
NEXUS Documentation

Release 6.4.xxxxx.0

Wood Group

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NEXUS IC SCREENS

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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.

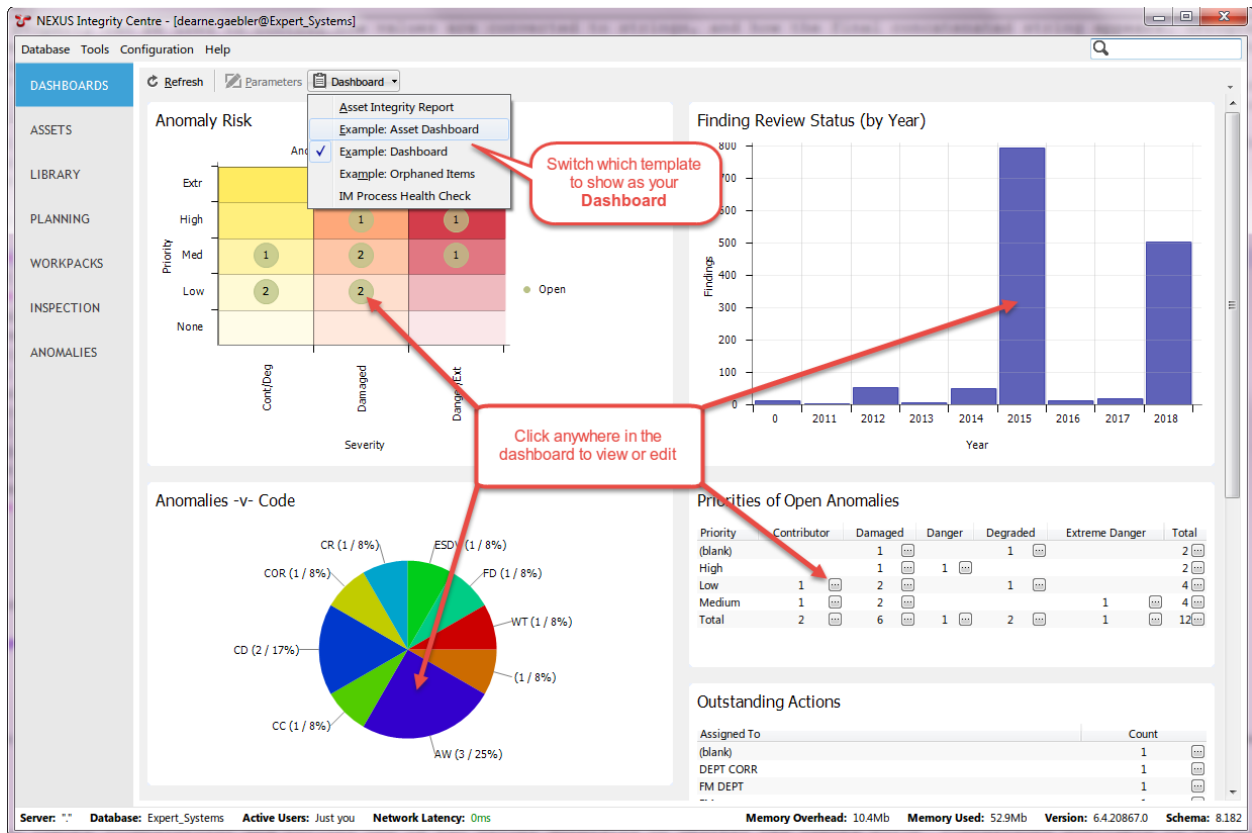
Note: If you make changes to data, the dashboard will not automatically be refreshed to show those changes. You'll need to click the **Refresh** button.

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: It is important to note that as the Asset 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.

The Asset Import Wizard

1. **Import Filename** - Navigate to the Excel or Text file which has been prepared for import. By unchecking the “Automatically commit transaction on successful import”, the wizard will present the user with a summary of the Import actions, prompting the user to commit changes. Please note that the database will still be in a Transaction state until the user Commits or Cancels the import.
2. **Configure Import** - If you are using the Excel output from the Asset Export wizard, then the destination Fields will be pre-populated. 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 2 rows).
3. **Import Complete** - This page summarises the import, advising the user how many rows have been added to the AIG forms and whether or not any new assets have been created as part of the import. It is important that the summary is scrutinised 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.

Note: If the importer encounters a completely blank row, 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, columns to the right of this will not be imported.

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

Note: If you are importing a sheet designed for use with NEXUS IC 5, it may have one or more columns titled ‘Component.Location’. In the Configure Import page, you should select ‘Asset Location.Full Location’ for these columns.

Note: You can have one ‘Asset Location.Full Location’ column, with levels in the asset hierarchy separated by space slash space, like ‘My Field / My Plaform / 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 Plaform’ and a second containing ‘My Member’.)

Tip: You can also import from .csv files. For very large imports, saving your Excel file as a .csv and then importing from the .csv may be faster.

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.)

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.

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. **Asset Selection** - Choose the Asset View and check which subset of assets to include in the export. **Note** use the **Select child** and **Unselect child** 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.
3. **Asset Information Groups** - Check which Asset Information Groups to include in the exported document.

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

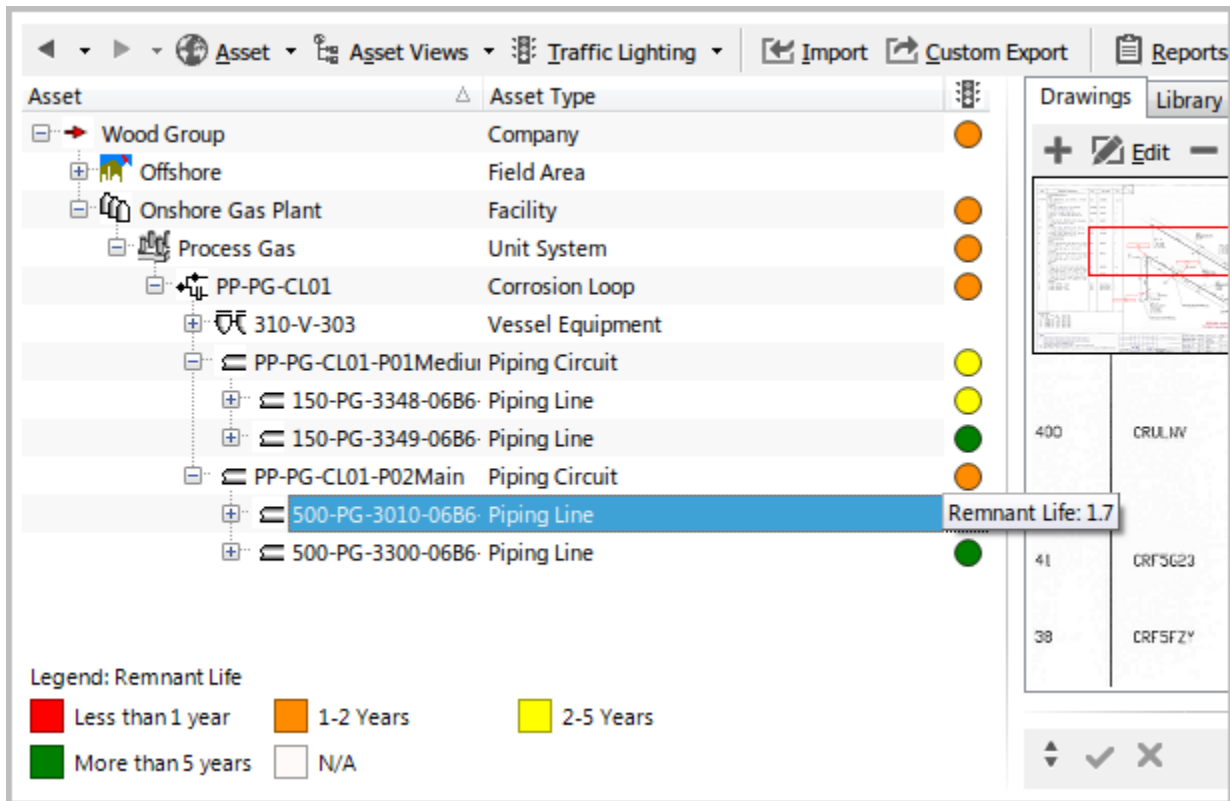
The Asset Views toolbar button first lists all Asset Views configured in the database, as well as providing ability to add, edit and delete Asset Views.

- **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.

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** → **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.
- **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.

- **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 'Piping' calculation parameter form. It features a sidebar with tabs for 'API 580', 'SPE - Consequence', 'SPE - Inspection History', 'SPE - Damage', 'SPE - Risk and Inspection Plan', 'SPE - Information', and 'System'. The main form is divided into two sections: 'Operating Data' and 'Material Data'. Callouts identify specific field types: a red warning icon for 'Indicates required information not completed.', a blue '(C)' for 'Unit aware field', a blue '?' for 'Indicates hint text is available. Hover mouse over to see text.', a blue 'f(n)' for 'Calculated Field', a blue 'f' for 'Global Lookup Field', and a red warning icon for 'Required 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 *Asset Information* or *Asset Types*.

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.)

Tip: If you are navigating through the Asset register and not concerned with the Asset Information, you can minimise the Asset Information pane. This will prevent the information from being loaded, which can be useful when the Asset Information is performing many calculations.

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.)

2.2.1 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.

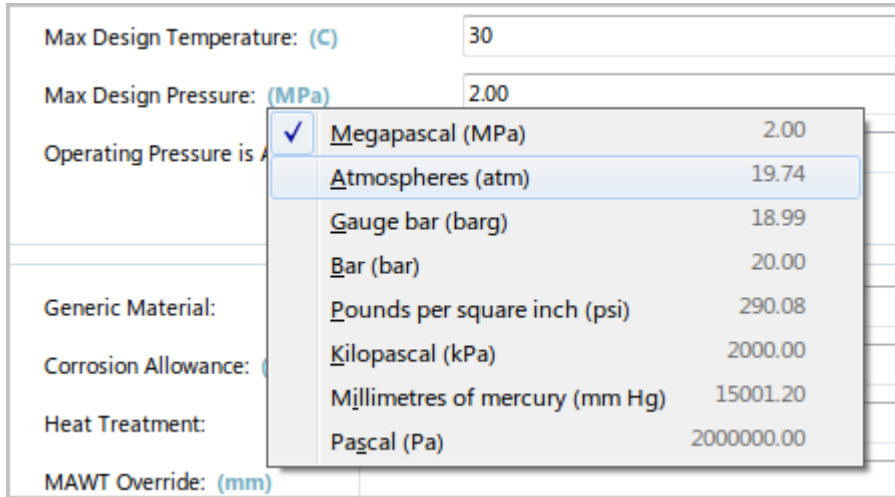
Video demonstration: The following sections detail functionality available to the user from an Asset Information Group form.

2.2.2 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.


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.

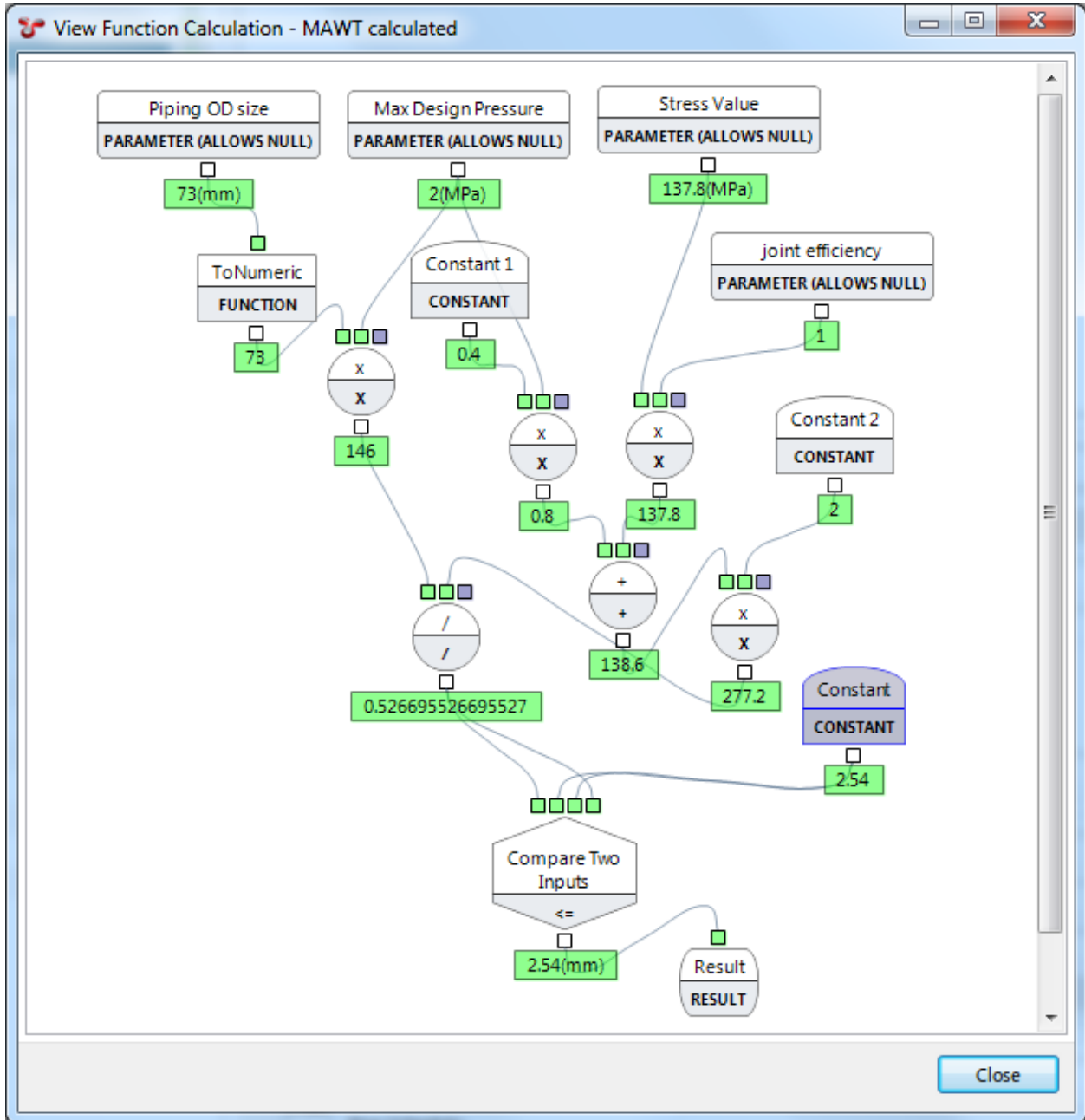


2.2.3 Calculated Field

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.

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

COF

Safety Impact

Platform Type: Occasionally Manned Asset Area Location: 50m from facilities (Zone 1)

Product: Gas, dry

Safety Consequence: Moderate $f(n)$ Adjusted Safety Consequence: Critical f

2.2.4 Global Lookup Field

Global Lookup fields are those fields where values is returned from a Matrix table. Lookup values are passed into the table 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 $f(n)$ icon.

Click on the $f(n)$ 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.

View Global Table Lookup - Piping Wall Thickness

+ Add Edit Delete Import Export Customise Inspect

Component Type	Pipe Schedule	Wall Thickness	Outside Diameter (mm)	size	Matched
	40S	5.156		73 65	Yes
	10S	2.77		48.3 40	
	5S	2.11		114.3 100	
	80S	12.7		219.1 200	
	80S	3.91		26.7 20	
	10S	2.11		26.7 20	
	5S	1.65		26.7 20	
	80S	3.73		21.3 15	
	10S	3.76		219.1 200	
	5S	2.77		219.1 200	
	10S	2.11		21.3 15	

OK Cancel

2.2.5 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.)

2.2.6 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 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

Dashboards 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**.

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

2.4.1 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.

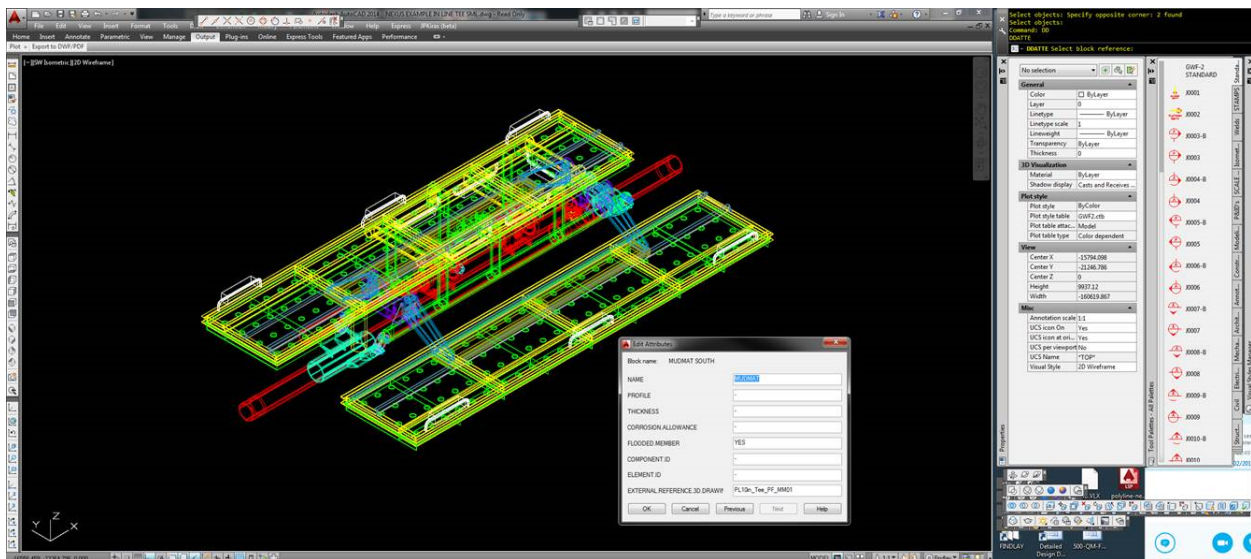
Caution: For optimal performance, an OpenGL graphics card is required on the client machine for this functionality. 3D drawings can take a considerable time to load. We recommend that 3D drawings are simplified as much as possible to reduce file size and load times.

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.



The screenshot displays the NEXUS software interface. At the top, there is a navigation bar with tabs for Drawings, Library, Asset history, Anomalies, 4-Site, Planning Templates, Children, and Dashboard. Below this is a toolbar with various icons for navigation and editing, including a 'View' dropdown and a 'Colour' dropdown. The main workspace shows a 3D model of a pipe assembly with red, green, and yellow pipes. The coordinates -5776.203; -1599.733; 23917.648 are displayed at the bottom of the model. To the right of the model, there are two thumbnail images: '3D - 10" PLEM' and 'Wood Group Assets'. Below the model is an 'Entity Information' table.

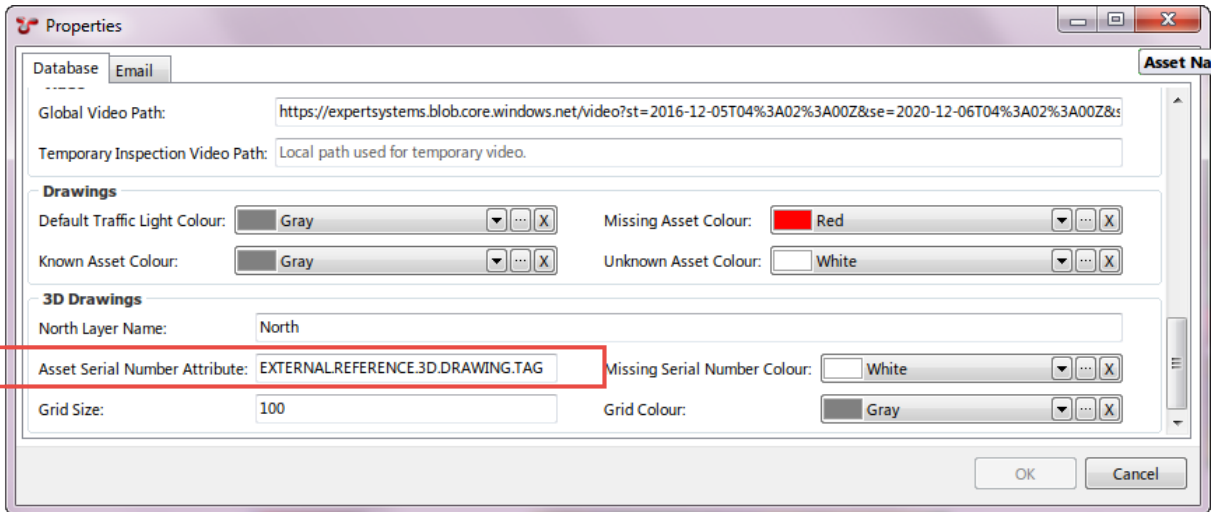
Attribute	Value
PROFILE	-
THICKNESS	-
CORROSION.ALLOWANCE	-
FLOODED.MEMBER	YES
COMPONENT.ID	-
ELEMENT.ID	-
EXTERNALREFERENCE.3D.DRAWING.TAG	PL10in_Tee_PF_M08_AN01

Below the table is a panel titled 'External Reference' with a sub-section 'External Reference' containing a text field with the value '3D Drawing TAG: PL10in_Tee_PF_M08_AN01'. On the left side of this panel, there are navigation icons (up/down arrows, checkmark, and X) and a vertical label 'Interfaces'.

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

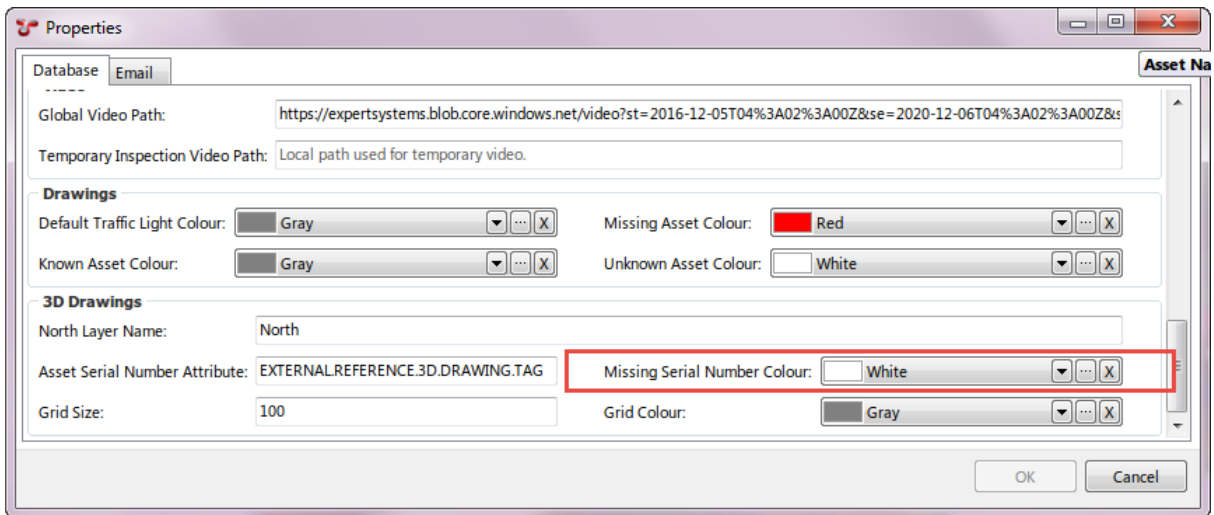
Step 2

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.



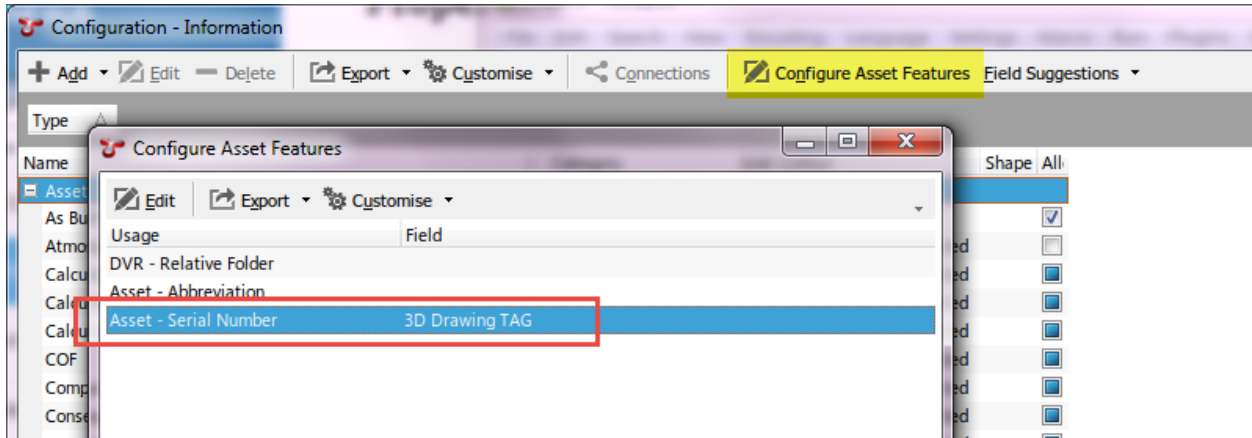
Step 3

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.



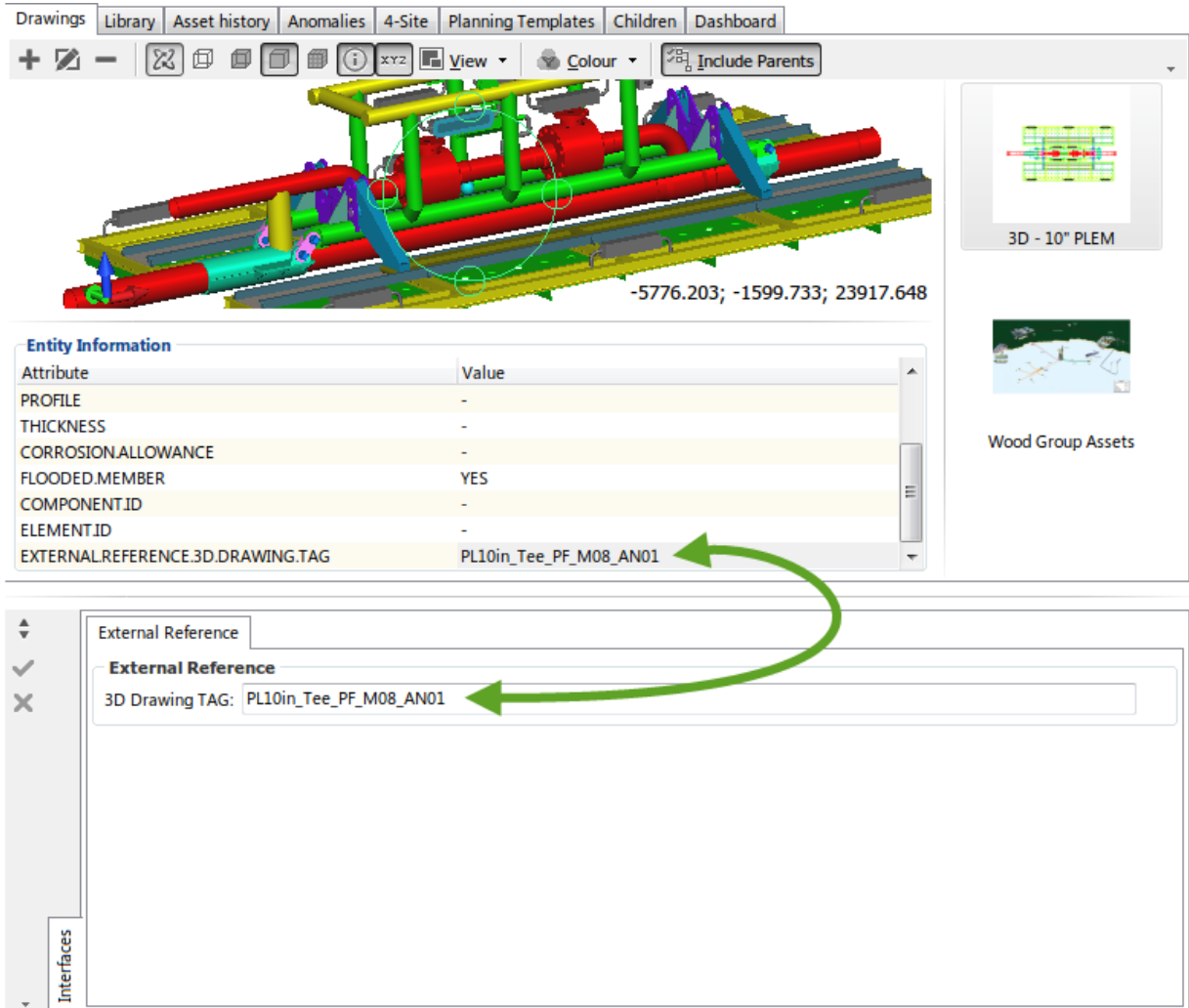
Step 4

Go to *Configuration* → *Assets* → *Information* → *Configure Asset Features* and specify the AIG and AIG field as the **Asset - Serial Number**. In this example, the corresponding field in NEXUS is in the AIG titled **External Reference** and the field is titled **3D Drawing TAG**.



Step 5

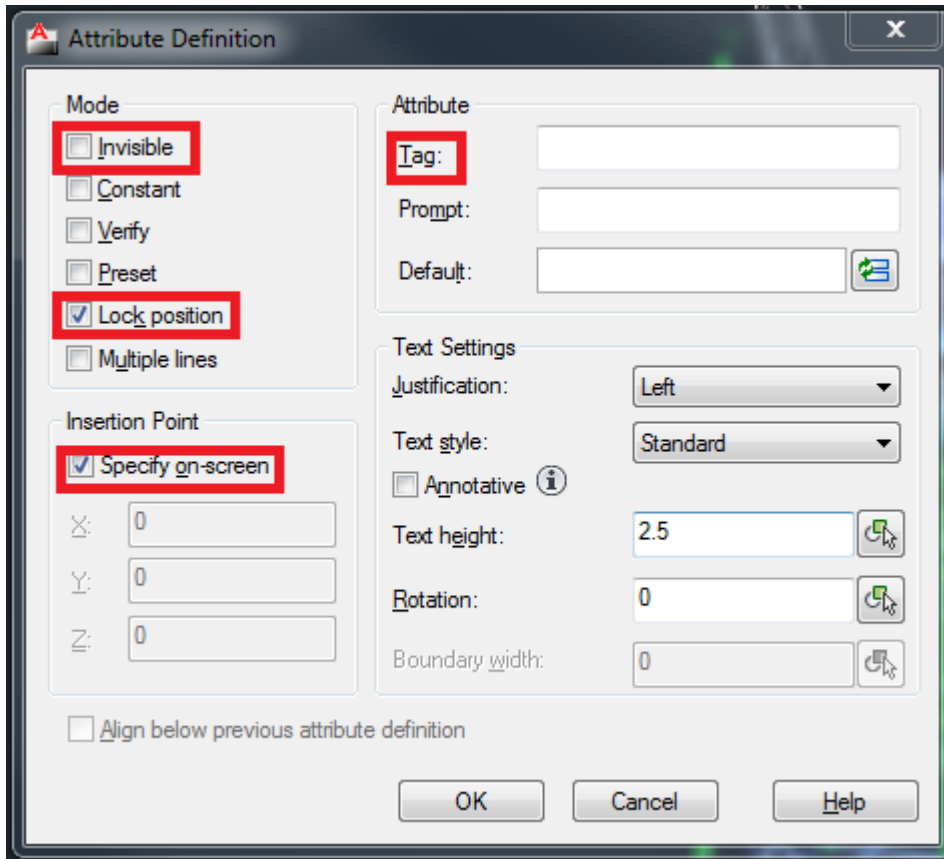
Ensure that the Asset Serial Number data is populated in the specified AIG field and that the data matches that in the Asset Serial Attribute in the 3D drawing.



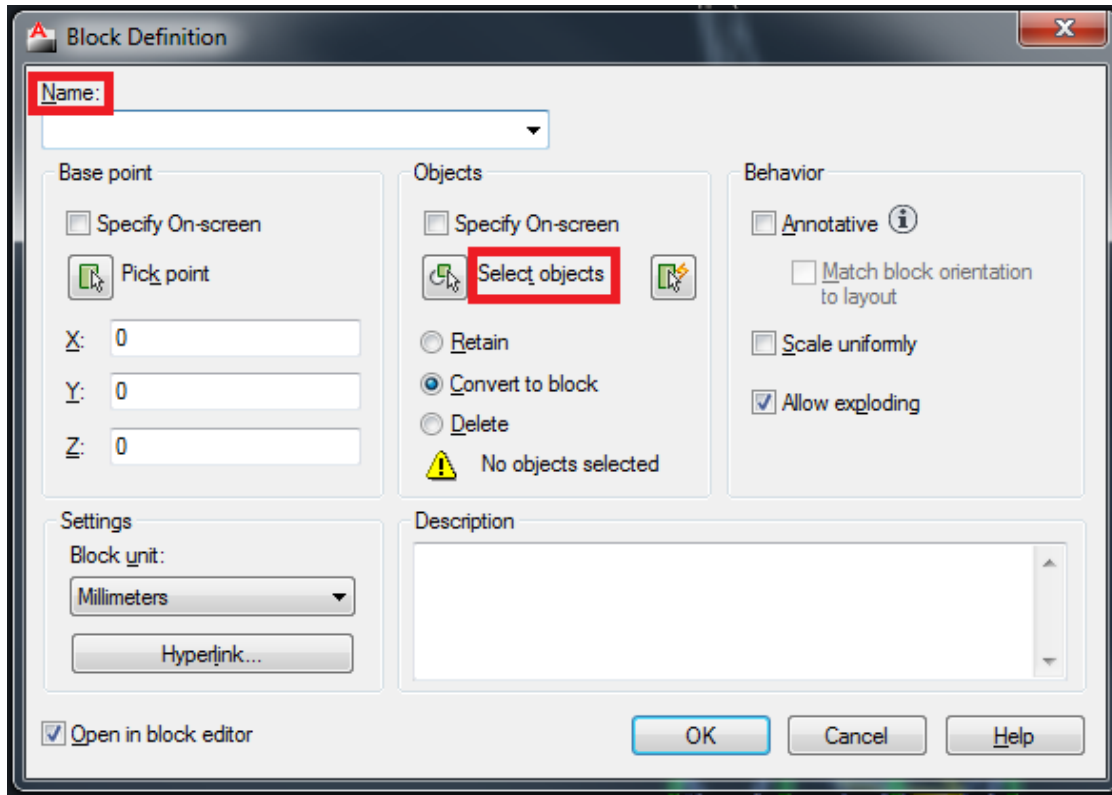
2.4.2 3D Drawing Preparation in Autocad

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

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



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

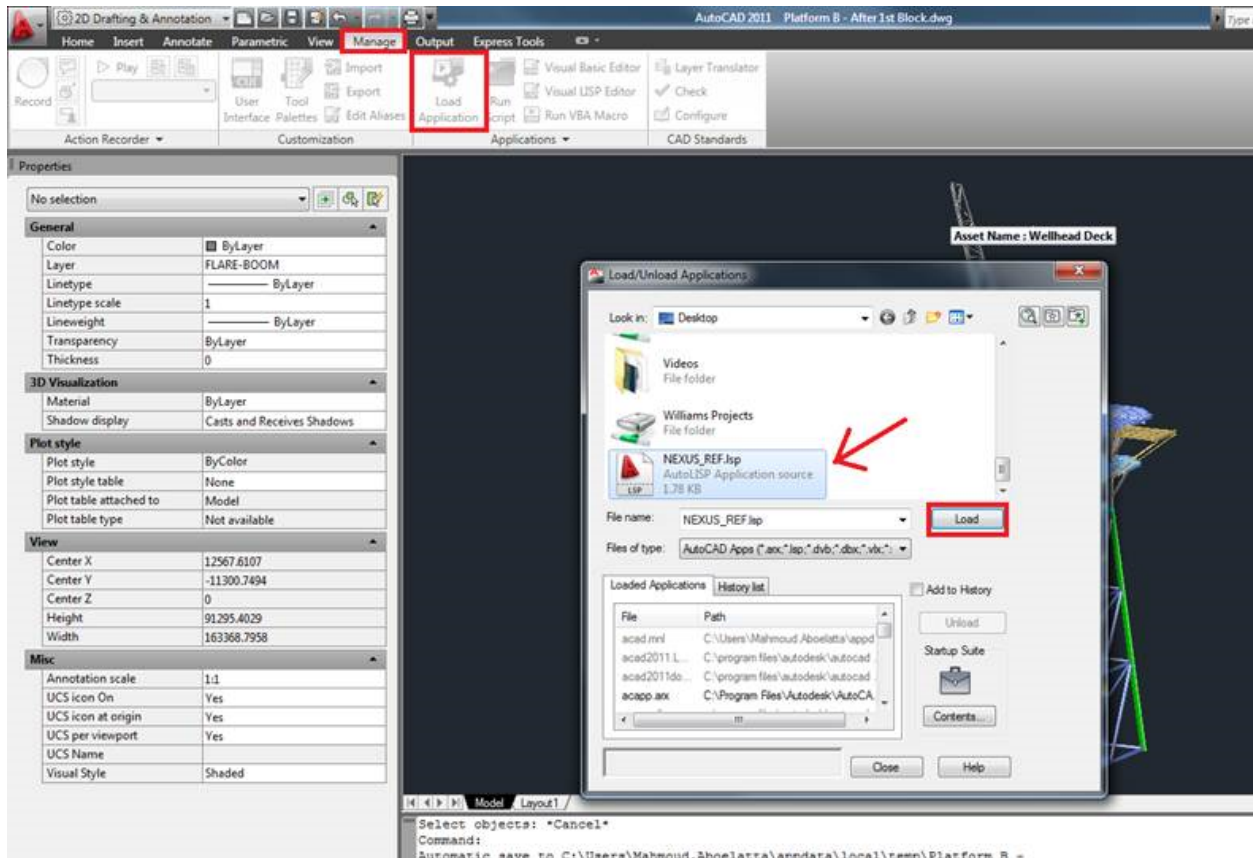


2. Type the block name (preferred to be the object component unique ID)
 3. Click on **Select objects**
 4. Select the attributes created in step 1
 5. Select the object required
 6. Press **OK** button
3. Fill out the attributes values. The value will be filled with the unique identifier that will be 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.

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.

2.4.3 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. **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.).

2.4.4 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*.

2.4.5 3D Drawings Toolbar

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* on how to configure 3D drawing objects to link to assets in the asset hierarchy.

2.4.6 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.

2.4.7 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.

2.5 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.

- **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:

- Asset
- Asset Type
- Workpack
- Anomaly
- Event / Log
- Event / Log Type
- Function
- RBI Model

- **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.

The screenshot shows the 'Add Anomaly' dialog box with the following fields and values:

- Location:** Asset: V8300-11
- Anomaly Details:**
 - Name: J/SL @ V8300-11
 - Description: Joint/Seal Leak
 - Code: J/SL
 - Severity: Degraded
 - Anomaly Number: 253
 - Reference Number: 10022014_353
 - Date Created: 08/06/2016
 - Created By: Maintenance
 - Anomaly Set: (empty)
 - Comments: Leak identified on the outlet flange.
- Status:**
 - Priority: Medium
 - Status: Open
 - Closed Out:

2.7.1 Properties of an Anomaly

1. **Name** - A short (50 character limit) name for the Anomaly.
2. **Description** - A 100 character field which provides more descriptive information of the anomaly.
3. **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*.
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. 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.
5. **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.

6. **Anomaly Number** - A numerical property which can be used to store a number against the anomaly. This number is not auto-populated.
7. **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*.
8. **Reference Number** - A 200 character limit field which can be used to reference (or cross reference) anomalies.
9. **Date Created** - The date the anomaly was first created. This will default to today's date, but is editable thereafter.
10. **Created By** - Name of the person creating the anomaly record. This will default to the currently logged in user, but is editable thereafter.
11. **Comments** - A large free text field to retain additional information about the anomaly which may not be captured in the properties of the anomaly.
12. **Asset** - The name of the asset that the anomaly is attached to. This is a required field.
13. **Status** - Status of the anomaly. Anomaly statuses are user-definable and can be configured from *Configuration* → *Anomalies*.
14. **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.
15. **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** Launches the **Add Anomaly** dialog. Properties of the new anomaly are to be completed and saved by clicking on **OK**. Click **Cancel** to cancel the new anomaly.
- **Edit** Launches the **Edit Anomaly** dialog and allows you to make changes to the currently selected anomaly. Click on **OK** to save changes or **Cancel** to ignore changes and close the dialog.
- **Delete** Deletes the currently selected anomaly.

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 workpack. Workpacks are linked to anomalies via findings and events.
- **Filter** → **Asset** Allows you to filter the anomaly listing by a sub-set of assets.
- **Reports** See *Reports* for information about the Reports toolbar option.

2.7.5 Matrix

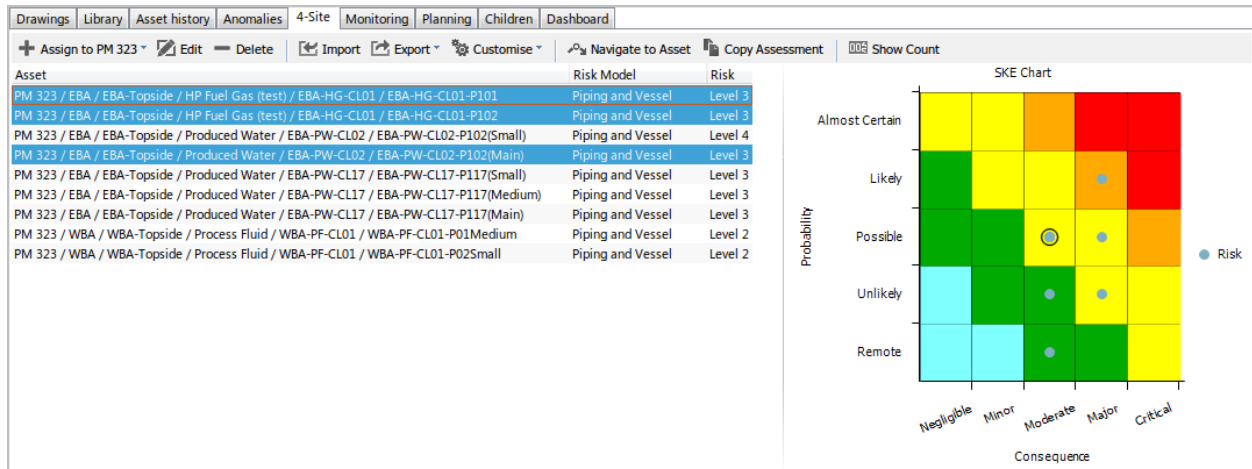
You can show anomalies on a risk matrix. This (when configured) is visible at the right or bottom right of the screen.

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.

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.



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.

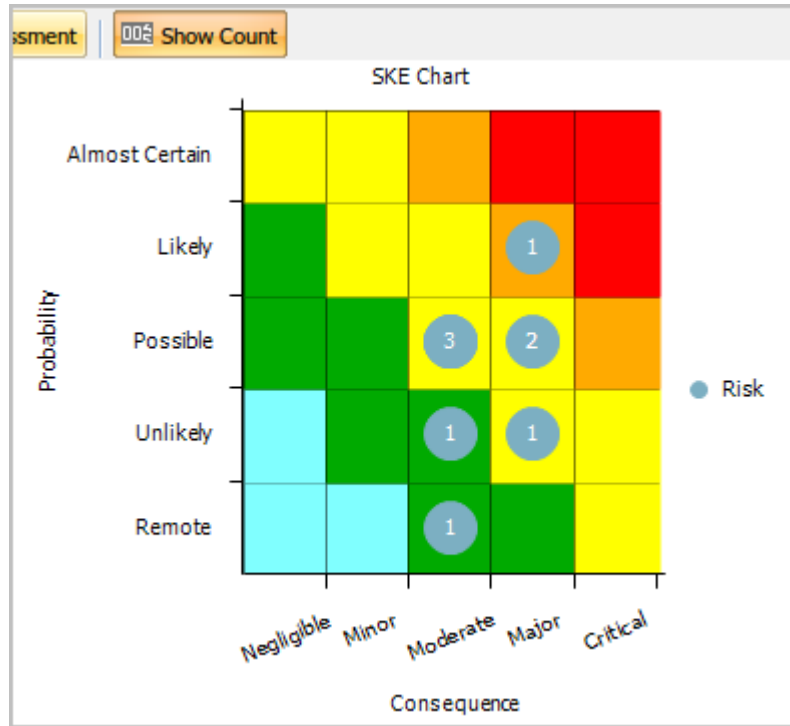
If you click on a scenario dot within the Matrix, the relevant row(s) in the grid will be highlighted, *and* the relevant dots for those assets' other scenarios will be highlighted in the Matrix.

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.
- **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.
- **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.

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** This menu item 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** 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.

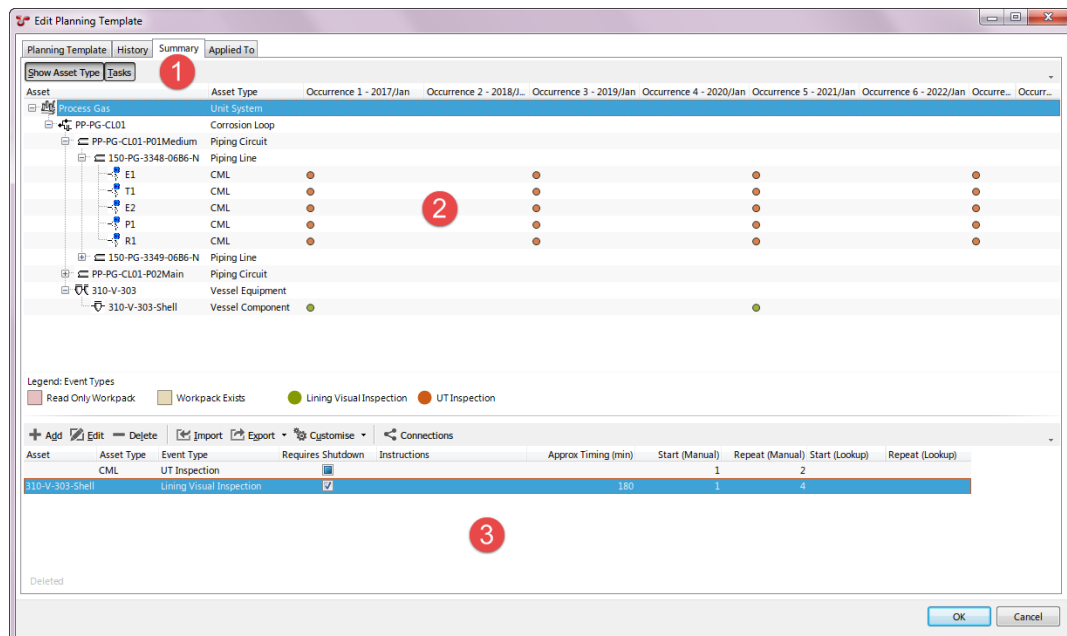
- **Import** This is shared functionality refer to *Import* for a full feature description.
- **Export** This is shared functionality refer to *Export* for a full feature description.
- **Customise** See *Toolbar* → *Customise* for information about the Customise toolbar option.

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.
- **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** - [TODO]
- **Order Number** - Used to identify the order in which this task should be carried out. Can be left blank if not applicable.
- **Approximate Timing** - Used to calculate the **Task Time (min)** and **Duration (Estimated) (days)** for the workpack.
- **Instructions** - Enter any specific task instructions here. Can be output to a Workpack report to provide guidance to the inspection engineer.

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.
- **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.

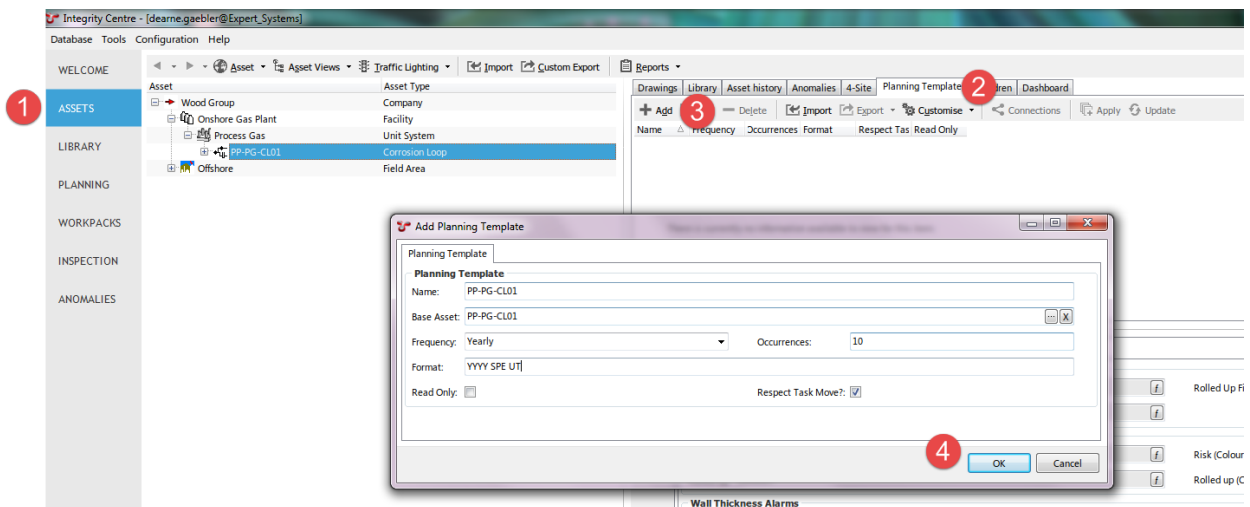
2.10.3 Worked Examples

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.

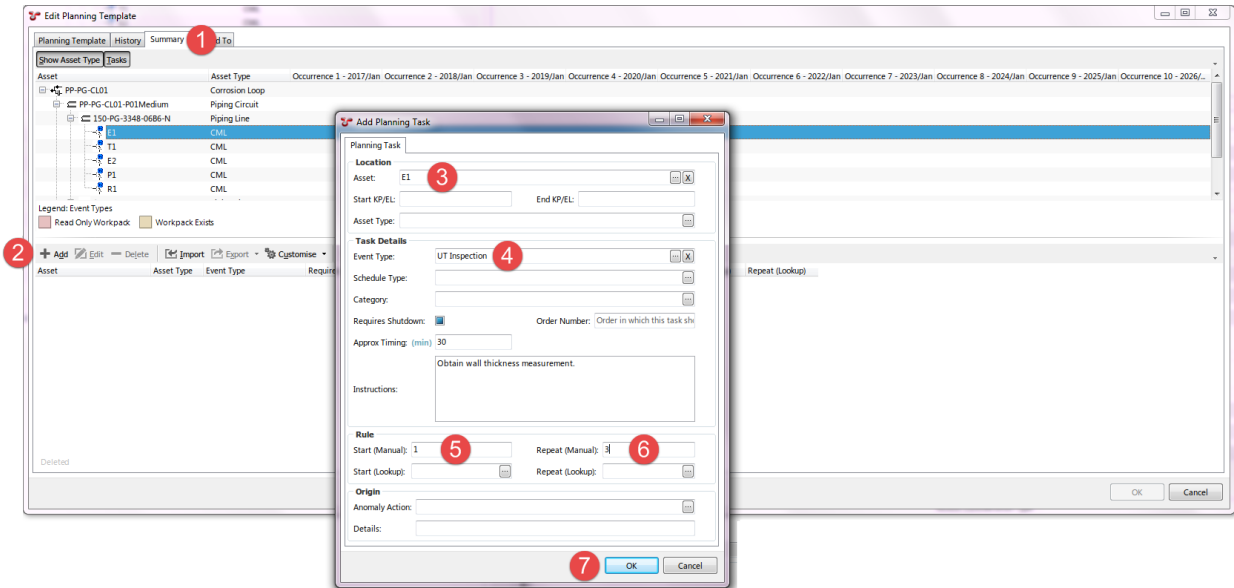


Input requirements for the Planning Template are the Name, Base Asset, Frequency, Occurrences and Format fields. Choose a name which best describes your planning template and a parent asset which will behave as a filter in later screens. In our worked example we have chosen a **Yearly Frequency**. The **Occurrences** field is arbitrary, we will be able to view **10** columns in the Summary page (explained later). 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.

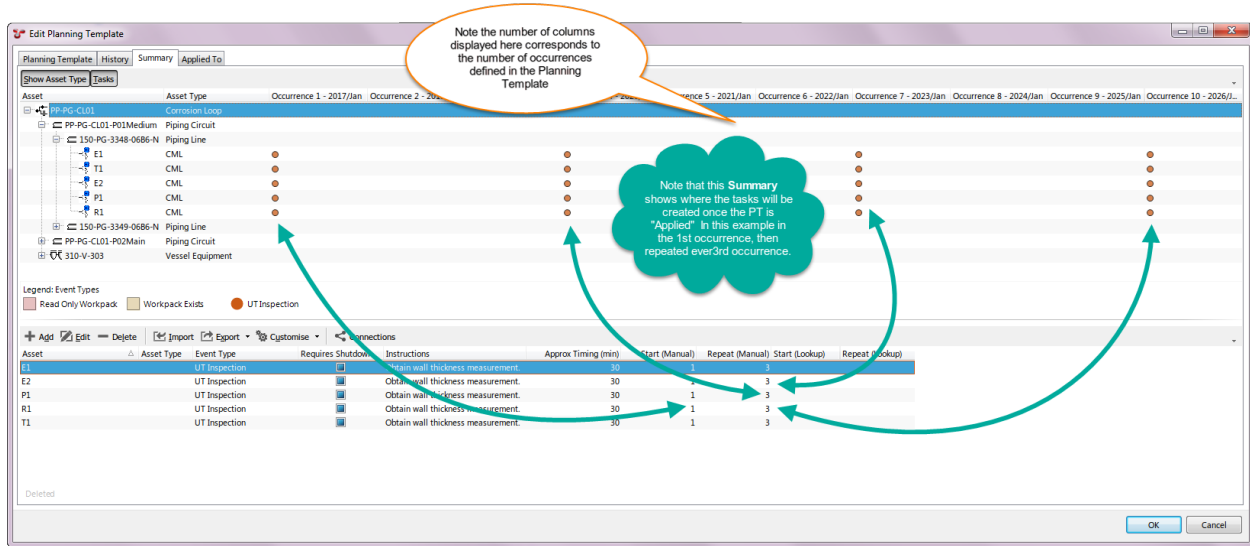


Input requirements for an Asset based planning template task are the **Asset**, **Event Type**, **Start** and **Repeat** fields.

1. **Asset** - Identifies which asset the task belongs to.
2. **Event Type** - Identifies the inspection method to be scheduled and carried out.
3. **Start** - Identifies the first occurrence that this task should occur, or a lookup to an AIG field.
4. **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 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.

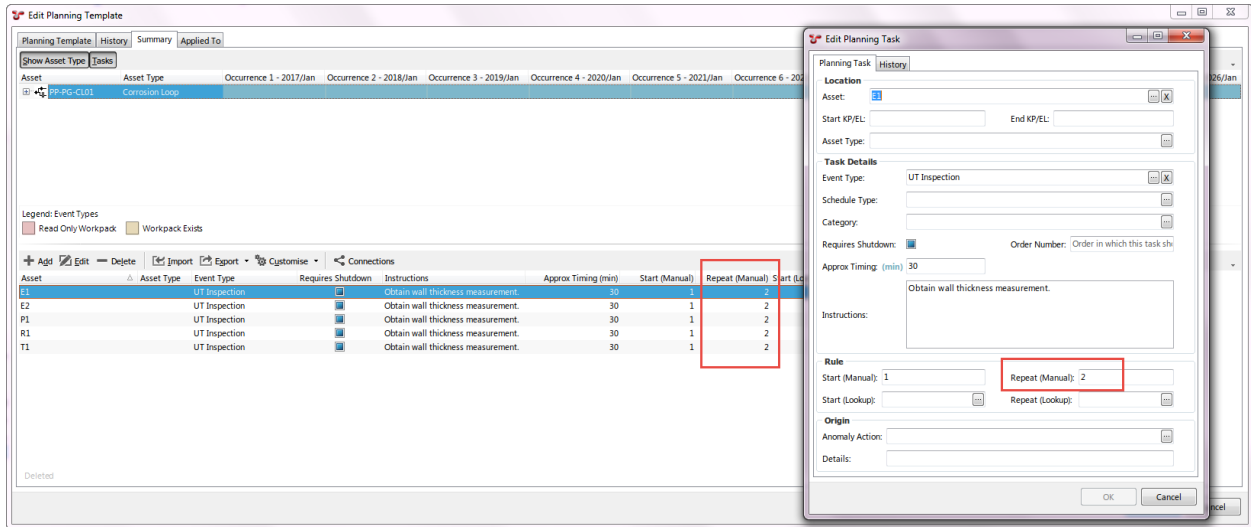
1. **Occurrences** - Allows you to choose how far into the future to create workpacks. Entering a date in the **Specific Date** field will automatically calculate the Number of Occurrences to apply, or entering a Number of Occurrences will automatically calculate the future Date. In this example we have entered 10, meaning that 10 years of futures 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:

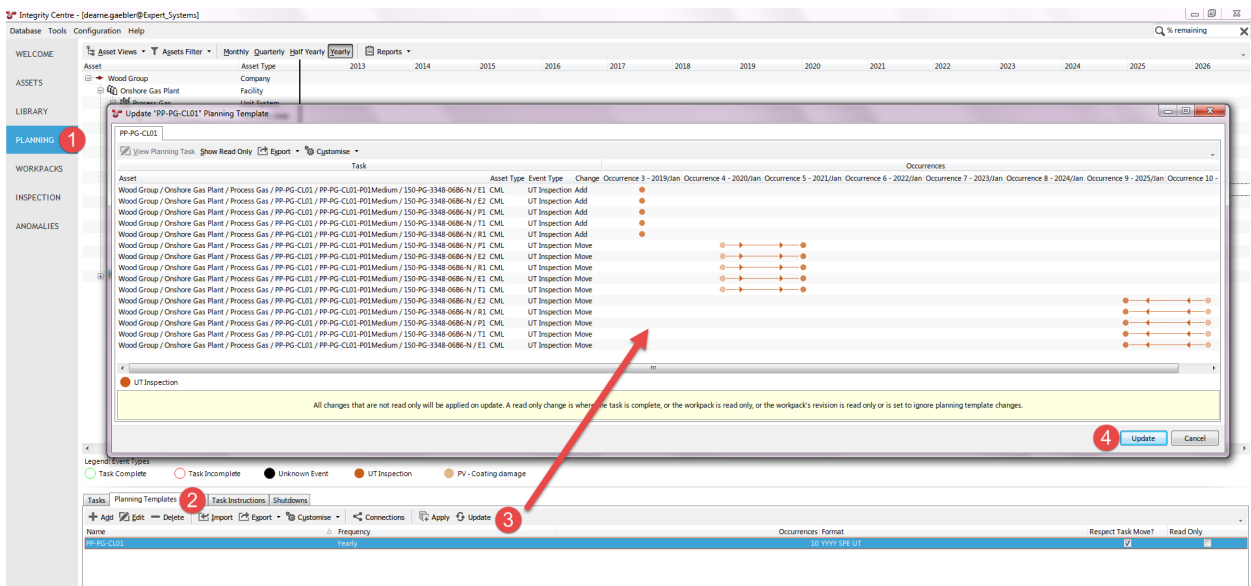


Step 6 - Update Planning Template

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.

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

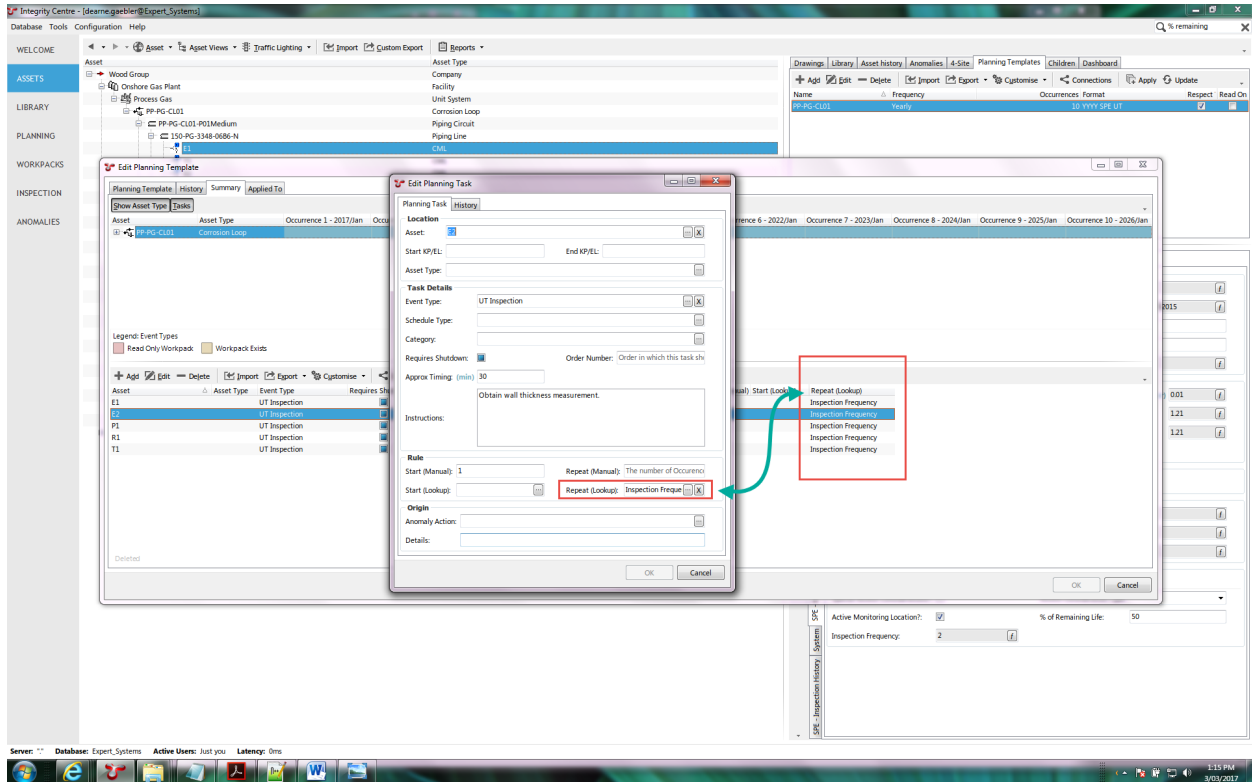
Inspection Considerations
Used to determine whether or not inspection locations will be scheduled from the Planning Template.

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:

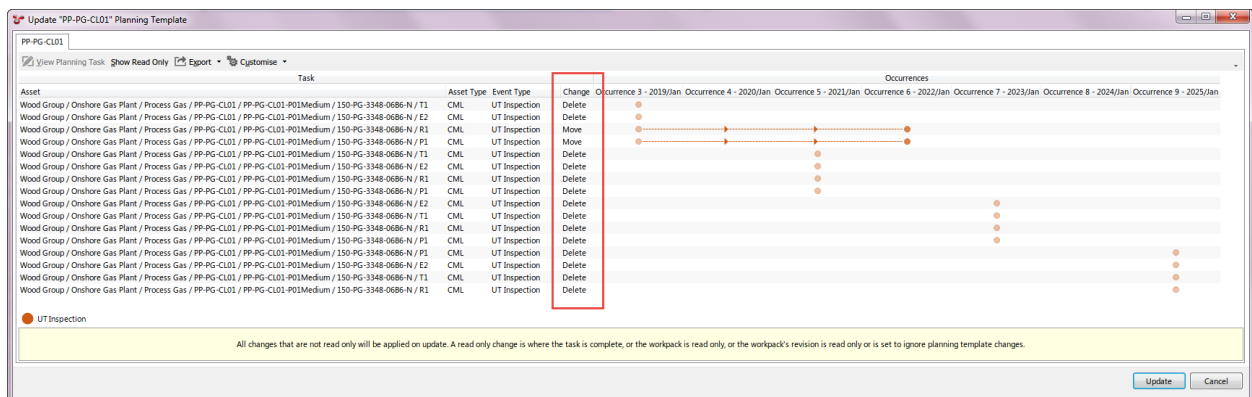


For each of the CMLs, the Frequency has been calculated as follows:

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

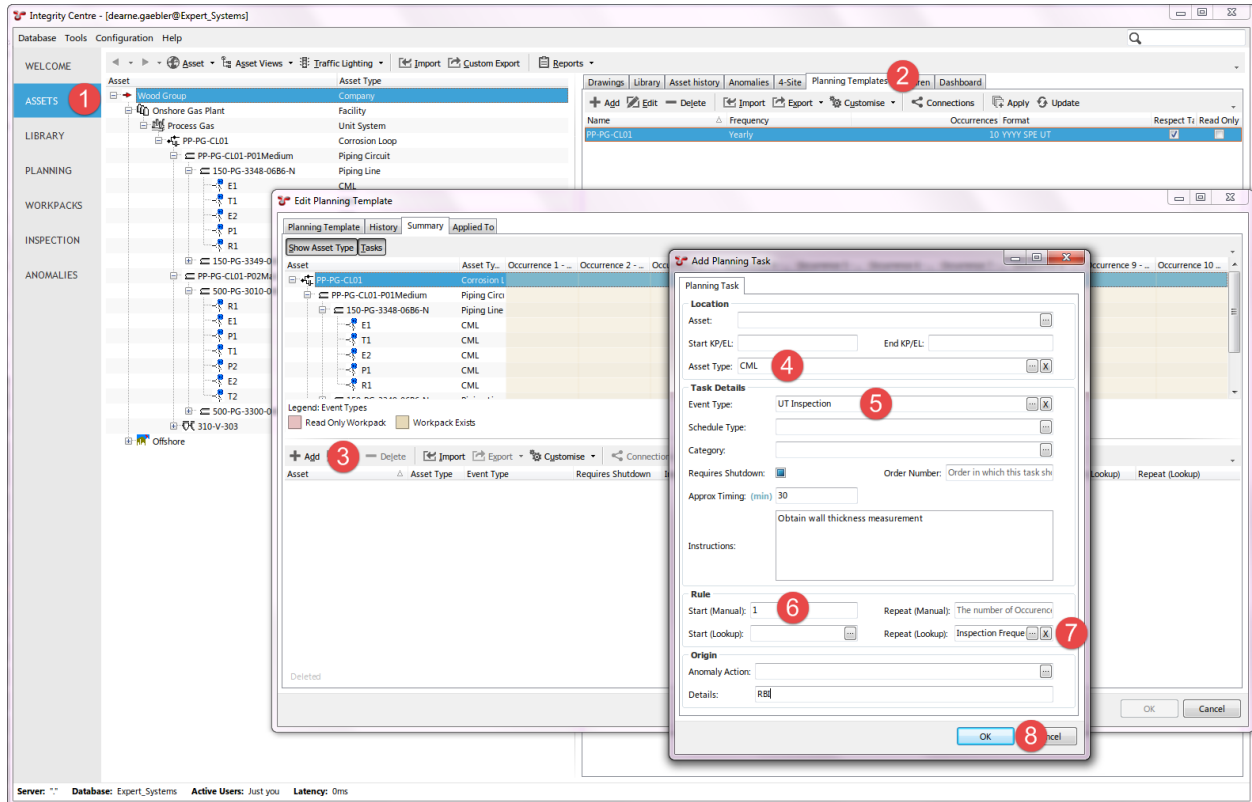
When the Planning Template is updated the previously created Tasks will be deleted and/or moved or new tasks created based on the revised frequency. Performing an Update allows you to view the proposed changes to existing tasks and view new tasks. Our Update is shown here:



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.



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. **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.
6. **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, 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.

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** Launches the **Add Planning Template** dialog. Click on **OK** to save, or **Cancel** to exit without saving changes.
- **Edit** Launches the **Edit Planning Template** dialog. Click on **OK** to save changes, or **Cancel** to exit without saving changes.
- **Delete** Deletes the currently selected 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.
- **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 AIG 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. 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*.

The Charts tab will list all of the Chart Templates that are suitable to the selected asset's type. If you don't see any Chart Templates listed, try changing to an asset of a different type.

Available Chart Templates will be listed alphabetically. The first Chart Template will be automatically expanded.

For some Chart Templates, at the right 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 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.

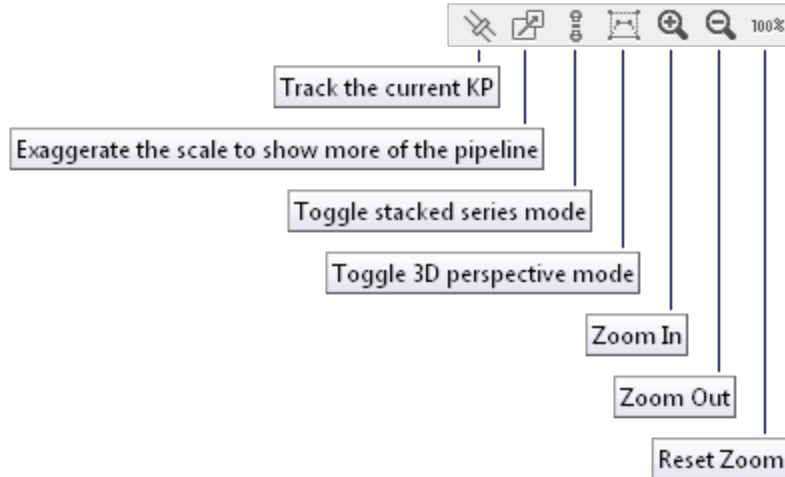
You can also control zoom with toolbar buttons Zoom In, Zoom Out, and Reset Zoom.

2.12.2 Charts 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.

2.12.3 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, WG 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 Group	Company
Onshore Gas Plant	Facility
Process Gas	Unit System
PP-PG-CL01	Corrosion Loop
PP-PG-CL01-P0	Piping Circuit
PP-PG-CL01-P0	Piping Circuit
310-V-303	Vessel Equipment
Offshore	Field Area
Platform A	Platform
Upper Deck	Topside Structure
Mezzanine Deck	Topside Structure
Main Deck	Topside Structure
Cellar Deck	Topside Structure
36" PL	Pipeline
24" PL	Pipeline
10" PL	Pipeline
2" PL	Pipeline
FSO	Floating Structure

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 (see *Asset Types* for more detail on configuring Asset Types).

2.14 Moving Assets

Moving assets in the hierarchy is achieved by clicking on an asset with the mouse, then dragging and dropping that asset to a new location in the asset hierarchy.

Tip: 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 50 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. **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.

+ 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:

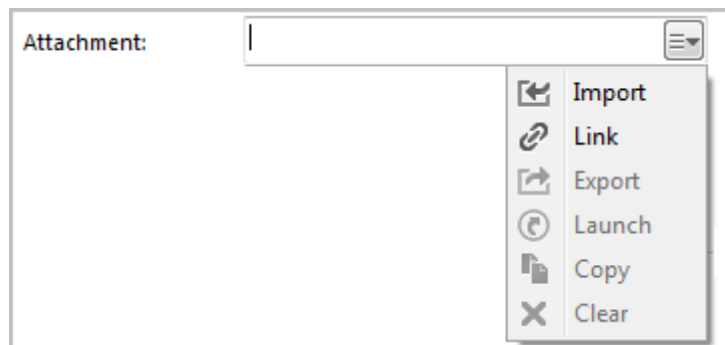
1. *ASSETS*
2. *LIBRARY*
3. *INSPECTION*
4. *ANOMALIES*
5. *Configuration* → *General* → *Functions* → *Edit Function Definition*
6. *Configuration* → *Assets* → *Types*
7. *Configuration* → *Events* → *Event Types* → *Edit Table Information*

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”.

3.1.1 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.

- **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:

- Asset
 - Asset Type
 - Workpack
 - Anomaly
 - Event / Log
 - Event / Log Type
 - Function
 - RBI Model
- **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

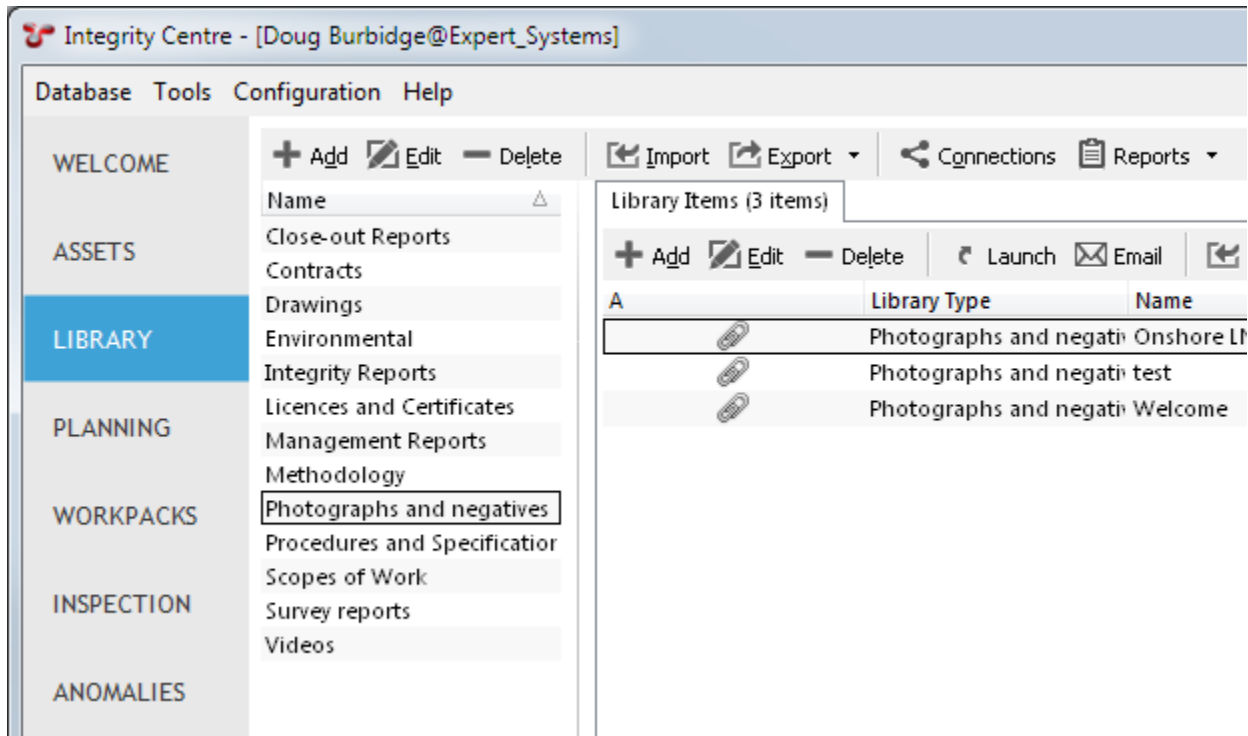
Each *Library* Item may have one or more ‘connections’ associated with it. A Library Connection is a ‘link’ between a Library Item and a data record. Connection Types include:

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 Log (where a library item is linked to a discrete event)
4. Event Log 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. RBI Model (where a library item is linked to an RBI 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:

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2. \\example.com\groups\eng\this_doc.docx

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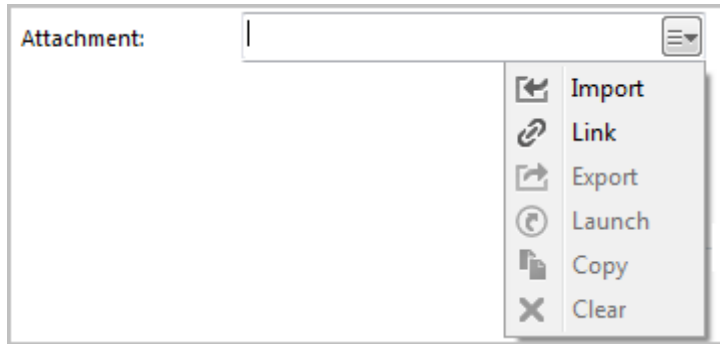
1. *ASSETS*
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3. *INSPECTION*
4. *ANOMALIES*
5. *Configuration* → *General* → *Functions* → *Edit Function Definition*
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7. *Configuration* → *Events* → *Event Types* → *Edit Table Information*

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

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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.

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

- Asset
 - Asset Type
 - Workpack
 - Anomaly
 - Event / Log
 - Event / Log Type
 - Function
 - RBI Model
- **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.

PLANNING

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.

4.1.1 Properties of a Task

1. **Asset** - where the task is to be completed.
2. **Start KP/EL / End KP/EL** - defines the starting and ending kilometre point or elevation of a task (if required).
3. **Workpack** - You must specify a workpack to contain your task.
4. **Event Type** - the type of Event which is to occur to complete this task (can be null).
5. **Schedule Type** - A non-required field, used for grouping, categorising.
6. **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).
7. **Assigned To** - you may optionally assign particular tasks to particular personnel.
8. **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.
9. **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.
10. **Approx Timing** - This will be used to estimate the overall duration (and optionally, cost) of workpacks.
11. **Due Date** - optionally set a due date by which you want this task to be completed.

12. **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.)
13. **Task Origin** - 150 characters.
14. **Anomaly Action** - If this task was created from an anomaly action, it is shown here.
15. **Planning Template** - If this task was created from a planning template, it is shown here.
16. **Event** - If an event has been used to complete this task, it is shown here.
17. **Task Status** - You may optionally create task statuses to classify your tasks.
18. **Is Completed** - True if an event has been used to complete this task.
19. **Retasked** - True if another task references this task (i.e. is linked to this task).
20. **Is Deferred** - True if Is Completed is true and Is Retasked is true.

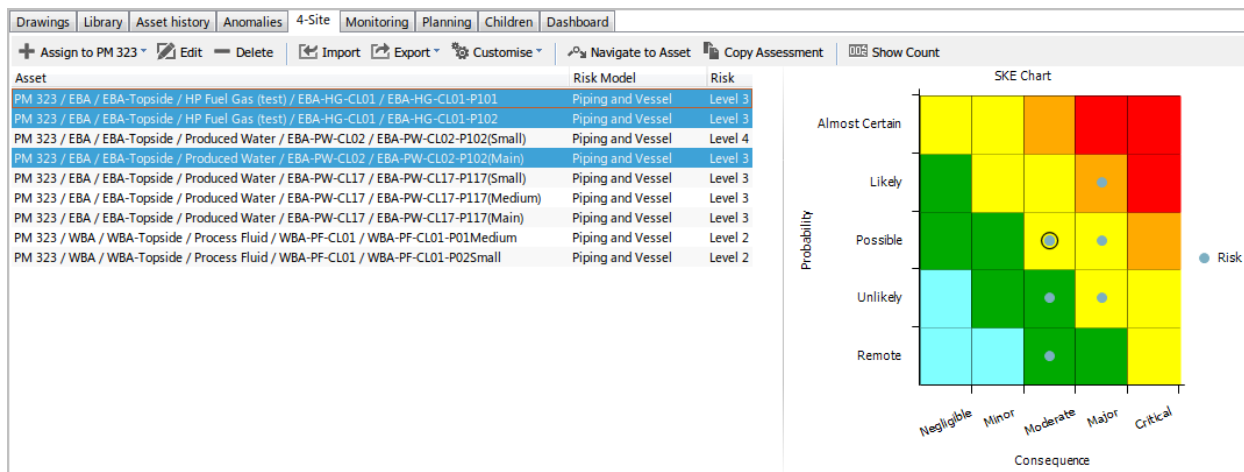
If the task has instructions (from any of event type instructions, planning template instructions or instructions on the specific task), those instructions will be shown in a pane on the right.

4.1.2 Tasks Toolbar

- **Add** Add a task.
- **Edit** Edit the selected task(s).
- **Delete** Delete the selected 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.



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.

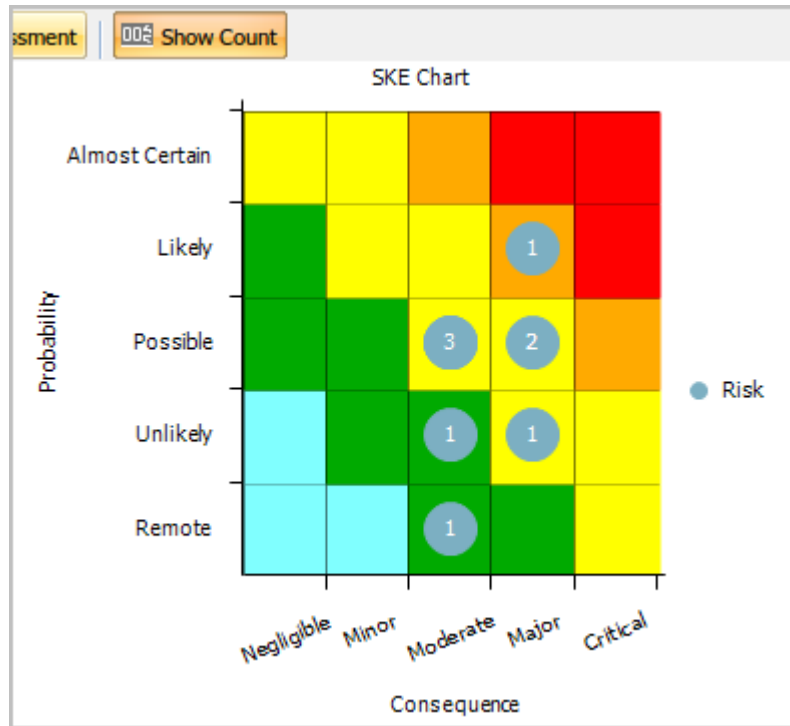
4.2.1 Risk Toolbar

- **Assign** → **Risk Model** Choose from the list of pre-configured Risk Models in the Drop Down menu to assign to the currently selected asset.
- **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.
- **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** Add a Shutdown.
- **Edit** Edit the selected Shutdown(s).
- **Delete** Edit the selected 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.

5.1.1 Properties of a Task

1. **Asset** - where the task is to be completed.
2. **Start KP/EL / End KP/EL** - defines the starting and ending kilometre point or elevation of a task (if required).
3. **Workpack** - You must specify a workpack to contain your task.
4. **Event Type** - the type of Event which is to occur to complete this task (can be null).
5. **Schedule Type** - A non-required field, used for grouping, categorising.
6. **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).
7. **Assigned To** - you may optionally assign particular tasks to particular personnel.
8. **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.
9. **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.
10. **Approx Timing** - This will be used to estimate the overall duration (and optionally, cost) of workpacks.
11. **Due Date** - optionally set a due date by which you want this task to be completed.

12. **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.)
13. **Task Origin** - 150 characters.
14. **Anomaly Action** - If this task was created from an anomaly action, it is shown here.
15. **Planning Template** - If this task was created from a planning template, it is shown here.
16. **Event** - If an event has been used to complete this task, it is shown here.
17. **Task Status** - You may optionally create task statuses to classify your tasks.
18. **Is Completed** - True if an event has been used to complete this task.
19. **Retasked** - True if another task references this task (i.e. is linked to this task).
20. **Is Deferred** - True if Is Completed is true and Is Retasked is true.

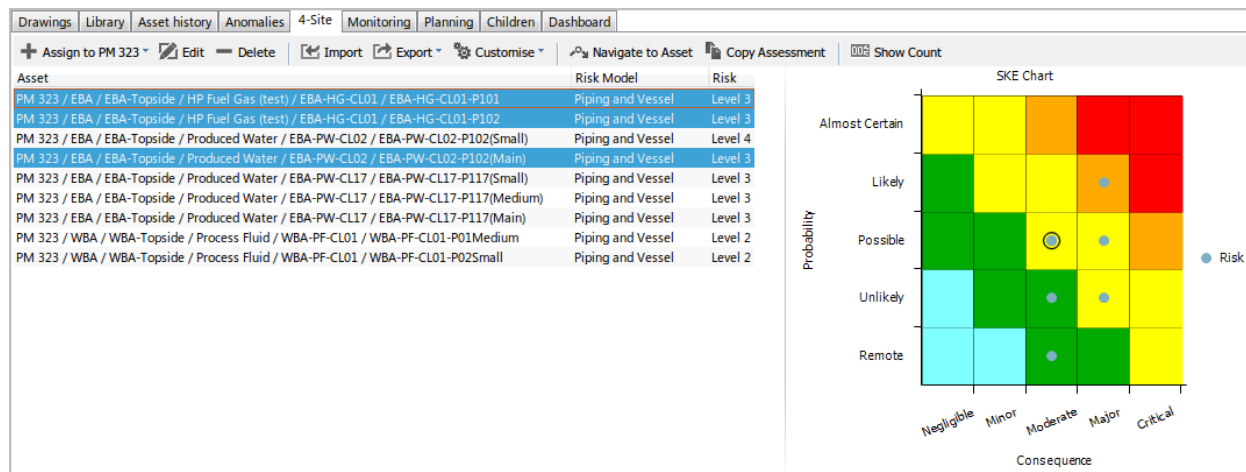
If the task has instructions (from any of event type instructions, planning template instructions or instructions on the specific task), those instructions will be shown in a pane on the right.

5.1.2 Tasks Toolbar

- **Add** Add a task.
- **Edit** Edit the selected task(s).
- **Delete** Delete the selected 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.



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.

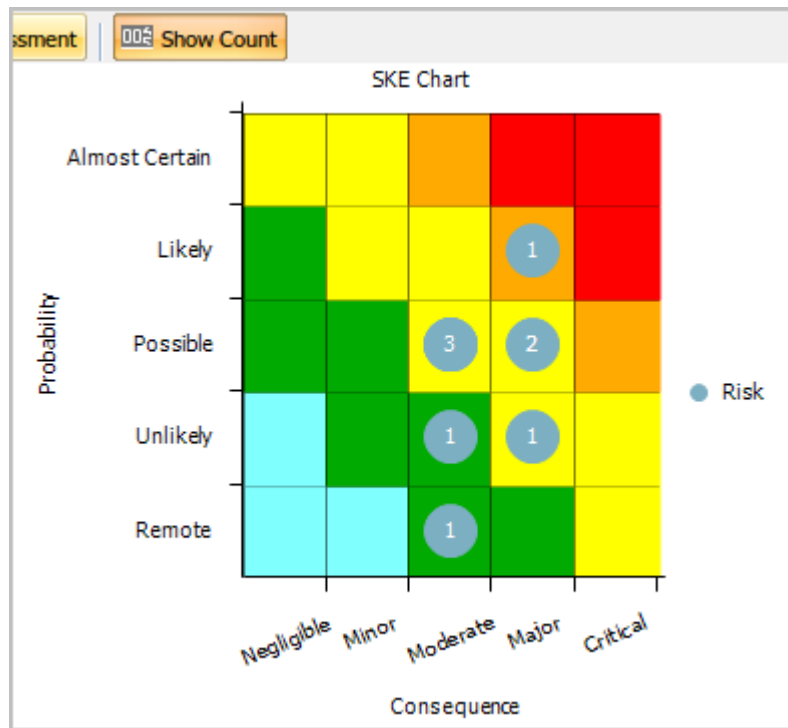
5.2.1 Risk Toolbar

- **Assign** → **Risk Model** Choose from the list of pre-configured Risk Models in the Drop Down menu to assign to the currently selected asset.
- **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.
- **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. (In NEXUS IC 5, tasks could not be directly added to a workpack — they had to be placed in a schedule which was in turn owned by a workpack. In NEXUS IC 6, a task is placed directly in a workpack.)

Workpacks can be bulk imported from MS Excel or manually created from the Add Workpack dialog.

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 (10 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 Read Only check box, when checked, will prevent users editing any information relating to that Workpack. This includes any tasks, events etc.
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** Add a Workpack.
- **Edit** Edit the selected Workpack(s).
- **Delete** Edit the selected 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 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.

6.2 Anomaly Triggers Tool

The Anomaly Triggers utility checks the event data for each event 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 *Tools* → *Anomaly Triggers* button, you will be shown an “Are you sure” message.

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).

Anomaly Triggers can be configured on fields in *Asset Information* and *Event Types*.

6.3 Asset History

See *Asset History*.


6.4 Asset Information

See *Asset Information*.

6.5 Charts

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

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 Chart Templates listed, try different types of events, by changing asset or by changing your filters. The Chart Templates 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.

Available Chart Templates will be listed alphabetically. The first Chart Template will be automatically expanded.

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

For some Chart Templates, at the right 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.

6.5.1 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 putting the mouse in the chart area and 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.

6.5.2 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.
- **Perspective** This option will represent the pipeline with a perspective to give a right impression of the height, width, depth and position in relation to each other and is only used in Pipeline View charts.
- **Exaggerate Scale** This will condense the pipeline and the events shown on the pipeline and is only used in Pipeline View charts.
- **Stacked** This will arrange the events on a pipeline in a stack for each type of event and is only used in Pipeline View charts.

Tip: Position your cursor over the chart area and then use your mouse wheel to increase/decrease the chart scale for export.

- **Copy** Use this button to copy the chart, as currently displayed, to the clipboard.
- **Drawings** For chart templates with a drawing image behind the chart, use this button to select the drawing.

6.5.3 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](#).

6.6 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.

6.7 Event Details

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

The screenshot displays the NEXUS software interface. On the left, there is a tree view of assets under 'PM 323'. The main area shows an 'Event Listing' table with columns for V, F, L, B, M, C, Event N, Asset, Start C, End Clock, Enk, Ea, Event Type, Sta, Survey, and Nor. The table contains several rows of event data. Below the table is an 'Asset Information' panel for 'Traffic Lights' showing 'Anomaly Count: 0', 'Measured WT: (mm) 8.05', and 'Risk: Level 4'. On the right, there is an 'Event Details' form for a 'UT Inspection' event, which includes fields for 'Inspection Date', 'Report No.', 'Thickness Measured', 'Contractor', 'Lowest CML Reading Location', 'Service Order No.', 'Isometric Drawing No.', 'Inspection Effectiveness', 'Coating Condition', 'Visual Inspection Result', 'Event', 'Workpack', 'Asset', 'Survey Set', 'Start Clock', 'End Clock', and 'Commentary'.

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

6.7.1 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*.

6.7.2 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

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

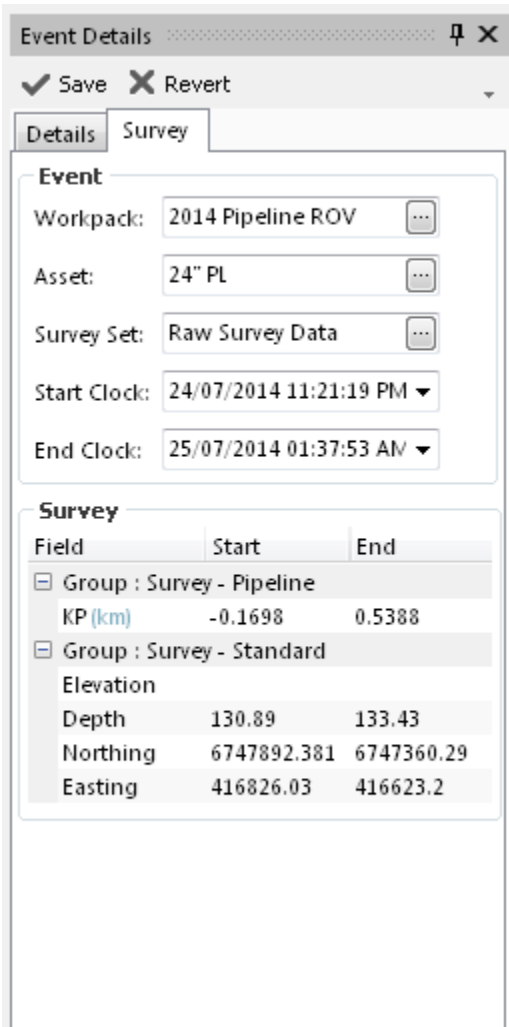
Coating Condition:

Visual Inspection

Visual Inspection Result:

Commentary

Notes:



Event Details

✓ Save ✗ Revert

Details Survey

Event

Workpack: 2014 Pipeline ROV ...

Asset: 24" PL ...

Survey Set: Raw Survey Data ...

Start Clock: 24/07/2014 11:21:19 PM ▼

End Clock: 25/07/2014 01:37:53 AM ▼

Survey

Field	Start	End
[-] Group : Survey - Pipeline		
KP (km)	-0.1698	0.5388
[-] Group : Survey - Standard		
Elevation		
Depth	130.89	133.43
Northing	6747892.381	6747360.29
Easting	416826.03	416623.2

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.

6.7.3 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.

6.7.4 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 (Zoom In and Zoom Out). The 'region:' label is positioned to the left of a photograph showing a textured surface with a blue polygonal markup overlaid on it. Below the image is a 'Commentary' section with a text area containing the text 'Anomalous damage'. At the bottom of the window, a navigation bar shows tabs for 'Task', 'Event Details', 'Multimedia', 'Incomplete T..', 'Finding', and 'Review Status'.

6.8 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 of 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.

6.8.1 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.

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.

6.8.2 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.
- **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*.
- **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
- **Tools** → **Anomaly Triggers** See *Anomaly Triggers Tool* for full description of the Anomaly Triggers utility.
 - **Export** See *Export* for full description of the Summary Export menu item.
 - **Customise** See *Customise* for full description of the Customise menu item.

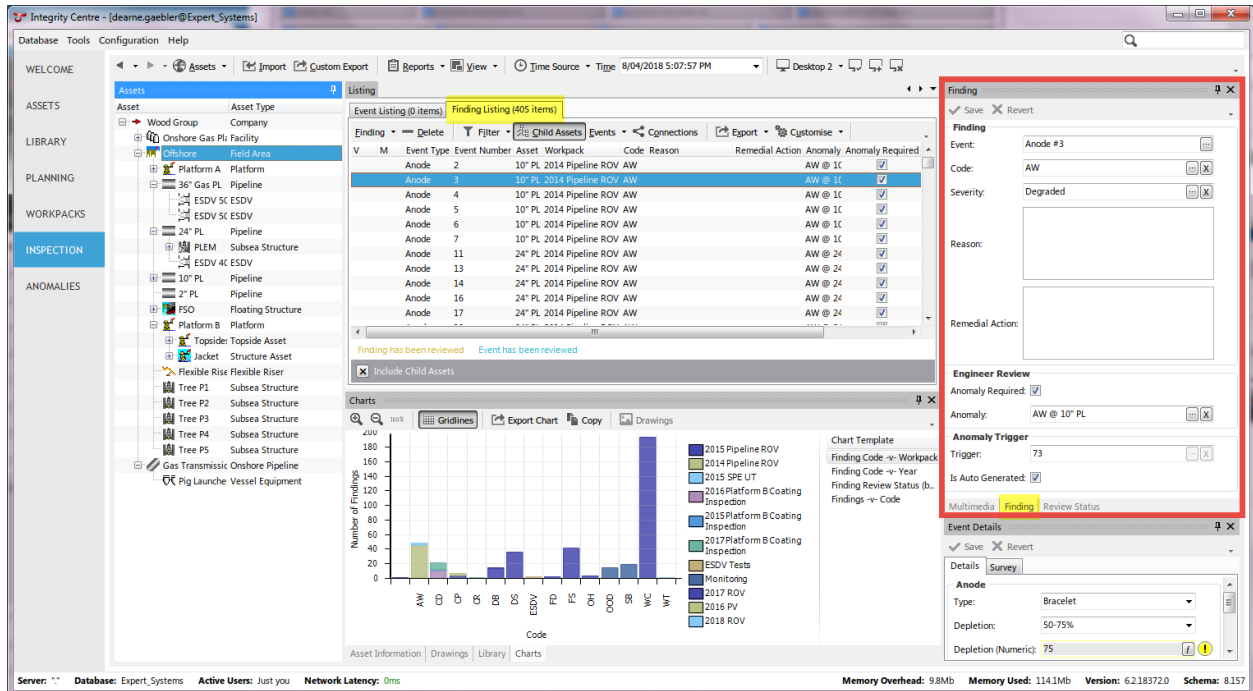
6.9 Finding

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

A finding record has a Code, a Severity ranking, Reason (descriptive text) and Remedial Action (descriptive text). Upon review, if the you deem that the Finding should be escalated to an Anomaly, then you should check 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.

6.9.2 Properties of a Finding

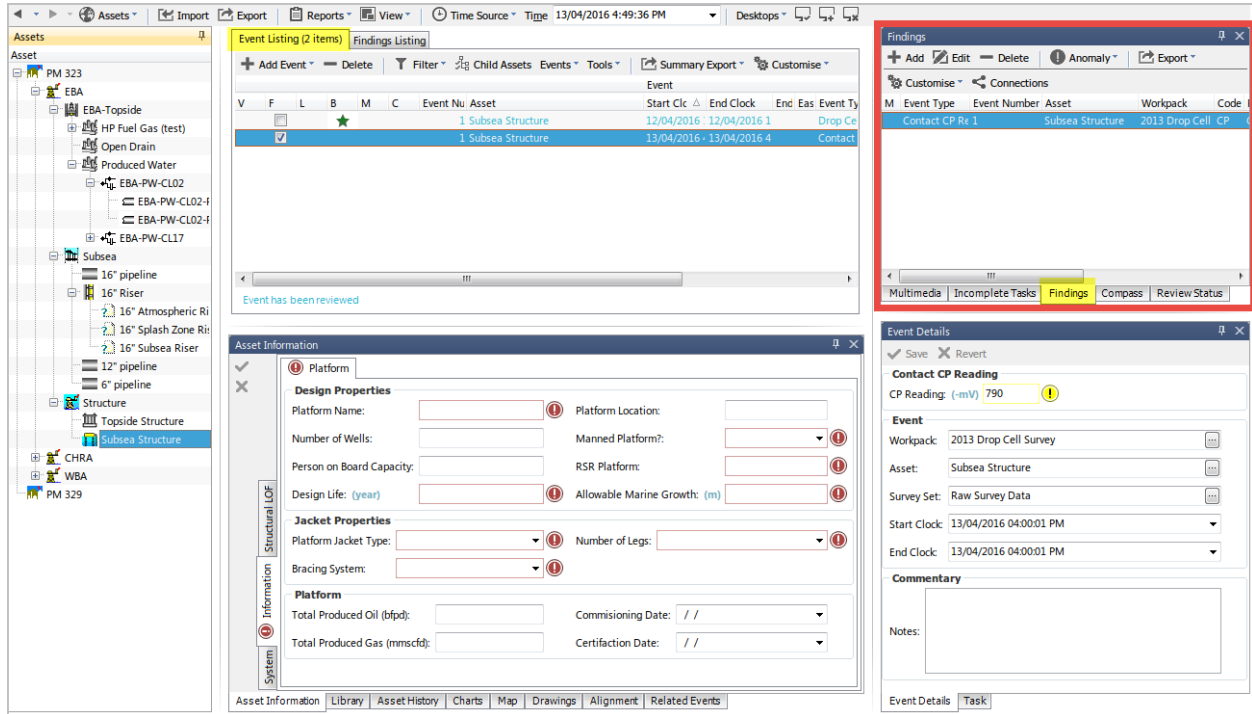
1. **Event** - The Event which this Finding is connected to.
2. **Code** - Code which identifies the type of Finding. These are the same codes that are used to classify Anomalies. Some typical codes may include “CD”, “PD” or “VIB” (Coating Damage, Physical Damage or Vibration); however, anomaly codes are user-definable and can be configured from *Configuration* → *Anomalies*.
3. **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.
4. **Reason** - Text field. Size unlimited.
5. **Remedial Action** - Text field. Size unlimited.
6. **Anomaly Required** - Check this box if this Finding should be linked to an Anomaly.
7. **Anomaly** - Anomaly that this Finding is linked to. This field only appears if **Anomaly Required** is checked.
8. **Anomaly Trigger** - If this Finding was automatically generated by an Anomaly Trigger, that trigger is shown here.
9. **Is Auto Generated** - True if this Finding was automatically generated by an Anomaly Trigger.

6.9.3 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*.

6.10 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 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 check 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.

6.10.1 Properties of a Finding

1. **Event** - The Event which this Finding is connected to.

2. **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*.
3. **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.
4. **Reason** - Text field. Size unlimited.
5. **Remedial Action** - Text field. Size unlimited.
6. **Anomaly Required** - Check this box if this Finding should be linked to an Anomaly.
7. **Anomaly** - Anomaly that this Finding is linked to. This field only appears if **Anomaly Required** is checked.
8. **Anomaly Trigger** - If this Finding was automatically generated by an Anomaly Trigger, that trigger is shown here.
9. **Is Auto Generated** - True if this Finding was automatically generated by an Anomaly Trigger.

6.10.2 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*.

6.10.3 The Findings Toolbar

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

6.11 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 (eg. events on child assets will not be listed).

A finding record has a Code, a Severity ranking, Reason (descriptive text) and Remedial Action (descriptive text). Upon review, if the you deem that the Finding should be escalated to an Anomaly, then you should check 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. **Event** - The Event which this Finding is connected to.
2. **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*.
3. **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.
4. **Reason** - Text field. Size unlimited.
5. **Remedial Action** - Text field. Size unlimited.
6. **Anomaly Required** - Check this box if this Finding should be linked to an Anomaly.
7. **Anomaly** - Anomaly that this Finding is linked to. This field only appears if **Anomaly Required** is checked.
8. **Anomaly Trigger** - If this Finding was automatically generated by an Anomaly Trigger, that trigger is shown here.
9. **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 Grid

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

1. **V** = The presence or absence of **Video** for the event recorded at this date/time.
2. **M** = The presence or absence of **Multimedia** 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) events, 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 noTEPAD ++(the event data) will be displayed as additional columns in the Findings Listing grid.

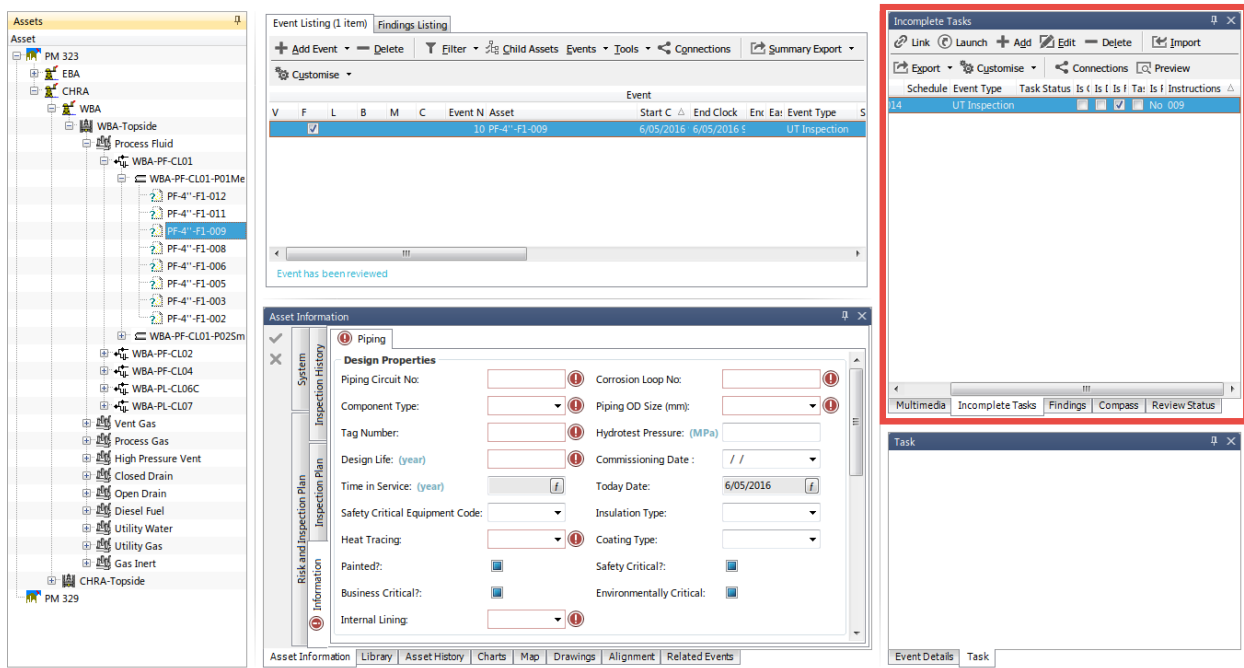
6.11.4 Findings Listing Toolbar

- **Finding** → **Finding Review** → **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** → **Finding Review** → **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** → **Finding Review** → **Mark Finding as not reviewed** This option will only be enabled on a 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** → **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
- **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.

6.12 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.

6.12.1 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*.

6.12.2 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** Launches the **Add Task** dialog. Complete the details of the task and click **OK** to save the new task or **Cancel**.
- **Edit** Launches the **Edit Task** dialog. Make required changes and click **OK** to save or **Cancel**.
- **Delete** Deletes the currently selected task.
- **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.

6.13 Library

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:

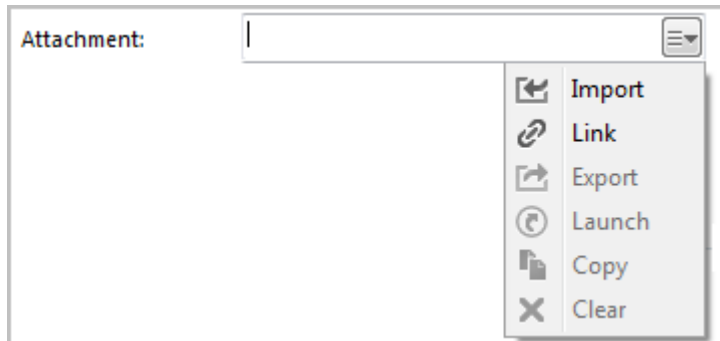
1. *ASSETS*
2. *LIBRARY*
3. *INSPECTION*
4. *ANOMALIES*
5. *Configuration → General → Functions → Edit Function Definition*
6. *Configuration → Assets → Types*
7. *Configuration → Events → Event Types → Edit Table Information*

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”.

6.13.1 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.

- **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:

- Asset
- Asset Type
- Workpack
- Anomaly

- Event / Log
- Event / Log Type
- Function
- RBI Model
- **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.

6.14 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 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.

6.14.1 Zooming

You can zoom in or out by putting the mouse in the map area and spinning the mouse wheel. You can also control zoom with toolbar buttons Zoom In, Zoom Out, and Reset Zoom.

6.14.2 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.

6.15 Multimedia

6.15.1 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.

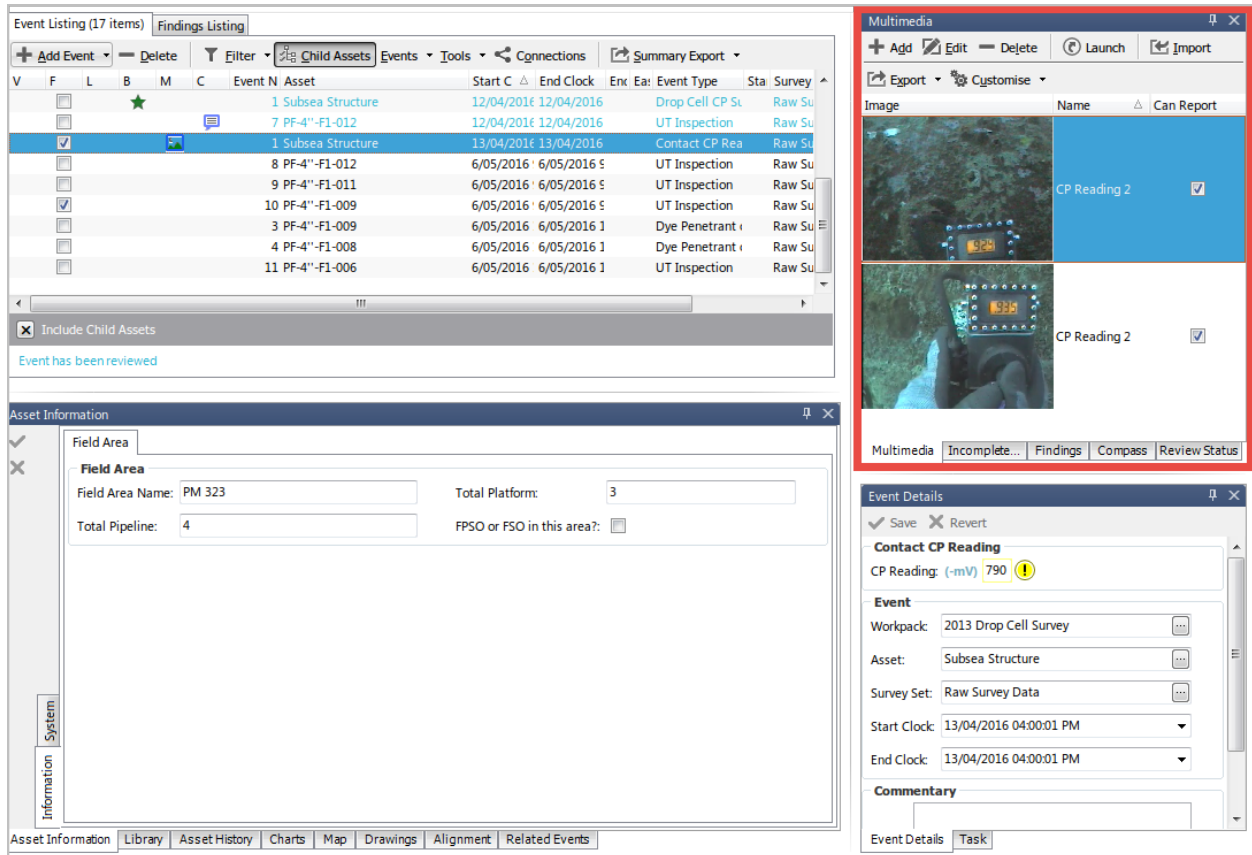
Note: The **Can Report** property of the Multimedia item can be used to filter which images are output to the report. (This column is invisible by default, but is available under *Customise* → *Columns*.)

- **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.
- **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.

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.

6.15.2 The Multimedia Toolbar

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

6.16 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.

6.17 Review Status

When an event 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.

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.

6.17.1 Report Table Sources

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

6.18 Inspections Toolbar

The **Inspections** toolbar button allows the user to add, edit and delete events.

- **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.
- **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.

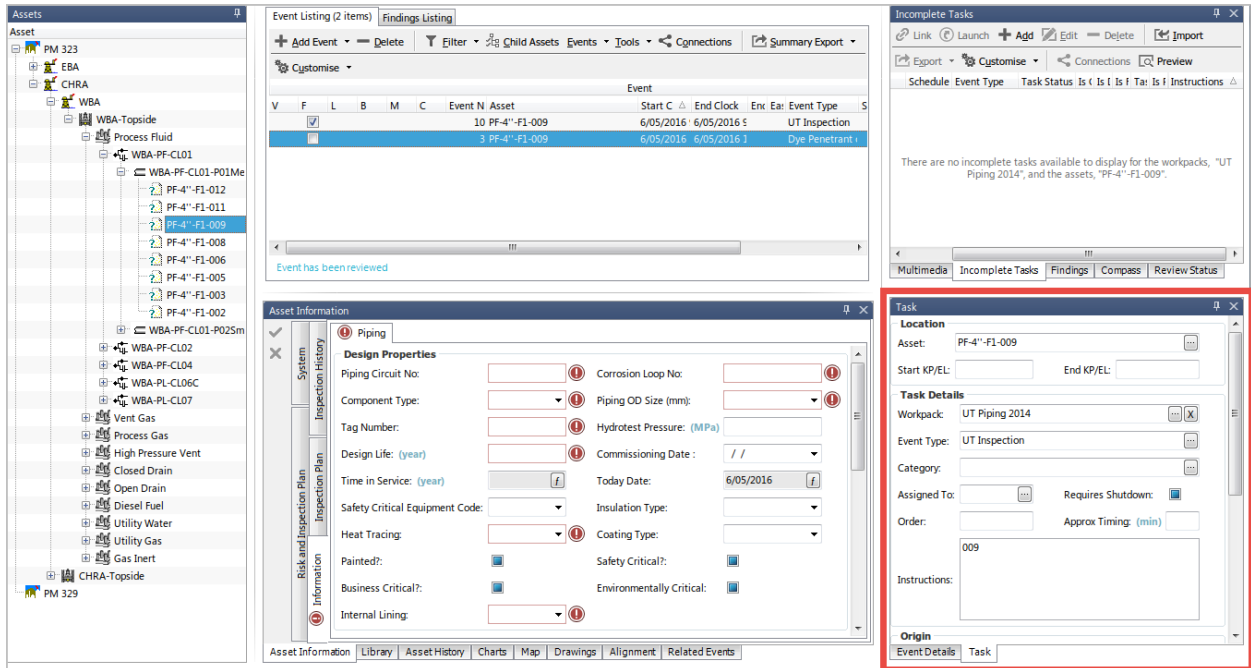
The Retire Equipment menu item is a Shortcut. As such, if necessary, it can be debugged using the Shortcut debugger. When you select the menu item, hold down the Control key on the keyboard. The Select Asset

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.

- **Import** See *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 *Import* for more detail on importing data from Excel.
- **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.

6.19 Task

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



There are no editing capabilities on this pane.

6.19.1 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*.

6.20 Video

6.20.1 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.

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

When video is *parsed*, NEXUS incrementally searches all folders under the **Global Video Path**, 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.

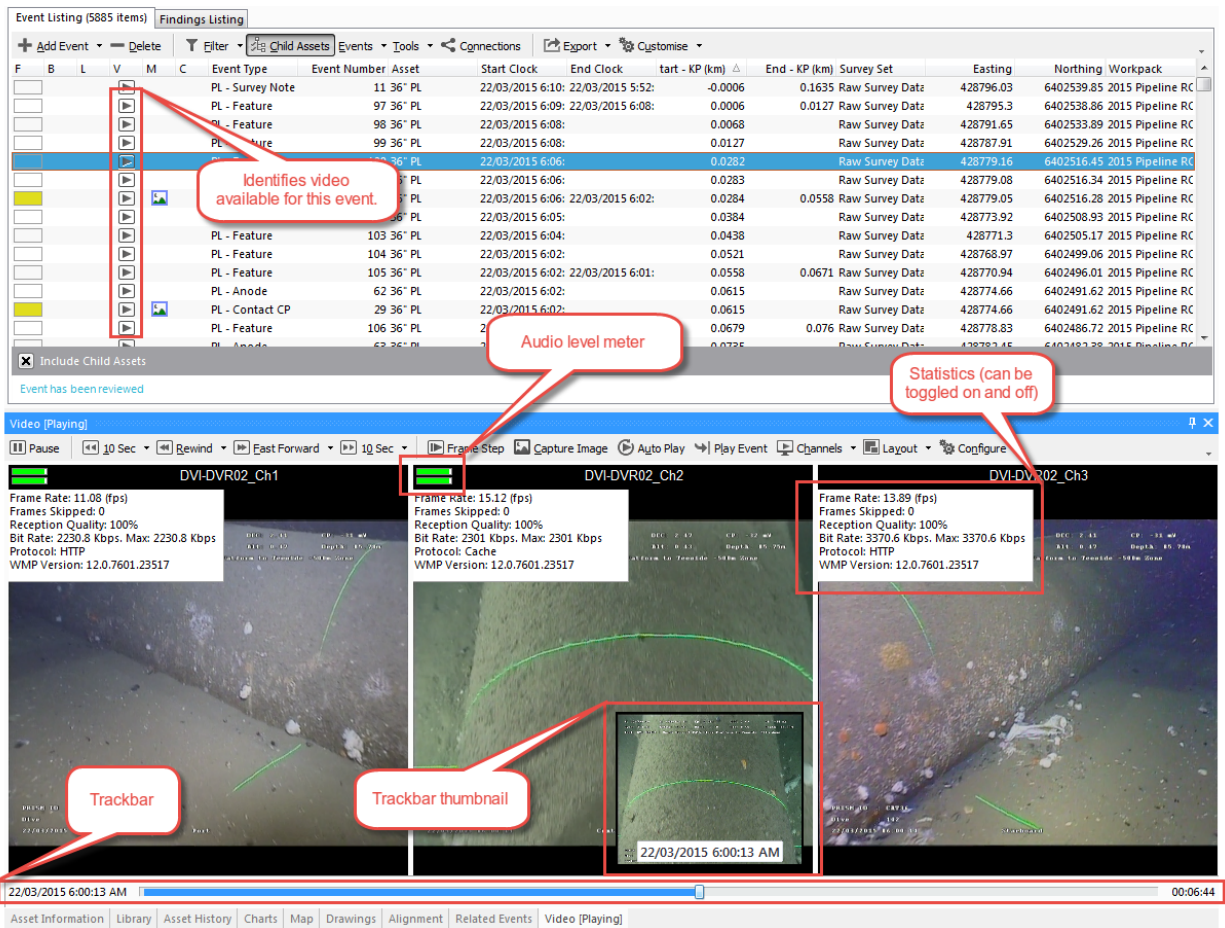
Now that NEXUS "knows" about the video files, it can determine which inspection events have associated video and allows the user to play the *Video* from the INSPECTION screen.

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.



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 (bandwidth), then disable one or more channels.

6.20.2 Video Toolbar

- **Play** Starts playback at the current point in time. The video can be paused by pressing this button again.
- **Play Event** Plays video for the event selected in the Event Listing.
- **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 of the speeds may not be available. When the desired position is reached, the video can be played by pressing the Play button.
- **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 of

the speeds may not be available. When the desired position is reached, the video can be played by pressing the Play button.

- **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.
- **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. The audio level meter will only be shown if the channel is enabled for the audio.
- **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** → **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 Time Videos** 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).

Note: You can tell NEXUS IC where to look for video by setting Global 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 No:

Action Type: Maintenance

Created At: 31/07/2016

Created By: John Citizen

Action Before: 20/10/2016

Assigned To: Maintenance




Completed At: / /

Percent Complete:

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

OK Cancel

7.1.1 Properties of an Anomaly Action

1. **Anomaly** - Is the name of the anomaly that this action belongs to. To change the anomaly that the action is assigned to, click on the  button to the right.
2. **Name** - A short (50 character limit) name for the anomaly action.
3. **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  button on the right hand side of the Status input control.
4. **Reference No.** - Used to reference (or cross reference) number. The number may relate to a Work Order number in your Planned Maintenance System.
5. **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  button on the right hand side of the Action Type input control.
6. **Created At** - Enter the date that the anomaly action is created. This will default to today's date, but is editable thereafter.
7. **Created By** - Enter the name of the person creating the anomaly action. This will default to the currently logged in user, but is editable thereafter.
8. **Action Before** - Enter a date that the anomaly action should be completed by.
9. **Assigned To** - Enter the name of an individual or department that is responsible for progressing or completing the Anomaly Action.
10. **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.
11. **Percent Complete** - Enter a value between 0 and 100. This is for reporting and information purposes only.
12. **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.
13. **Is Tasked?** - This field shows whether this action has had a task assigned to it.

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, 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** Launches the **Add Action** dialog. Properties of the new Anomaly Action are to be completed and saved by clicking on **OK**, or click on **Cancel**.

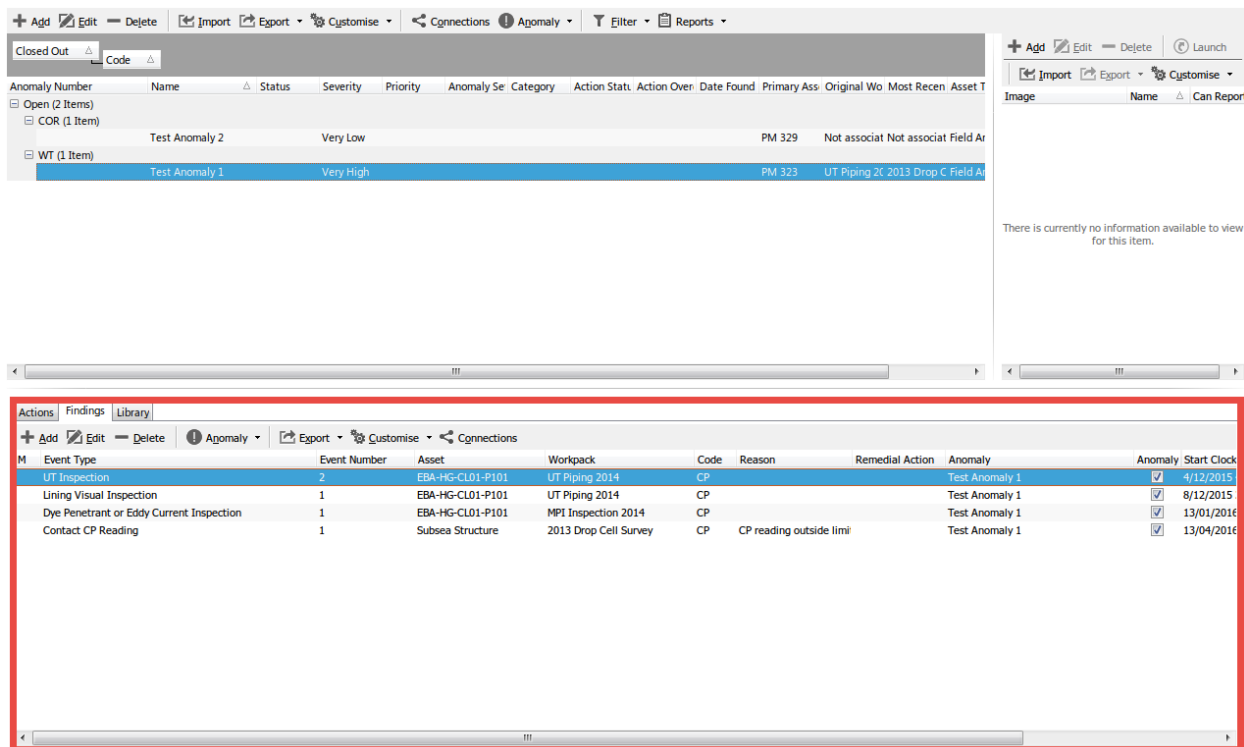
- **Edit** Launches the **Edit Action** dialog and allows you to make changes to the currently selected Anomaly Action. Click on **OK** to save changes or **Cancel** to ignore changes and close the dialog.
- **Delete** Deletes the currently selected Anomaly Action.

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



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 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 check 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. **Event** - The Event which this Finding is connected to.
2. **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*.
3. **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.
4. **Reason** - Text field. Size unlimited.
5. **Remedial Action** - Text field. Size unlimited.
6. **Anomaly Required** - Check this box if this Finding should be linked to an Anomaly.
7. **Anomaly** - Anomaly that this Finding is linked to. This field only appears if **Anomaly Required** is checked.
8. **Anomaly Trigger** - If this Finding was automatically generated by an Anomaly Trigger, that trigger is shown here.
9. **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.

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:

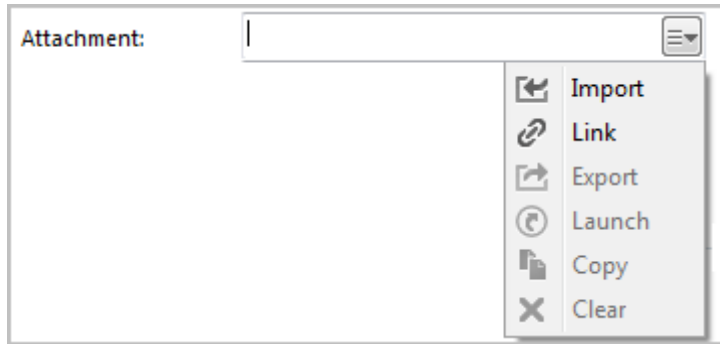
1. *ASSETS*
2. *LIBRARY*
3. *INSPECTION*
4. *ANOMALIES*
5. *Configuration* → *General* → *Functions* → *Edit Function Definition*
6. *Configuration* → *Assets* → *Types*
7. *Configuration* → *Events* → *Event Types* → *Edit Table Information*

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”.

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.

- **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:

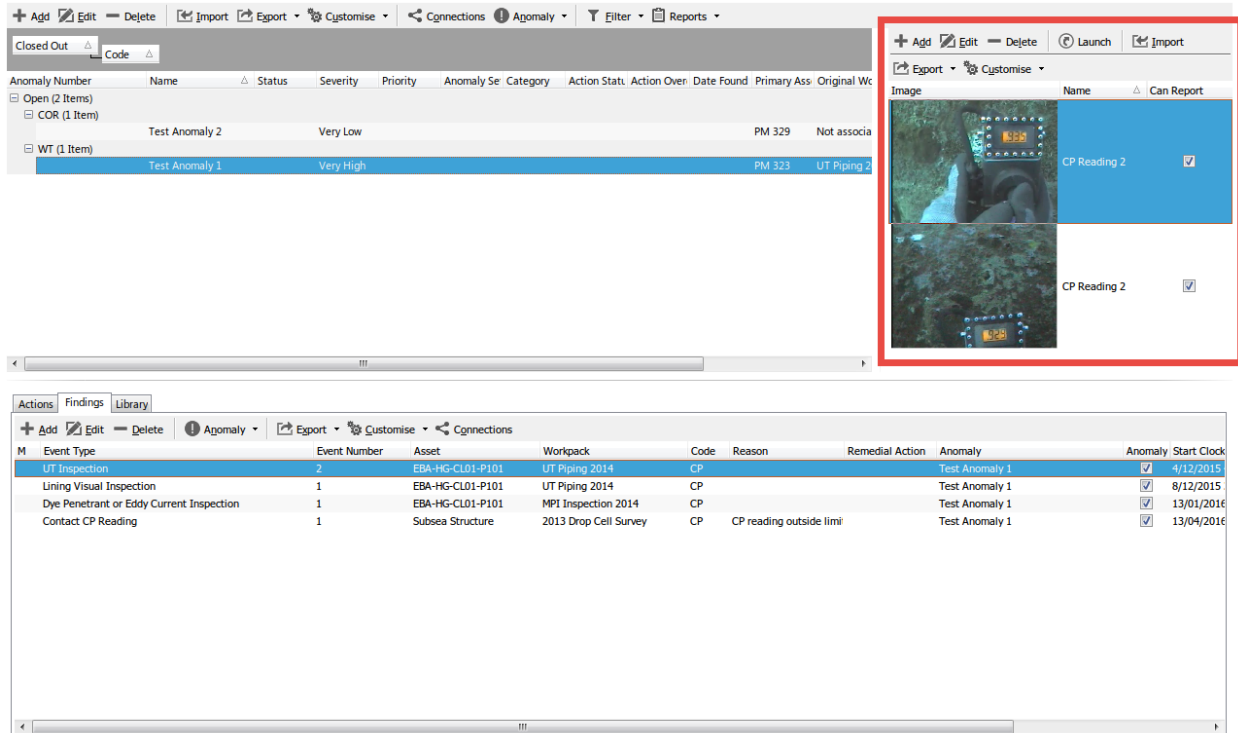
- Asset
 - Asset Type
 - Workpack
 - Anomaly
 - Event / Log
 - Event / Log Type
 - Function
 - RBI Model
- **Export** See *Export* for information about exporting Library Items. Please note that this option will only export the contents of the grid, not the Library Items themselves.
 - **Customise** 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 or anomalies.

7.4.1 The Multimedia Toolbar

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

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.

Add Anomaly

Anomaly

Location
Asset: V8300-11

Anomaly Details
Name: J/SL @ V8300-11
Description: Joint/Seal Leak
Code: J/SL Severity: Degraded
Anomaly Number: 253 Reference Number: 10022014_353
Date Created: 08/06/2016 Created By: Maintenance
Anomaly Set:

Comments:
Leak identified on the outlet flange.

Status
Priority: Medium Status: Open
Closed Out:

OK Cancel

7.5 Properties of an Anomaly

1. **Name** - A short (50 character limit) name for the Anomaly.
2. **Description** - A 100 character field which provides more descriptive information of the anomaly.
3. **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*.
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. 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.
5. **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.

6. **Anomaly Number** - A numerical property which can be used to store a number against the anomaly. This number is not auto-populated.
7. **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*.
8. **Reference Number** - A 200 character limit field which can be used to reference (or cross reference) anomalies.
9. **Date Created** - The date the anomaly was first created. This will default to today's date, but is editable thereafter.
10. **Created By** - Name of the person creating the anomaly record. This will default to the currently logged in user, but is editable thereafter.
11. **Comments** - A large free text field to retain additional information about the anomaly which may not be captured in the properties of the anomaly.
12. **Asset** - The name of the asset that the anomaly is attached to. This is a required field.
13. **Status** - Status of the anomaly. Anomaly statuses are user-definable and can be configured from *Configuration* → *Anomalies*.
14. **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.
15. **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** Launches the **Add Anomaly** dialog. Properties of the new anomaly are to be completed and saved by clicking on **OK**. Click **Cancel** to cancel the new anomaly.
- **Edit** Launches the **Edit Anomaly** dialog and allows you to make changes to the currently selected anomaly. Click on **OK** to save changes or **Cancel** to ignore changes and close the dialog.

- **Delete** Deletes the currently selected anomaly.

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 workpack. Workpacks are linked to anomalies via findings and events.
- **Filter** → **Asset** Allows you to filter the anomaly listing by a sub-set of assets.
- **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.

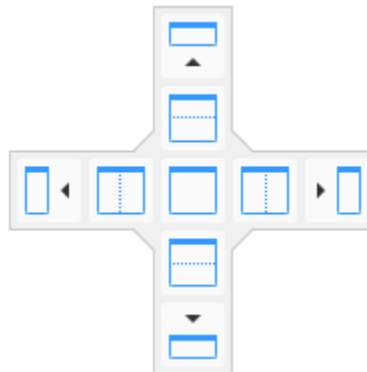
To make this matrix work, you will need to configure *Database* → *Properties* → *Database* → *Anomaly Risk Chart*. You will also need to configure the “System - Anomaly - Risk Score” function.

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  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.

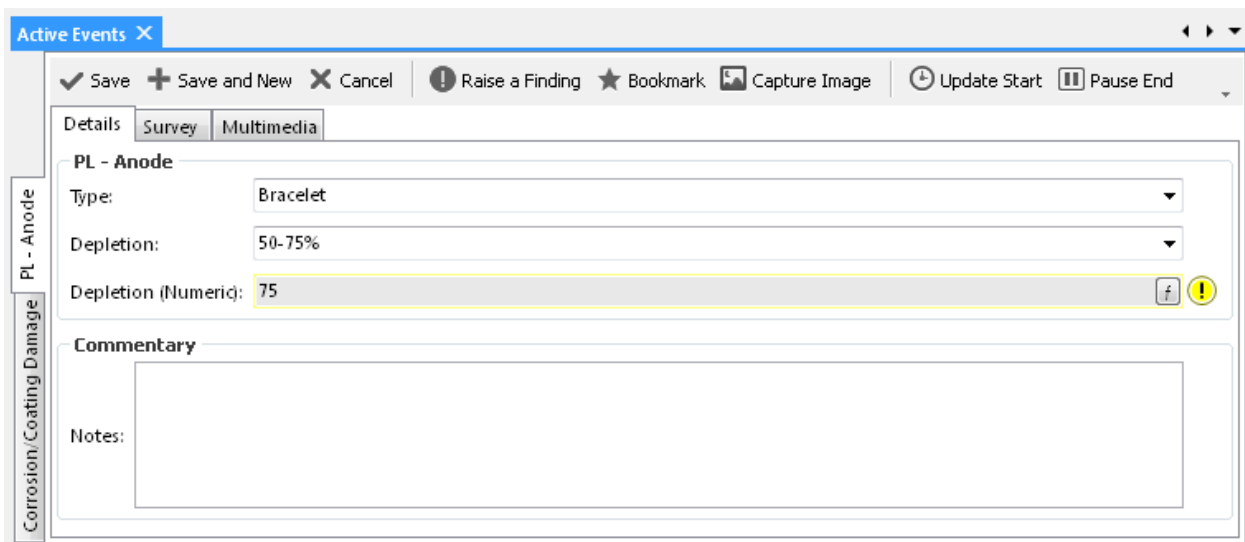
Three desktop layouts are automatically created for you: Structures, Pipelines, and Setup.

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 Active Events

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).



(The event shown above will generate a finding when the user clicks **Save**, because “Depletion (Numeric)” is anomalous.)

8.2.1 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 and 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.
- **Cancel** Cancels the active event without saving to the database.
- **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.

- **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.

8.2.2 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.

8.2.3 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.

8.2.4 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.

8.3 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).

8.3.1 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 are using two ROVs simultaneously, you will typically have a different survey set for each ROV.
- Template Group - click the Template Group ellipsis and select a *Template Group* from the list.

8.4 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 data bounds are exceeded, IC-Inspection automatically creates a Finding on the event.

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

Anomaly triggers can be configured on event fields in NEXUS IC in *Event Types*. Anomaly triggers for specific assets can be configured in NEXUS IC by right-clicking on an asset and choosing **Anomaly Triggers...**

8.5 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.

8.6 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.)

8.6.1 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.

8.7 Charts

Charts are generated from *Chart Templates*.

The Charts window will list all of the Chart Templates that are appropriate for inspection data. 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.

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 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.

8.7.1 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.

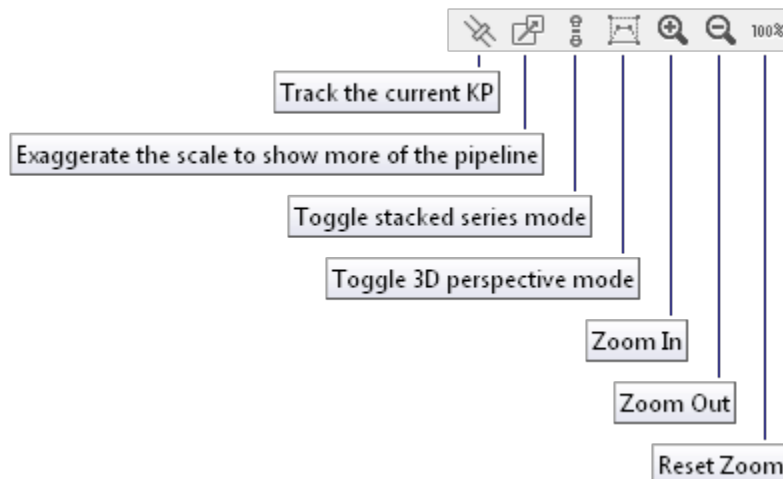
You can also control zoom with toolbar buttons Zoom In, Zoom Out, and Reset Zoom.

8.7.2 Charts 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.

8.7.3 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](#).

8.8 Devices

The Devices panel allows you to manage:

- Incoming serial data;
- Control of DVRs.

8.8.1 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.

These survey devices are exactly analogous to their equivalents in IC-Inspection 5 — it's the same code at heart.

8.8.2 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.

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.

8.8.3 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.

8.8.4 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.

8.8.5 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 **Text Overlays**.
- Choose the overlay you wish to edit and click **Edit**, or click **Add**.
- Size the dialog to roughly represent the aspect ratio of your recorders.
- Drag fields from the tree at the left onto the screen layout at the right. Drag regions around, use the Nudge buttons, or use the fine-tuning in the list at the bottom right. Select fonts, colours, prefixes, suffixes, etc. You can multi-select regions by ‘lassoing’ them in the screen layout.
- Once you’ve OK’ed out of that chain of dialogs, you should see survey values updating in real-time on your recorders.

8.9 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.

8.10 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.)

Each event in your database is shown as a square button. Buttons are sorted by category. (You can set event categories in NEXUS IC, under *Configuration*.)

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.

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.

Events appear in the launcher grouped by category and ordered alphabetically.

8.11 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 re-launch those events.

Note that there is a right-click menu allowing you to relaunch, 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 re-launch 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 of 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.

8.11.1 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.

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.

8.11.2 Event Listing Toolbar

- **Relaunch** Launch the event for editing. This sends the event to the Active Events window.
- **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.

8.12 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.

8.13 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.

8.14 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.

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:

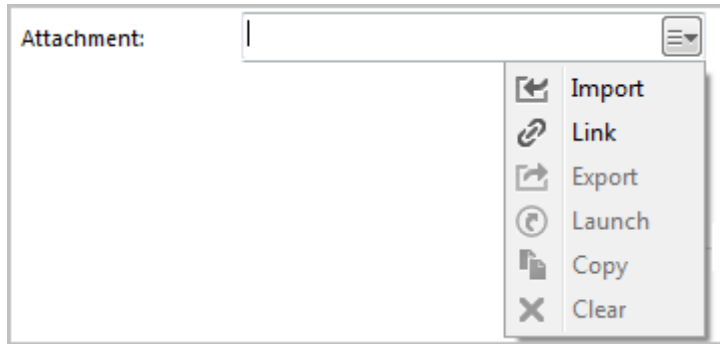
1. *ASSETS*
2. *LIBRARY*
3. *INSPECTION*
4. *ANOMALIES*
5. *Configuration* → *General* → *Functions* → *Edit Function Definition*
6. *Configuration* → *Assets* → *Types*
7. *Configuration* → *Events* → *Event Types* → *Edit Table Information*

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”.

8.14.1 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.

- **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:

- Asset
 - Asset Type
 - Workpack
 - Anomaly
 - Event / Log
 - Event / Log Type
 - Function
 - RBI Model
- **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.

8.15 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 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.

8.15.1 Zooming

You can zoom in or out by putting the mouse in the map area and spinning the mouse wheel. You can also control zoom with toolbar buttons Zoom In, Zoom Out, and Reset Zoom.

8.15.2 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.

8.16 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.

8.16.1 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.

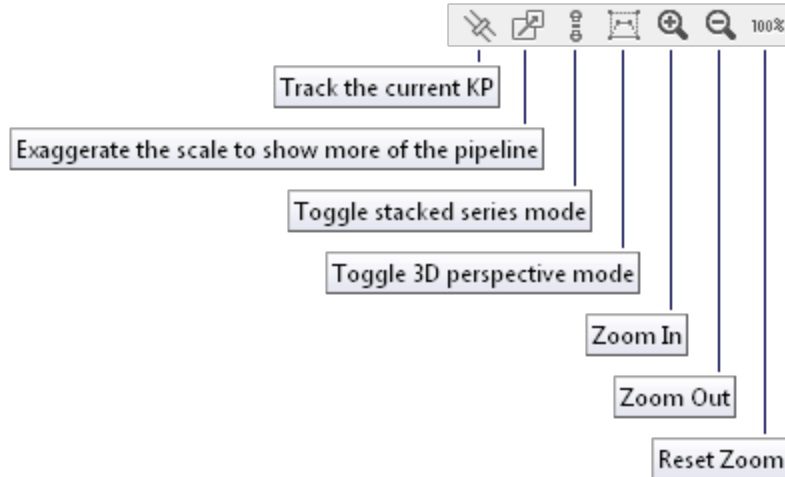
You can also control zoom with toolbar buttons Zoom In, Zoom Out, and Reset Zoom.

8.16.2 Charts 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.

8.16.3 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](#).

8.17 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.

8.17.1 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.

8.17.2 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.

8.18 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.

8.18.1 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.

8.18.2 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.

8.19 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.

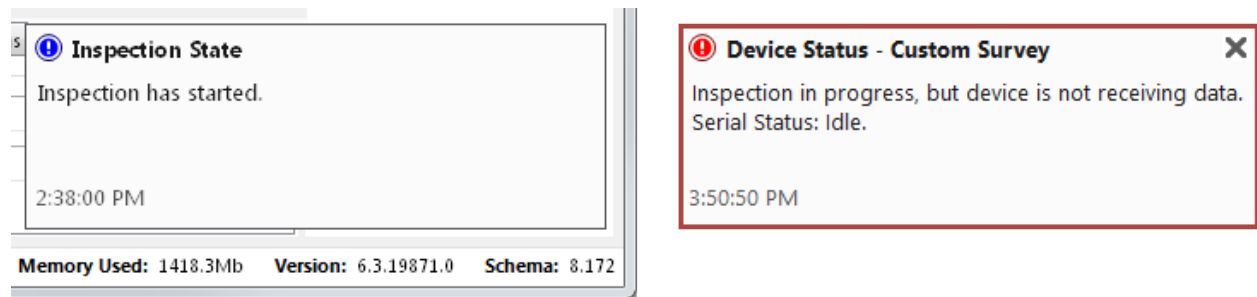


Fig. 8.1: A low-priority notification and a high-priority notification

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.

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:

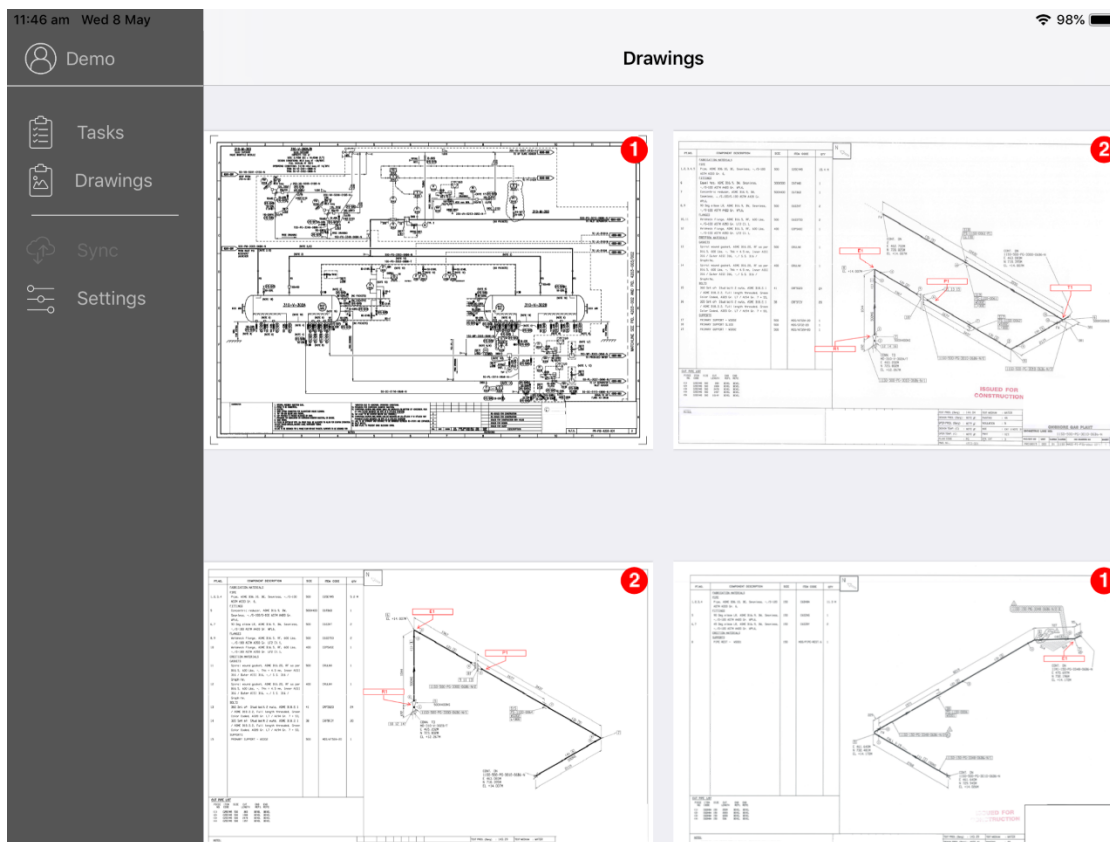
- Configure a NEXUS IC database, including *Assets*, *Event Types*, and optionally *Tasks* and *Drawings*.
- Configure IC-Inspection, including desktops, *Devices*, *Survey Values* and optionally *Event Templates*.
- Configure digital video recorders, whether *IC-Recorder* or a third-party recorder.
- 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 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.



9.2 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 uncompleted, 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.

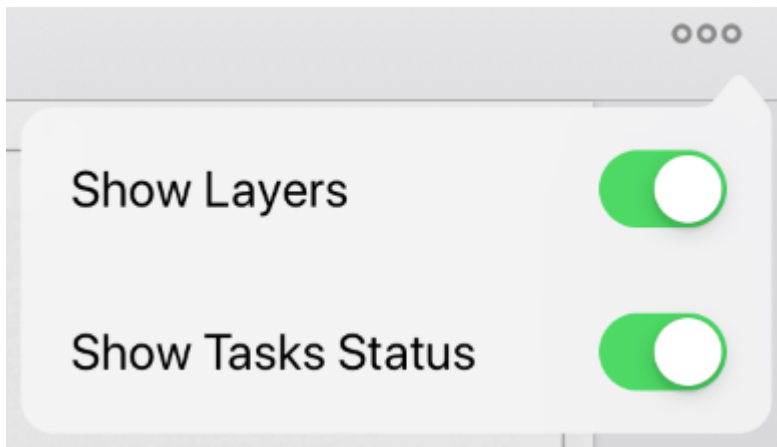
To see a layer's tasks, tap on that layer.

The screenshot shows the 'Drawings' screen in the NEXUS application. At the top, it displays the time '11:50 am Wed 8 May' and the user 'Demo'. The main area is divided into a table of components on the left and a technical drawing on the right. The table lists various piping components with their descriptions, sizes, and quantities. The drawing shows a complex piping layout with various fittings and valves. Below the drawing, there is a section for 'ASSIGNED TASKS' and 'ADHOC TASKS'. The 'ASSIGNED TASKS' section lists a task: '(2019 SPE UT) UT Inspection on E1' with the description 'Obtain wall thickness measurement'. The 'ADHOC TASKS' section lists a task: '(2019 PlatformA FM) UT Inspection on Cellar F1'.

ITEM	DESCRIPTION	SIZE	QTY
1	PIPE	300	10.4
2	FLANGES	300	1
3	VALVES	300	1
4	TEES	300	1
5	ELBOWS	300	1
6	END CAPS	300	1
7	BRACKET	300	1
8	WELDING	300	1
9	INSULATION	300	1
10	PAINT	300	1
11	MARKING	300	1
12	TESTING	300	1
13	COMMISSIONING	300	1
14	OPERATION	300	1
15	MAINTENANCE	300	1
16	REPAIR	300	1
17	REPLACE	300	1
18	REMOVE	300	1
19	INSTALL	300	1

To complete a task, tap on that task. You will be taken to the ic-inspector.event_details screen for that task.

At the top right of the Drawing screen you will see a blue **ooo** ellipsis. Tap this to reveal options to change what you see on the Drawings screen.



9.3 Tasks

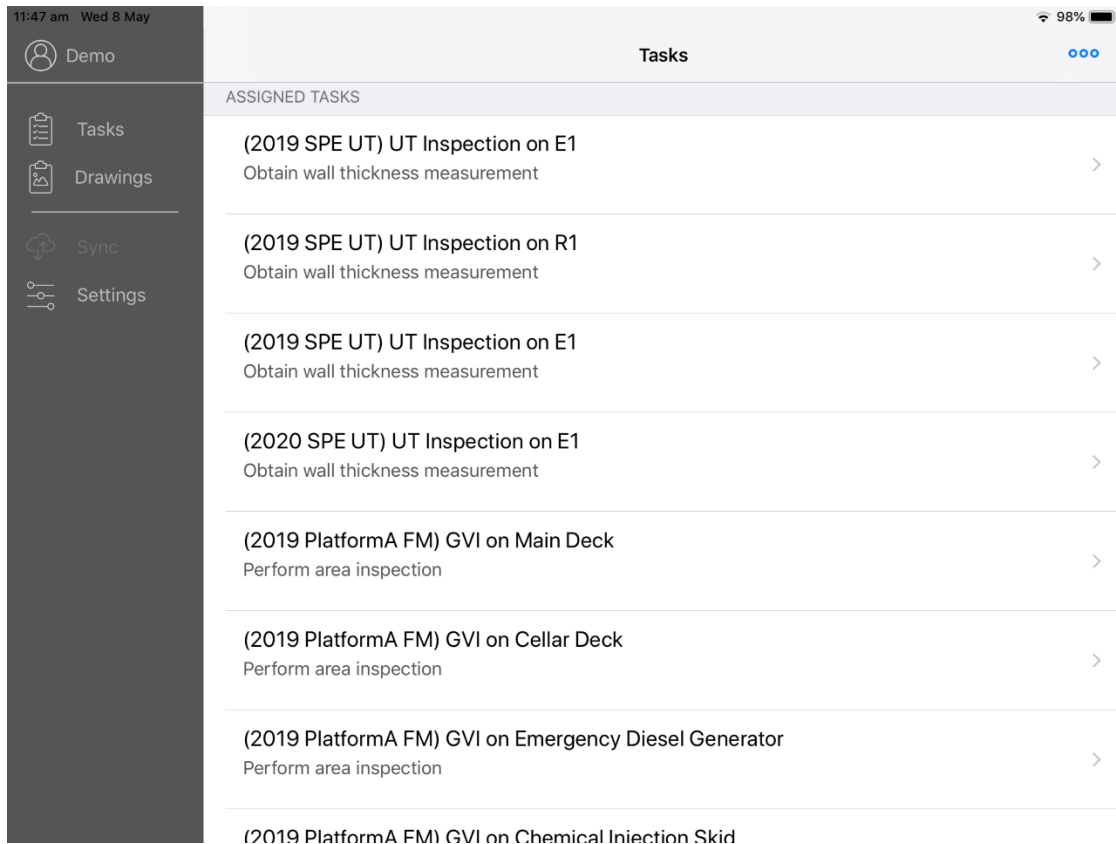
On this screen you'll see a complete list of tasks assigned to you.

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.

In both cases, when you tap a task you'll be taken to the `ic-inspector.event_details` screen to fill out more information.

When you complete an assigned task, it will be marked as completed. When you complete an ad hoc task, it will not — ad hoc tasks remain available to filled out again and again.

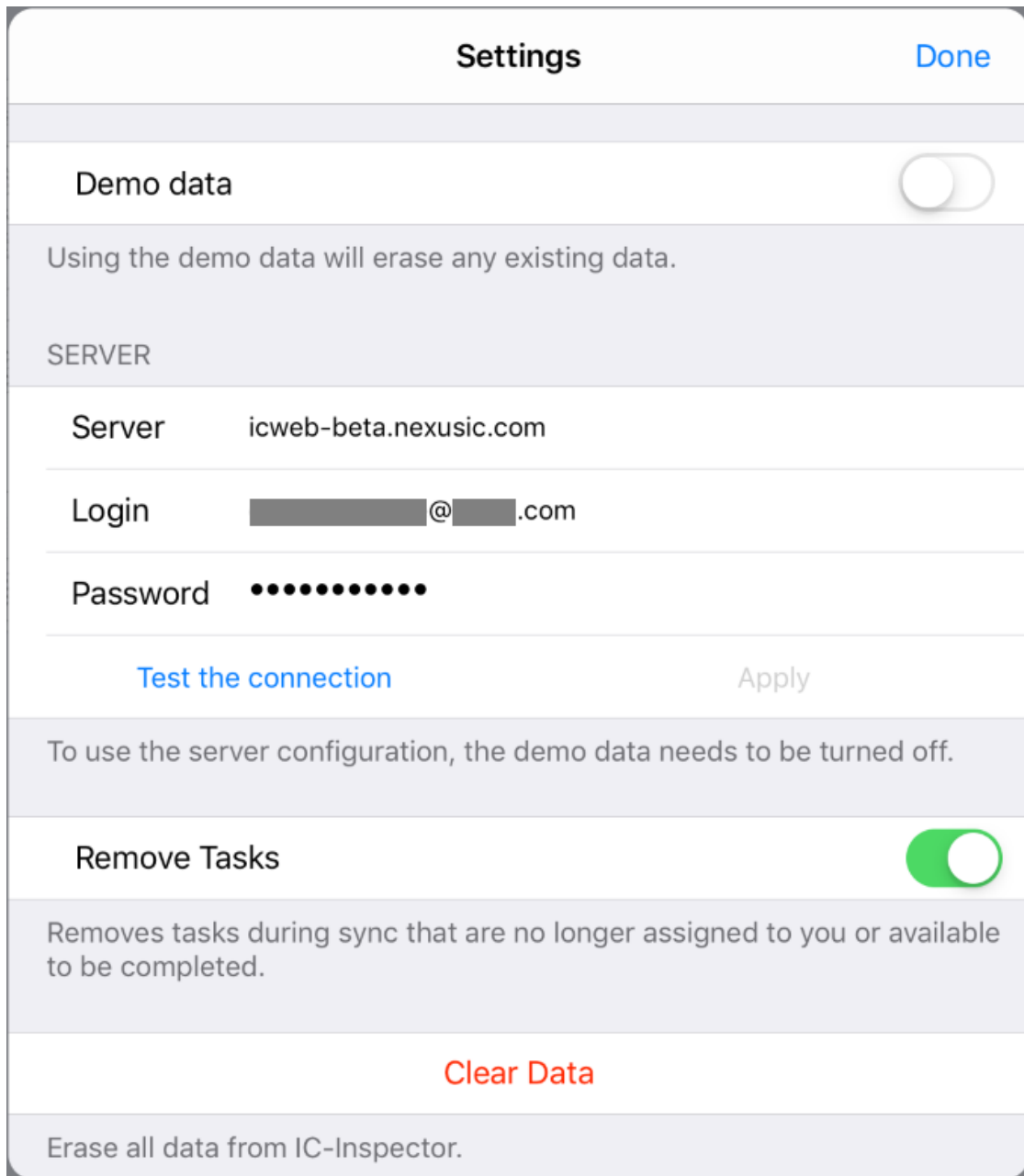


9.4 Settings

If you would like to try IC-Inspector with demo data, tap the **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 **Apply**.

The **Remove Tasks** 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.)



9.5 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.

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.

You can download the IC-inspector app free from the Apple 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*.

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*.

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](#).

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 [Geek-bench](#). 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.

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 record to AVI, MP4 (recommended) or WMV.

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.

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 System Hardware or Marshall Encoder. “System Hardware” can be any device that implements Microsoft’s DirectShow interface. This includes nearly every video capture card, sound card, or USB capture device.

10.2.1 System 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 Recording

The Recording page lets you set a variety of values related to recording.

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.

The remaining options on this dialog page are explained within the dialog.

The intent behind specifying a **Time Limit** on video files 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. Note that if you are controlling IC-Recorder from IC-Inspection, you should control file time limits from there, not here — untick the limits here in IC-Recorder.

10.4 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.

10.4.1 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.)

10.4.2 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 to the Profiles folder, 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.

10.4.3 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.

10.5 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.

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.

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.

10.6 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*. If you are controlling IC-Recorder from IC-Inspection 5, you should configure overlays here in IC-Recorder. (It is not necessary to run the separate Text Overlay Server application.)

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. (If you configure Spare1 thru Spare4 fields in IC-Inspection 5's Text Overlay window, they will be sent through to IC-Recorder.)

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 last 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 of 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.

10.7 Communication with IC-Inspection

IC-Recorder works best in conjunction with IC-Inspection 5 or *IC-Inspection 6* — a connection to IC-Inspection is necessary to get IC-Inspection’s survey data visible as an overlay on IC-Recorder, for IC-Inspection to be able to start and stop recording on your IC-Recorders, and for IC-Recorder to be able to send multimedia still images on request. Go to IC-Inspection 5’s Device Manager or IC-Inspection 6’s *Devices* and add a Generic DVR or an IC-Recorder.

10.7.1 IC-Inspection 5

IC-Inspection is responsible for choosing the file name for each video file. So if you set a Project Location of “C:\one”, and a Base Path of “two” and a Filename Format of “<yyyy-mm-dd> <hh-nn-ss-zz> - <camera> - <countfromone>”, then when you click Start Inspection, or when IC-Inspection decides that it’s time to roll over to a new file, it might create a file on the IC-Recorder PC called “C:\one\two\2018-01-02 12-34-56-00 - Centre - 1.wmv”. You can create your own Filename Format — you can put a date or time format of your choice inside <angle brackets>, and you can also include “<camera>” to include the camera name and <countfromone> to include a “uniquifier” which will start from the value shown in Count, and increment each time a new video file is started. (Note that while you can specify tenths, hundredths or thousandths of a second with z, zz or zzz, if IC-Inspection’s survey source only gives time down to whole seconds, the fraction part will always be 0, 00 or 000.)

To send a DVR folder, go to IC-Inspection’s *Tools* → *Options* → *Video*, and click the ‘...’ button next to Source Field and select the Asset Information field that contains your DVR folder. The final path that your video file gets recorded to will be made up of the Project Location you selected in IC-Recorder’s *Tools* → *Options* → *Recording*, plus the base path you selected in the IC-Inspection device, plus the Source Field, followed by the filename created using the template you specified in the IC-Inspection device, with a file extension of “.avi” or “.wmv” depending on your selection in *Tools* → *Options* → *Format*.

(Previously it was necessary to carefully synchronise time between IC-Inspection 5 and DVRs, to ensure that the DVR used the correct time in filenames. But since IC-Recorder receives the filename directly from IC-Inspection, this is no longer necessary.)

10.7.2 IC-Inspection 6

Again, IC-Inspection is responsible for choosing the file name for each video file. In IC-Recorder you can set a Project Location. In NEXUS IC, under *Configuration* → *Assets* → *Information*, click **Configure Asset Features** to select the field that will be used for DVR folder. This path is then appended to the project location.

See also *Devices*.

10.7.3 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.

IC-WEB DEPLOYMENT GUIDE

- *Requirements*
- *Installation*
- *Updating*
- *Configure IIS*
- *Configure IC-Web*
- *Authentication*
- *Common Errors and Troubleshooting*

11.1 Requirements

11.1.1 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

11.1.2 Client Side:

- A Modern web browser. The following have been tested to work:
 - Microsoft Internet Explorer 11
 - Microsoft Edge
 - Mozilla Firefox (60.0.2)
 - Google Chrome (68.0.3440.106)
 - Safari (11.1.2)

11.2 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.

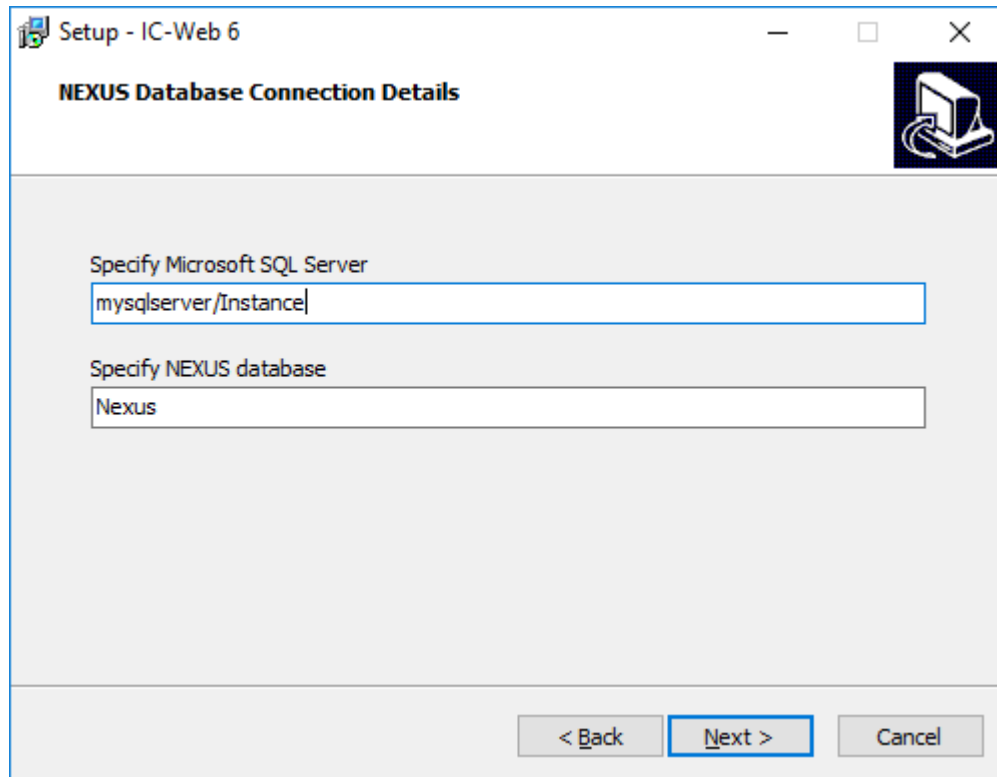
The screenshot shows a Windows-style dialog box titled "Setup - IC-Web 6". The main heading is "New Website Details". Below the heading are four text input fields:

- "New Website Name" containing "ICWeb"
- "New Website App Pool Name" containing "ICWeb"
- "Run Website as (domain\username)" containing "wood\web-service-account"
- "User's Password" containing masked characters (dots)

At the bottom of the dialog are three buttons: "< Back", "Next >" (which is highlighted with a blue border), and "Cancel".

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.



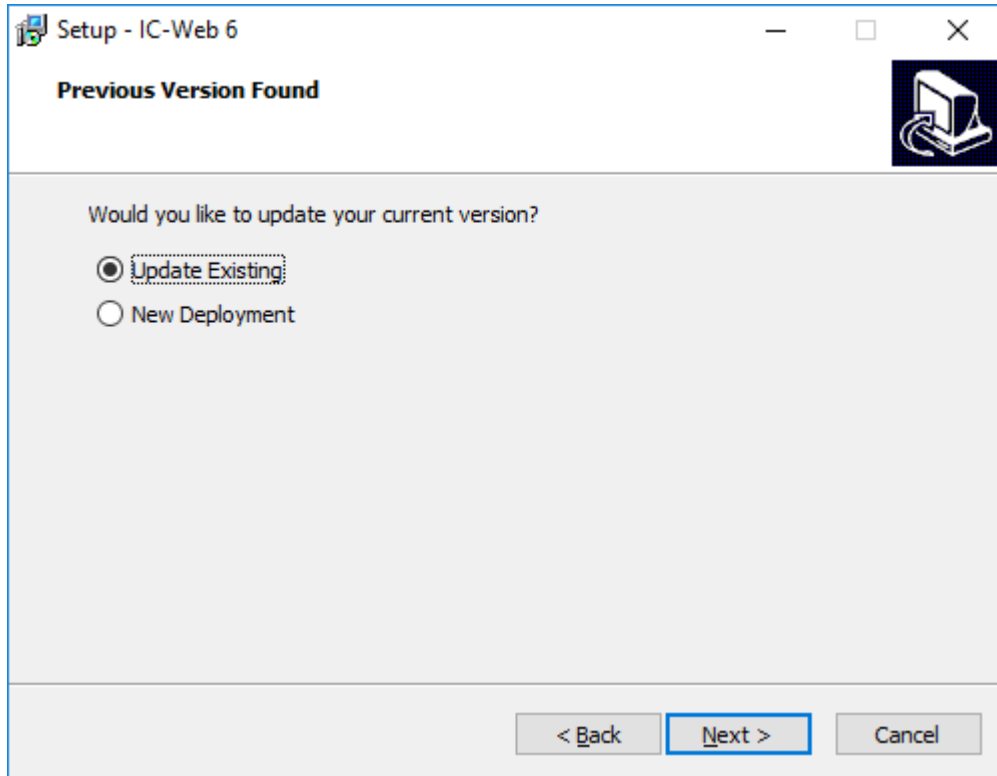
9. Click install and the file and configuration will be setup.
10. The last step contains a link to a drivers for ODBC for SQL server (<https://www.microsoft.com/en-gb/download/details.aspx?id=36434>). This must be downloaded and installed on the server before you run IC-Web.

11.3 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. Run ICWebSetup.exe
2. Accept the License Agreement.
3. Select *No* to install IIS (as you already have IIS installed).
4. Select *Update Existing* when asked if you want to update you existing version



5. Click Next
6. Click install

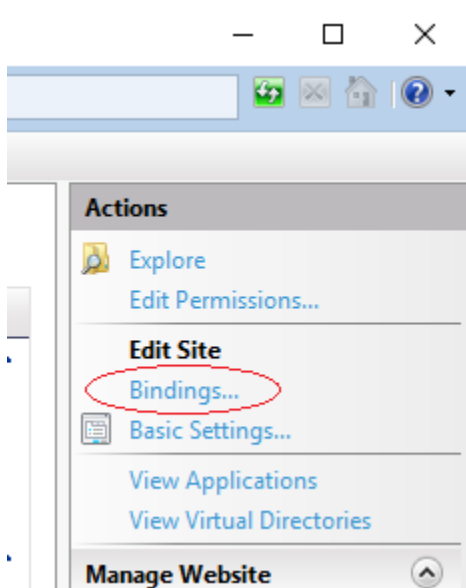
This will install the new version of IC-Web but will leave the web server settings and configurations settings as they are.

11.4 Configure IIS

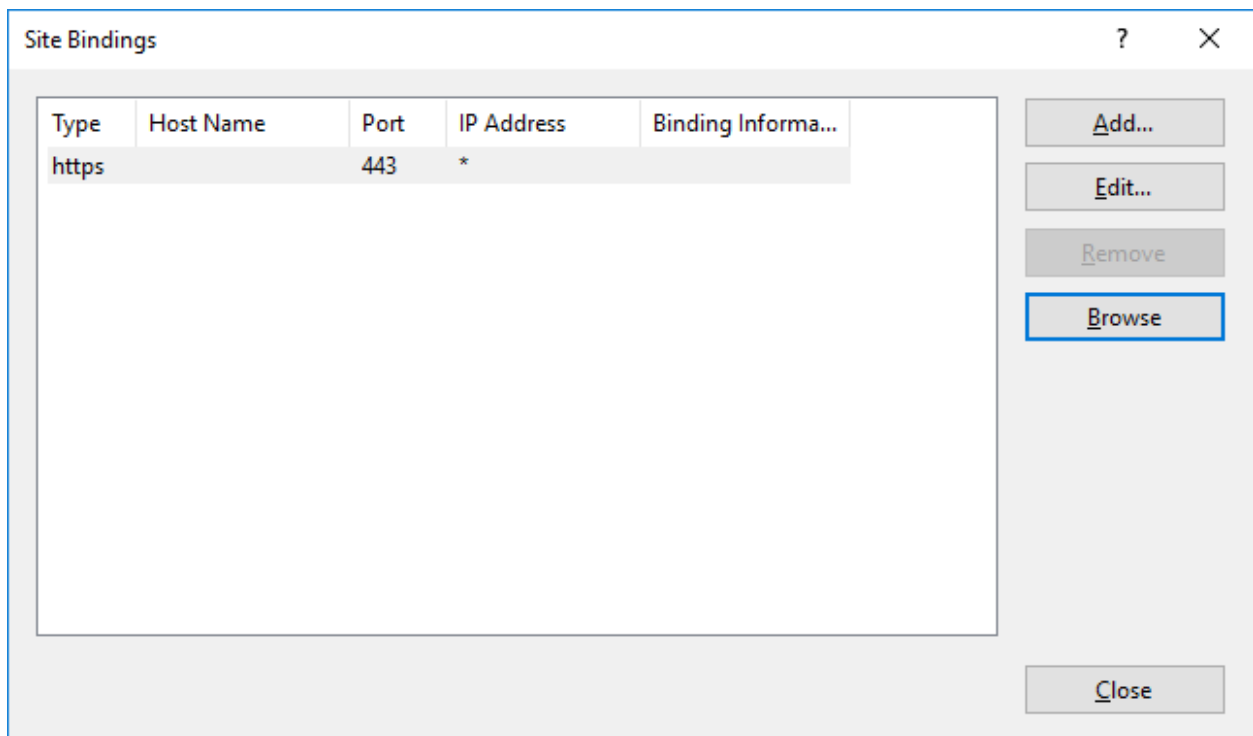
Once installed, IIS should be set up and IC-Web should be running on the HTTP protocol on port 80 of your web server. Running IIS on HTTP should only be done for initial testing. As soon as you are happy with the deployment you must modify the IC-Web website to use Secure HTTP (HTTPS) and stop the IC-Web 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.

11.4.1 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:

11.4.2 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 true.
- 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.

11.4.3 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.

11.5 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 is set to an account that exists in NEXUS IC - usually.
- `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.

11.6 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.

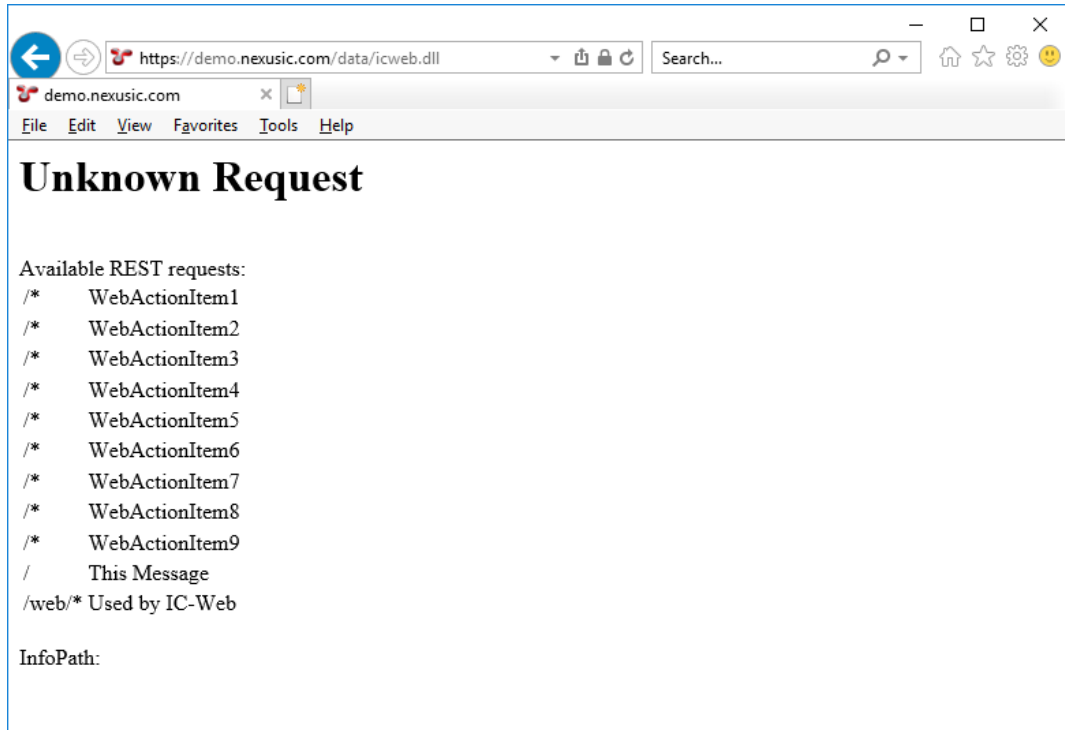


11.7 Common Errors and Troubleshooting

11.7.1 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.

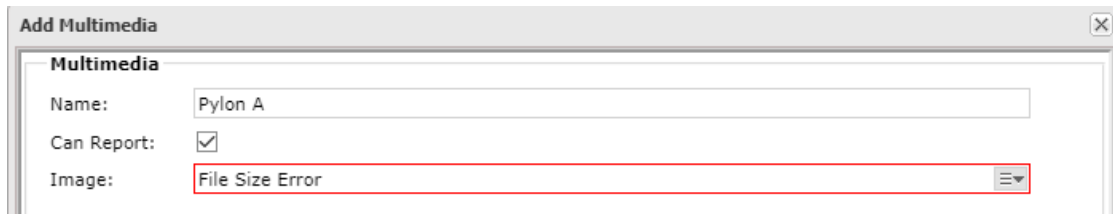


If you get a completely blank screen here please ensure you have install the ODBC for SQL server (<https://www.microsoft.com/en-gb/download/details.aspx?id=36434>).

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*.

11.7.2 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 thusly inserted into the NEXUS IC database in Bytes. So in the example above this is 1073741824 Bytes (which is 1GB).

11.7.3 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

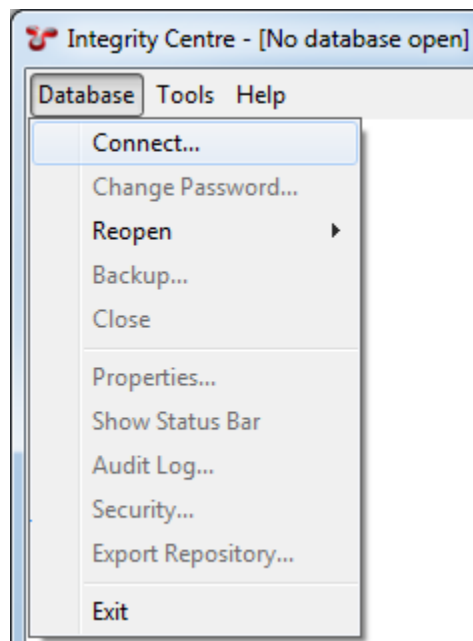
Check the Application Pool and the website account have rights to run the website and connect to the SQL server and NEXUS Database.

MAIN MENU

12.1 Database

12.1.1 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).

 Connect to a Database


Which server do you wish to connect to?

Please select (or type) the Microsoft SQL Server you would like to connect to:

Server:

Connect using:


- Current User
- Specific Windows / Domain User
- SQL Server Authentication

 Connect to a Database ✕

Which database do you want to open on the server ".\sql2012"?

Please select the database you would like to open:

- Create a new NEXUS database:
Database Name:
- Existing NEXUS Database:
Database: (8.098) ▾
- Restore a backup into a new (or existing) NEXUS database:
Backup File: ...
Database Name:

 Connect to a Database

Who would you like to login as?

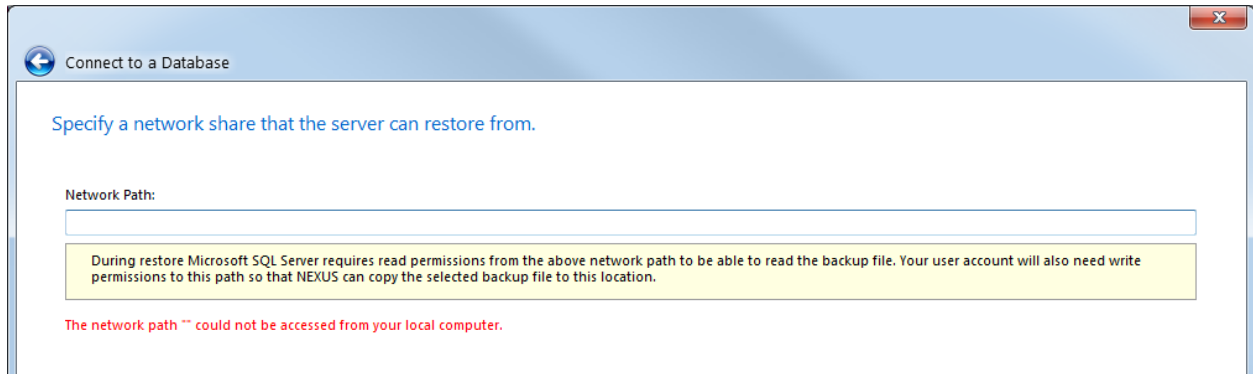
Please specify a username and password to login to this database with:

Username:

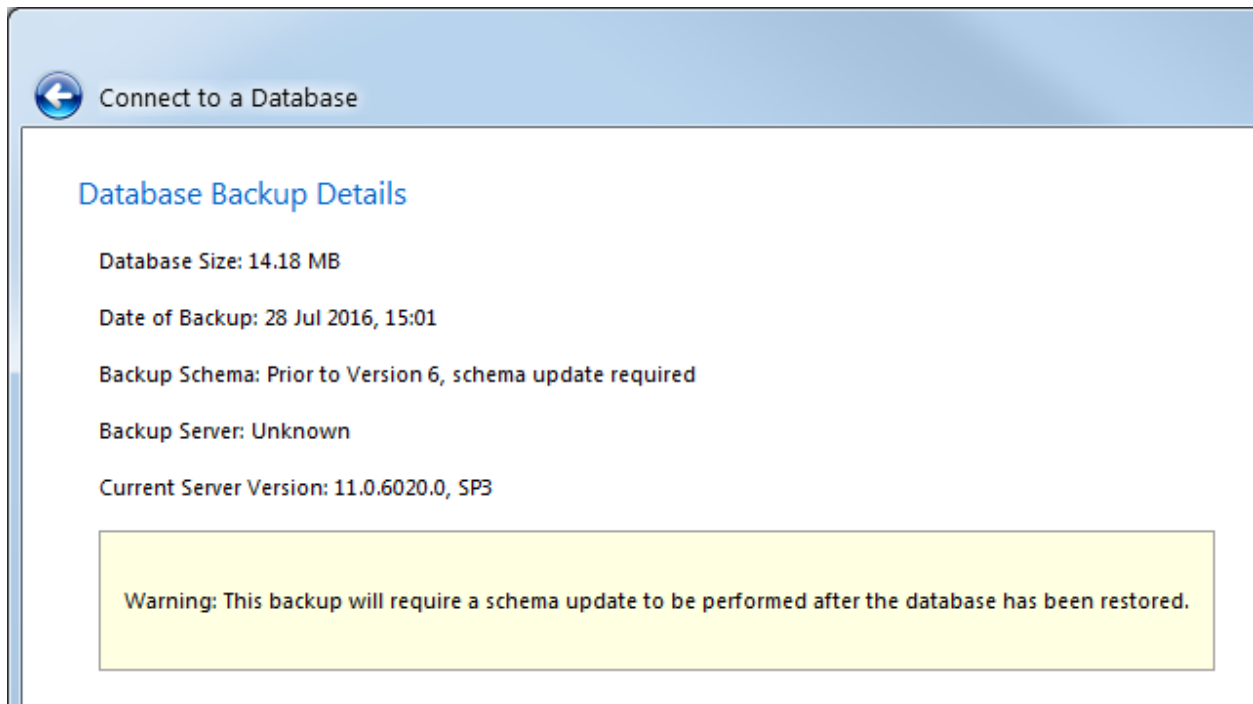
Password:

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.



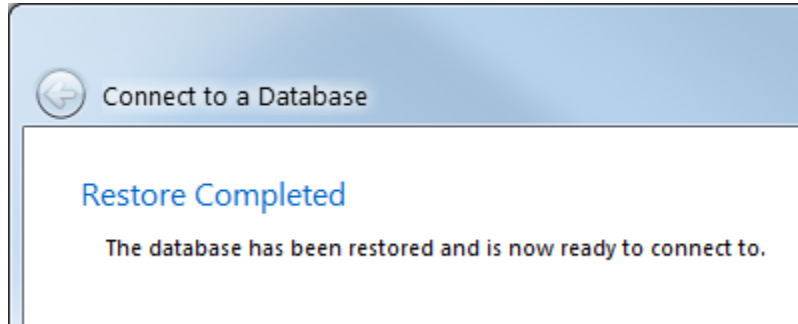
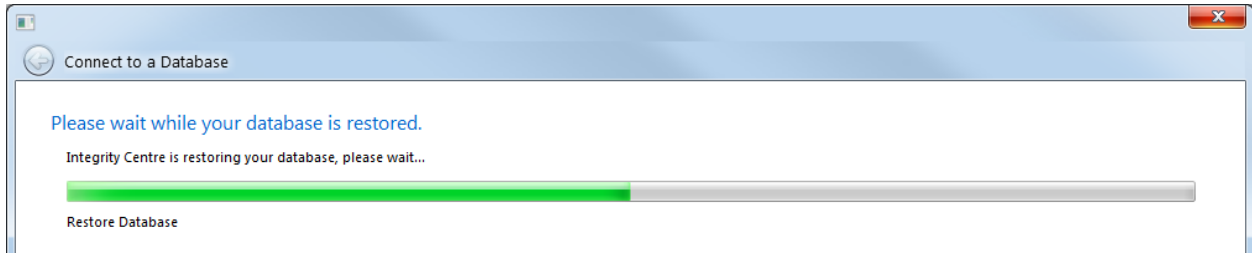
If you have chosen to restore a database from backup, you will be shown details of the backup file. Click Next to begin the restore.



Now watch this progress bar.

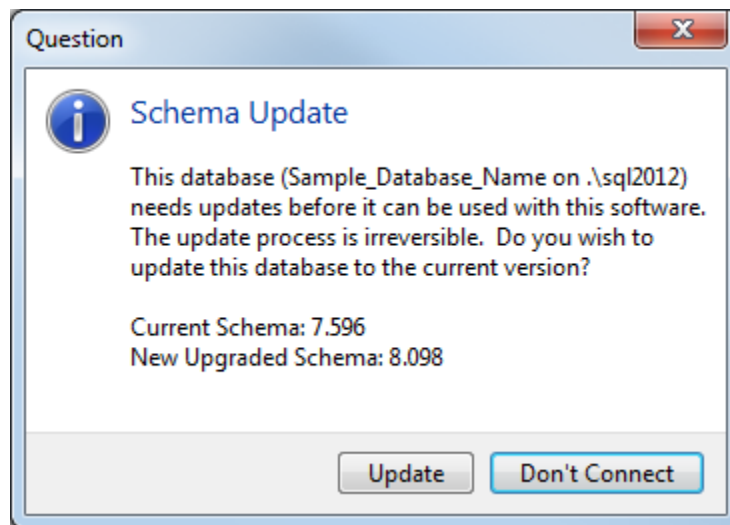
Once NEXUS IC tells you the restore has been completed, click **Connect**.

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.



- Database → Connect
- Database → Reopen
- Database → Backup
- Database → Subscriber
- Database → Close
- Database → Your Profile
- Database → Change Password

- *Database* → *Properties*
- *Database* → *Audit Log*
- *Database* → *Security*
- *Database* → *Properties*
- *Database* → *Export Repository*
- *Database* → *Show Status Bar*
- *Database* → *Exit*

12.1.2 Connect

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*.

12.1.3 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).

12.1.4 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.

12.1.5 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

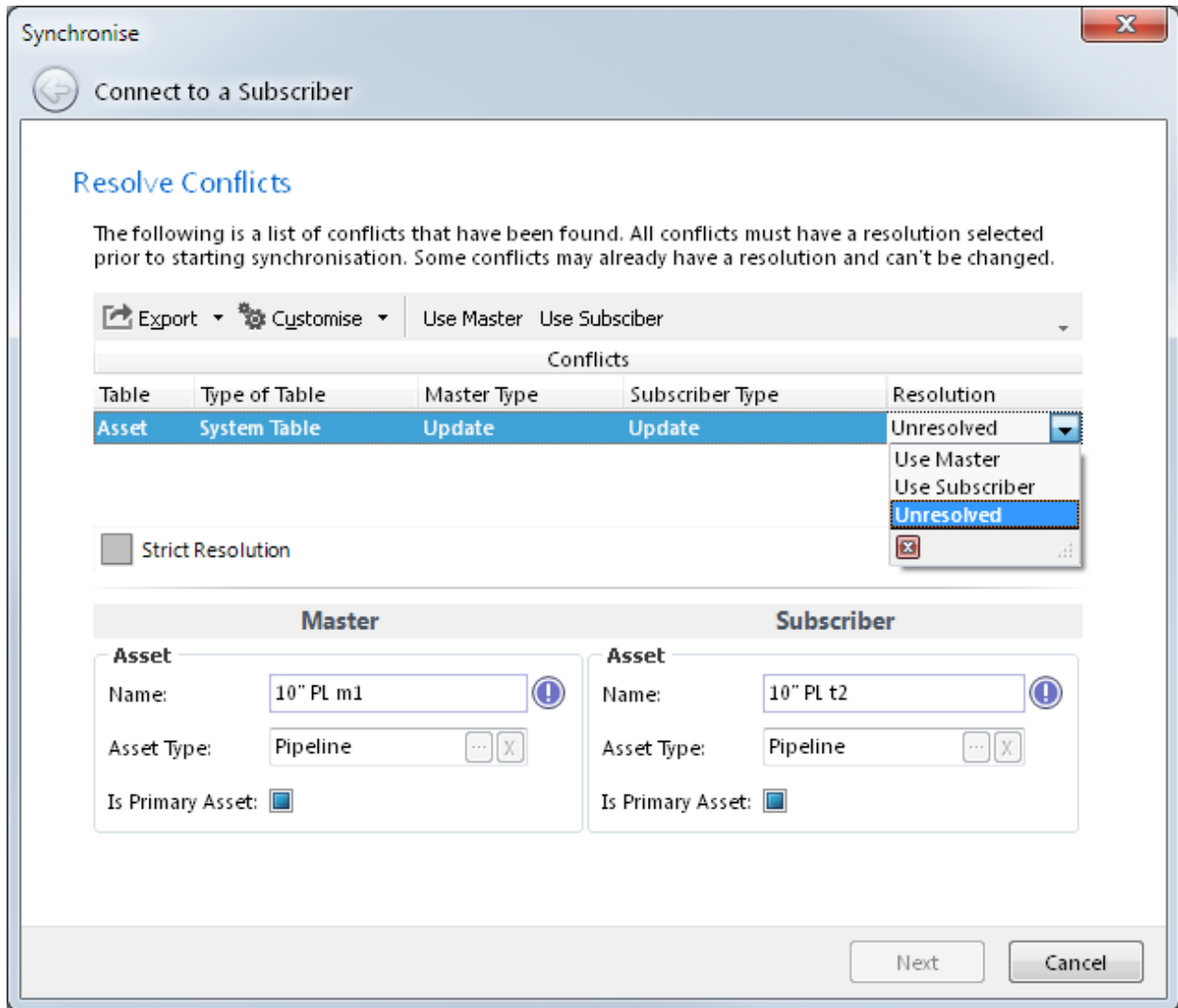
A Subscriber database can either be created as a backup file, or via a direct connection to the offsite MS SQL Server. In most cases, Subscriber databases are created by the Backup File (Manual) method, the backup file is then restored to the offsite MS SQL Server.

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 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.



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.

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 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.

Possible operations are Insert, Update and Delete.

12.1.11 Security


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.

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.

- **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 Integrity Centre window, shows the database server you are connected to, the name of the database you are connected to, the number of currently connected users, and an estimate of how fast the connection to this database server is. In addition the Memory Overhead, Memory used, Software Version and Database Schema number is also displayed. We recommend that when Memory Used gets up to 2GB, you close the application and restart.

You can toggle the status bar on/off using this menu option.

12.1.14 Exit

Self-explanatory, really.

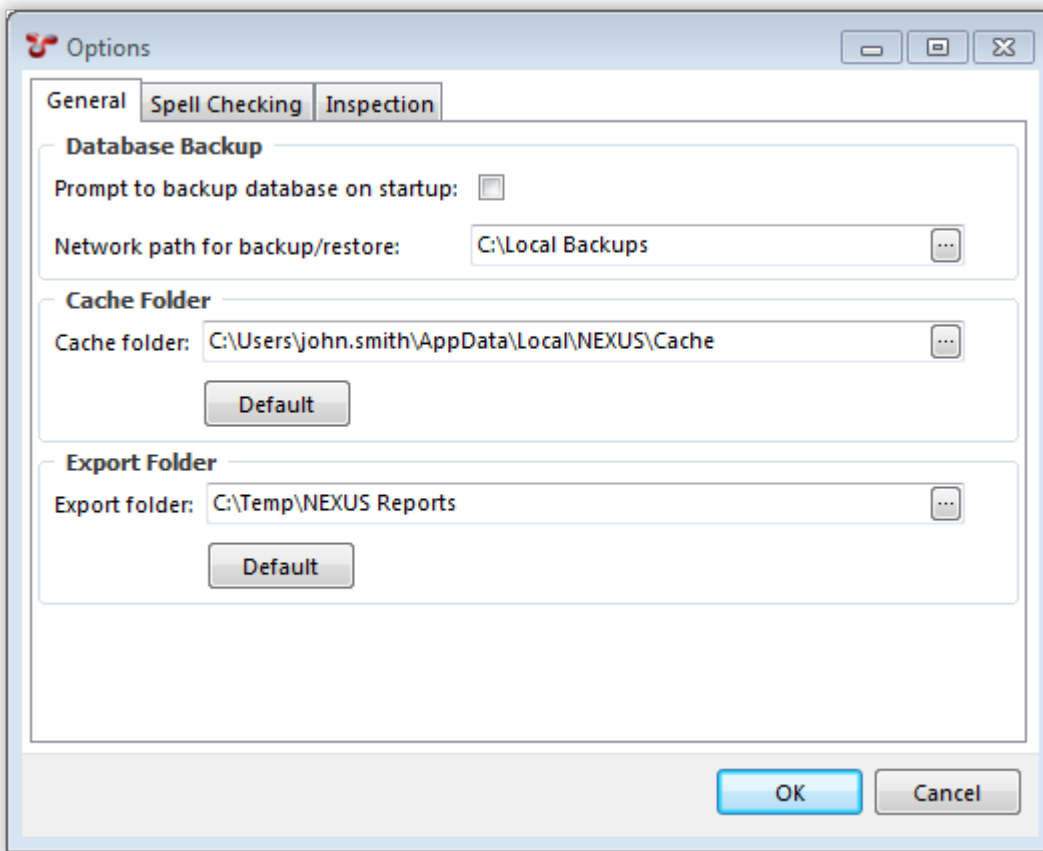
12.2 Tools

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.

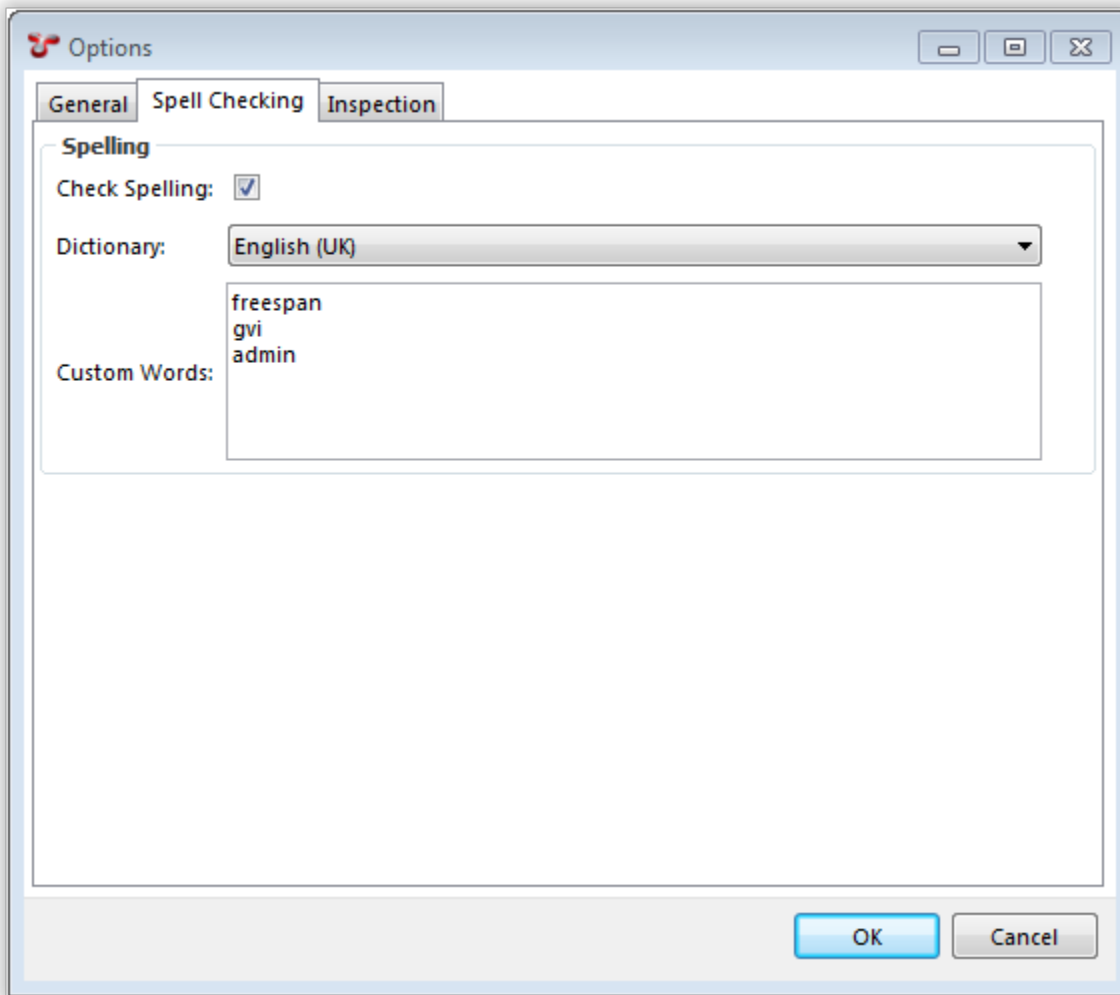
Example valid path:

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.

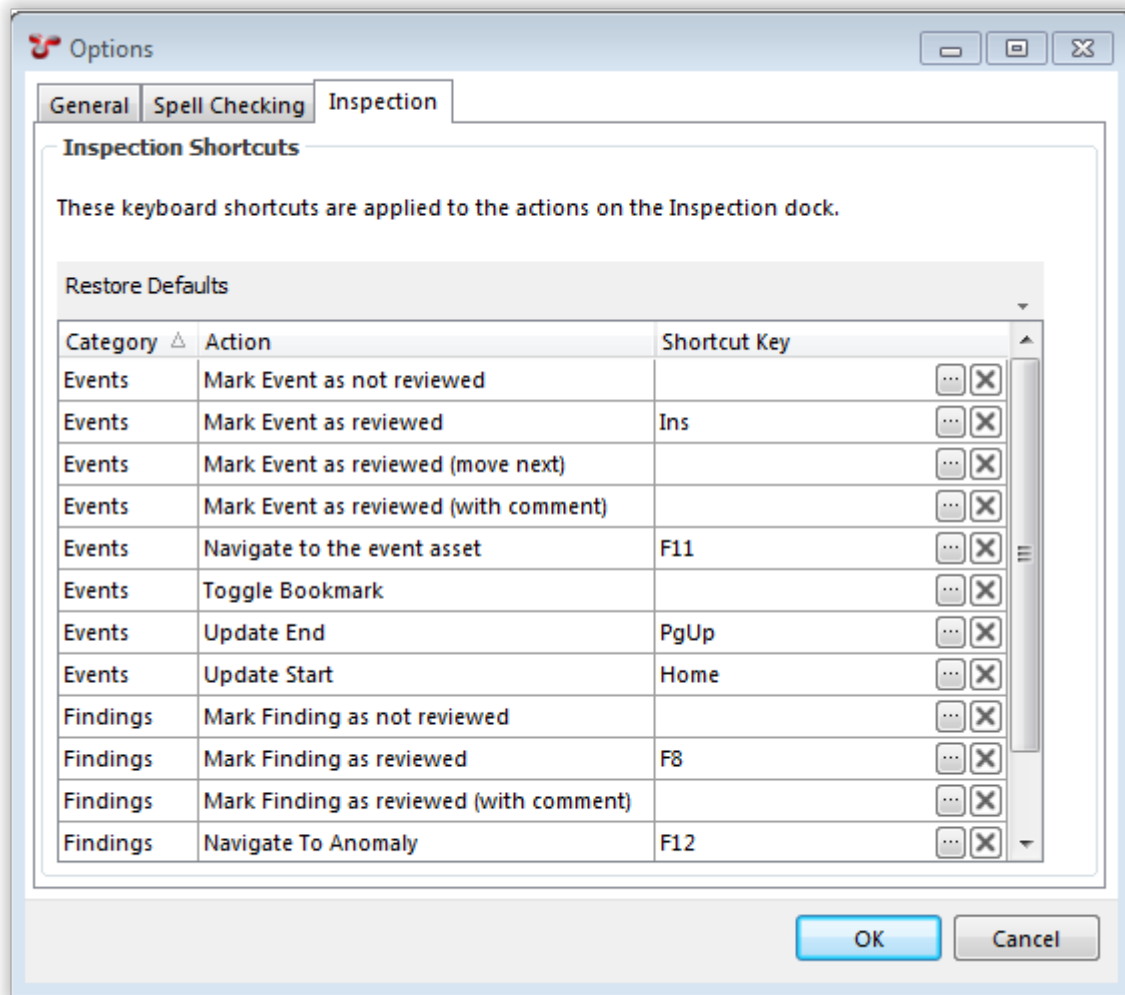
Spell Checking

- 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, the user can elect to encode the video files to the native streamable H.264 file format during the copy process.

12.2.3 Parse Video...

Clicking on the **Parse Video...** menu item, initiates a process whereby all files in the Global Video Path (and the Temporary Inspection Video Path if one exists) are read and the properties stored in the database. The datetime

properties of the video files are the links to the events in the **INSPECTION** screen.

The parsed videos will appear in the Tools | *Video...* dialog (see above).

See also *How does video playback work?*

12.3 Configuration

12.3.1 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.

12.3.2 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.

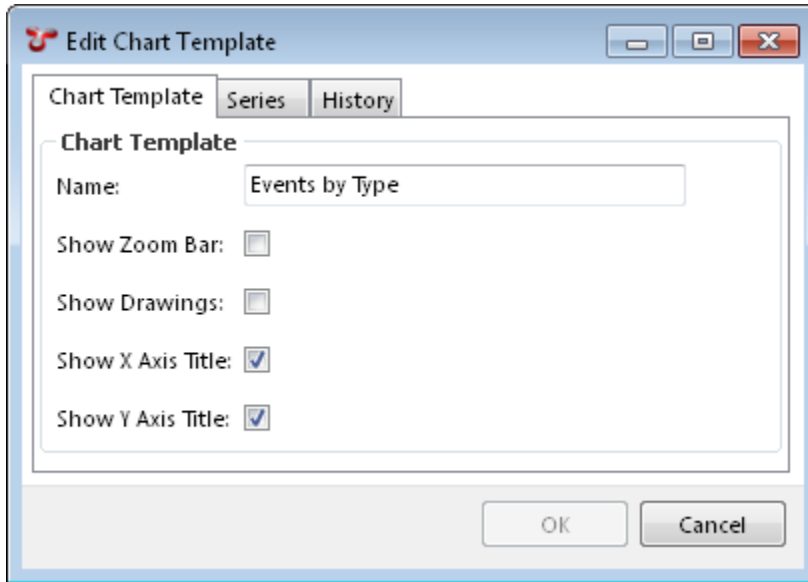
Mouse wheel zoom may not work in the Event shape editor. This is a focus issue related to Windows. Use the magnify+ and magnify- buttons instead.

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.



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.

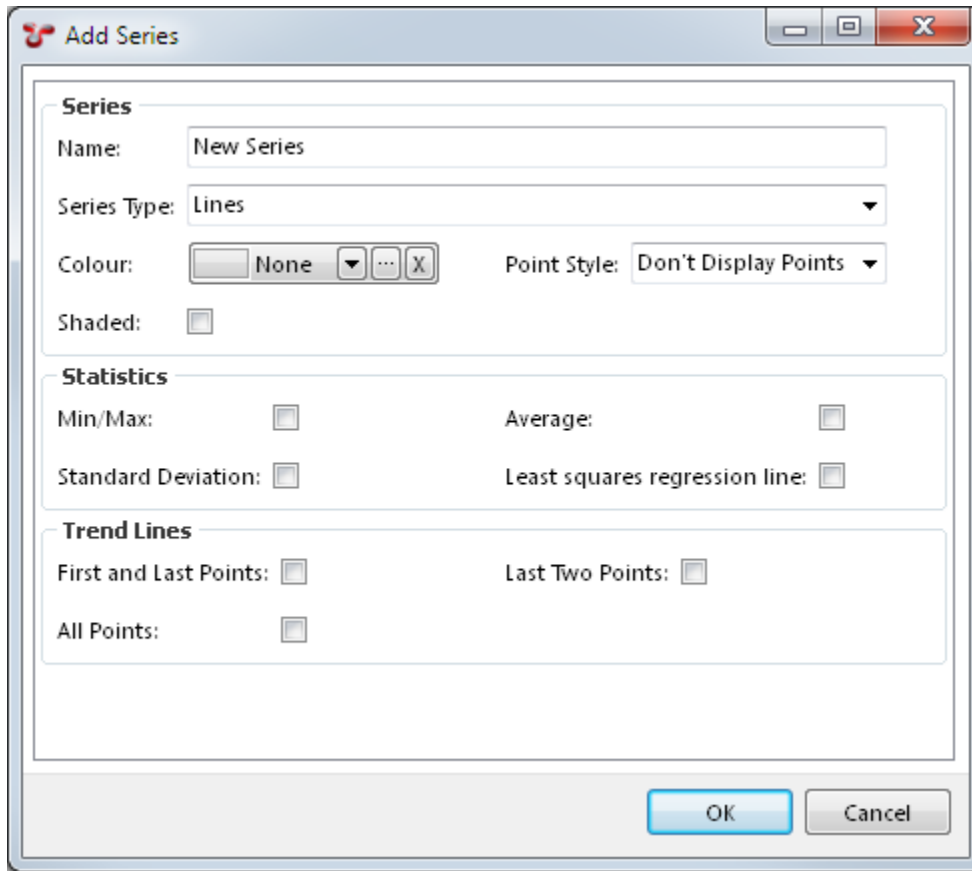
Show X Axis Title and **Show Y Axis Title** control whether the chart will contain text showing a title for each axis.

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.



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 not uncommon), 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,
- Contour,
- Gantt,
- 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 under you line series 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.

Point, Line and Bezier series have just X and Y axes.

Vertical Line have just an X axis. Horizontal Line 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 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 pie slice. (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 pie slice. (If your pie 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.

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 (see below) 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.

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.

12.3.3 Company

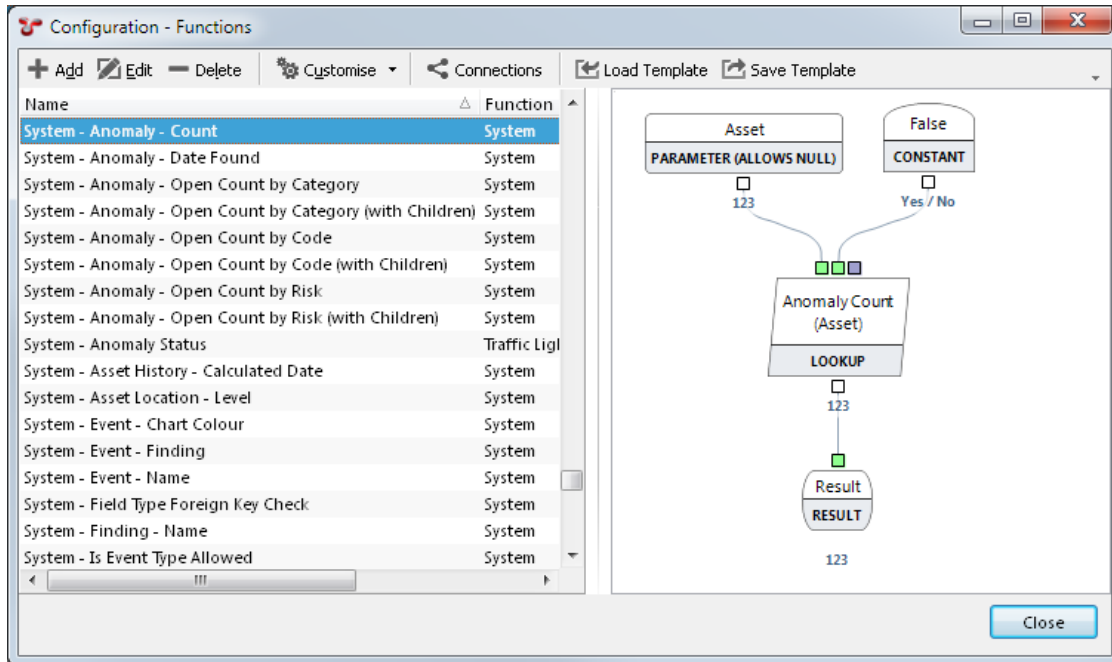
Company entries can be used to group Personnel (to show what company a given person works for) and Schedules (to show what company will be carrying out a particular scope of work). You should set up Company entries if these groupings are useful to you.

12.3.4 Functions

Configuration → *General* → *Functions* allows you to create, edit and delete functions.

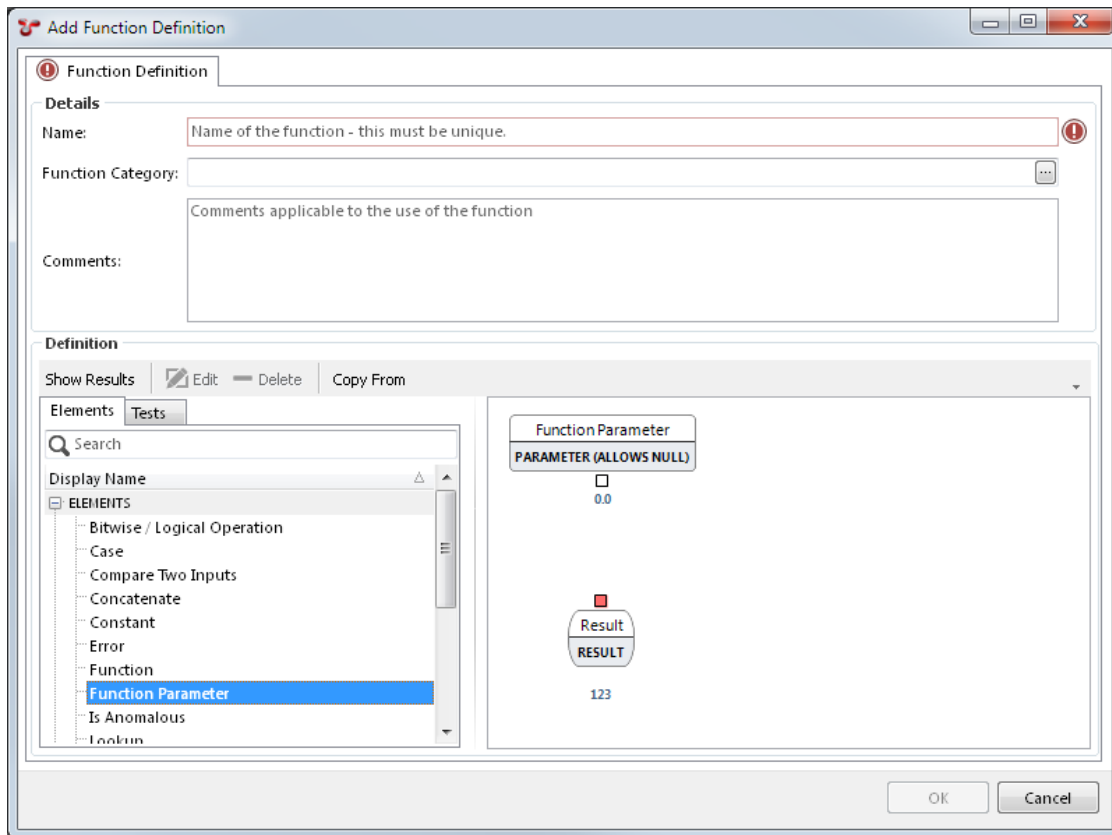
The Functions window enables you to build and edit customised functions which can be used in other areas of NEXUS IC, such as *Asset Information* fields, *Event* fields and *Report Sources*. You can drag and drop elements into the Function Editor, then connect the elements together to define the way 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**.

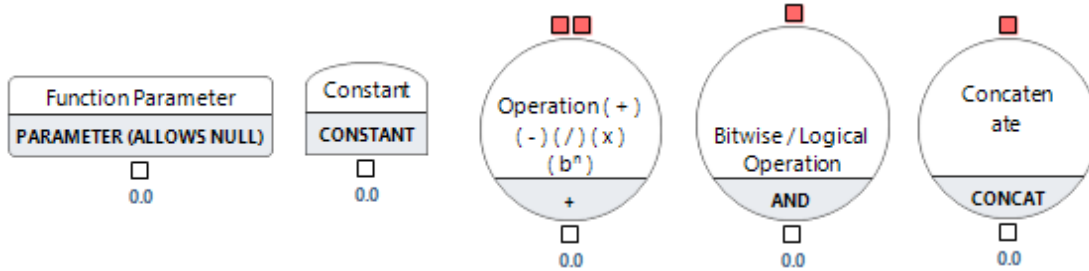
To delete existing functions, select them in the *Configuration* → *Functions* dialog and click the **Delete** button at the top of the dialog.

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.)

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 functions 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.

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.”

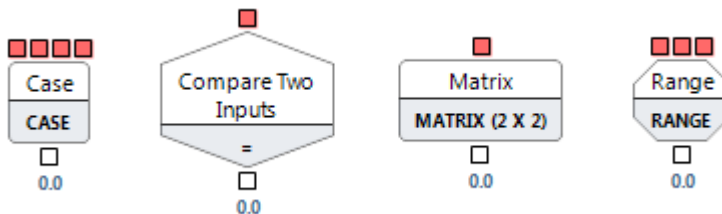
You can put a number between the “%” and the letter to specify the width. If the number turns out to be less characters than the width you’ve specified, it will be padded with spaces. You can put a “.” after that width (or just directly after the “%”) followed by a precision, to specify the number of 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.

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 (<=).

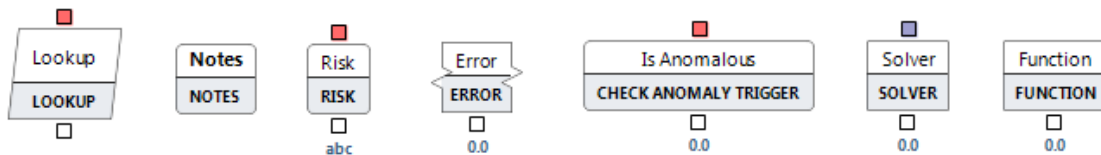
Matrix

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

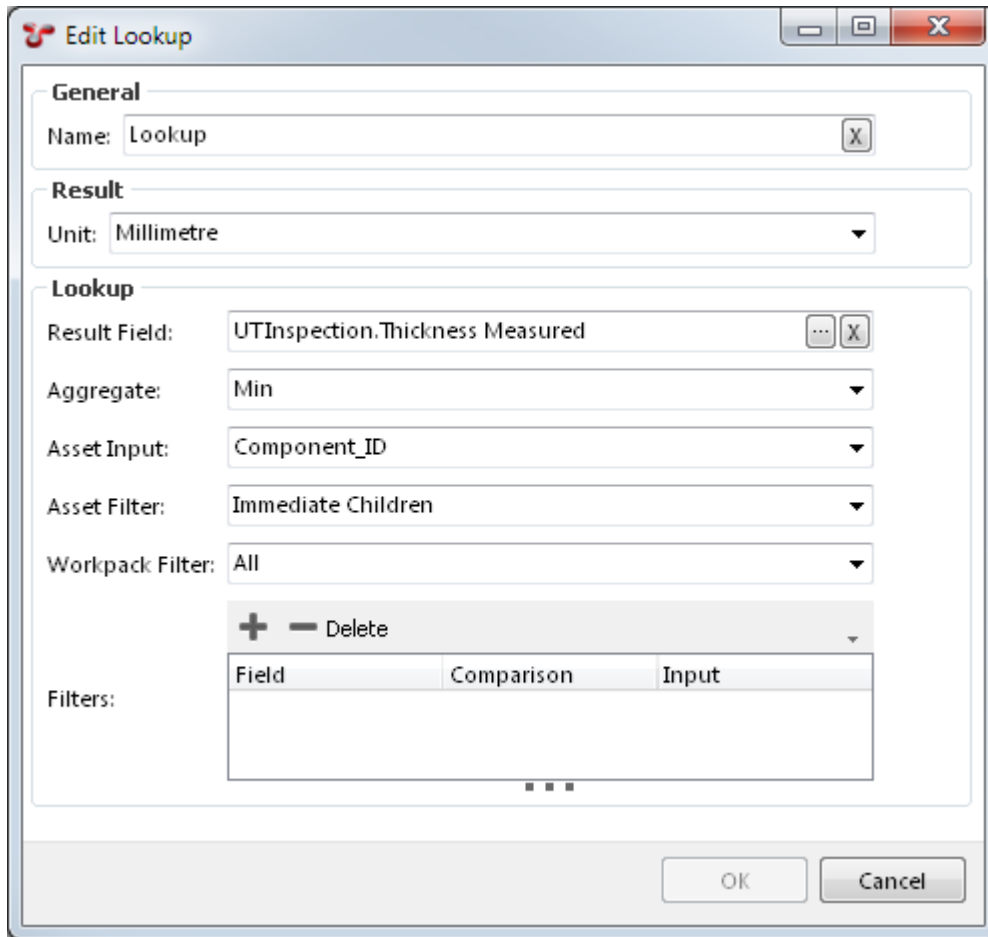
The Range element is similar to the Case element, except that you specify a range of input values for each case, rather than a single specific value. Range evaluates a numeric input against a series of numeric ranges and returns the found value. For each range, you specify the Lower (\geq) and Upper (\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 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. (If you are using an option other than “No Children”, 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.

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 are cached, so the first lookup in a particular circumstance may be slower than subsequent lookups. For small frequently-used tables (a few hundred rows), all the rows in the table will typically quickly get cached, and will 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 etc.

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.

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, excluding trailing blanks.	LEN('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'
REPLACE	Replaces all occurrences of the second given string expression in the first string expression with a third expression.	REPLACE('Alphabet','ph','f') = 'Alfabet'
RTRIM	Returns a character string after truncating all trailing blanks.	RTRIM('Alphabet ') = 'Alphabet'
SUBSTR	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 numeric expression; also called arccosine.	$ACOS(.3) = 1.26610367$
ASin	Returns the angle, in radians, whose sine is the given numeric expression; also called arcsine.	$ASIN(.3) = .304692654$
ATan	Returns the angle in radians whose tangent is the given numeric expression; also called arctangent.	$ATAN(.3) = .291456794$
Ceil	Returns the smallest integer greater than, or equal to, the given numeric expression.	$CEIL(15.7) = 16$
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	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.	$FLOOR(15.7) = 15$
Ln	Returns the natural logarithm of the given numeric expression.	$LN(95) = 4.55387689$
Log	Returns the base- 10 logarithm of the given numeric expression.	$LOG(10,100) = 2$
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.	$TAN(135 * 3.14159265359/180) = -1$
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 to truncate (make zero) m digits left of the decimal point.	$TRUNCTo(15.79,1) = 15.7$ $TRUNCTo(15.79,-1) = 10$

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.

Other Functions

Function	Description	Example of use
Day	Returns the Day part of a date.	DAY(38462) = 22
GetDate	Returns the current system date.	GETDATE() = <Today's current date>
GetDate-Time	Returns the current system date and time.	GETDATE() = <Today's current date and time>
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
LastInspection-Date	Returns the last inspection date for a component.	N/A
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
Month	Returns the Month part of a date.	MONTH(38462) = 4
NextInspection-Date	Returns the next inspection date for a component.	N/A
PassThru	Returns parameter value without any modification.	PASSTHRU('Alphabet') = 'Alphabet' PASSTHRU(123) = 123
ToDate	Converts the input value to date data type.	TODATE(38462) = 2005-04-22 TODATE('22 April 2005') = 2005-04-22
ToNumeric	Converts the input to a numeric data type.	TONUMERIC('123') = 123 TONUMERIC(TODATE('22 April 2005')) = 38462
Year	Returns the Year part of a date.	YEAR(38462) = 2005

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.

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.

Load / Save Template

Clicking **Save Template** will save the selected function as a file. This function can then be loaded into this or another database via **Load Template**.

12.3.5 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.

12.3.6 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.

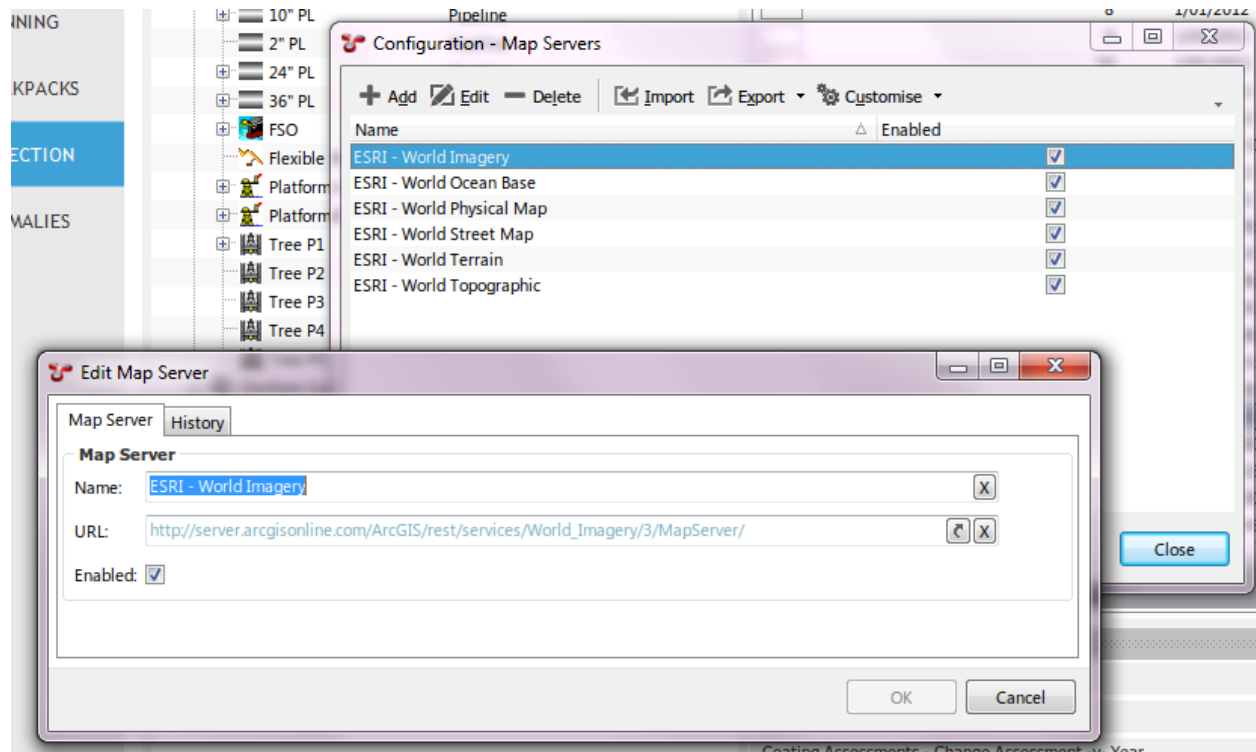
Value is what’s passed to functions that use this lookup list field as an input. If the lookup list item has some sensible numeric value, this is often given in the Value field. For example, if the lookup list is “Anode depletion”, and the first item has a Comment of “0 - 25%”, the Value might be “25”. 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.

12.3.7 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.



12.3.8 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.

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.)

12.3.9 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.

12.3.10 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.

12.3.11 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.)

12.3.12 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.

12.3.13 Shortcuts

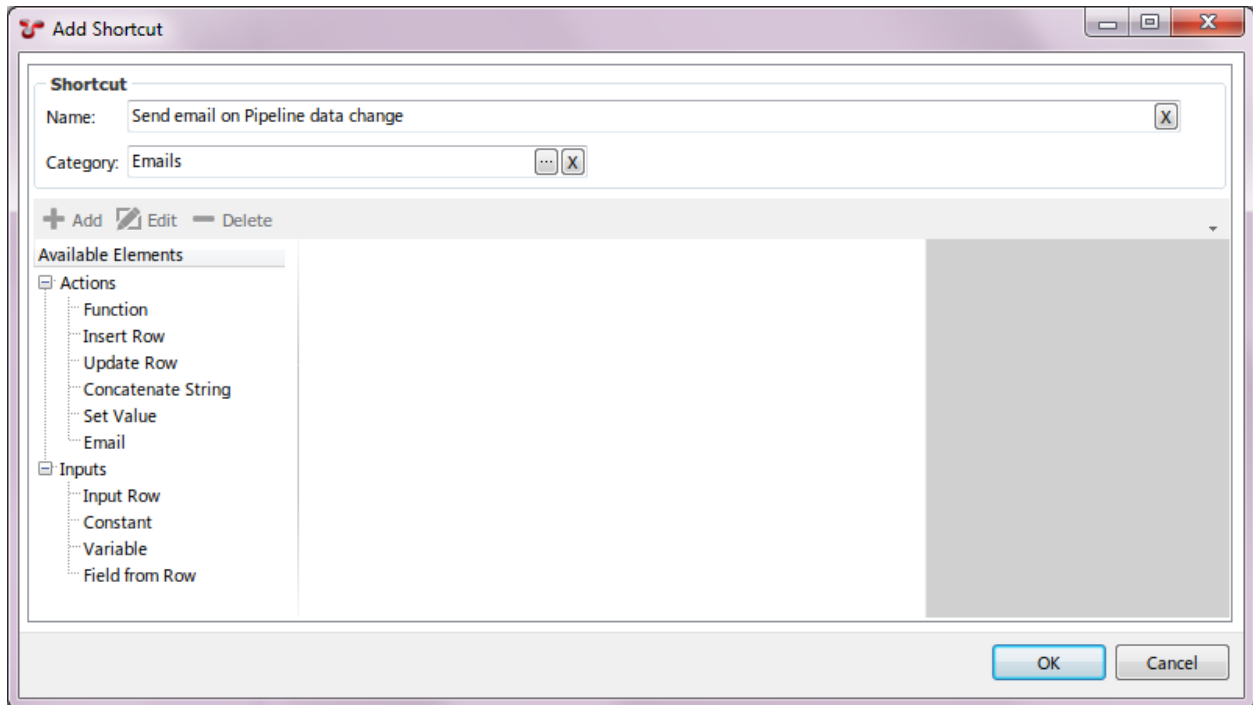
Shortcuts - Worked Examples

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.



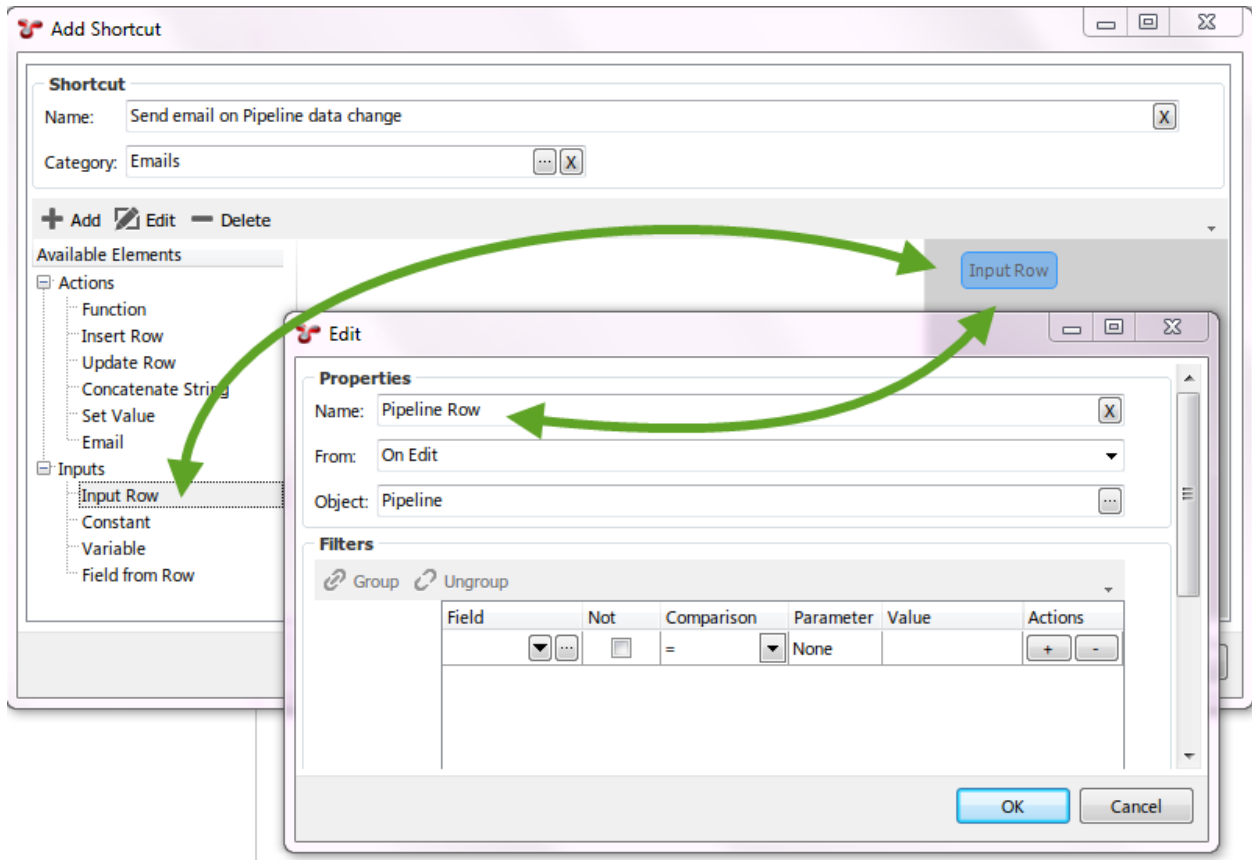
Input requirements for the Shortcut are **Name** (mandatory field) and **Category** (non mandatory field).

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.

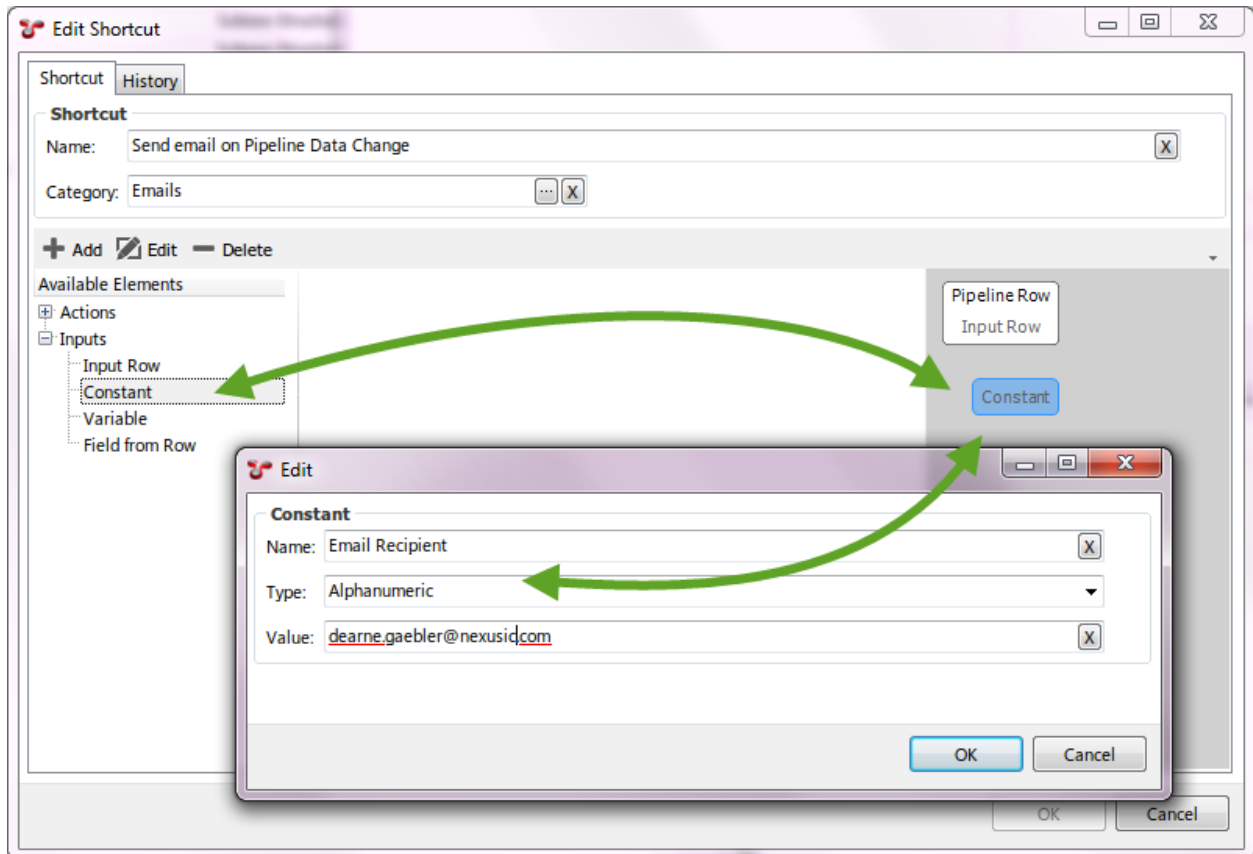
To set up the trigger for the email, we need an **Input Row** element. Click on **Input Row** under the **Inputs** group and drag it into the Shortcut workspace.

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**).

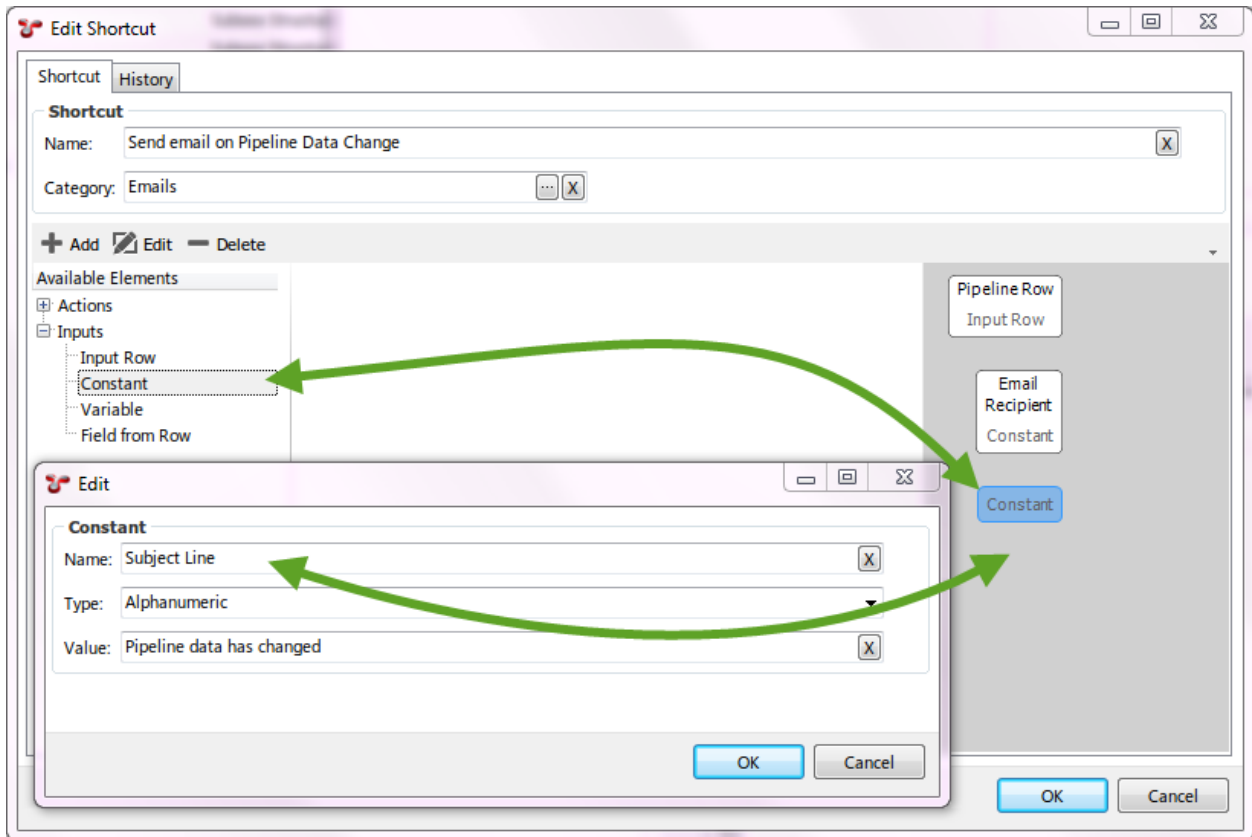


Step 3 - Set up the Email Attributes

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**.

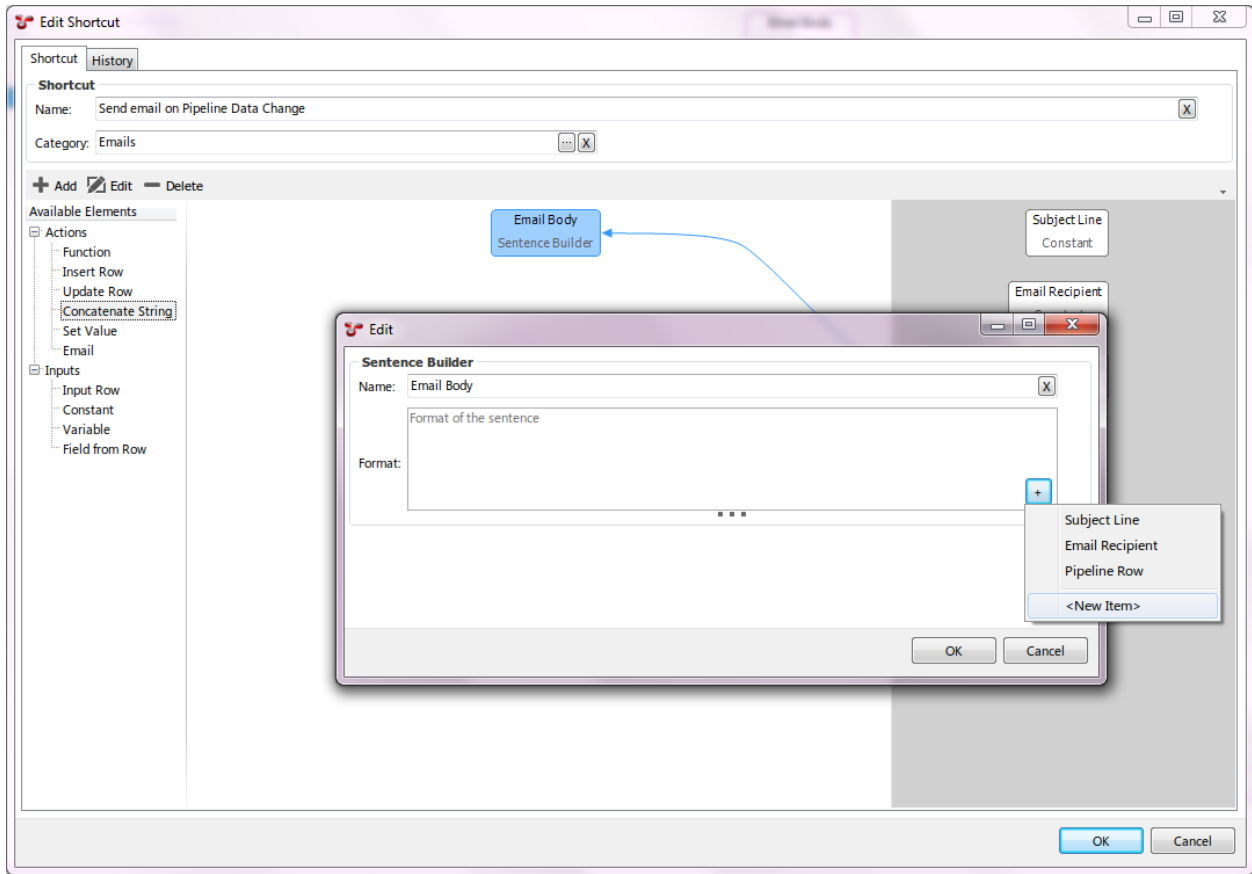


Click on the **Constant** element under the **Inputs** group and drag into the Shortcuts workspace. Edit the Constant and enter the **Name** (“Email Subject” so that it is identifiable later) and **Value** (your email address) and click OK.

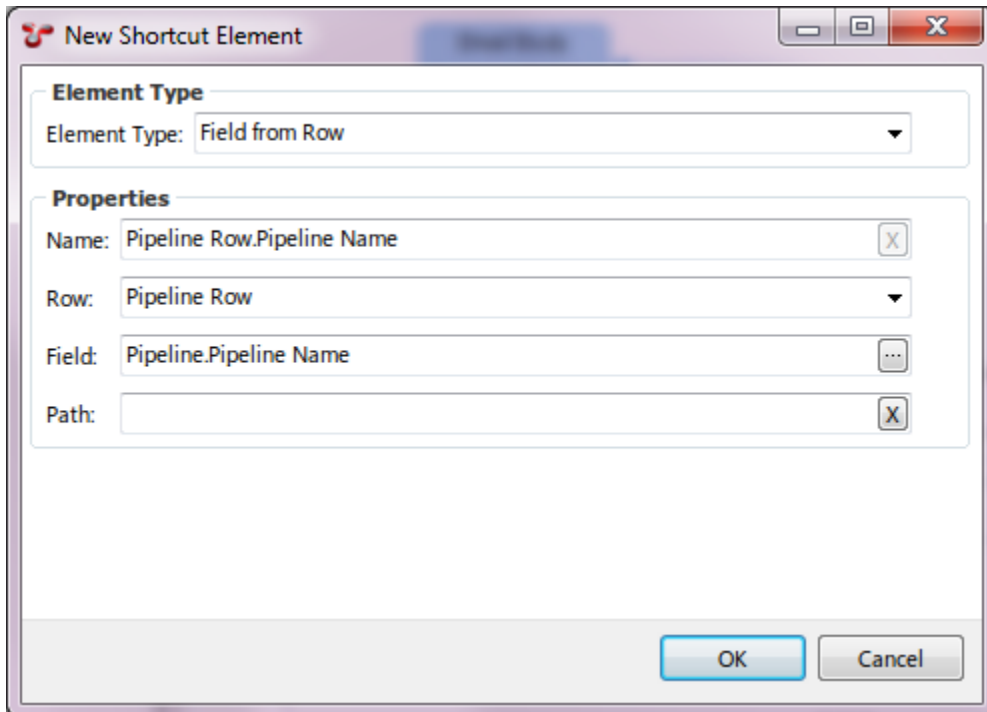


Click on the **Concatenate String** element under the **Actions** group and drag into the Shortcuts workspace. Edit the Sentence builder element and enter the **Name** (“Email Body” so that it is identifiable later).

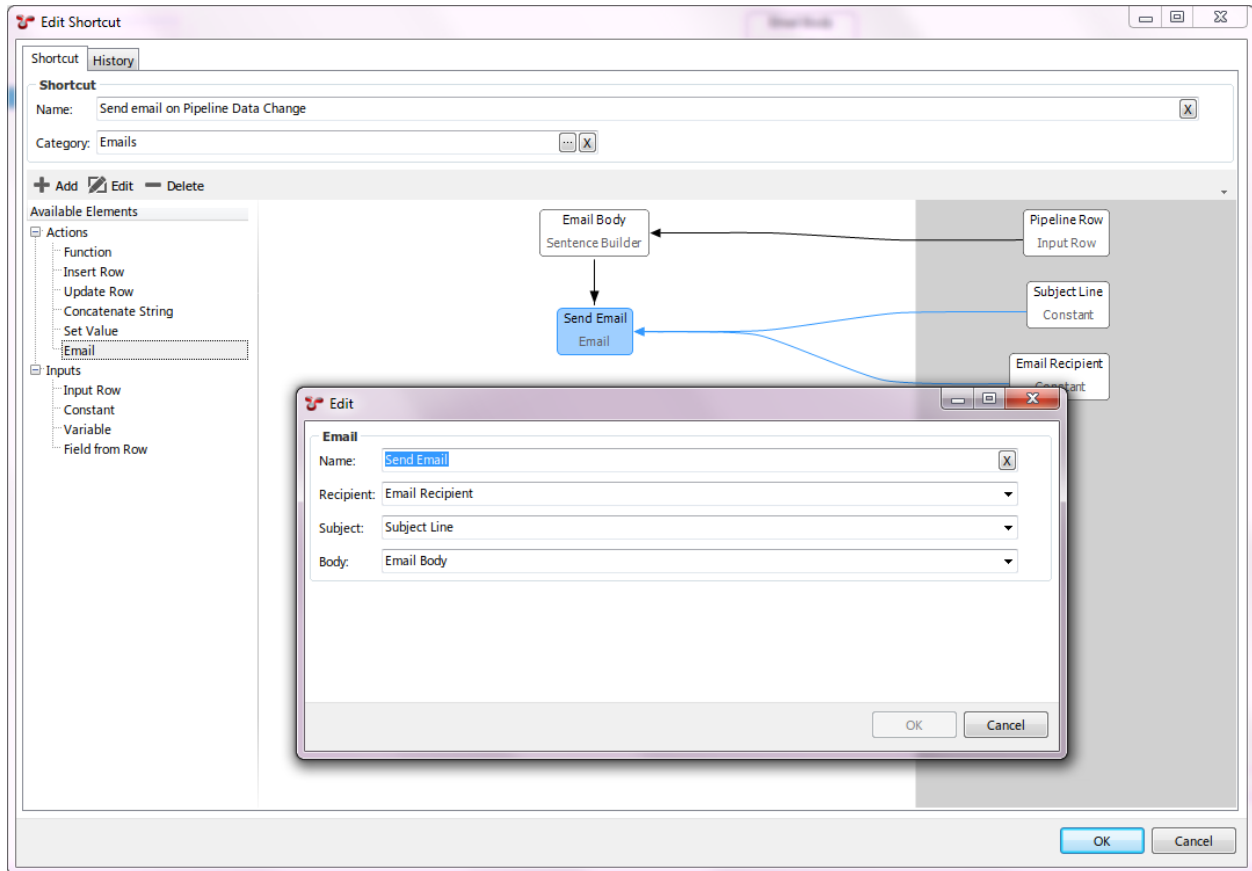
We are going to add text into the email body which is made up of information from the Pipeline AIG, click on the + button in the bottom right hand corner of the control and choose **New Item**.



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.

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 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.

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.

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.

Within an input, the “From” option of “Retrieve Focused Item” is inherently multi-select: your shortcut actually gets run once for each selected item.

12.3.14 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.)

Field Layout

On the Field Layout page, 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 also 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. 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.

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.

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.

Visible Report controls whether this field will be shown when the table is exported in a report template.

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.)

Note that 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 blue 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.

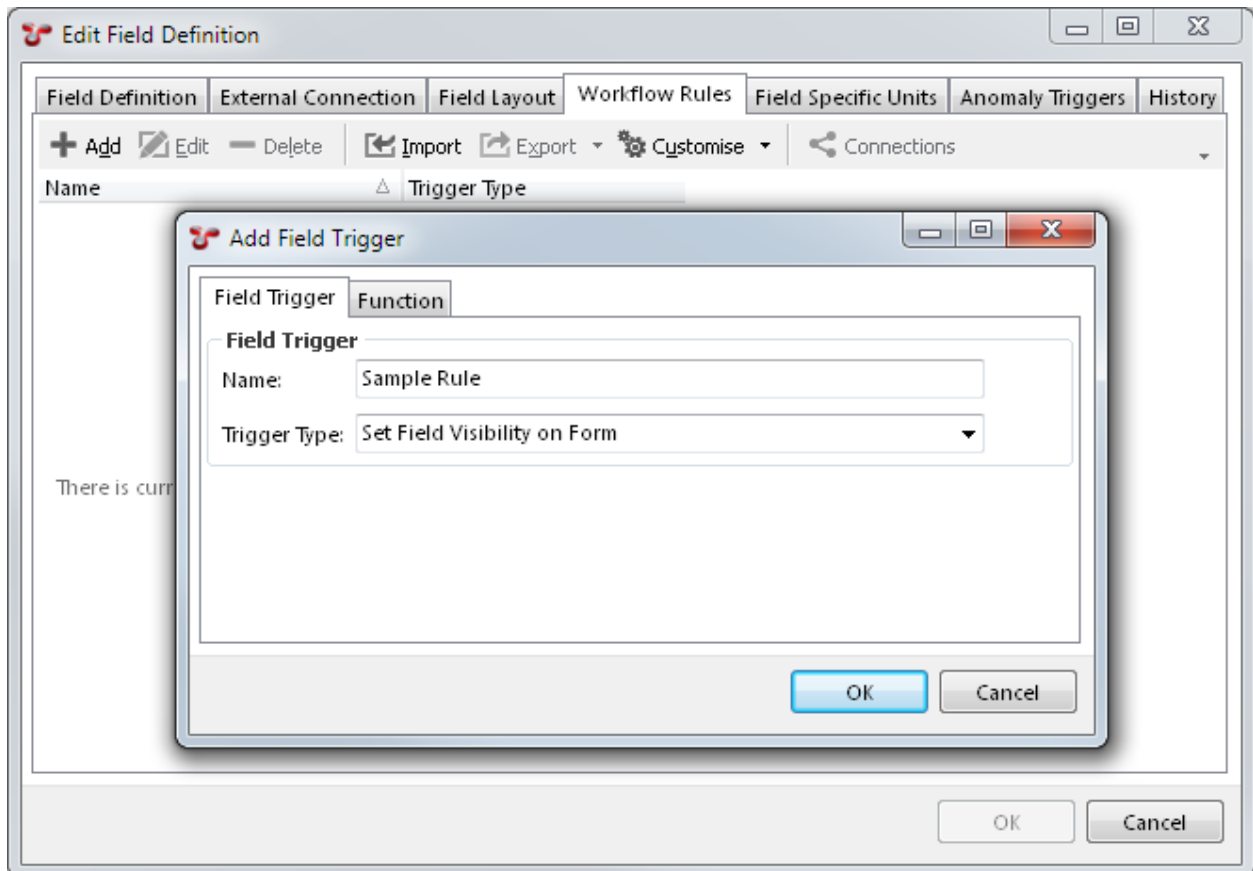
Workflow Rules

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 5) 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 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.) 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.

12.3.15 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 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.

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 Events 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.

12.3.16 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.

12.3.17 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.

(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.)

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.)

Field Layout

On the Field Layout page, 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 also 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. 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.

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.

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.

Visible Report controls whether this field will be shown when the table is exported in a report template.

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.)

Note that 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 blue 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.

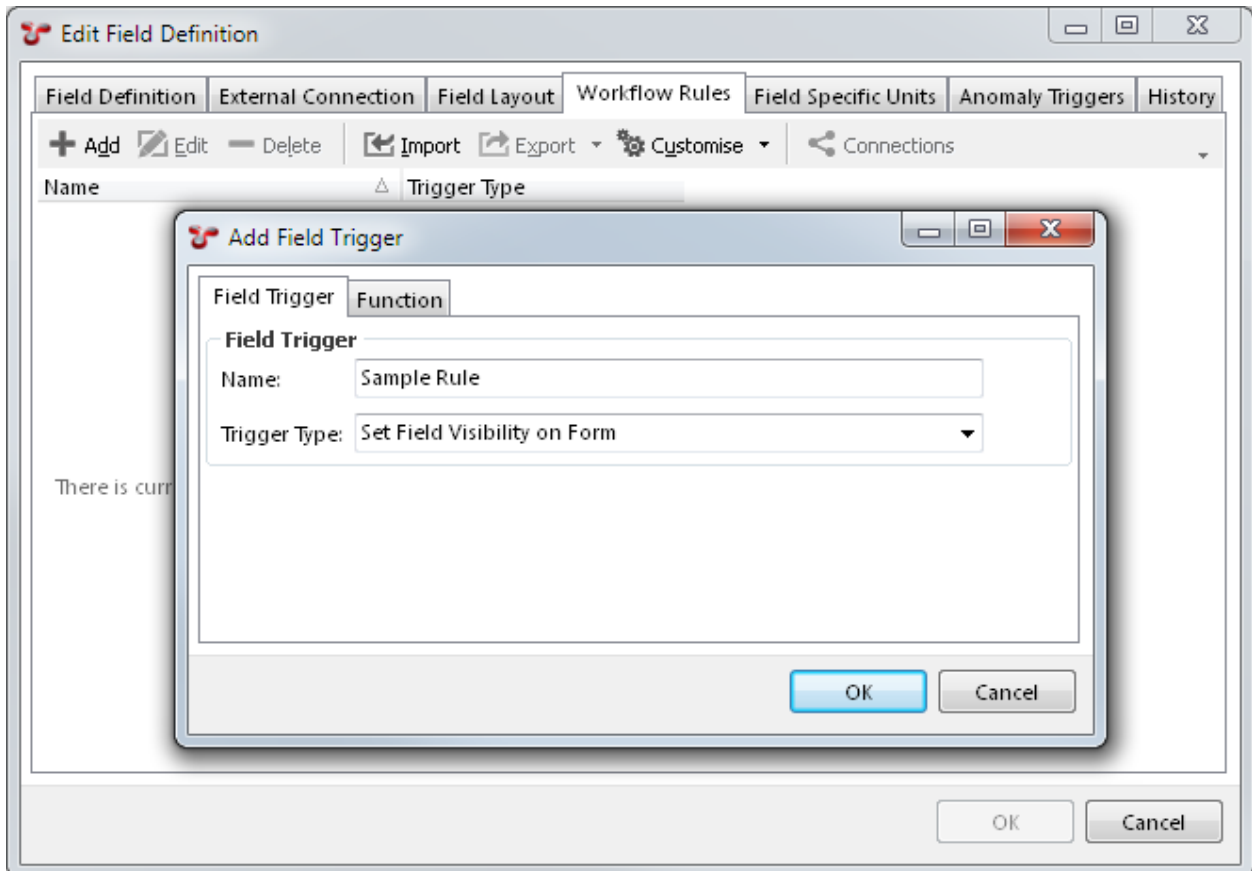
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Sometimes you want a field's properties to be controlled by other data. If you want, for example, a field to be visible only when some other field is filled in (or vice versa), edit the field and go to the Workflow Rules tab. Click **Add**, and under 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:

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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.



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 5) 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 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.) 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.

12.3.18 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.

12.3.19 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.)

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**.)

12.3.20 Configuration → Planning

The various *Configuration* → *Planning* menu items allow you to create, edit and delete Cost Codes, Task Categories, Schedule Types, 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.

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".

Types

Schedules can be given a Type.

Workpack Groups

Workpacks can be grouped.

Workpack Revisions

And given a Revision. By default, the grid on the *Workpacks* screen is grouped by Revision.

12.3.21 Event Types

Configuration → *Events* → *Event Types* allows you to create and configure *event* forms. Users can then use these forms to record event data.

An event's Icon 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.)

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: Event, Sub Event, Survey Data, or Continuous Event.

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, for example, would be an event.

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.

A Survey Data form captures information like location (Easting, Northing, etc.), KP, CP (CP Reading, Field Gradient, etc.) and so on.

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.

Configure Location/Pipeline 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.

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.)

Field Layout

On the Field Layout page, 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 also 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. 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.

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.

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.

Visible Report controls whether this field will be shown when the table is exported in a report template.

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.)

Note that 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 blue 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.

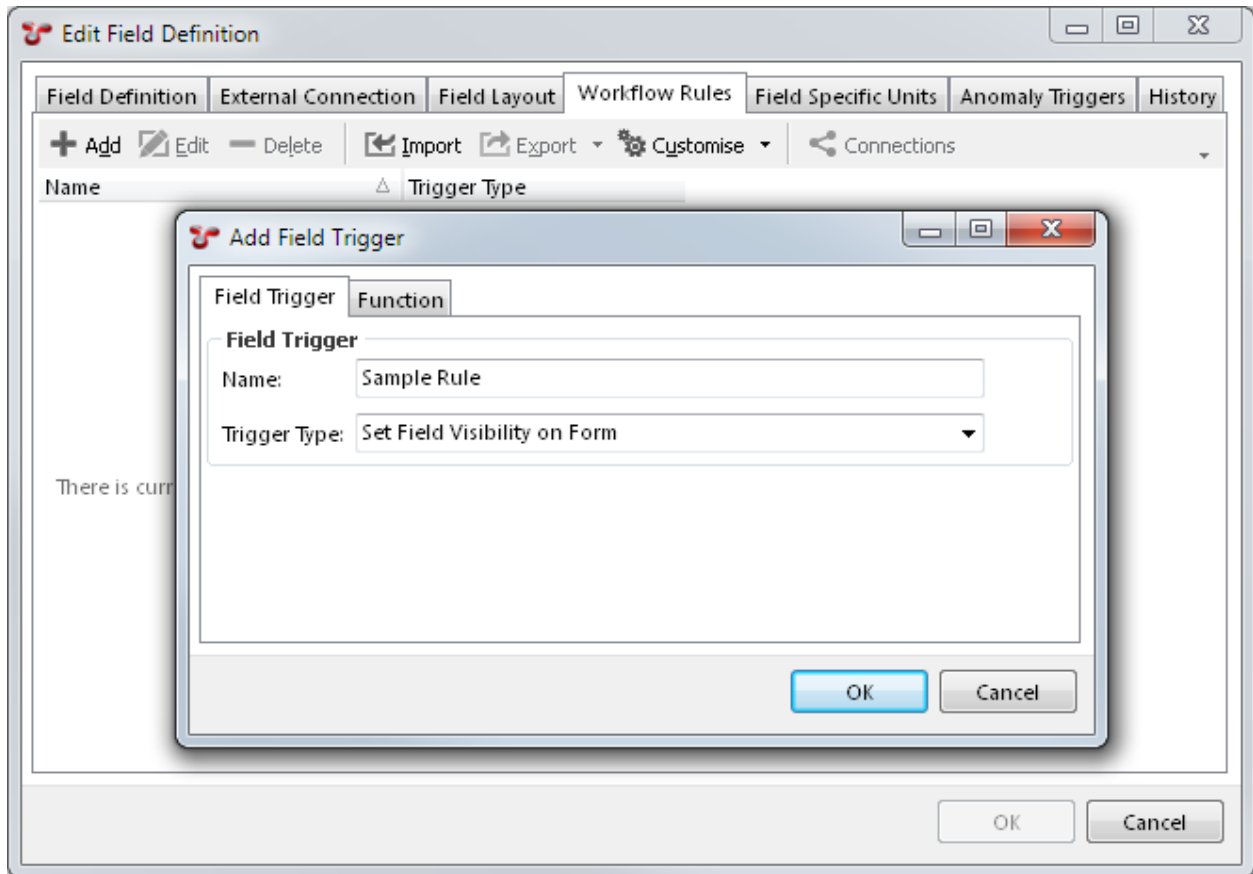
Workflow Rules

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 5) 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 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.) 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.

12.3.22 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.

12.3.23 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.

12.3.24 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". 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.

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.

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 comm-separated value) is likely to be faster than an Excel import file.

12.3.25 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.

12.3.26 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*).


12.3.27 Report Templates

- *General strategy*
- *Add/Edit*
- *Report Template dialog*
- *Sources*
 - *Simple Source*
 - *Union Source*
 - *Distinct Source*
 - *Parameter Source*
- *Elements*
 - *Element Group*
 - *Text (Paragraph)*
 - *Section Heading*
 - *Table of Data*
 - *Vertical Table*
 - *Pivot Table*
 - *Chart Template*
 - *Risk Chart*
 - *Multimedia Thumbnails*
 - *Drawing Details*
 - *Page Break*
 - *Section Break*
 - *Table of Contents*
- *Toolbar*
 - *Schedules*

– Styles

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), are saved into a Report 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, several element 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, 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 a tree of 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.)

If you click the Generate button (and select an output format), you will get a blank report generated.

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.

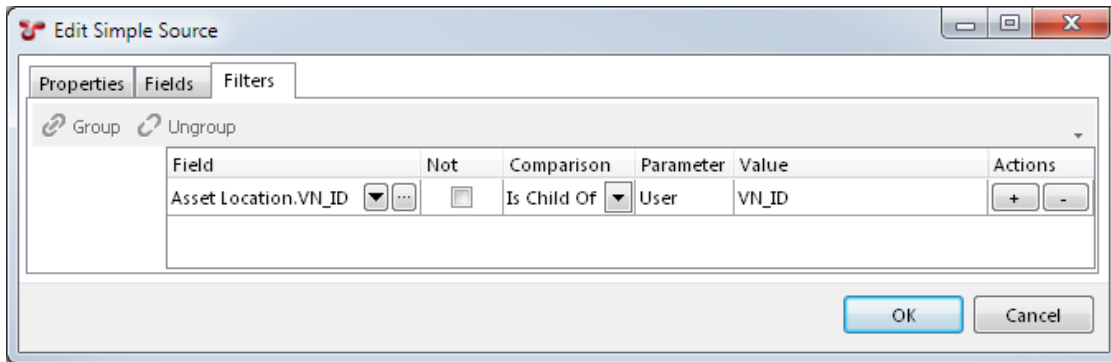
'like' is only applicable to string comparisons: use '%' (percent) to match several unknown characters, and '_' (underscore) to match a single unknown character. For example, Name like _VI would match 'GVI' and 'CVI'; Name like 'PL %' would match 'PL Anode', 'PL Damage', etc.

'<', '>', '<=' 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.

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*.)

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.


You'll need to select a Source for this Element Group. (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.

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 or set the style of the paragraph text (the **Body** style will be applied by default).

Section Heading

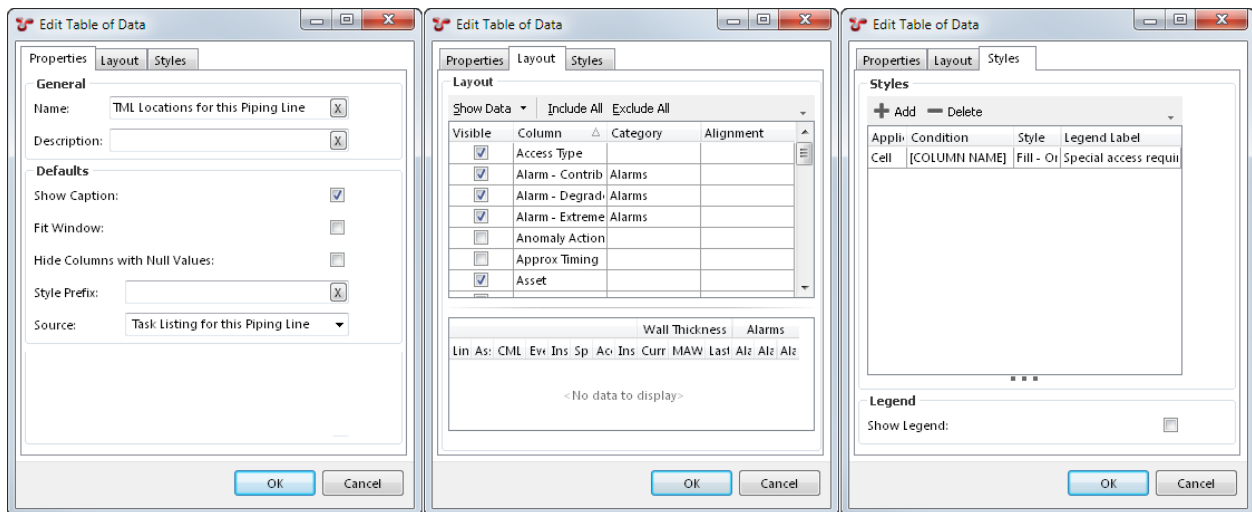
This element lets you set up headings in your report. Right-click within the **Content** box to get a list of styles and fields, or simply type text. Check the **Include in Table of Contents** checkbox to have this section heading appear in the Table of Contents.

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.

Note: Only tables with data will be shown in the generated report. If a table has 0 rows, it (and its caption) will not be shown.

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.

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.

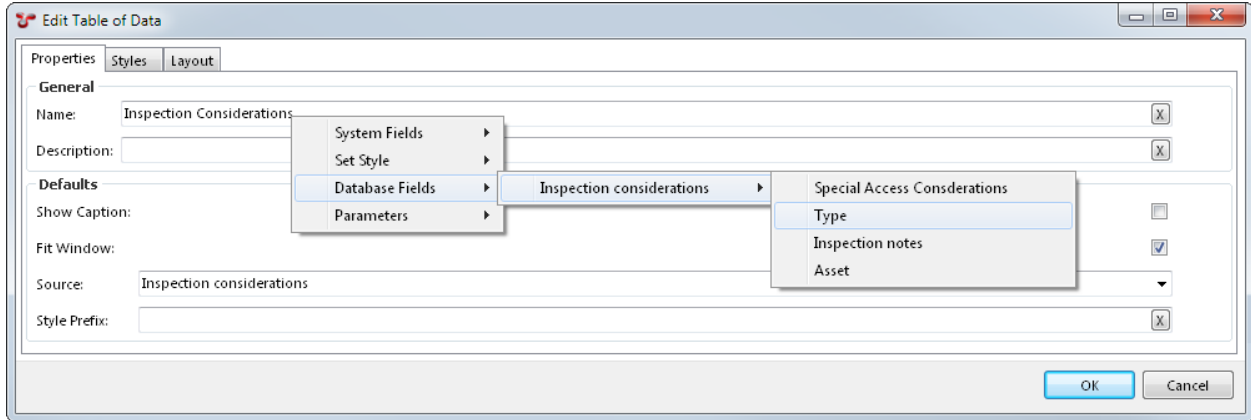
You can change the width of columns by hovering the mouse over the right edge of the column header, and then either double-clicking or by clicking and dragging the column to a new width. This will change the column widths in the generated report.

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. 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 completed and uncompleted 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). Sometimes 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 number 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.

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.

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.

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 addition to forcing output onto a new page (in RTF only, as HTML and Excel do not have the concept of pages) 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.

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.

Toolbar

Schedules

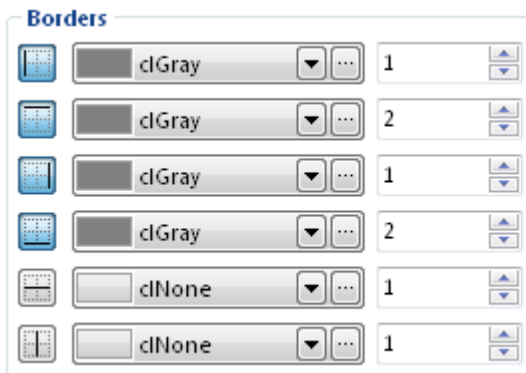
If your database is hosted on a Wood Group cloud server, you will see the **Schedules** toolbar button. Here you can configure scheduled reports to automatically run periodically, sending the output to users via email. Click **Schedules** to bring up the Scheduled Reports dialog. In this dialog, click **Add** to add a new scheduled report. Add one or more Recipients as a comma-separated list.

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

Note: Excel reports will ignore many style settings, in favour of using Excel’s own style settings.

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.)

12.3.28 General

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.

12.3.29 Assets

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.

12.3.30 Planning

Cost Codes,
Task Categories,
Schedule Types,
Workpack Groups,
Workpack Revisions.

12.3.31 Events

Event Types: forms to log inspection data,
Mutually Exclusive Events,
ROVs,
Survey Sets.

12.3.32 Anomalies

Checklists,
Codes,
Code Categories,
Priorities,
Sets,
Severities,
Status,
Action Status,
Action Types.

12.3.33 Reports and Dashboards

Report Categories,
Report Templates: templates that users can run to generate reports as Word documents, HTML, etc.

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 Group. Click on the support@nexusic.com label to launch the default mail program and prepare an email for Wood Group'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

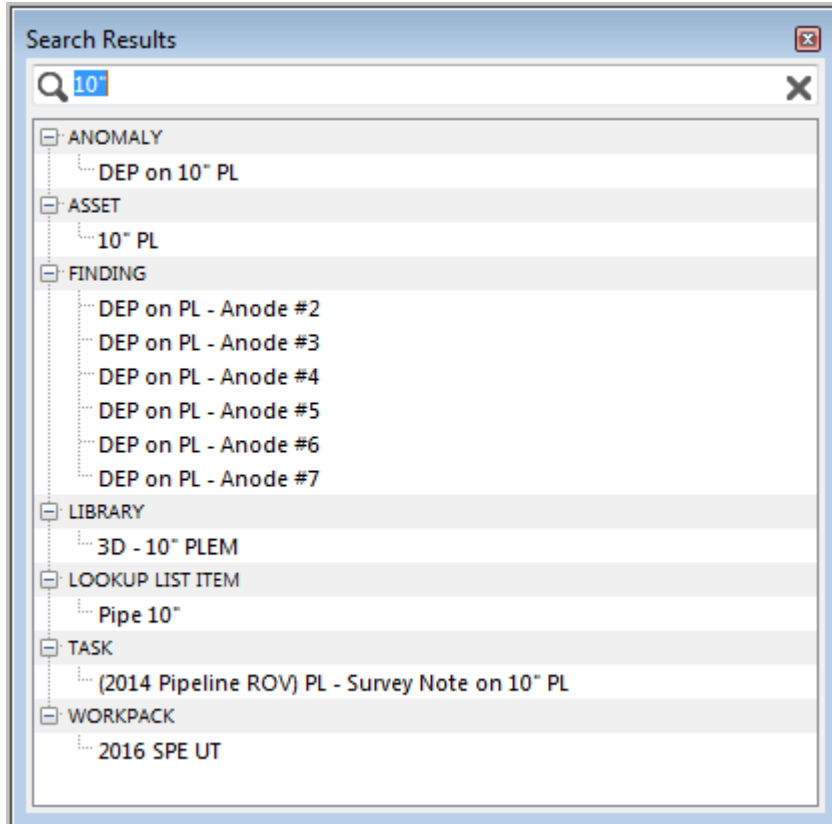
The below topics cover functionality which apply to the grids (and to the grids toolbar) which appear in many different places in NEXUS IC and IC-Inspection.

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.



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.

To carry out further searches, type fresh text into either the Search Results window or the Search box, and press Enter.

13.1.1 Find As You Type

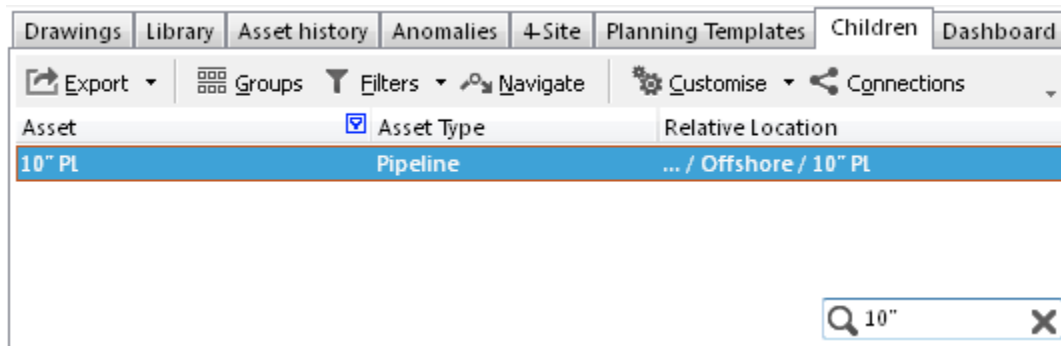
In most grids in NEXUS IC, if the grid has focus and you type on the keyboard, the grid will filter for the text you have typed. For example, if you type "Pipe" (without the quote marks), all rows in that grid that contain "Pipe" will be shown, and other rows will be temporarily hidden.

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.

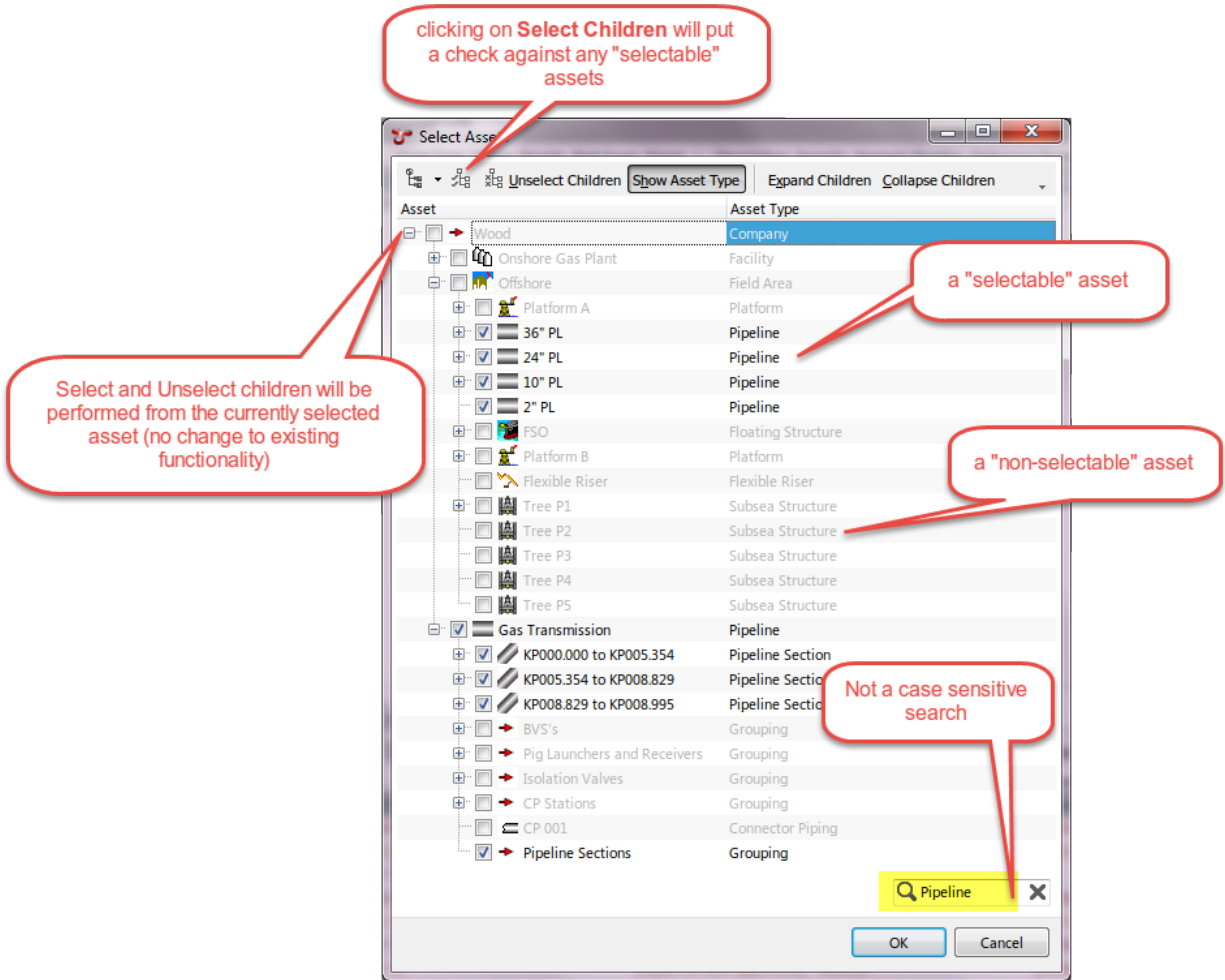
You can dismiss the Find As You Type search box by clicking the **X** at the right of the find box. You can also dismiss it by pressing the Escape key. (But note that if the Find As You Type box doesn't have focus, and you're in a dialog, pressing Escape cancels the whole dialog.) You can manually bring up the Find As You Type box by pressing Ctrl-F.

13.1.2 Asset Trees

If you want to use Find As You Type on assets, one way is to go to the *ASSETS* → *Children* tab.



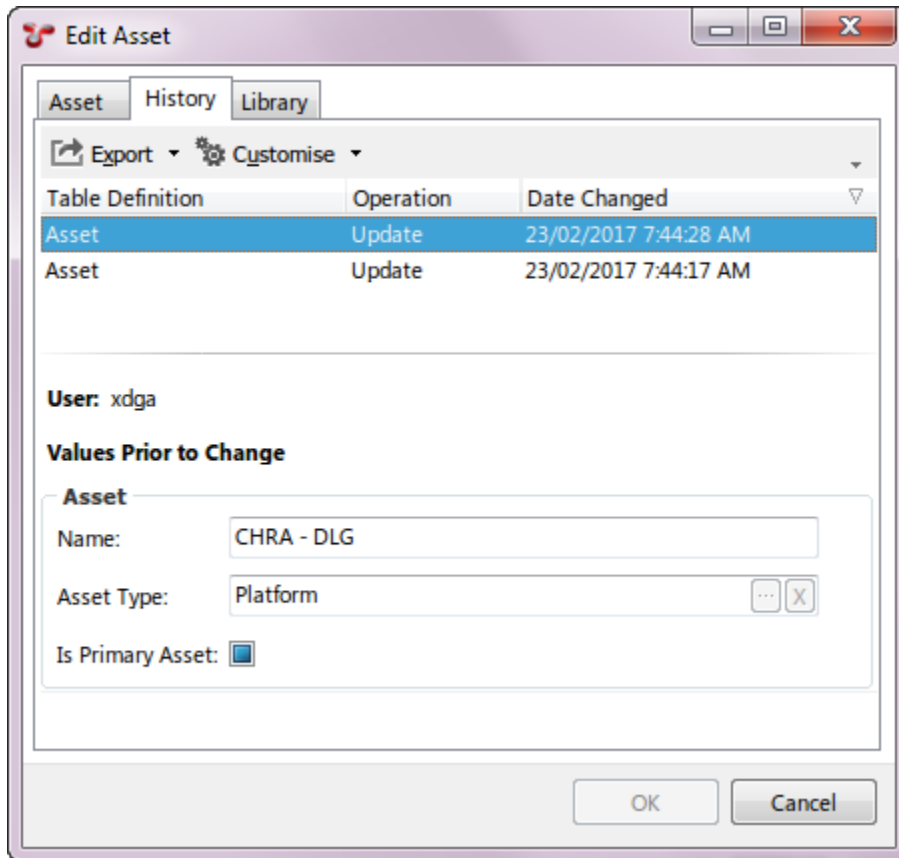
You can also use Find As You Type anywhere an asset tree appears: on the *ASSETS* or *PLANNING* screen, on a picker that asks you to select assets, etc. When filtering a tree, unmatched rows will not disappear — instead, they will grey out. This is so that you can still expand nodes to reach child nodes 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. This stores all changes made against this record of all changes.



The upper section lists in tabular form, all changes made to this record. The lower section displays the name of the user, the form and the values of each field prior to the currently selected change.

13.3 Add / Edit / Delete

Most grids in NEXUS IC have toolbar buttons for Add (+), Edit (✎) and Delete (−).

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. Note that if you have read-only permissions on the object in question, you will see a View button instead of an Edit button.
- **− 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

The **Connections** toolbar button shows items that are linked to the active record.

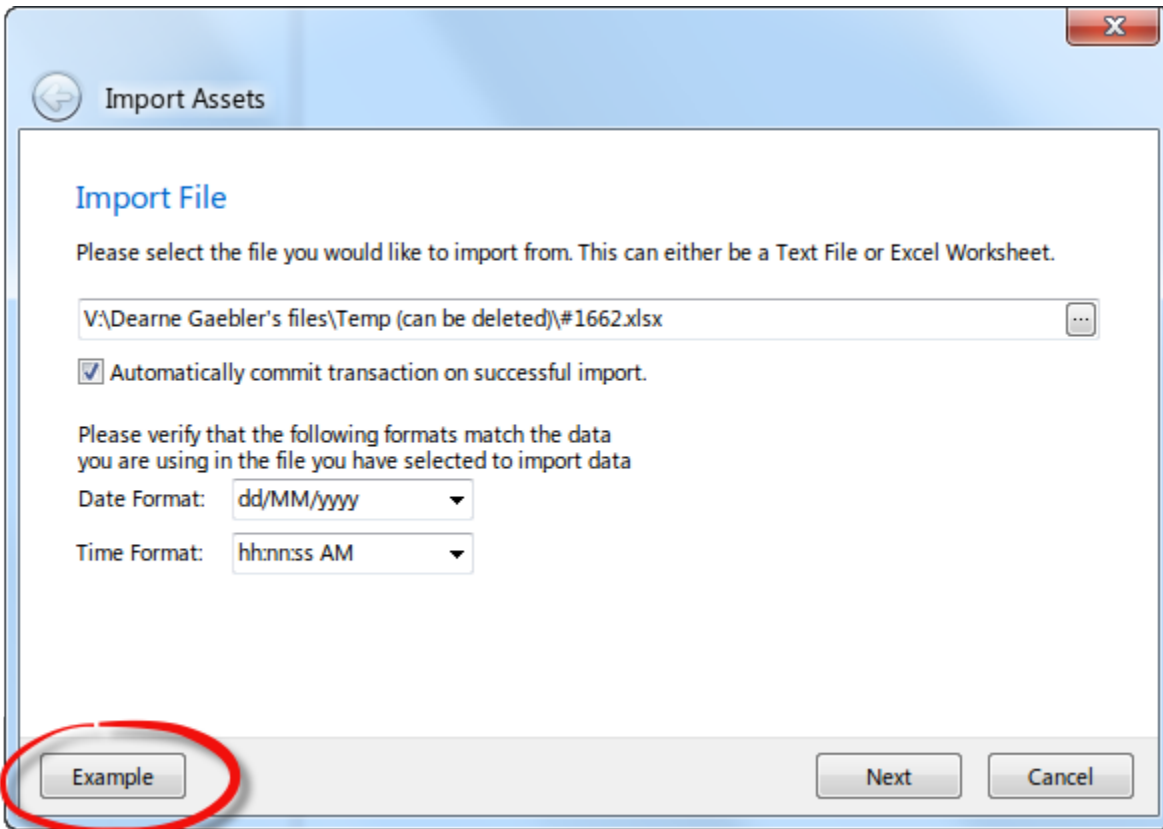
Note: The Connections toolbar only shows items that depend on this item — it does not show the reverse. For example, if you are looking at Connections for an event, it will show Multimedia, Findings, etc, but it will not show the Asset that this event is on, because the event is connected to the asset, not the asset to the event.

Hint: If you were considering deleting an asset (or assets) from the asset hierarchy, we would 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.

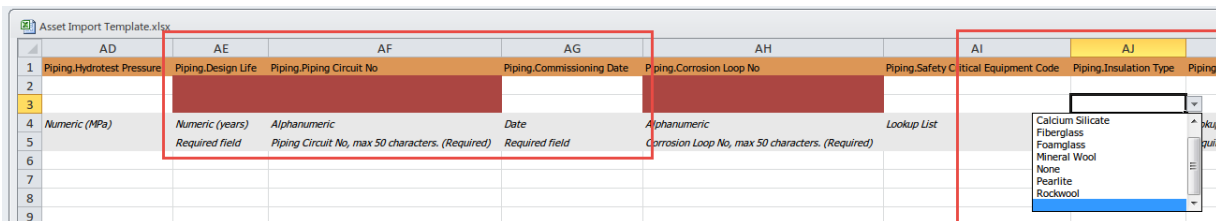
13.5 Import

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:



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 Excel or Text file which has been prepared for import. If you uncheck the “Automatically commit transaction on successful import”, the wizard will present you with a summary of the Import actions, and will prompt you to commit changes. Please note that the database will still be in a Transaction state until you Commit or Cancel the import.
2. **Configure Import** - If you are using the Excel output from the Example template, then the destination Fields

will be pre-populated. 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).

3. **Import Complete** - This page 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.

Note: If the importer encounters a completely blank row, 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, columns to the right of this will not be imported.

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

Note: If you are importing a sheet designed for use with NEXUS IC 5, it may have one or more columns titled 'Component.Location'. In the Configure Import page, you should select 'Asset Location.Full Location' for these columns.

Note: You can have one 'Asset Location.Full Location' column, with levels in the asset hierarchy separated by space slash space, like 'My Field / My Plaform / 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 Plaform' and a second containing 'My Member'.)

Tip: You can also import from .csv files. For very large imports, saving your Excel file as a .csv and then importing from the .csv may be faster.

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.)

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.

13.6 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 the “Custom Export” button available on the *ASSETS* and *INSPECTION* areas. 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.

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*.

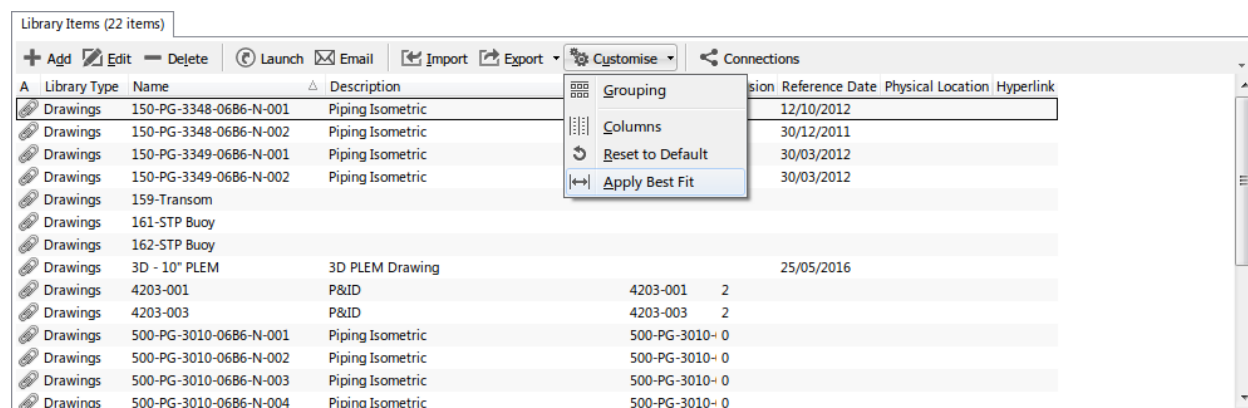
13.8 Customise

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.

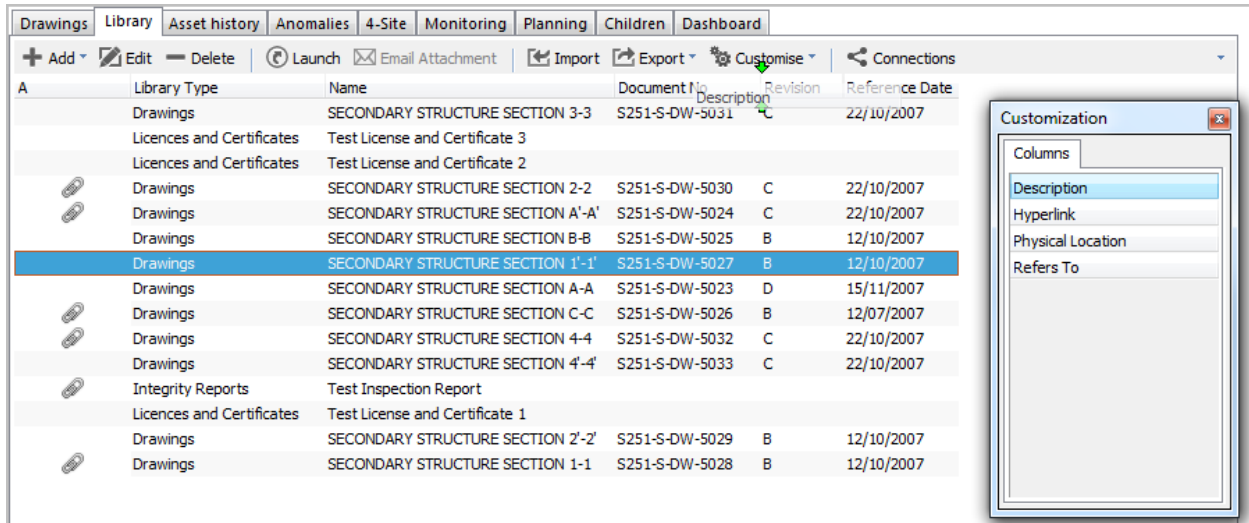
These settings are saved for each user and will be remembered next time that user logs into NEXUS IC.

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 columns 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.

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.

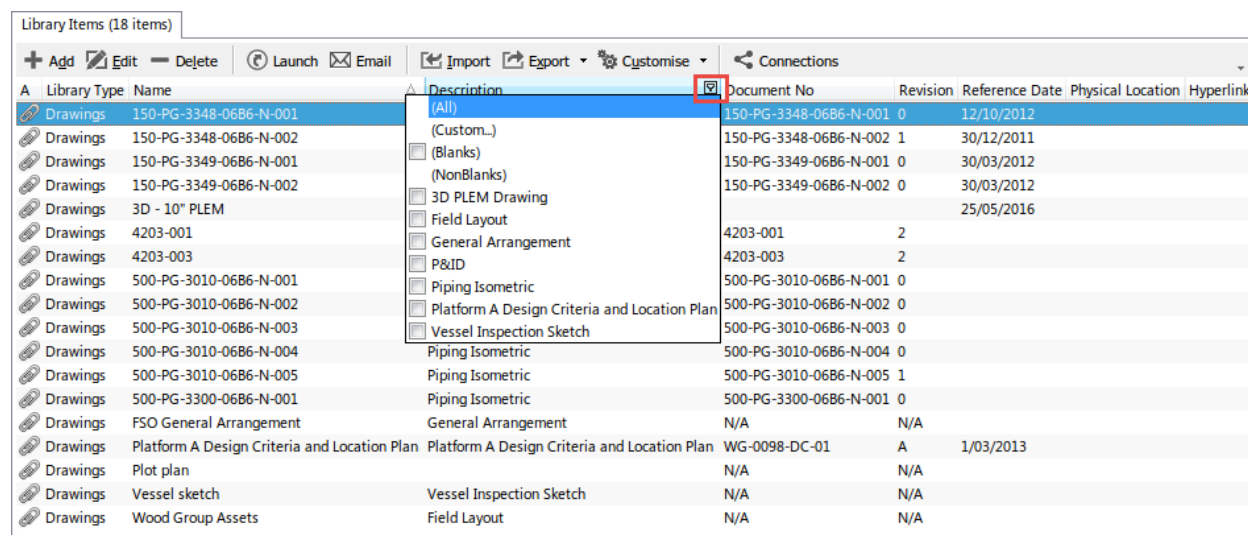
13.10.2 Sorting by one or more columns

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



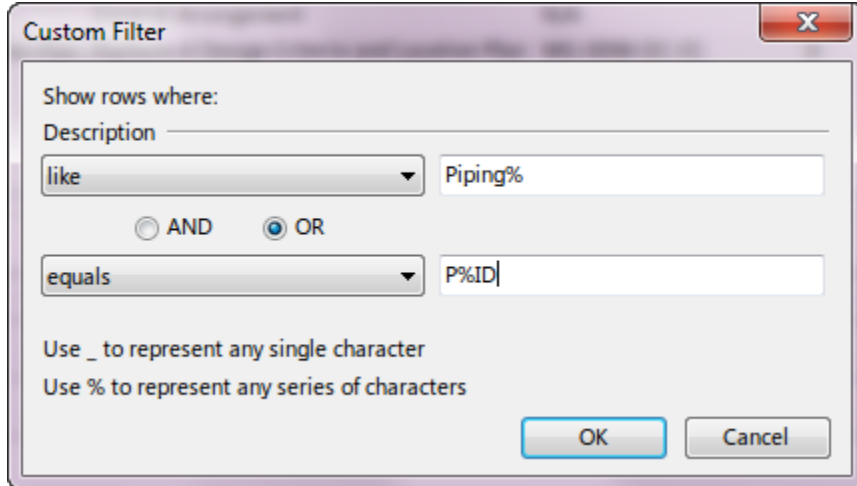
The screenshot shows a table titled "Library Items (18 items)" with columns: Library Type, Name, Description, Document No, Revision, Reference Date, Physical Location, and Hyperlink. A dropdown menu is open over the "Description" column, showing a list of filter options with checkboxes. The "Description" column is highlighted in blue, and a red box highlights the filter icon in the header cell.

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.

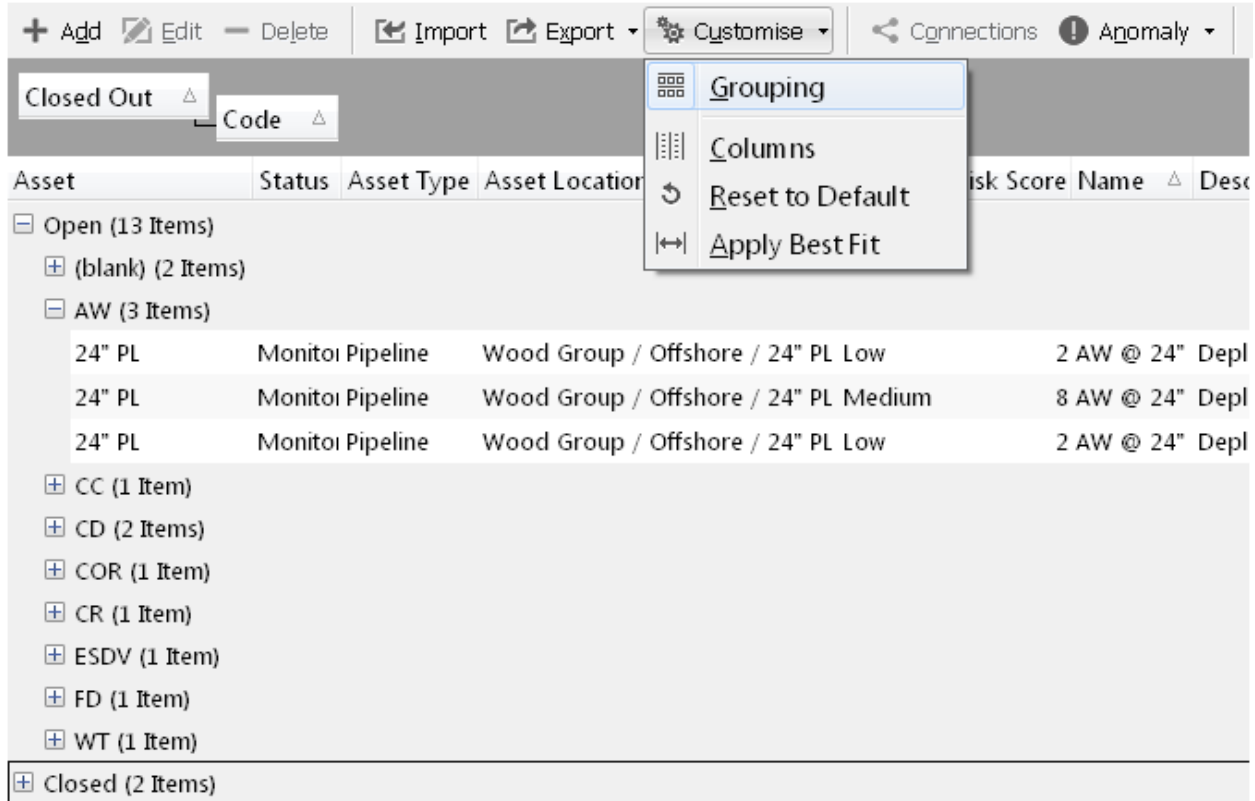
See also: *Find As You Type*.

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 gray 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 gray 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 gray 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: <input type="text" value="PP-PG-CL01-P01Medium"/>	Corrosion Loop No: <input type="text" value="PP-PG-CL01"/>
Component Type: <input type="text" value="Pipe 6"/>	Piping OD Size (mm): <input type="text" value="168.3"/>
Tag Number: <input type="text" value=""/>	PID: <input type="text" value="4203-001"/>
Hydrotest Pressure: (MPa) <input type="text" value=""/>	Design Life: (years) <input style="border: 2px solid red;" type="text" value=""/>
Commissioning Date: <input type="text" value="10/08/2012"/>	Time in Service: (years) <input type="text" value="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.

The screenshot shows a 'Piping' form with a 'Calculation Parameter' tab. Under 'Design Properties', there are several input fields:

- 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: [empty] (with an 'X' button)
- PID: 4203-001 (with an 'X' button)
- Hydrotest Pressure: (MPa) [empty]
- Design Life: (years) 120 (highlighted with a red border and a red warning icon)
- Commissioning Date: 10/08/2012
- Time in Service: (years) 5.85 (with a 'f' button)

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.

Numeric fields can have minimum and maximum values set. These can be fixed or they can be drawn from specified asset information fields. Yes/No fields can also be set to trigger findings.

Fields with out of range data are clearly identified on the form.

The screenshot shows a 'UT Inspection' form with a 'Survey' tab. Under 'UT Inspection', there are several input fields:

- Inspection Date: 22/07/2015
- Report No: WG-150-PG-3348-06B6-N_UT001 (with an 'X' button)
- Thickness Measured: (mm) 11.5 (highlighted with a yellow border and a yellow warning icon)
- Contractor: XYZ Contractor (with an 'X' button)
- Lowest CML Reading Location: 3o/c (with an 'X' button)

When inspection Events are imported from Excel and the data is outside of the Anomaly Trigger bounds, then Findings are automatically created against each of these events.

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 7, Windows 8, Windows 10. x86 (32-bit) and x64 (64-bit), Windows Server 2012 R2 (or higher) supported.
- **ODBC Drivers:** Version 11 and above recommended. (<https://www.microsoft.com/en-us/download/details.aspx?id=53339>)
- **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

- Internet Explorer 10 or above
- Edge 40 or above
- Firefox 53.0 or above
- Chrome 54.0 or above
- Safari 9.1 or above

IC-Web Server

- **Processor:** Core i5 / i7
- **Graphics card:** If 3D support is required then the graphics card must support OpenGL.
- **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 11 and above recommended. (<https://www.microsoft.com/en-us/download/details.aspx?id=53339>)

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.

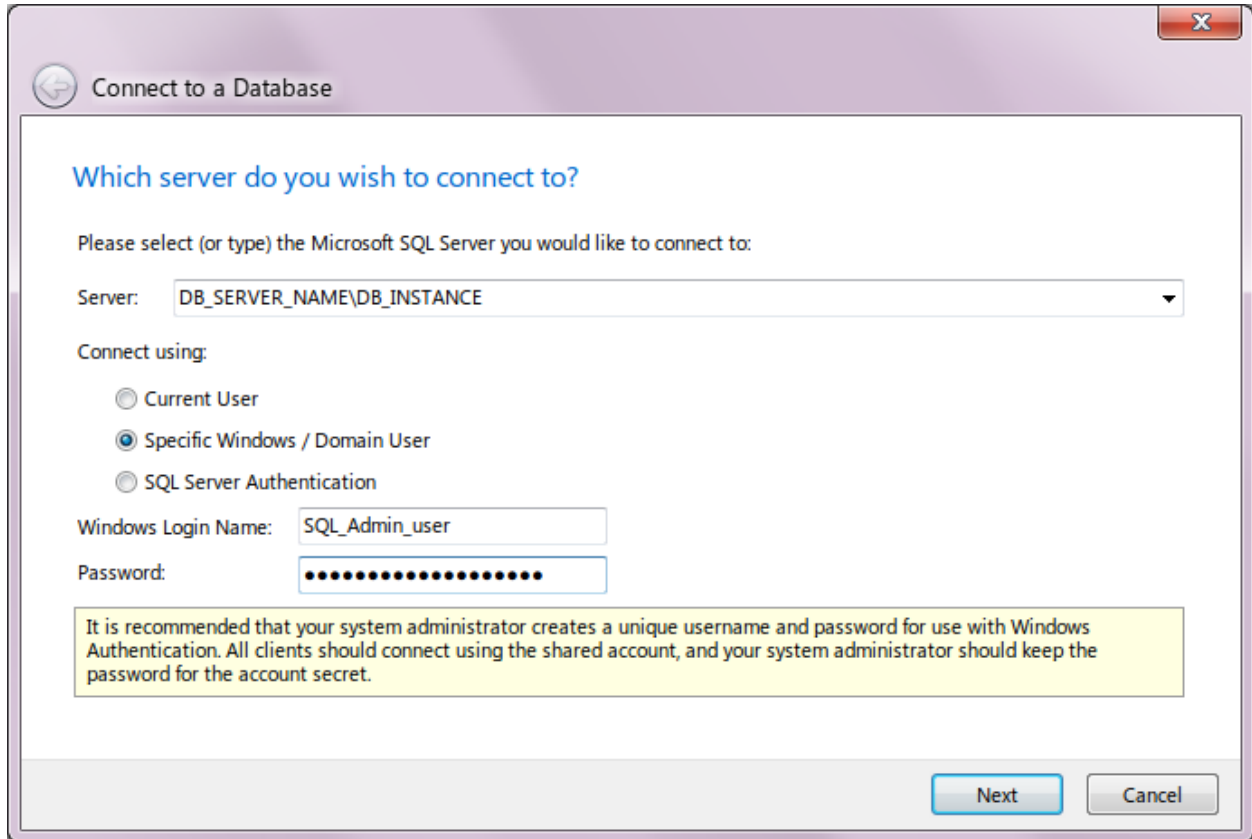
14.1.3 Backup Folder

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.

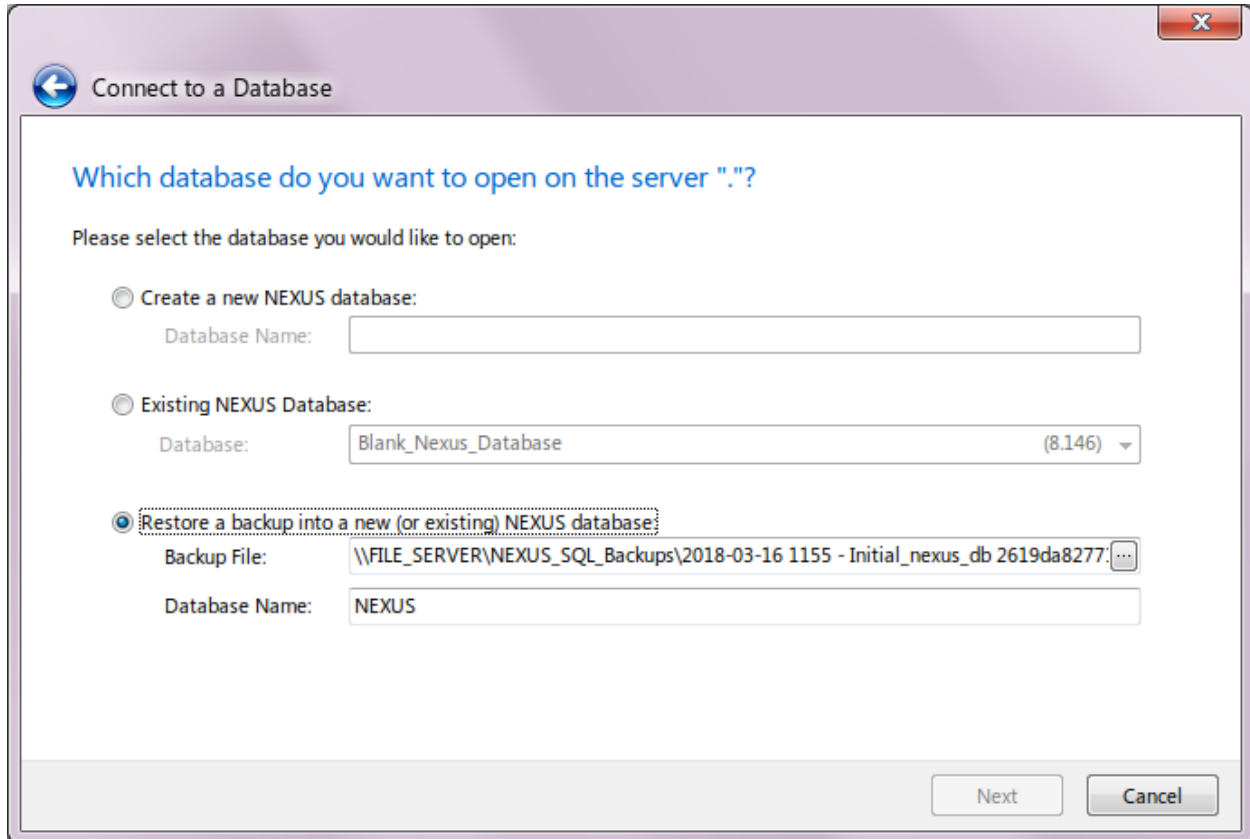
14.1.4 NEXUS Software Installation

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. (Note that genuine NEXUS setup installers are digitally signed by Wood Group Kenny Australia PTY LTD.)
2. After installation, launch NEXUS application to launch the Database Connection Wizard.

- 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:



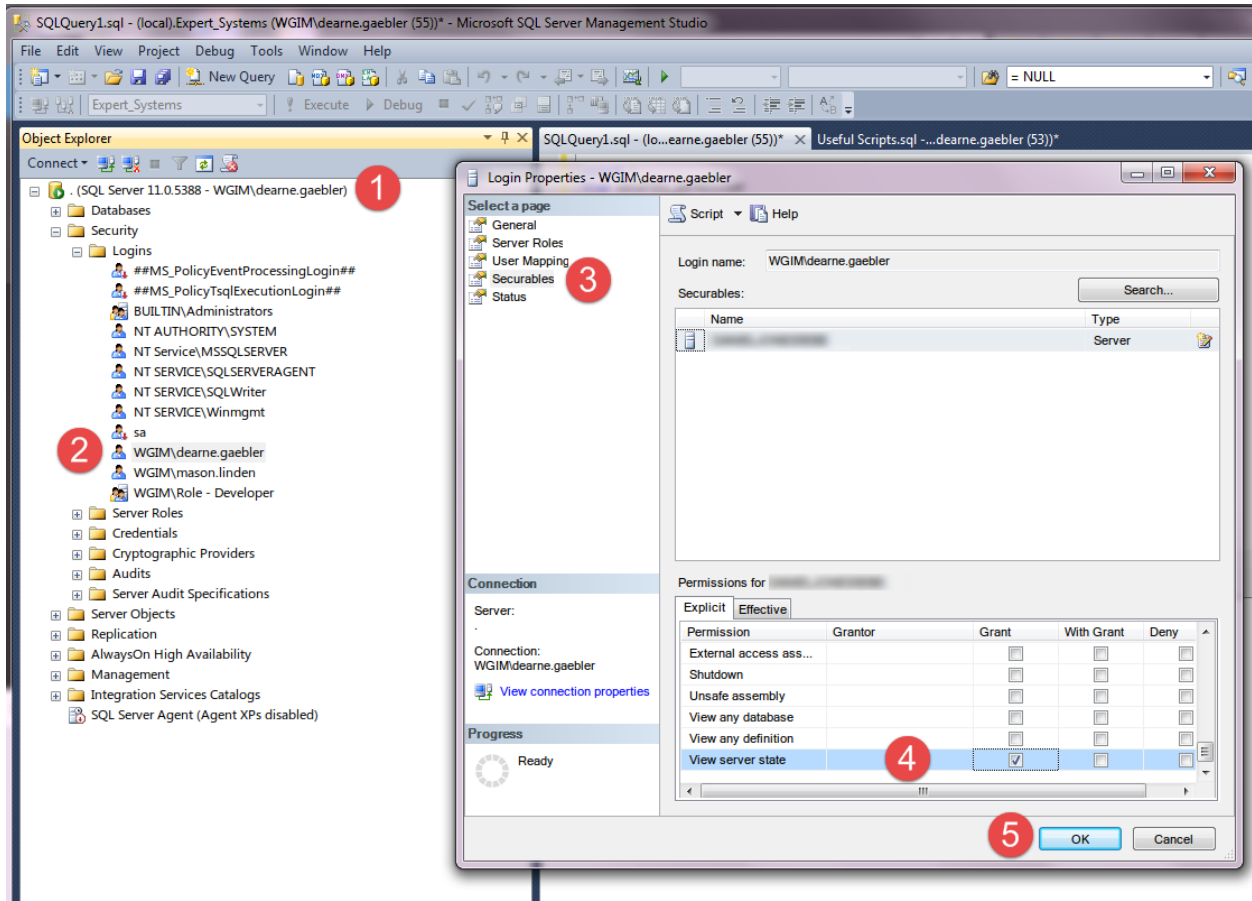
- In the **Which database...** page of the wizard, enter the full path to the NEXUS backup file. This may be a UNC path (like ‘\FILE_SERVER\NEXUS_SQL_Backups’) or if the database server and NEXUS IC are running on the same machine it may be a Windows path (like ‘C:\Database Backups’).
- Enter a name 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 whitelist 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".

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.

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.

Firewall 1

Windows firewall, by default, blocks everything. If it is safe for you to turn off the firewall 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).

Anti-virus

If you are using a third-party firewall, anti-virus, anti-malware, 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.)

More

<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>

<https://docs.microsoft.com/en-us/sql/sql-server/install/configure-the-windows-firewall-to-allow-sql-server-access?view=sql-server-2017>

Set up permissions on the Database Server

Firewall 2

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 9or 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.

Preamble on setting up NEXUS IC including recommended security good practice

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
```

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
```

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=pA55wOrd /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

8.184

- 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.

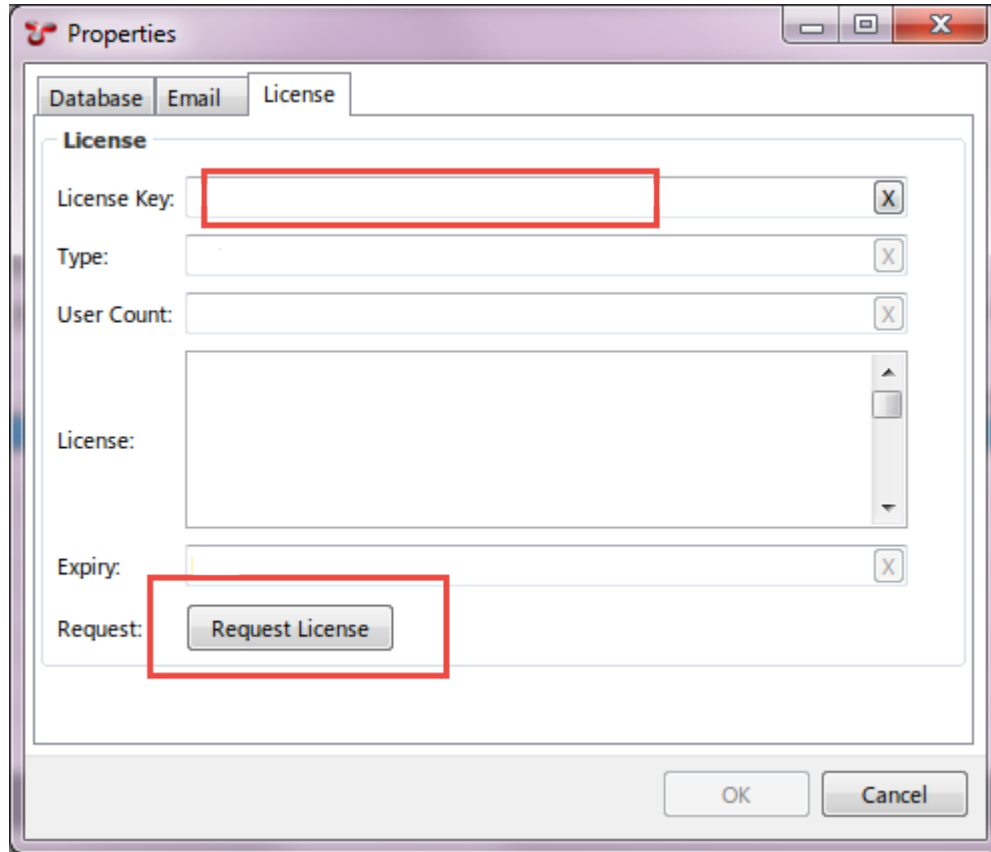
Upgrading from HASP to Software Based Licensing

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

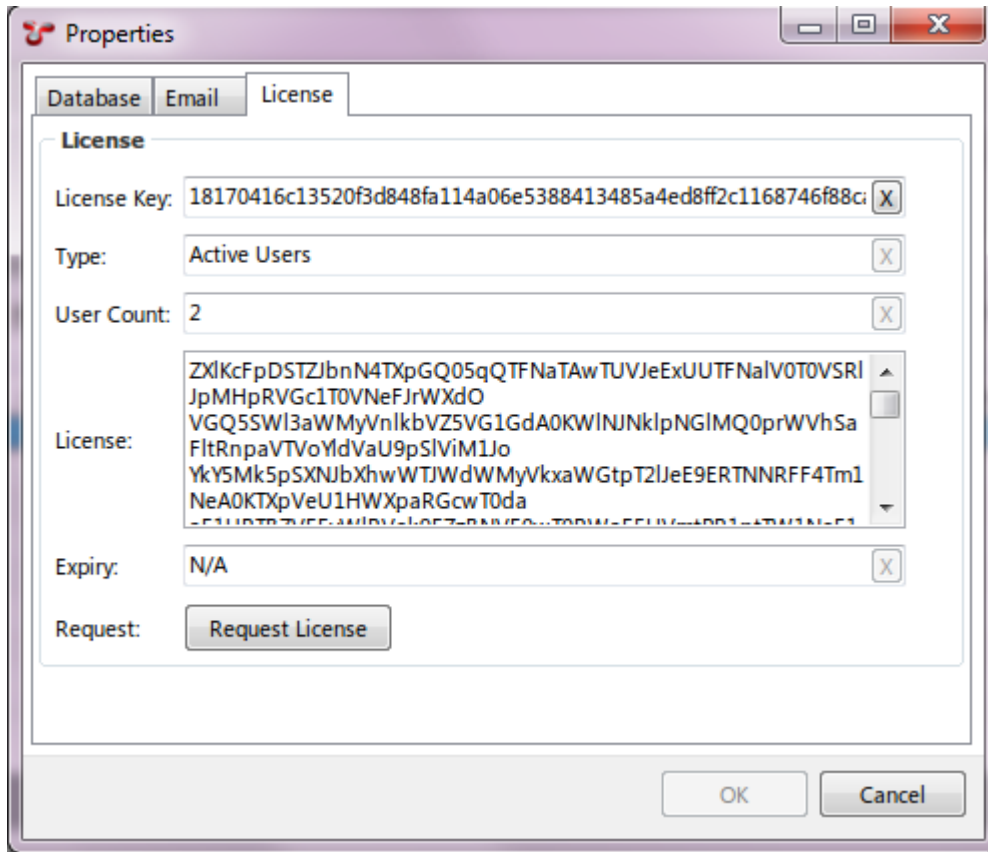
- Launch NEXUS.
- When you connect to the database the first time, you will be prompted to enter the license key. This is in the *Database* → *Properties* → *License* dialog, then click on **Request License**.



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.

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.

Re-authentication

The only circumstances under which re-authentication is required is when the database name OR the database server name is changed.

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 up to the client. Our recommendation is to hold daily backups for 14 days and retain monthly backups for two years and annual backups for all time.

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 a 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 NEXUS IC metatable.
- **insertData** : this is essentially the same as an add query on NEXUS IC metatable.

- `deleteData` : this is essentially the same as an delete query on the NEXUS IC metatable.
- `getTrafficLight` : this is used to get traffic light specific requests
- `getChart` : this get either the chartlist if no extra params 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
- `rows`: JSON array containing the data to updated 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 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 in which to start returning data from
- `limit` (optional): the number of rows after the starting row which to return data to
- `resultFormat` (optional): the type of object the requester wants returned (defaults to JSON)
- `maxSize` (optional): Used in conjunction with `resultFormat=thumbnail` argument to specific the max size (either height or width depending on source aspect ration) 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 trafficlight 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

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",
      "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 ie “(” and does not require a params attribute
- **closeNesting** Represents a trailing bracket ie “)” 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 seperate request arguments - see “Sort” below
- **distinct** Ensures the resultset 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 which 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 too `FieldValue`
- **ctGreaterEqual** For when `FieldName` is greater than or equal too `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. **ASCIDESC** : 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)

Ie

ICWeb.dll/web/?requesttype=getdata&metaData=Header&limit=200 – will return Header data from the first row entry to the 200 entry

ICWeb.dll/web/?requesttype=getdata&metaData=Anomaly?start=20&limit=50 – will return rows 21 to the 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 specifically the icon image used in Comp_Icon or Boolean_Value table
- **image** - This will return an 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 conatins 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 (ie 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 preformed 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`. IE - `joe.blogs@mycompany.com`

Returned JSON results

The results return 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. ie

```
{
  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 the 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 thing that are lookup 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 do display user friendly names to users but allows 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 result 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 who's 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 fieldname
- **FieldTitle**: This is the User friendly fieldname 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 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 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 sometime lumped into groups for display if set this will contain the name of the group this field belongs too
- **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 captions 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 fields 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 an 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 Passthrough fields, contains the Table_Def key for the table this links too.
- **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 fieldtype
- **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}}

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":"ct

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 businessobjects 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}&start=52&filter=[{"method":"opennested"}, {"method":"where", "params": {"field":"Component_ID", "comparetype":"ct

The filter expanded out :

```
[
  {
    "method": "opennested"
  },
  {
    "method": "where",
    "params": {
      "field": "Component_ID",
      "comparetype": "ctGreater",
      "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%"
    }
  }
]
```

```

        "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": "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 as 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 of the returned file.
- **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 string representing an array of ordered fields that you want included in the data. ie `&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 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 file will be return (either a CSV or TXT file depending on what is specified in the format parameter)

Note: the hash parameter will determin 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
```

Desciption

This call return 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 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.
- **hash** - The authenticated hash token the server has provided you with from a `getSecurity` request. See *Authentiation*
- **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 resposne 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 return as the response.

Note: the hash parameter will determin 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.

14.2.6 REST Service Specifications v2.0

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

Example

Request authentication via a users username and password.

Request

```
GET /icweb.dll/security/login
Authorization BASIC YWRtaW46cGFzc3dvcmQ=
```

Note 'YWRtaW46cGFzc3dvcmQ=' is the BASE64 encoded equivalent to the string 'admin:password'

Response

```
{
  "hash":
  ↪ "E05DEB57605BA82CD1A0C130B38C7BC1415BA094B28D73B03577B7CAB438834E6B680B437C85A65CA796AB6E7DC854555",
  ↪ ",
  "id": 4,
  "username": "admin"
  "license": "write"
}
```

Example

Request authentication via an API Key.

Request

```
GET /icweb.dll/security/login
Authorization APIKEY_
↪ RTA1REVCNTc2MDVCQTgyQ0QxQTBDMTMwQjM4QzdCQzE0MTVCQTA5NEIyOEQ3M0IwMw==
```

Note: the APIKey is shown BASE64 encoded.

Response

```
{
  "hash":
  ↪ "E05DEB57605BA82CD1A0C130B38C7BC1415BA094B28D73B03577B7CAB438834E6B680B437C85A65CA796AB6E7DC854555",
  ↪ ",
  "id": 4,
  "username": "admin"
  "license": "write"
}
```

Example

Request authentication via an email token.

Request

```
GET /icweb.dll/security/login
Authorization TOKEN
↳RTA1REVCNTc2MDVCQTgyQ0QxQTBDMTMwQjM4QzdcQzE0MTVCQTA5NEIyOEQ3M0IwMw==
```

Note: the APIKey is shown BASE64 encoded.

Response

```
{
  "hash":
  ↳"E05DEB57605BA82CD1A0C130B38C7BC1415BA094B28D73B03577B7CAB438834E6B680B437C85A65CA796AB6E7DC854555
  ↳",
  "id": 4,
  "username": "admin"
  "license": "write"
}
```

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}
```

URI Parameters

Name	In	Required	Type	Description
tableName	Path	Yes	String	tableName of the business object to be returned.

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>BusinessObject-FieldCategory</i>	Array of Business Object Field Categories, defines all the visible categories	Yes	
fields	<i>BusinessObject-Field</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	Optional	Default
name	String	Default display name of the field	No	
fieldName	String	Field Name used in REST requests	No	
fieldTypeId	Integer	Type of data the field stores in the database. See <i>Field Types</i>	No	
displayFieldTypeId	Integer	The display type of the field type, this may differ to fieldTypeId, for example fieldTypeId may be calculated, but displayFieldTypeId may be string, must be a simple type.	Yes	field-TypeId
editorTypeId	Integer	Type of control that should be used to allow the user to edit raw data for this field.	No	
displayEditorTypeId	Integer	Type of control that should be used to allow the user to edit the display value of this field, used for filtering, reports	Yes	editorTypeId
fieldSize	Integer	Maximum size of a string field	Yes	0
comments	String	Long comments describing use of the field	Yes	
required	Boolean	Defines if the can be set to 'null'.	Yes	No
lowerValue	Float	Defines the absolute minimum value for an Integer/Float field	Yes	undefined
upperValue	Float	Defines the absolute maximum value for an Integer/Float field	Yes	undefined
format	String	Defines the display format for a field	Yes	undefined
preventEdit	Boolean	Prevent the user from editing the value in this field, only valid for native field types.	Yes	No
category	String	Category of the field, used to group like categories into 'groups'	Yes	BusinessObject.Name
blankText	String	Value displayed in edit field, when the field value is null	Yes	undefined
formColumn	Integer	Number of columns the field should consume on the form	Yes	1
formOrder	Integer	Order of the field when displaying as a form	Yes	0
formVisible	Boolean	Is the field visible on the form	Yes	True
gridOrder	Integer	Order of the field when displaying as a grid	Yes	0
gridCaption	String	Caption used as the grid caption	Yes	BusinessObject-Field.name
gridVisible	Boolean	Is the field visible on the grid, True, visible by default, False, not visible, null, not visible by default but can be turned on.	Yes	null
booleanType	Integer	The display type for Boolean fields	Yes	undefined
isBooleanType	Boolean	Is the above display type for boolean fields an image.	Yes	No
foreignTableId	Integer	The key for the foreign meta table this field refers to.	Yes	undefined
unitId	Integer	The key for the unit assigned to this field, only relevant for Float fields.	Yes	undefined
lookupListId	Integer	The key for the lookup list assigned to this field	Yes	undefined
isLookupList	Boolean	Is the display type for the lookup list.	Yes	No

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

Example

Request

```
GET /icweb.dll/bo/Workpack
```

Response

```
{
  "key": 136,
  "tableName": "Workpack",
  "name": "Workpack",
  "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,
        "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,
        "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,
        "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,
        "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}
```

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 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	TableRow []	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 <code>keyValue</code>
404 Not Found		Field <code>fieldName</code> not found in <code>tableName</code>

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	Integer	Starting row to be returned, when using paged datasets this sets the first row returned.	0
pageSize	Query	No	Integer	The number of rows in each page. Determines the maximum number of rows to return in the requests, starting at startRow.	100
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
    },
    {
      "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
}

```

Create Row

Create a new row in a business object.

HTTP Request

```
PUT /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	Reserved for future use, should use 0.

Request Body

This contains fields and values for the new 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,
  "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

200 OK

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
401	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
Expiry	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

```
{
  "Repository_ID": 1,
  "UNC": "file.pdf",
  "File_CheckSum": "cf894da06f793ed73d841c72dd0bfde3"
}
```

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
401	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	Optional
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	Optional	Default
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 Integer	Specify the function name or function key to be executed .
format	Path	No	String	Possible values are <code>value</code> or <code>png</code> . <code>value</code> is the default if omitted, and ensures the result of the function is returned. If <code>png</code> 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
401	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	Op-tional
state	string	State of the function call, <code>ok</code> or <code>error</code> .	No
value	<i>Any</i>	If state is <code>ok</code> then this will hold the result of the function execution.	Yes
message	String	If state is <code>error</code> 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

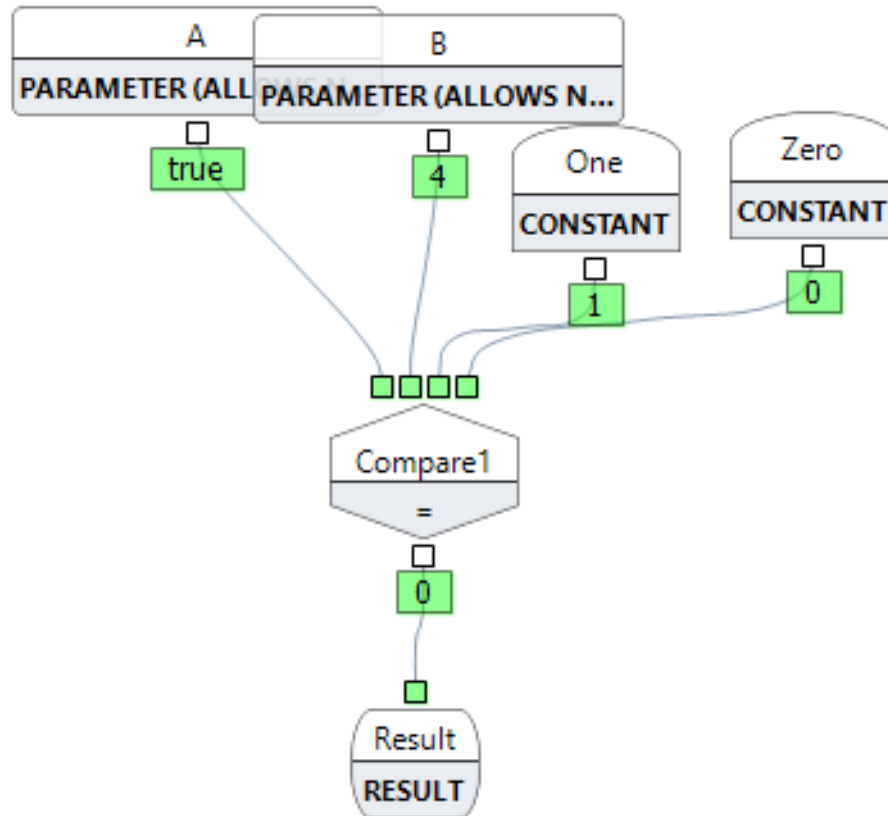
```
{
    "state": "ok",
    "value": false
}
```

Request

```
POST /icweb.dll/function/Compare A = B/?format=png
```

```
{
    "A": true
    "B": 4
}
```


Response



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"
            }
        )
}
```

```

    )
}

# 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

# 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
$updateRow = Invoke-RestMethod -method POST -body $body -uri $uri

$updateRow.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 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>			

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/6.4/nexus.pdf>

14.3 Software as a Service (SaaS)

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 – Planned application downtime is required for server O/S patching. This is performed monthly and is typically performed out of hours. Non-routine downtime 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 – daily database backups are taken and retained for 14 days. A monthly database backup can be retained for two years.

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 to provide fail-over in the event that a data centre goes offline.

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.

14.3.1 Pre-Requisites for RemoteApp

Client Operating System: Windows 7, Windows 8, Windows 10. x86 (32-bit) and x64 (64-bit), Windows Server 2012 R2 (or higher) supported.

14.3.2 Windows 7

To ensure smooth RemoteApp connections on Windows 7, 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>

14.3.3 IC-Web Supported Browsers

- Internet Explorer 10 or above (Edge is not supported)
- Firefox 53.0 or above
- Chrome 54.0 or above
- Safari 9.1 or above

14.4 Known Issues

#8358 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.

#8331 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.)

#7725 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.

#7630 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.

14.5 Upgrading from v5

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.

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.

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.
- 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 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.)

14.6 Other Documentation

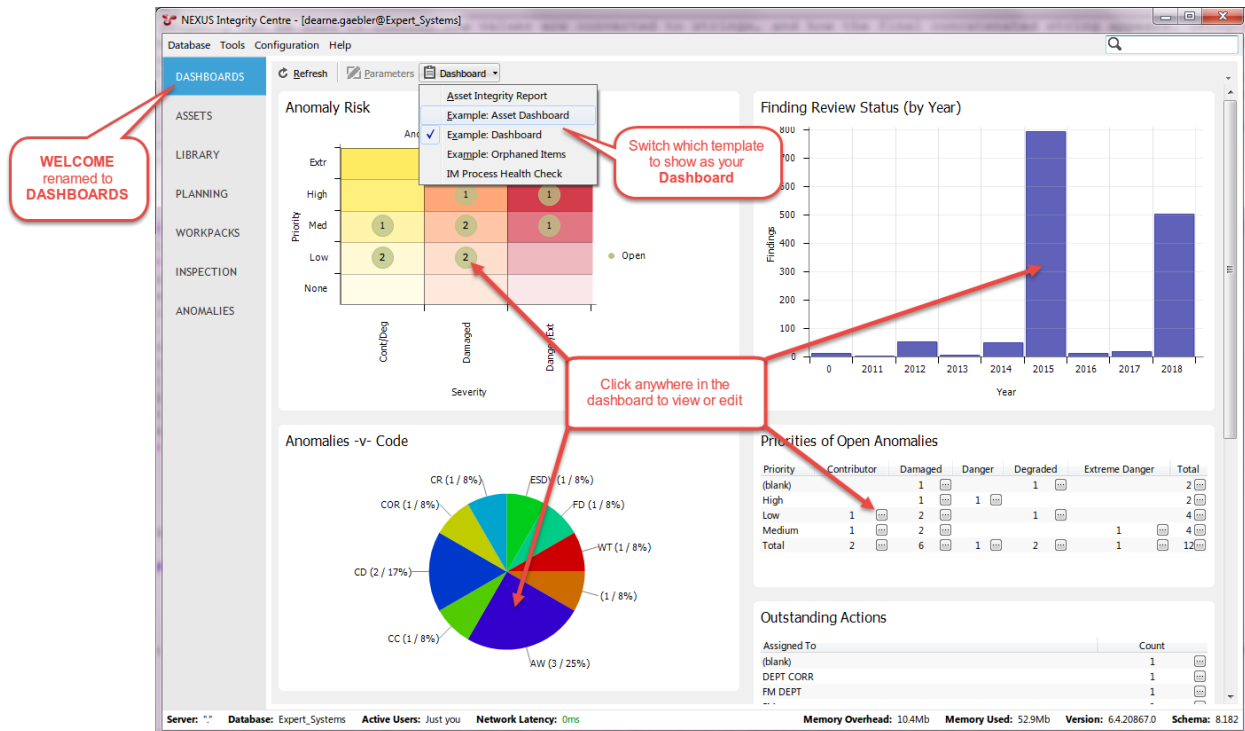
A training manual, showing how to use IC-Inspection for offshore eventing and NEXUS IC for offshore review, is available.

14.7 What's New

New features in NEXUS IC 6.4 include the following:

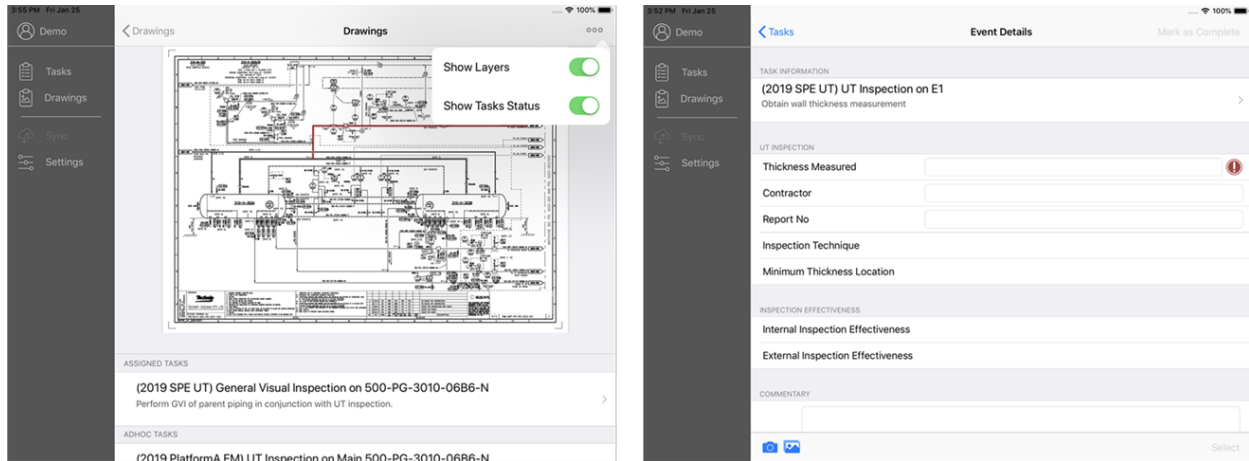
14.7.1 Dashboard

The static Welcome report has been replaced with interactive *Dashboards*. Double-click to view/edit detailed data behind each table or chart. The asset dashboard has been made similarly interactive.



14.7.2 IC-Inspector

A new product has been added to the NEXUS suite. It's named *IC-Inspector* and it runs on an iPad. You can send tasks to an iPad in the field and inspectors can send data back from that iPad. The application can work when a data network is available on only a limited basis: for example an inspector can receive tasks at the beginning of the day, collect data all day (including via the iPad's camera), and then return to a network connection to synchronise that data back at the end of the day.



14.7.3 No more HASP keys

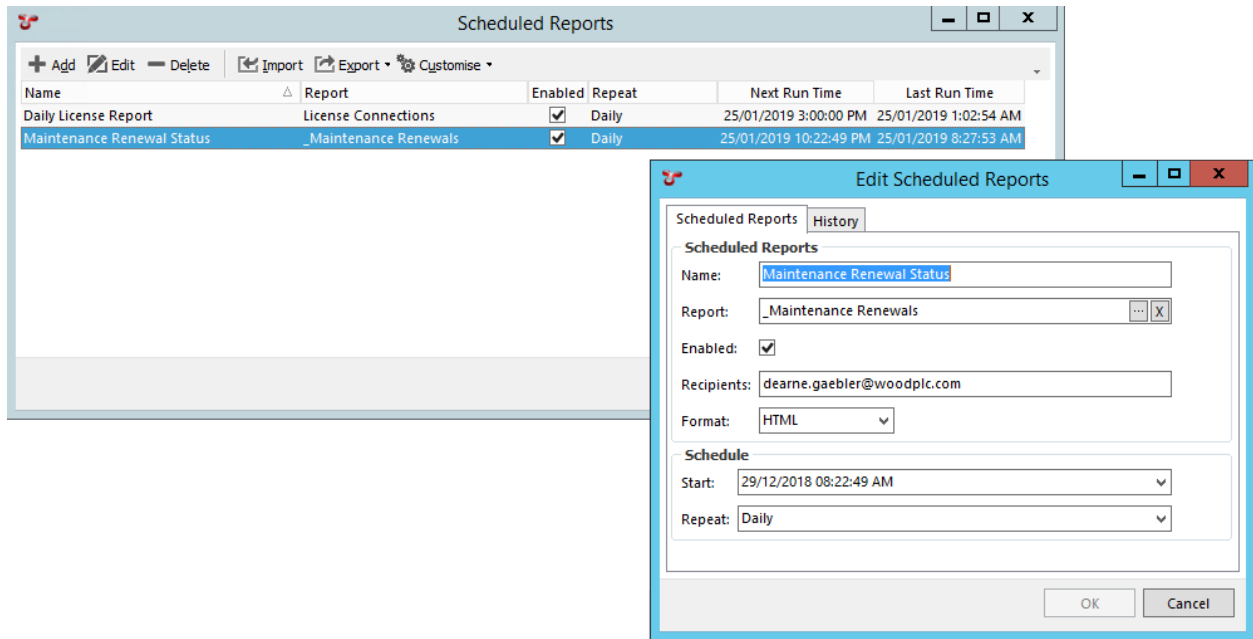
For a long time, to use the NEXUS suite you needed a physical HASP key dongle plugged into a machine. This had drawbacks: the key could get lost or stolen or otherwise be in the wrong place; the key could get damaged or broken; and if you were running NEXUS IC in the cloud, it could be difficult to find a place to plug the HASP key into. In 6.3 we added a new software licensing method: you could have your server contact our server via the internet for a license. In 6.4 we've removed support for HASP keys, so before you upgrade to 6.4, it is essential that you contact us for a new software-based license key.

14.7.4 Asset View security

It is now possible to allow/deny access to individual asset views on an individual user (or user group) basis. You can give users full read/write access to assets from a particular asset view, or read-only access, or no access at all.

14.7.5 Scheduled Reports (available to Wood Hosted clients only)

You can now configure any reports to be generated periodically and sent via email to a list of recipients.

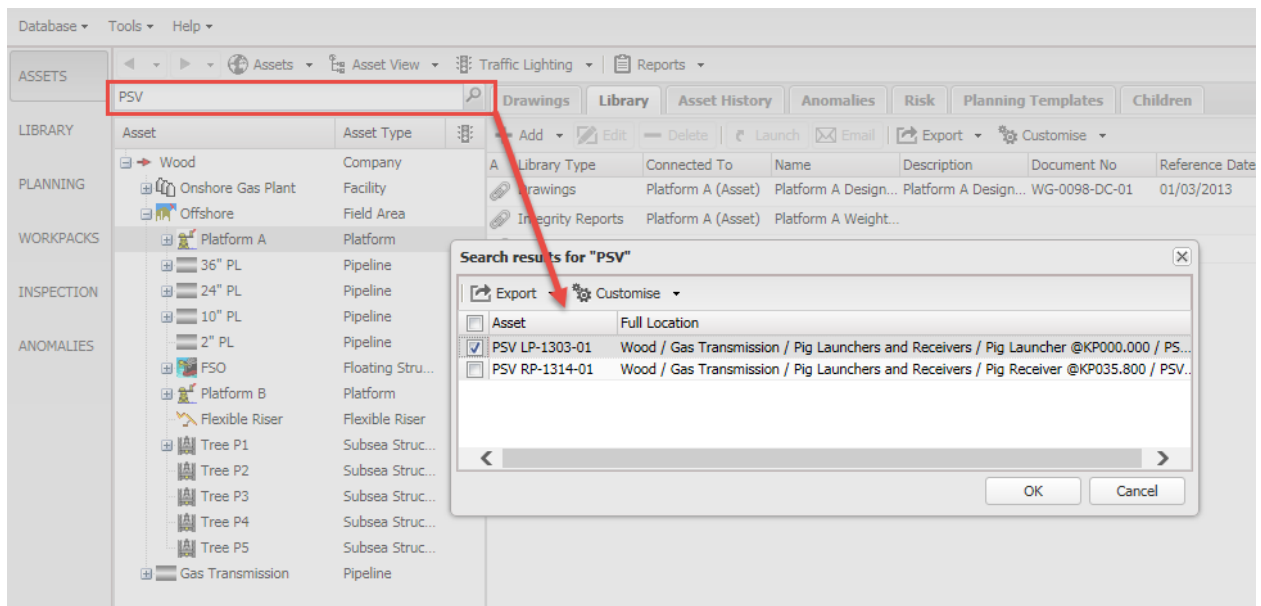


14.7.6 IC-Web improvements

IC-Web users (with a read/write license) now have the ability to add and/or edit a wide range of information: asset information, events, anomalies etc. Please note that all configuration activities will still be carried out using NEXUS IC. We've also added a quick Asset Search box to the asset hierarchy, allowing you to quickly find assets.

14.7.7 Point and Range Events are now just Events

Historically, NEXUS had the concept of Point events and Range events. From v6.4, there is no longer any requirement to differentiate between Point and Range event types.



14.7.8 HiDPI

NEXUS 6.4 builds on 6.3's support for high dots-per-inch monitors, which includes many laptop screens.

14.7.9 And many more

- In report tables, we've added the option to hide columns of data which contain all NULL values. This is particularly useful in Vertical Tables.
- In *Video* review, we've added frame step backward. (Where available. Limitations apply. Offer void where prohibited by video codec.)
- In *Lookup* objects in functions we've added a "Contains" comparison type.
- Ability to define new Base *Map Servers* (from clients' own GIS systems).
- Export NEXUS *Reports* directly to Library.
- Shortcuts with functions with parameters.
- Import *Survey Set* data (not just via events).
- Configure quick access to *Favourites* reports on the *Reports* toolbar button.

14.7.10 Older versions

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 6.3](#)

[What Was New in 6.2](#)

[What Was New in 6.1](#)

The following pages contain pertinent legal information.

15.1 End User License Agreement

END-USER LICENSE AGREEMENT FOR: NEXUS INTEGRITY CENTRE

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7. Compliance with Applicable Laws:

You must comply with all applicable laws regarding use of the SOFTWARE PRODUCT.

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5. PRIVACY

The application may anonymously track your usage and send it to Wood for analysis. We use this analysis to make improvements to the software. The application may also capture information relating to unhandled errors and may capture a screen image in this specific scenario. Any user identifiable information is blurred. No personally identifying information is tracked, and nothing about your usage can be tracked back to you.

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15.2 Cryptography Declaration

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (<http://www.openssl.org>)

This product includes cryptographic software written by Eric Young (ey@cryptsoft.com). This product includes software written by Tim Hudson (tjh@cryptsoft.com).