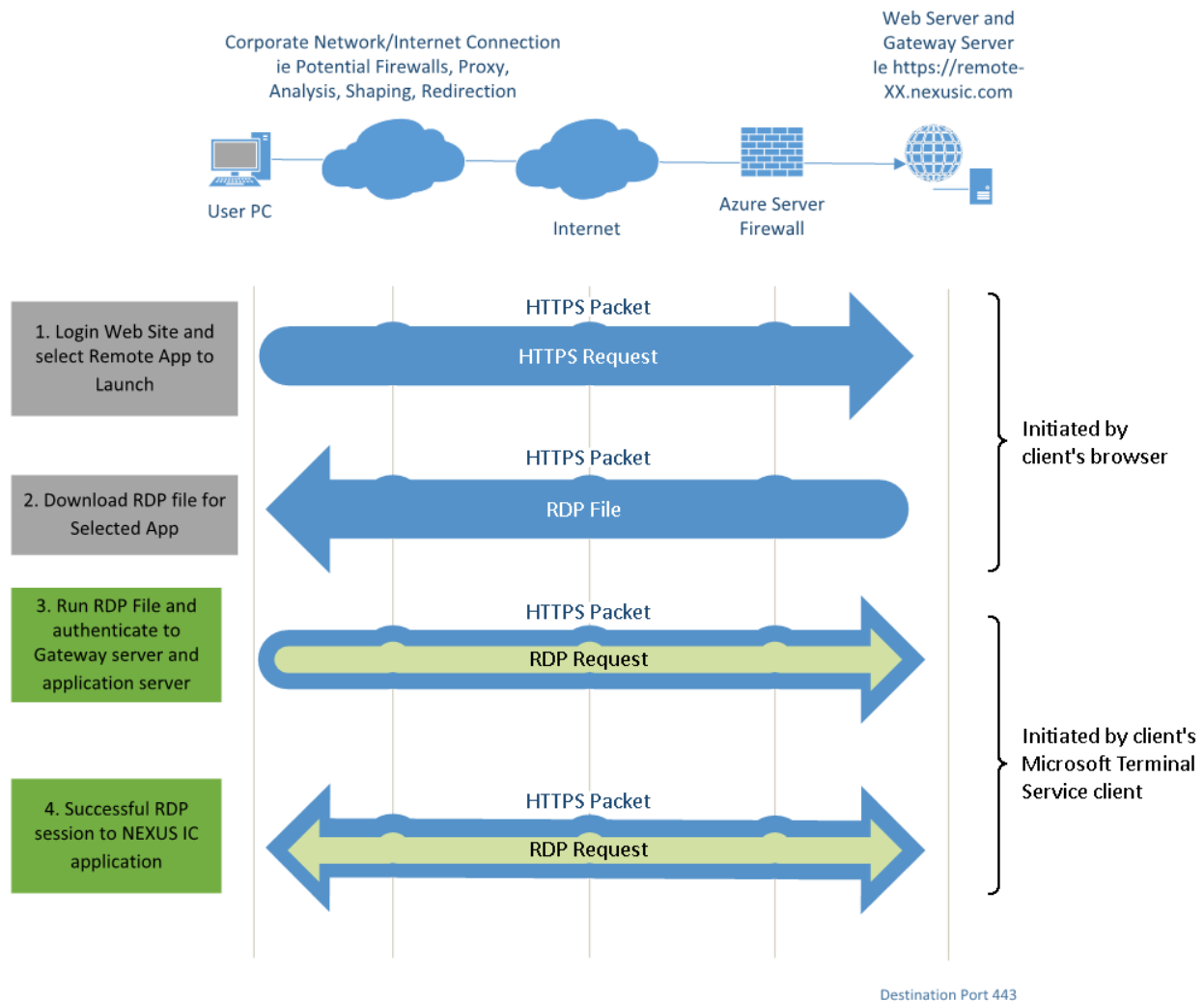
If you are having difficulty connecting to a Wood NEXUS IC cloud instance via RemoteApp, the problem may be your corporate firewall. Try connecting from a device not connected via the corporate internet connection, and not running corporate software that may interfere with the connection. For example, try connecting from home via a personal computer, or try connecting from your *smartphone* via the phone network.

If the corporate infrastructure is blocking the connection, note the following:

- RemoteApp requires client access to port 443.
- If you or your IT department have set policy “Network security: LAN Manager authentication level” away from its default, you must set this back, via domain policy or Local Security Policy (secpol.msc). Under *Local Policies* → *Security Options* ensure that **Network security: LAN Manager authentication level** is set to “Not Defined” or “Send NTLMv2 response only”.



- Deep-packet inspection and modification tools may prevent connections from completing, for example if they find an RDP connection inside an HTTPS stream and decide to rewrite it. See diagram below for the steps involved behind the scenes in an Azure RemoteApp connection:



See also: *NEXUS IC, IC-Web & IC-Inspector SaaS logins.*

Wood provides a SaaS solution using cloud-based servers in Microsoft Azure. Access is provided via RemoteApp and our web app, *IC-Web*.

Location – Wood presently operates cloud hubs in UK, USA, SE Asia and Australia. We can stand up services in any Microsoft Azure data centre as required for clients with specific geographic restrictions on data storage.

Sign-on – NEXUS has the ability to authenticate users via Active Directory connection.

Availability – System availability is historically greater than 99.9%.

Downtime – Access to NEXUS via SaaS may be temporarily unavailable for scheduled maintenance or for unscheduled emergency maintenance due to causes beyond Wood's control. The window for daily automated maintenance of servers is typically out of hours (eg. 0200 to 0400) and will NOT always result in service downtime. This maintenance window allows critical security issues to be addressed promptly after the release of a relevant patch. Any necessary 'non-routine' downtime during business hours is scheduled and approved with client contact.

Response times & Latency – Tasks within NEXUS can take a varying amount of time (from milliseconds to minutes) depending on complexity. Increased network latency can degrade performance. Wood recommends <120ms latency for acceptable performance with RemoteApp and <300ms for IC-Web.

Backup regime – database backups are taken each business day and retained for 14 calendar days. Additional backups

for longer term retention can be held by agreement or transmitted to customer. This may have a small cost impact.

Disaster Recovery (DR) & Business Continuity (BC) – There is no client side requirement for DR/BC. The hosted service is resilient to single server failures through the use of redundant Azure infrastructure and provides coverage in the event that a data centre goes offline. Wood replicates database backups to each of the Azure data centres that we use around the globe.

Privacy & Confidentiality – Data is stored securely in MSSQL Server and access is only granted to authenticated users.

Security – Access to data within NEXUS is controlled by in-built functional security. Logged in users are authenticated by SSO (where configured, or Username Password authentication where not). And each user is assigned security permissions. Security permissions can be defined at Group Level, or user Level. Security for the overall service relies on Microsoft Azure which meets a broad set of international and industry-specific compliance standards.

Scalability – the SaaS service can be scaled both horizontally and vertically for expansion of scope and increased number of users.

14.3.3 Additional Features

Because we have the ability to closely manage cloud instances of NEXUS IC than we do for instances deployed on client's own infrastructure, we are able to offer some additional features:

- *Scheduled reports*
- Import and export jobs are offloaded to a separate server, allowing users to exit NEXUS while jobs continue to execute
- REST API requests which generate and download reports are only available for SaaS clients
- Database maintenance
- Infrastructure optimization
- Database configuration management across regions
- Wood users supporting your database will not consume a NEXUS license
- Software update service, including early access to Beta releases

14.3.4 Pre-Requisites for RemoteApp

Client Operating System: Windows 8, Windows 10. x86 (32-bit) and x64 (64-bit), Windows Server 2012 R2 (or higher) supported.

14.3.5 Windows 7

Note that Windows 7 is no longer supported. If you use it anyway, you will at minimum need to install the following Microsoft patches: <http://support2.microsoft.com/kb/2830477> and then update by following the Microsoft patch notes here: <http://support2.microsoft.com/kb/2923545>

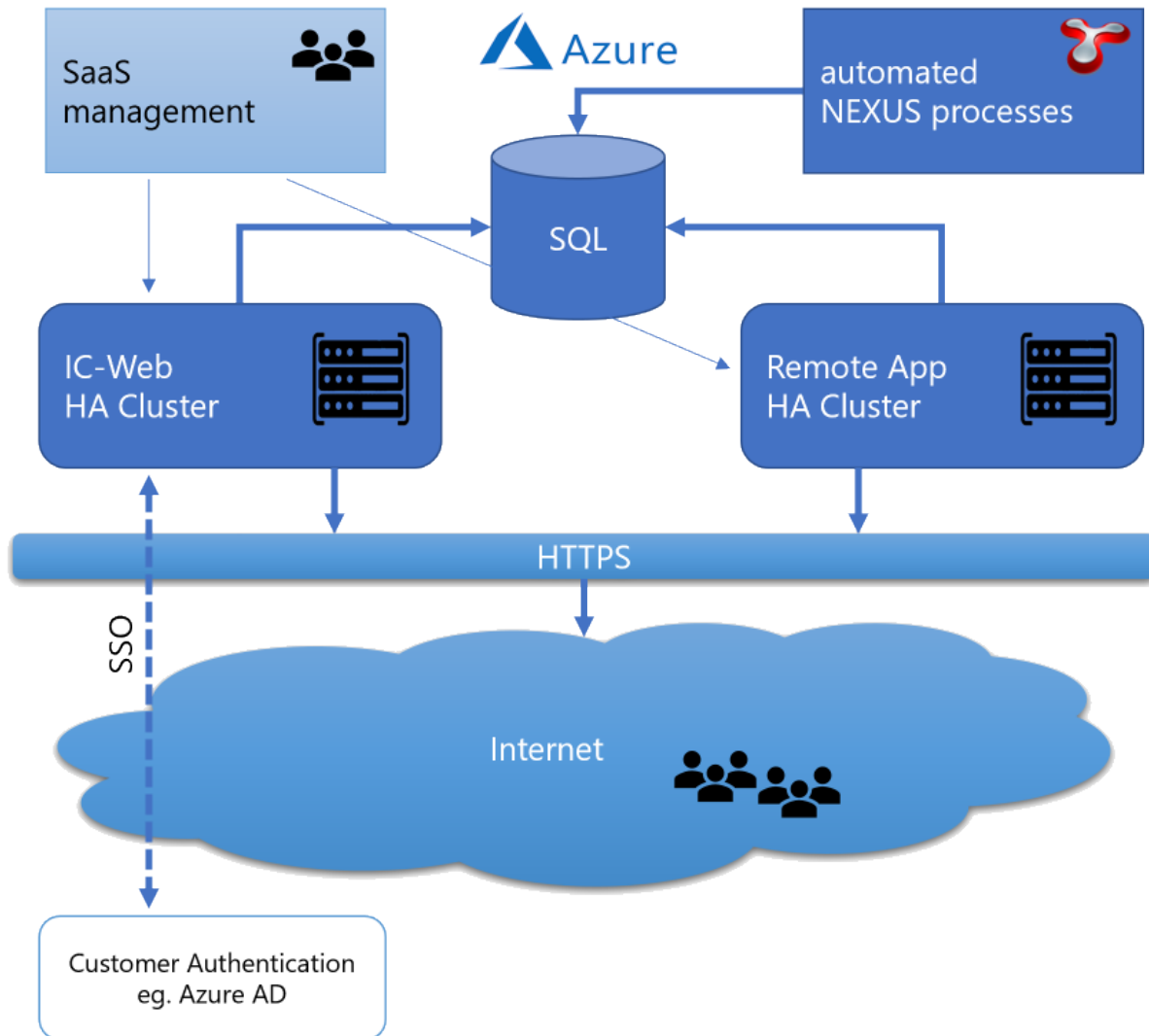
14.3.6 IC-Web Supported Browsers

- Chrome 54.0 or above
- Microsoft Edge 79 or above

- Safari 9.1 or above
- Firefox 53.0 or above. 3D drawings may be slower in Firefox.

Internet Explorer is not recommended, and does not support 3D drawings.

High level SaaS architecture - NEXUS



14.4 Known Issues

Description	Issue Number
<p>Sorting by the ‘Connected To’ column in the Library grid for grids with more than ~500 rows will take some time to complete. Clicking the Cancel button will not successfully cancel the sort action once it is in progress.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> • Hide the ‘Connected To’ column if possible • Do NOT sort by the ‘Connected To’ column unless absolutely necessary. • If you must sort by the ‘Connected To’ column, wait patiently for the sort to complete (it may take up to 30 minutes) then take the necessary action and then IMMEDIATELY sort by another column (eg. Name or Doc Ref or Doc Date). <p>Warning: If you fail to sort by a different column then, when you navigate away from the Library screen or exit the application these sort settings will be saved and you will have to wait for the sort to complete again on next load.</p>	#45063
NEXUS IC, IC-Inspection and IC-Recorder does not fully support the Dark mode color feature setting available in Windows	N/A
SVG Grey scale issue: if you view SVG images and you select the Grey Scale option, the image may appear with a solid black background, and thus black portions of the image may be obscured.	#8358
3D drawing not displayed: 3D drawings originally drawn with SESAM GeniE jacket and then converted to DWG may not display. This is because our third-party 3D DWG viewer does not cope with these DWG files. (It is possible that these particular files do not adhere to the DWG standard.)	#8331
Layer hovering doesn’t work with 2D DWG file: when you hover over a region on a regular drawing (JPG, PDF), the opacity of the region changes slightly. When you hover over a region of a 2D DWG file, the opacity does not change.	#7725
3D drawing structure error: some 3D DWG files show minor rendering errors when viewed in NEXUS. Again, this is a limitation of our third-party 3D DWG viewer.	#7630

14.5 Upgrading

14.5.1 IC-Inspection 5 Users

If you’ve upgraded from IC-Inspection version 5 to version 6, here are some quick things that you should know:

- The window manager has been replaced with the same panel manager used in NEXUS IC 6’s *Inspections* screen. See *Desktops* for more details.
- All grids in version 6 work in the same way. Once you’ve learned one of them, you’ve essentially learned them all. (Exception: There are one or two grids where the new *multi-edit* feature doesn’t work.)
- The Events toolbar is gone — use the *Event Launcher* and/or shortcut keys set up through *Event Templates* instead.
- The Events pane is now called *Active Events*.
- The Database Information pane is now called *Active Inspection*.
- The Assets window no longer has a column to show the number of remaining tasks. An Incomplete Tasks *traffic light* has been created to replace this feature.
- Asset information is now editable in IC-Inspection, if the user has that *security permission*.

- Text overlay is now part of *Devices*. Text Overlay Server is gone, as text overlay functionality is now incorporated directly into IC-Recorder (and some other third-party DVRs).
- The following windows are removed: CP Stab, Operation, Survey Charts, Video, Video Recorder. (If you want video preview, just run an IC-Recorder.)
- The Task Information summary showing number of tasks remaining has been removed. If you want similar functionality back, add a *traffic light*.
- Pipeline View (and Pipeline View Secondary) have been replaced with the all-new 3D *Pipeline View*.
- We now support 3D DWG drawings. (Bear in mind that large 3D DWGs may be slow.)
- If you are using a third-party DVR, you should test its integration with IC-Inspection 6 well ahead of your inspection. Third-party DVRs must now support our generic DVR control protocol to be supported in IC-Inspection.

See also *NEXUS IC 5 Users* upgrade notes.

14.5.2 NEXUS IC 5 Users

If you've upgraded from NEXUS IC version 5 to version 6, here are some quick things that you should know:

- All grids in version 6 work in the same way. Once you've learned one of them, you've essentially learned them all. (Exception: There are a couple of grids where the new *multi-edit* feature doesn't work.)
- Speaking of which, *multi-edit* is new and very powerful.
- The list of major areas at the left of NEXUS IC 6 should be immediately familiar, but there are now no sub-selections within each of those areas. Configuration is moved to the *Configuration* menu. (Of course all those Configuration screens are made of standard grids, and all work in the same way.)
- Some areas are missing because they've been incorporated into other screens. For example, 4-Site has now been incorporated into the Assets → *Risk* screen.
- The old Scheduling → Schedules screen's View → Assets and View → Workpacks are now the *Planning* and *Workpacks* screens respectively.
- *Tools* → Options is where it's always been, but there's less in it. Things specific to your database are now in *Database* → *Properties*.
- You can rearrange Asset Information tabs by drag-dropping them.
- We now support 3D DWGs. (Bear in mind that large 3D DWGs may be slow.)
- *Drawings* are now a special kind of Library Item. If you add one drawing to several different assets, it now gets added as a library item once, and connected to those several different assets, thus saving database space.
- Setting up a sheet for import is a bit different: in version 5, you created a sample sheet for import by exporting something. In version 6, you instead use the *Import* wizard's Example button.
- *Chart Templates* and *Traffic Lights* are configured differently in version 6.

14.5.3 Upgrading from an earlier v6 version

1. Ensure that you have a NEXUS user account which is in the Administrators Security Group, and that the account has read/write access to special permission Upgrade Schema.
2. In your current version of NEXUS, perform a backup of the database (we suggest that this backup file is permanently archived).
3. Run the installer on the Application Server (or on users' individual PCs).

4. Have one of the users from Administrators security group launch NEXUS IC v6 from the desktop shortcut and click on OK to update the database schema. The schema update will take some time to complete (about 1-10 minutes), so please be patient when the Status dialog appears.

Note: If you are currently using a HASP key license, you will need to switch to *Software Based Licensing*.

Note: If you're upgrading from 6.0, 6.1 or 6.2, see [this note about SQL Server permissions](#).

See the relevant *What's News* for highlights of changes.

14.5.4 Upgrading from v5

If you are upgrading from NEXUS IC version 5:

- We suggest consulting with us. Email us at support@nexusic.com.
- Ensure that you have used NEXUS 5's Database Backup feature to take a backup of your version 5 database and have put the backup in a safe place. We suggest that this backup file is permanently archived.
- In NEXUS IC 5, ensure that a user account exists that has permission to upgrade the database. In *Database* → *Security*, check *Security Areas* → *Asset Integrity Manager* → *Schema Update* for both the Administrators group and the user account you plan to use. If in doubt, set both to read/write.
- Make another backup.
- In NEXUS IC 5, set the security permission back to forbid the Schema Update permission. The reason for this is to prevent a user who is experimenting with version 6 from accidentally upgrading your live version 5 database. Once a particular database is upgraded to version 6, version 5 software will be unable to open it.
- Restore the database with NEXUS IC 6 from the backup which has its security permissions set to allow the upgrade. We recommend not just connecting to the existing database, because if you do this you will not get an option to set a backup path. This backup path is necessary for the upgrade to work correctly.

You will receive an upgrade prompt. Note that the upgrade is irreversible (which is why you took a backup) and may take some time. (It's OK to kick it off in the evening and check the results in the morning — it doesn't need watching.)

At the end of the upgrade, NEXUS IC 6 will have written a log, giving details of its actions. This log is named `IntegrityCentre_Trace.log` and can be found in `C:\Users\[USER_NAME]\AppData\Roaming\NEXUS`.

Search this for the word "Warning" or the phrases "Warning[tab]Storage Engine" or "Warning[tab]Schema". This latter phrase covers the most important issues. All these are warnings, not errors — they are merely here to let you know about changes that were made. Information messages can be safely ignored. Preserve a copy of this log file — otherwise it will be overwritten next time you restart NEXUS IC.

If you run into any problems, contact us with a pre-upgrade backup of the database and/or a copy of the log file.

Traffic lights and report templates will not be ported from version 5 — you will need to recreate these afresh in your new version 6 database. (This is because these features work in a different way in version 6, for speed reasons.)

14.5.5 Upgrading IC-Web to v6.6 (or later)

IC-Web 6.6 is now running a 64-bit rest service ISAPI module. Previous versions were 32-bit.

What needs to change? - You need to ensure that the "Enable 32-bit applications" attribute for the application pool running IC-Web is set to False.

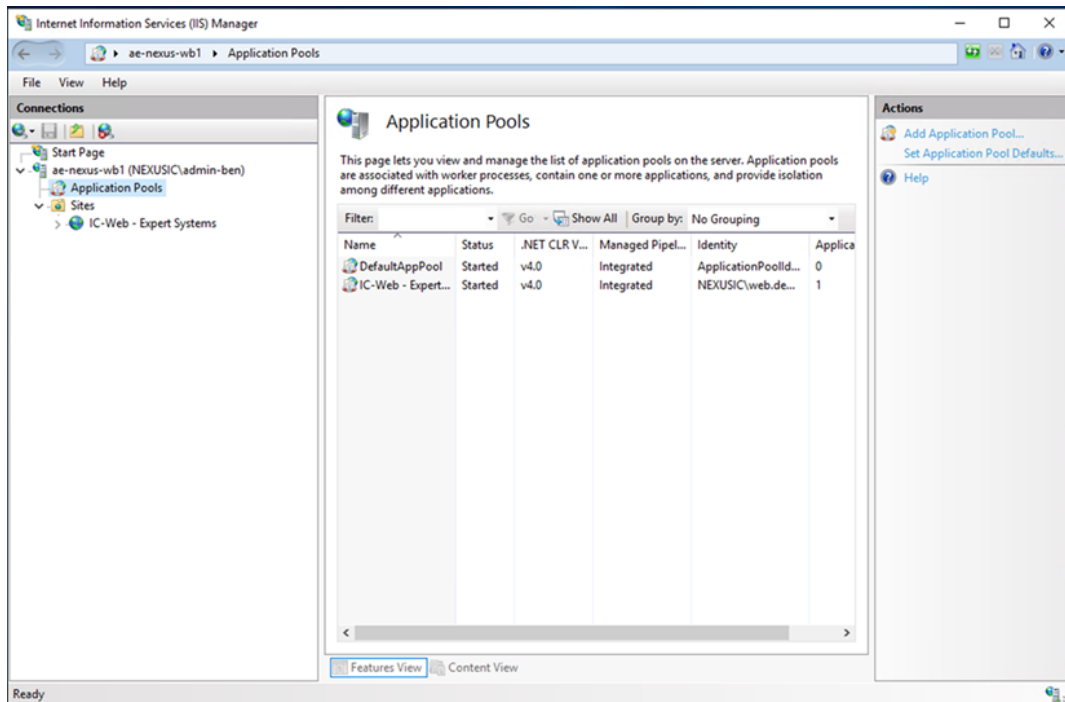
For New Website Setup

1. If you are setting up IC-Web for the first time or created a new website for 6.6, the installer will handle this for you just run the installer and install the new site by following the instructions in the installer.

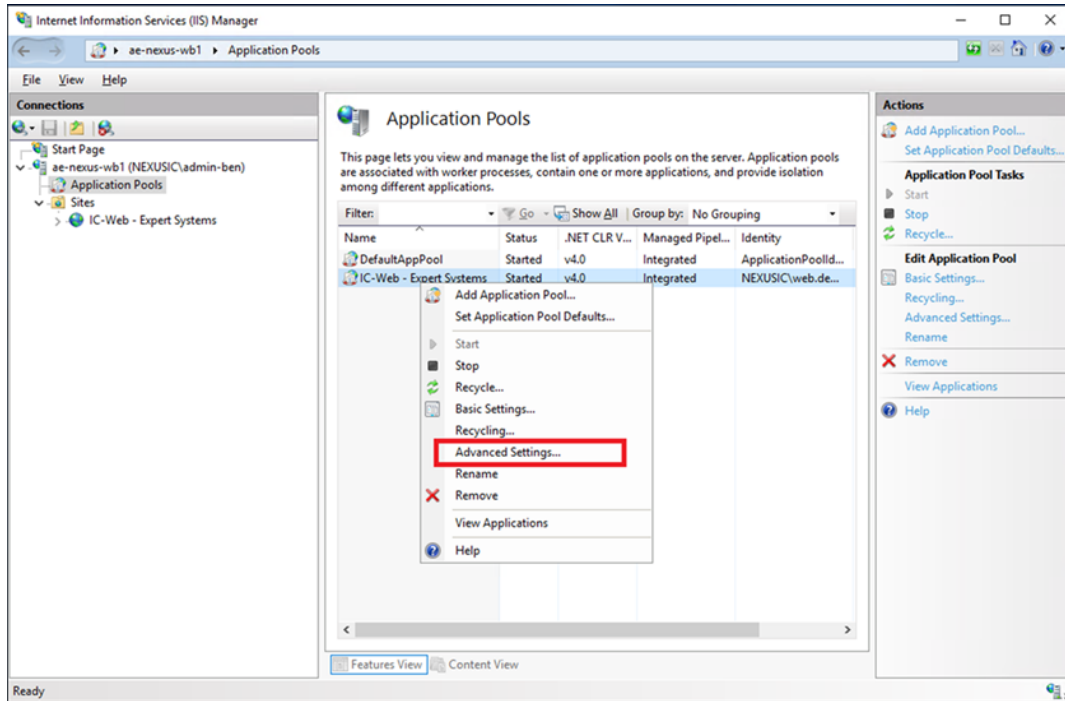
For Existing Website Upgrade

If you have IC-Web 6.5 (or earlier) installed and use the “update” option in the installer, these extra steps need to be undertaken manually when the installer is finished running.

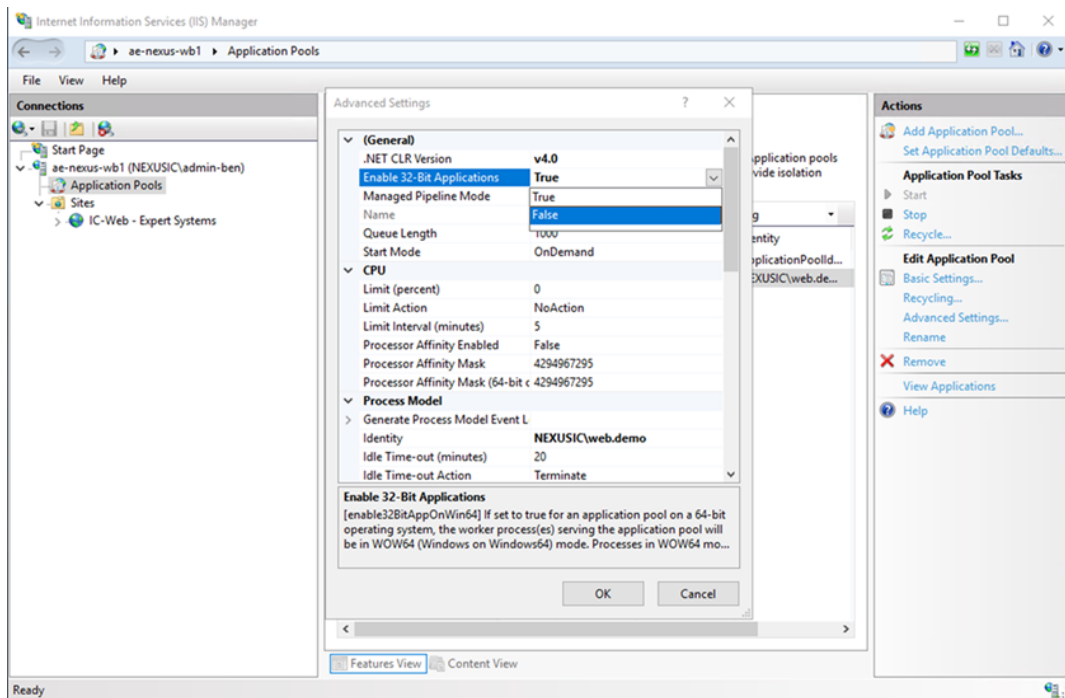
1. Open IIS and expand node on the left until you see “Applications Pools” and select it.



2. Select the application pool that the IC-Web website is using (default application pool name is “ICWeb”) and right click on this application pool and select “Advanced Settings...”.



3. Find “Enable 32 Bit Applications” and change the value from True to False.



4. Double check “Enable 32 Bit Applications” is definitely now set to “False” and press “Ok” on the Advanced Settings window to save that change.
5. Restart your IIS service.

14.6 Third-party DVRs

IC-Inspection can be used to remote *control* digital video recorders during online inspection, providing a permanent link between the inspection data and the video record. In addition to controlling our own *IC-Recorder*, the following DVRs are also controlled by IC-Inspection 6.



Fig. 1: Seascope Pontus DVR



Fig. 2: Digital Edge



Fig. 3: Visual DVR

A standard DVR control protocol has been developed and is available for [purchase](#).

To configure a VisualDVR to accept commands via the protocol, left-click on the main video preview. A menu pops up. Click *Systems Setup & Admin* → *Advanced* → *NEXUS IC DVR control* and tick **Enable NEXUS IC DVR control**. For other products, consult manufacturer documentation.

14.7 Other Documentation

A [training manual](#), showing how to use IC-Inspection for offshore eventing and NEXUS IC for offshore review, is available.

14.8 What's New

New features in NEXUS IC 6.7 include the following:

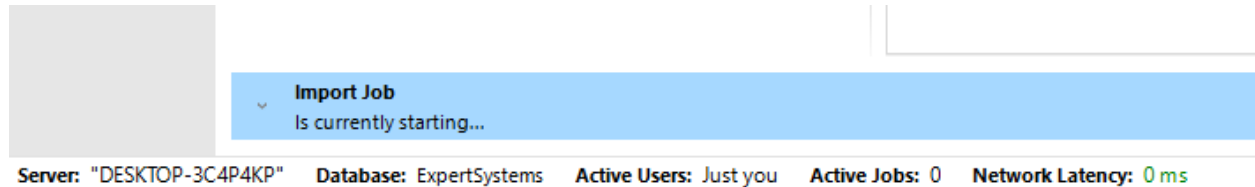
14.8.1 NEXUS IC

Enhanced Importing Features

The Import Engine has been reimplemented and extended to work in both NEXUS IC and IC-Web.

Imports now happen in the background allowing users to continue to interact with the software while the import is in progress.

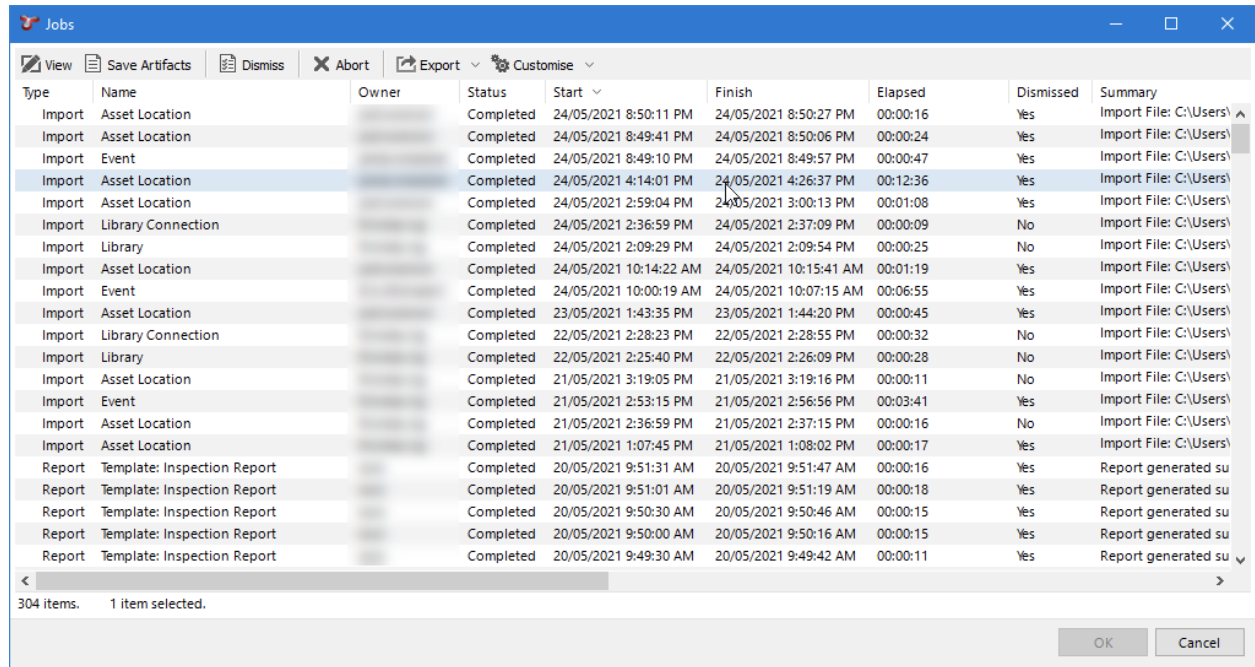
For more information on the changes to importing in NEXUS IC, see *The Import Wizard*.



Job Management Console

The status bar at the bottom of the main NEXUS IC window now shows the number of Active Jobs (the number of imports currently running in the background). Double-clicking this number will summon the **Job Management Console**.

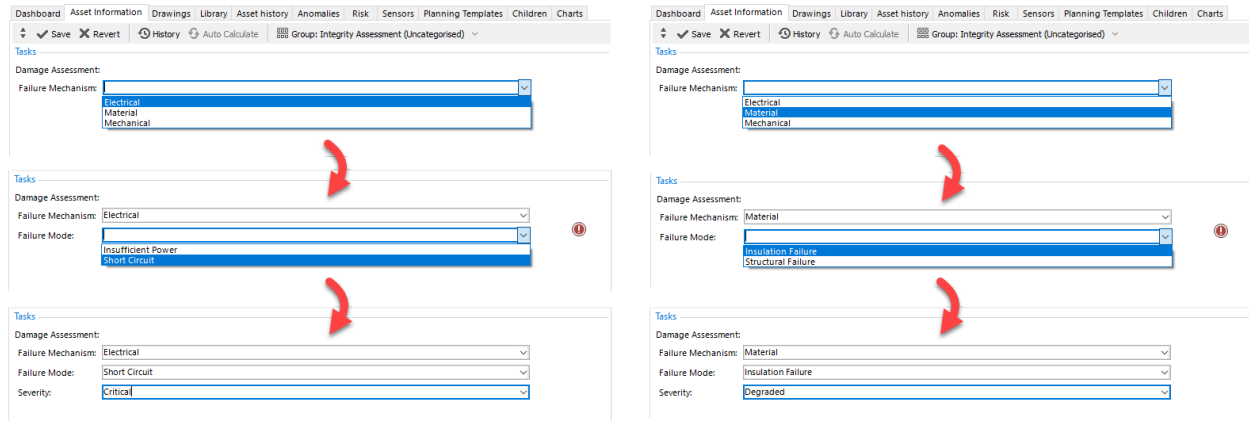
The **Job Management Console** gives information on each job's progress, including jobs that are currently running or have been dismissed. See *Show Status Bar* for more information.



New Data Type - Global Table Link

Global Table Link is a new data type that can be selected for use on Asset Information or Event forms. This data type provides a dynamic lookup list capability in which a series of combo boxes are displayed where the options presented depend on the previous selection.

Under the hood NEXUS IC will apply filters progressively (guided by the user) until the desired table row is linked to the relevant form. See [Global Table Link Field](#) for more information.

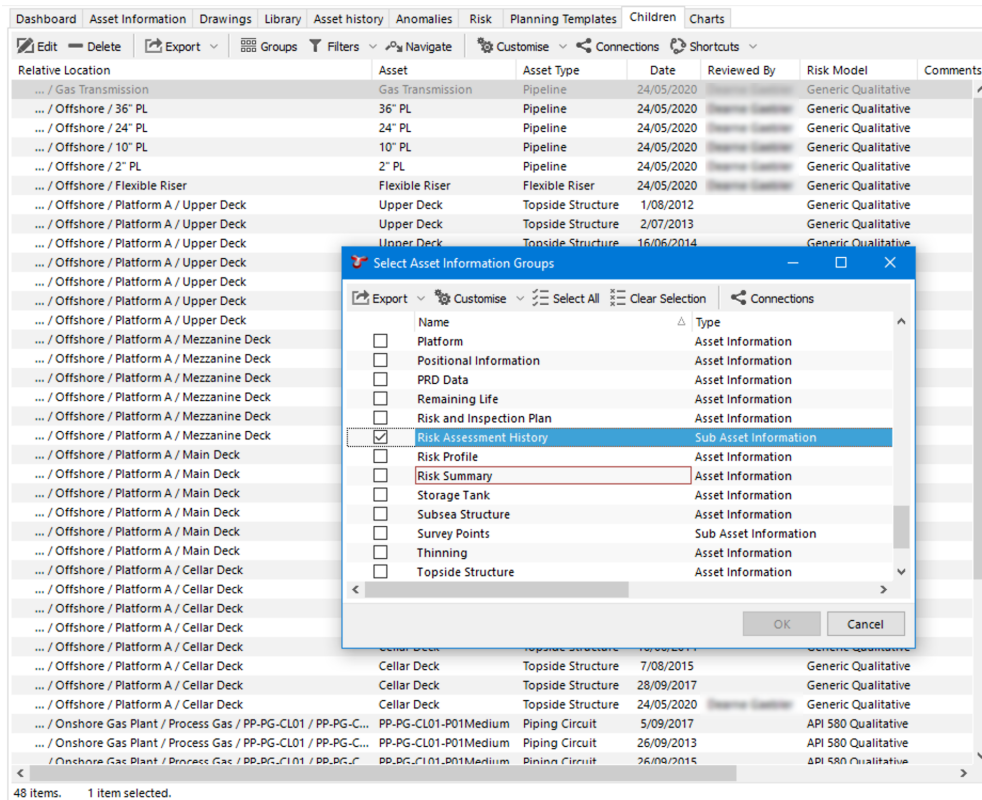


Enhancements to Children Tab

Previously, we only had the option to choose Asset Information Groups in the Children tab. This release will enable users to select Sub Asset Information data to view in the Children tab.

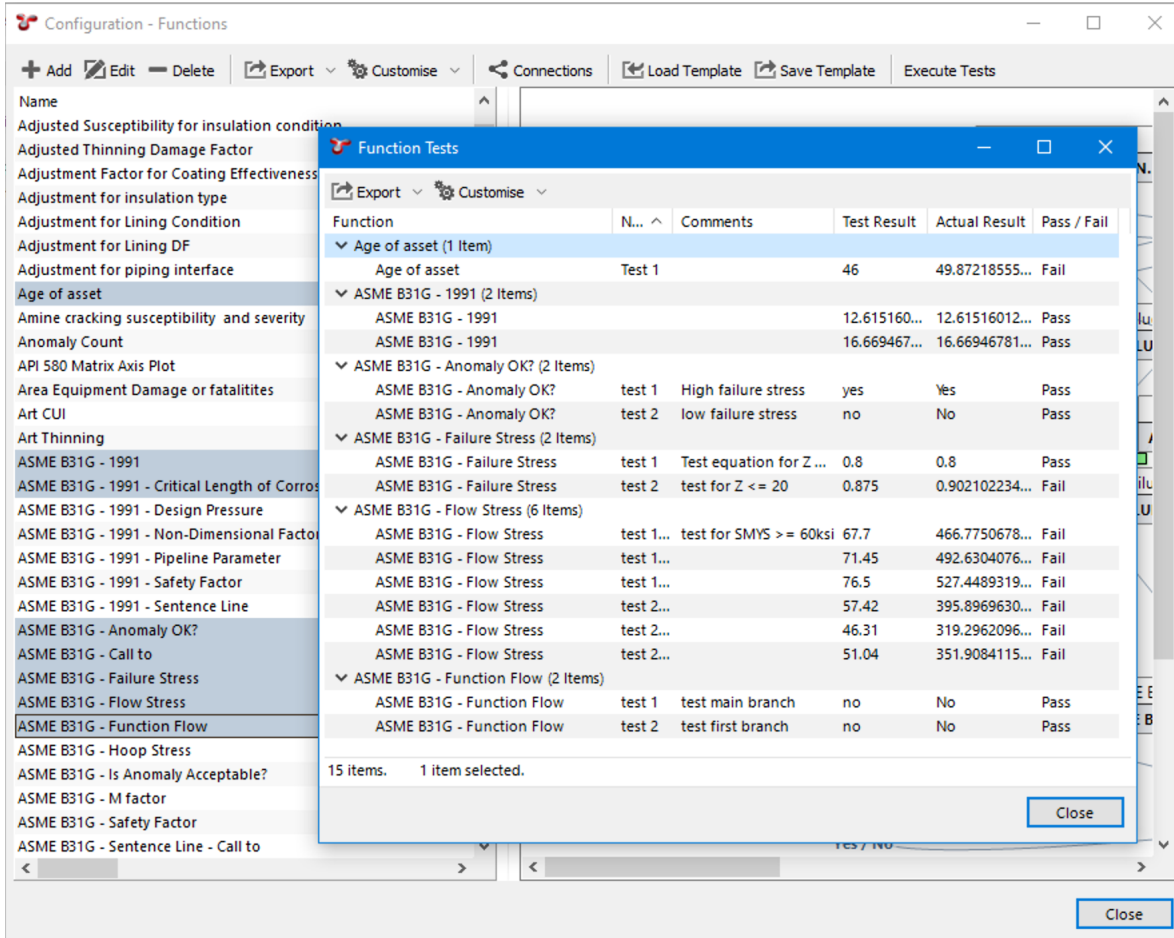
Sub-Asset Information Groups can now be selected under the Children tab in the Assets screen, where previously only Asset Information Groups could be selected.

This allows easy comparisons of data across different assets and provides the ability to bulk update sub-asset information across multiple assets simultaneously. See [Children](#) for more information.



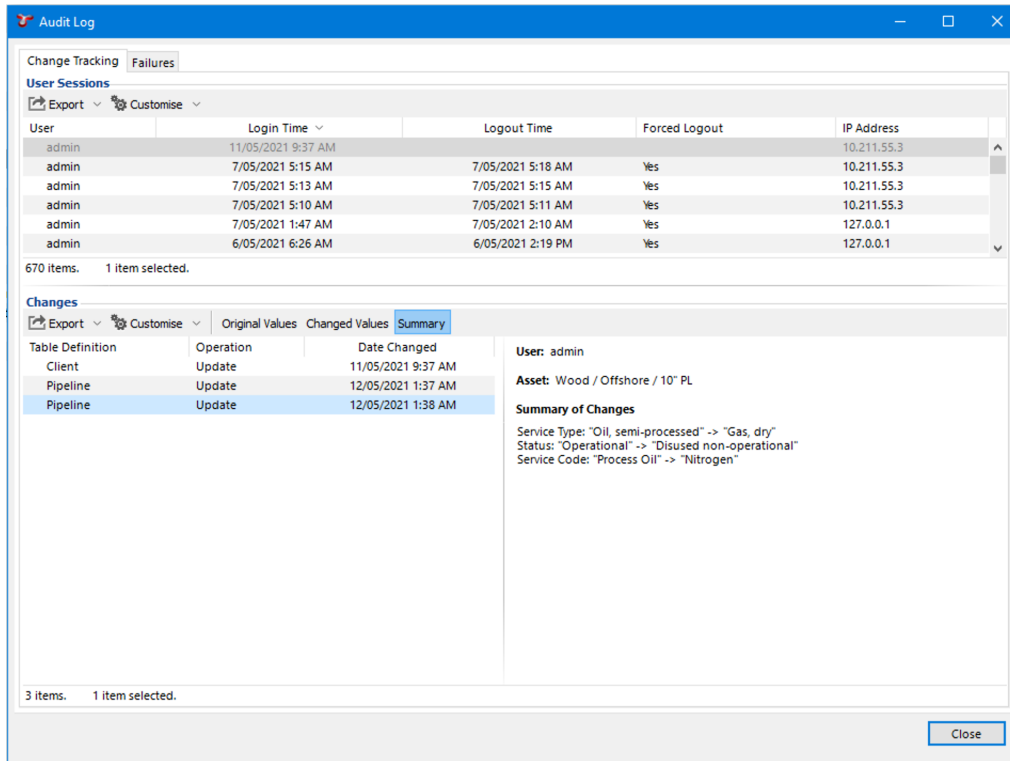
Function Tests

For a database whose functions are configured with test cases, NEXUS now supports the ability to run all test cases at once and generate the results in a single report. Previous functionality only allowed one test case to be run at a time. See *Functions* for more information on generating test reports.



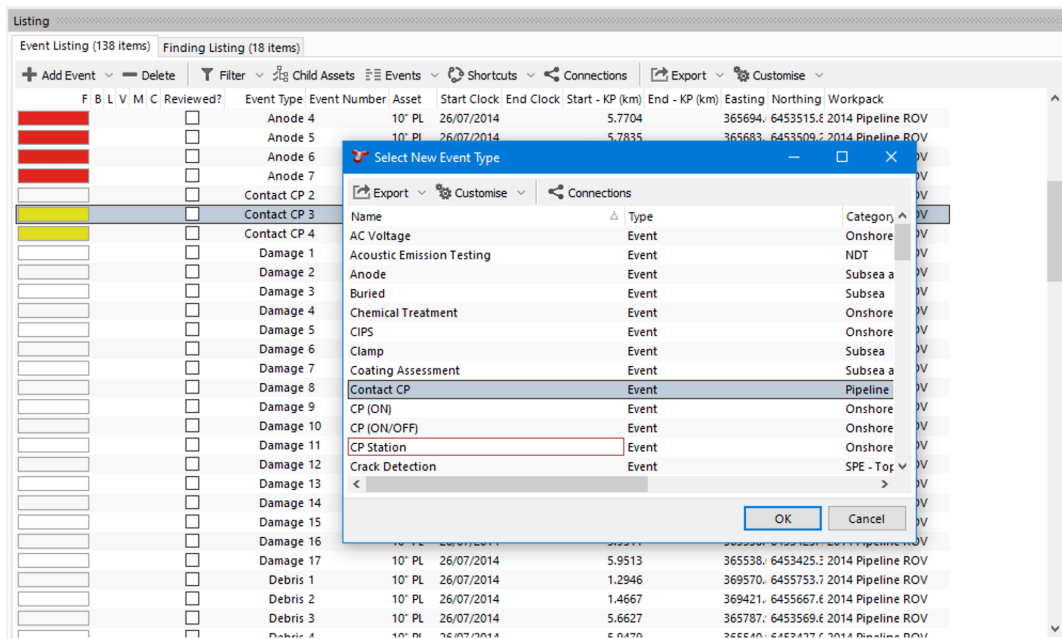
Audit log

In the Audit log dialog, you can now choose between displaying the original value *before* a change was made, or the value *after* a change was made. You can also now see a summary of the changes via the Summary tab. This summary will show all changes within a log in an easy to read, compact format. See *Audit Log* for more information.



Change Event Type shortcut

You can now change the event type of an existing event while retaining the link to all associated Survey Data, Multimedia, Findings. This is done by selecting the Change Event shortcut in the Inspection > Listing screen's shortcut menu. See *Event Listing Toolbar* for more information.



Function Statistics

Runtime statistics have been enhanced and are even more useful in optimising the efficiency of routines. Runtime statistics can be explored for each function and include data such as the number of function calls, and the average time to compute the function.

Statistics can be shown for individual function elements as a hint when you hover over the item with your mouse. To do this, navigate to Configuration > Functions and either call the function via the Execute Tests button, or edit the function and click **Show Results**, then hover over an element with your mouse to reveal its statistics. See [Statistics](#) for further details.

Name	Function Category	Calls	Total (ms)	Parameters (ms)	Average (ms)	Min (ms)	Max (ms)	Total including Parameters (ms)
Anomaly Count	Reports							
API 580 Matrix Axis Plot	API 580							
Area Equipment Damage or fatalities	API 581 - COF							
Art CUI	API 581 - LOF							
Art Thinning	API 581 - LOF							
ASME B31G - 1991	IC-Finesse	4	6.493	0.045	2.134	0.168	3.076	6.538
ASME B31G - 1991 - Critical Length of Corrosion	IC-Finesse							
ASME B31G - 1991 - Design Pressure	IC-Finesse	4	0.044	0.024	0.017	0.01	0.028	0.068
ASME B31G - 1991 - Non-Dimensional Factor	IC-Finesse	4	0.064	0.037	0.025	0.016	0.041	0.1
ASME B31G - 1991 - Pipeline Parameter	IC-Finesse							
ASME B31G - 1991 - Safety Factor	IC-Finesse	4	0.153	0.012	0.041	0.03	0.062	0.165
ASME B31G - 1991 - Sentence Line	IC-Finesse							
ASME B31G - Anomaly OK?	Onshore PIMS							
ASME B31G - Call to	Onshore PIMS							
ASME B31G - Failure Stress	Onshore PIMS							
ASME B31G - Flow Stress	Onshore PIMS							
ASME B31G - Function Flow	Onshore PIMS							
ASME B31G - Hoop Stress	Onshore PIMS							
ASME B31G - Is Anomaly Acceptable?	Onshore PIMS							
ASME B31G - M factor	Onshore PIMS							
ASME B31G - Safety Factor	Onshore PIMS							
ASME B31G - Sentence Line - Call to	Onshore PIMS							
ASME B31G - Z value	Onshore PIMS							
Assessed Corrosion Rate EXT	Onshore PIMS							

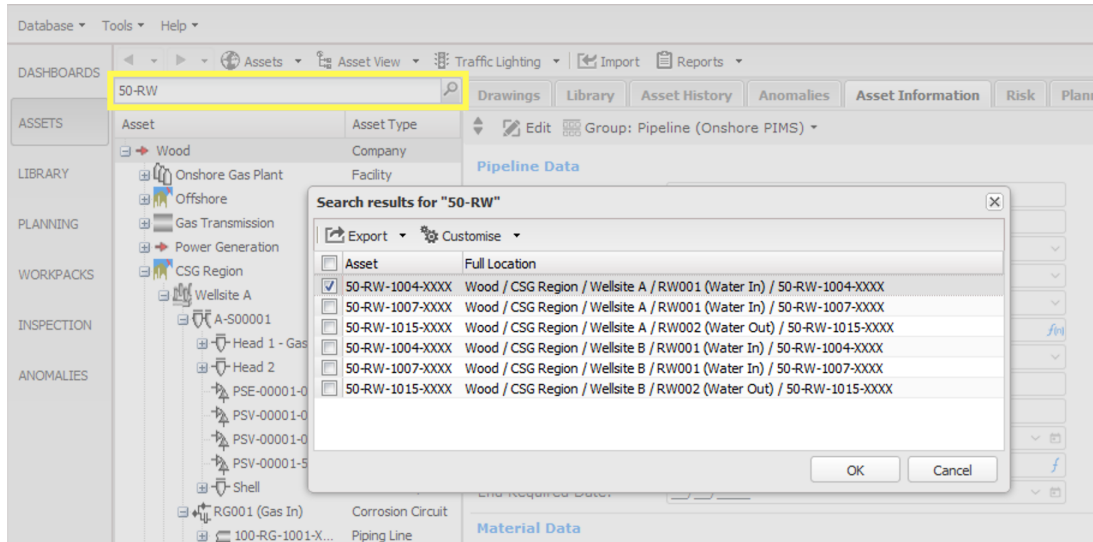
The right pane shows a diagram with nodes for 'Defect Length', 'Depth', and 'Pipe Wall Thick'. Below these are nodes for 'ASME B31G - 1991 - Pipeline Parameter', 'ASME B31G - 1991 - PIPELINE PARAMETER', and 'ASME B31G - 1991 - CRITICAL LENGT'. A 'Depth %' node is also visible at the bottom.

And more...

- The Connections dialog now displays the Table Name as well as the Field Name so that it is now possible to identify where sub-asset information groups and sub event fields are used.
- Scheduled reports now have the option whether to include the date/time in the report filename. See [Schedules](#) for more information.
- SaaS clients can now use a function in their report scheduling to determine whether to generate the report at the scheduled time. This gives more control over the conditions that trigger report generation. See [Schedules](#) for more information.
- Lookup fields for *Requires Shutdown* and *Approx Timing* have been added to Planning Tasks. This allows their values to be calculated per-Asset, rather than manually entered for each Asset.

14.8.2 IC-Web

- Key grids in IC-Web now support in-grid filtering, pagination and multi-column sorting, refer to [User Interface Features](#) for more detailed information.
- IC-Web now has a Search box above the Asset tree, which searches only Asset names.



- IC-Web (for Wood hosted customers only) is now fully featured for importing data. Import files and associated images or documents are packaged and run in a queue, allowing users to continue working in IC-Web simultaneously. See *IC-Web* for information on the differences between importing in NEXUS IC and IC-Web.
- URL GET parameters can now be used to navigate to sections of IC-Web. See *Navigating via URL* for more information.
- The IC-Web dashboard has been enhanced to support more chart types.
- IC-Web grids can now have multi-select columns, used to select multiple rows at once. Currently this is implemented when adding a Connection to a Library item.

14.8.3 IC-Inspection

- IC-Inspection now supports the auto-population of event fields from incoming Survey Data. See *Populate event fields with device data* for step-by-step guide on how to configure this functionality, including a video demonstration.
- We have updated our DVR protocol to support asset information data being sent to third-party digital video recorders for text overlay.
- Search functionality has been added to IC-Inspection. See *Search Differences* for more information.

14.8.4 Upgrade Warnings

Anomaly Created By

The **Created By** field was previously an alphanumeric free text field, but is now filled with an entry from the Personnel table via the usual ellipsis button. During the schema upgrade, NEXUS IC will check each entry in the **Created By** field to see if they exactly match the name of an existing user. If they do, that user will be assigned appropriately. If not, text will be added to the Anomaly Comments field saying “Created By: [text]”. So before you upgrade, check the contents of the **Created By** field and ensure that (a) names are consistent; and (b) names have matching entries under Database | Security. (Users can have Enabled unticked, and need not be assigned a per-seat license).

SQL Server Support

Version 6.7 officially supports Microsoft SQL Server 2019 and newer. (6.6 and previous versions support SQL Server 2012 and newer.)

Version upgrade information

To simplify our code, version 6.7 only includes the ability to upgrade from version 6.6. If you are running an older version (v6.5 or earlier), backup your database, upgrade to 6.6, then upgrade to 6.7.

If you're upgrading from 6.0, 6.1 or 6.2, see [this note about SQL Server permissions](#).

If you're upgrading from 5.x, *more effort* is required.

What Was New in [6.6](#), [6.5](#), [6.4](#), [6.3](#), [6.2](#), [6.1](#).

The following pages contain pertinent legal information.

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