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1. Introduction

LFM NetView enables secure on demand access to a ‘Trusted Living Pointcloud’, to deliver the as-operated asset conditions to all project stakeholders where and when needed.

LFM NetView is a simple, intuitive way to view laser scan images and access trusted as-is datasets. It can be used to share information within an organisation and their nominated partner companies, where projects can be accessed via company networks or the internet. Projects can be efficiently stored and managed locally, or as an enterprise Cloud based solution.

Once configured, the LFM NetView project of the asset brings laser survey data to a wide range of users, either in the office or on the move. The imagery and tools are simple to access, and novice users can visualise conditions on site without the necessity of prior training. Any number of users can access a project or asset concurrently. All users are accessing the same LFM dataset; the ‘Trusted Living Pointcloud’.

In addition to the traditional engineering and design users; LFM NetView & LFM Server are now as relevant to inspection, maintenance, operations, and facility management personnel. They can now all interact and communicate with each other by accessing a controlled master dataset.

LFM NetView is innovative and unique in its approach to sharing 3D laser scan data online as it connects back to the master LFM Server dataset. This approach ensures that resolution of 3D laser scan data is maintained when accessed remotely. The LFM NetView approach ensures there are no restrictions; for the first time end-users can remotely and rapidly access huge datasets containing an unlimited number of scans.
LFM NetView projects require no additional software to be installed on machines prior to use as it is plug-in free. All that is necessary is the project URL and login credentials. Most modern browsers support LFM NetView projects including Microsoft Internet Explorer, Google Chrome and Microsoft Edge. Projects can be accessed by an array of mobile devices from tablets to smartphones.

LFM NetView projects can still be used in office environments on workstations and laptops however, where many people benefit from its accessibility and simplicity.

Security is understandably an extremely important aspect when considering software to view laser scanned assets. LFM NetView has this designed into its core functionality and can be configured to use secure certificated (https) communications for all interactions between viewer and project host. All the project files used by the software are encrypted, and can only decrypted within the components of the LFM NetView system.

LFM NetView is available in both online and offline modes. Data can be ‘checked out’ from the master dataset, used remotely where there is no internet connection, and then later ‘checked in’ and synchronised.

LFM NetView is also unique in the level of functionality offered. An extensive range of Markup and measurement facilities are provided. This allows users to visualise and create Markups & measurements, either in the office, or on site. As LFM NetView Markups are being attached to 3D data, once a Markup has been added to the project database, any scan that can conceivably see that volumetric shape will automatically display it within the laser scan image.

LFM NetView also displays project ‘Fast Tags’ that have been added by LFM Server project administrators from external data sources; spreadsheets; CSV files; Tag lists; engineering information etc.. These can be manually assigned and positioned by interacting with the BubbleViews, or located directly by importing their name, descriptions, and coordinate values using LFM Server.

3D objects can also be viewed inside LFM NetView. Users can interact with these objects to see them directly inside the laser scan data and display their tag information. As these are true 3D objects, they can be visualised in any laser scan that see the object in question.

LFM NetView security, architecture and configuration are covered in a separate document.

Please visit the LFM website for further information about LFM Server’s capabilities. (www.lfm-software.com)
## 2. Key Features

### General
- Tablet enabled
- Use on the Cloud
- Online / offline mode
- Connect to multiple LFM Server datasets
- 3D Markup support
- 3D object support
- Google Maps landing page support
- Links to external documents & URLs
- Scan meta-data display
- Plug-in free solution
- Single Sign On support
- Unlimited browser users
- Ideal for:
  - Inspection
  - Facility Management
  - Construction
  - Demolition Planning
  - Maintenance
  - Compliance
- Language support:
  - English
  - French
  - German
  - Portuguese

### Integrated Floorplan
- Created from as built laser data
- Support for multiple plans at different elevations
- Sectional floorplans
- Scan location display
- Field of view indication

### Viewing Images
- High resolution imagery
- 360 degree control [azimuth/vertical]
- Pan and zoom
- Diagonal flight
- Optimised for tablet use
- Directional compass
- Colour/Mono switching
- Rapid download speeds
- Magnification window

### Viewing Fast Tags & Markup
- True 3D Markup display. Markups will be displayed in all scans capable of seeing a given Markup
- Markups can be created in LFM Server or LFM NetView, then shared with project personnel
- Add links to documents or URLs
- 3D Markup toolkit can be used online or offline
- Markup may also be labelled to suit the needs of the project. [E.g. Inspect, Maintain, Paint, etc.]
- Edit (re-size or re-position) markups after creation
- Comprehensive search tools
- Integration with AVEVA NET

### Measurement
- Units
  - Metres
  - Millimetres
  - Feet and Inches
  - US Survey Feet & Inches
- Point measurement enquiries
- Distance measurement enquiries
- Pipe diameter enquiries
- Tie-in display from LFM Server
- Online / offline measurement
- 3D measurement support
- Measurements stored in Database (DB)

### Collaboration
- Centralised data storage (DB)
- Portal onto a live LFM Server datasets
- Download project scans to a mobile device for site visits
  - Time limited on device
  - Inspection items
  - Labels
- Synchronise following visit
  - Instant 3D Markups
  - Measurements
Supported Hardware & Browsers

Desktop, laptop, tablet, and smartphones.
  • Graphics card/processor supporting WebGL required

Internet Explorer 11
Microsoft Edge v25 and above
Google Chrome

Please note: LFM NetView may operate on other browsers, but has been optimised and tested for use with the above.
3. Using this guide

LFM NetView projects can be accessed on a wide range of devices and browsers which may differ with respect to user input.

These graphics illustrate a user input or control description. If there are any references to selection, flight control or general use that do not have these graphics, it should be assumed that these relate to standard desktop or laptop computers.

User controls for standard laptop or desktop computers.

When there is a difference with the way the interface behaves with respect to use on mobile devices you will see this graphic followed by a description.
4. Accessing LFM NetView Projects

4.1 Project Access

Users will be given a project landing page URL, project name, username and password. This information needs to be entered to gain access to the project.

Enter the project landing page URL in the browser address bar to access the project login screen.

![Project Login Screen]

The project name, username and password should then be entered in the boxes as shown below.

![Logged In Screen]

Note that if the project folder and project file name match then you can enter just the name of the project file and this will be automatically be expanded by LFM NetView. If the project folder and project file name are different you can enter just the project folder and the project name (e.g. project_folder/project_name.proj). For example:

…/NetViewProjects/Project1/Project1.proj can be shortened to Project1.
…/NetViewProjects/Revamp/Project1.proj can be shortened to Revamp/Project1.
LFM NetView projects can be used online or offline. If a user prepares a project for offline use this can be accessed via the landing page. Please read the ‘Taking LFM NetView Offline’ section for further information about preparation or use of projects on the move.

There are currently two types of LFM NetView accounts that offer either standard or guest user privileges (guests cannot save to the project database). Accounts may be given permission to go offline by the Project Administrator.

The project URL field contains a drop down box which stores a history of previously accessed projects for increased ease of access.

4.2 Google Maps Landing Page

If the project being accessed has a Google Maps landing page, the login screen will only ask for the username and password – it will not ask for a project URL.

Upon logging in to the landing page, an instance of Google Maps will be displayed with a project marker showing the location of each project on the landing page. The projects will also be listed in the Sidebar.
Each of the datasets can be located either by manually zooming in to one of the dataset markers, or by selecting the relevant project and dataset in the sidebar.

On zooming into a dataset, each of the individual scan positions within that project will be displayed on the map. The scan markers will be coloured based on the elevation of that scan. A key is provided at the bottom right of the page to show which colour relates to which elevation.

Clicking on a project/dataset/scan marker will bring up a dialog that displays the details of that project/dataset/scan. Pressing the *Open* button will load the login page for the associated project.
Simply enter your username and password (the Project field will be pre-populated) and click Log In to enter the project. And if the project is SSO, it will auto login provided it is on the same corporate network as the landing site.

![Login Screen]

LFM NetView 4.2.1.0 onwards supports Google Maps functionality, the licence terms of which prohibit use in certain areas - including China (a full list can be found at: https://enterprise.google.com/maps/terms/maps-prohibited-territory.html). Use of the release in these areas is therefore also prohibited without further review by AVEVA legal and development teams – please contact support@lfm-software.com for further details.

### 4.3 Single Sign On

If a project has been set up with Single Sign On, your username and password will be the same as your company account username and password. Once you have entered your login details they will be remembered by your browser for a period of time which is specified during project setup (between 1 and 12 hours). Once that period has passed, you will be asked to re-enter your details in order to continue using that project. The session time will then begin again.
4.4 Logging Out

To log out of a project click the Menu Options button (highlighted below) and select Log Out as shown left. A confirmation dialogue will appear asking you to confirm you want to log out. Click Yes to proceed.
5. The Project Floorplan

A site floorplan is presented upon entry to the project. LFM NetView supports the use of multiple floorplans which are all derived from laser data. These are typically set to correspond with the site major elevation changes, and are defined by the person creating the LFM NetView project. Sectional plans can also be used for side elevations at key points of interest. If a user wishes to switch to a different floorplan they can do so via the Project Components Browser ‘Floorplan’ tab.

The project scan locations are identified as blue circles on the floorplan. Users simply pan/zoom to a point of interest and select a suitable scan location to load the laser scan BubbleView directly from the displayed plan.

Note: There are two other ways to load BubbleViews which will be covered separately in this guide (scans list and from within the current BubbleView).

Floorplan movement controls:

- Pan - Left mouse click and drag
- Zoom – Roll mouse wheel

- Pan - Finger press and drag
- Zoom - Pinch

Note: LFM NetView floorplans will offer an increased level of detail as the user navigates & zooms to a point of interest.
The floorplan view can also display the project 3D Markups/measurements/objects. This allows the user to determine where they are located within the building or facility, so that appropriate scans can be opened in which to display them.
6. Loading Scans from a Floorplan

To load scans from the floorplan:

- Double-click on a scan site
- Double tap with your finger on a scan site
7. BubbleView Images & Control

The BubbleView is an intuitive method for viewing and interacting with data from a laser scan, and allows the user to place themselves at any scan location, and visualise the scene as if they are standing there.

The BubbleView provides the user with a dynamic but narrow field of view at any one time, which will reduce perspective distortion in the image. A BubbleView allows true 360° rotation of the image with both directional and magnification control. Real time zooming and panning gives the user the sensation of actually flying around the scanned environment. Comprehensive measurement and Markup facilities are also available within the BubbleView environment.

BubbleViews offer true ‘photo’ clarity, and link back to the original measured 3D coordinate (greyscale or colour). With this system there is no requirement to decimate or degrade the laser scan to allow use on the internet. All interactions with BubbleViews are therefore effectively using potentially limitless high resolution sets of laser measurements to guarantee high levels of precision and clarity.

LFM NetView BubbleViews are 3D enabled, and are capable of displaying objects, project tags, Markups, objects and measurements.

A mini floorplan window is available in the bottom right of the open BubbleView. This provides a viewing frustum which is updated in real time to reflect the current field of view. As a user zooms in to focus on a point of interest, the frustum narrows in unison. This can be toggled on or off in the Options.

BubbleViews have navigational compasses displayed in their ‘dead’ zone. This area does not contain laser data.
BubbleView controls:

- Pan – Left mouse click and drag
- Zoom – Roll mouse wheel

- Pan – Finger drag
- Zoom – Pinch
- Centre screen - Double-tap on a point of interest

### 7.1 Switching Between Colour and Intensity

For colour scans it is sometimes desirable to view the intensity data without the colour overlaid. This can be for scans taken in poor lighting conditions or if a shadow is obscuring an item of interest.

To do this select the colour/intensity switch in the top right of the BubbleView window as shown left. Note that this switch will only be present in scans where colour is available.

### 7.2 Loading other scans from within the current BubbleView

In the Floorplan section of this guide we saw how to load a BubbleView directly from the floorplan. BubbleViews can also be located and launched from within the current open BubbleView. Again, other scan sites are displayed as blue circles. The circles are scaled according to range – scan sites closer to the current BubbleView are larger; scan sites further away from the current BubbleView are smaller.

The range of scan locations displayed can be configured by the user via the Options tab of the Project Components Browser. It is advisable to reduce the range figure on densely scanned projects so they do not impede use of the BubbleView.

To load scans from the current BubbleView:

- Double-click on a scan site
- Double tap with your finger on a scan site
8. Accessing the Projects Components Browser (Sidebar)

The Project Components Browser (sidebar) controls several LFM NetView features and options.

Many of LFM NetView's features are accessed from the Project Components Browser, a simple switch controls the visibility of this menu. Simply toggle the Project Components Browser on/off as required (see illustration left).
9. Project Components Browser - Floorplan

LFM NetView supports the use of multiple floorplans which are all derived from laser data. These are typically set to correspond with the site major elevation changes, and are defined by the person creating the LFM NetView project. Sectional plans can also be used for side elevations at key points of interest. The illustrations below show sectional and building level floorplans.

Click/tap on the Floorplan tab to show the list of available floorplans within the current project. Click/tap on the desired floorplan to display it in the main LFM NetView window.

Floorplans can be searched for by name using the search box at the top of the list.
10. Project Components Browser - Datasets

LFM NetView 4.2 onwards supports multiple LFM Server datasets within one LFM NetView project. This allows for easier structuring and management of point clouds and related data.

Click/tap on the Datasets tab to show the list of available datasets within the current project. Click/tap on the desired dataset to display the list of scans within that dataset.

Load the desired BubbleView by clicking/tapping on it.

Users can search for a particular dataset or BubbleView by name. Many projects prefix scan names with building/unit, level, or process name. Using the scan filter in these situations is beneficial. The filter can be reset using the cross symbol.

If the scans within the project contain metadata, the View Metadata for BubbleView icon (highlighted left) will be displayed at the side of the scan name. Simply click this icon to display the metadata for that scan.
11. Modelled Objects Display

LFM NetView can display 3D objects from an .xgl or .zgl file. This allows users to see the modelled objects overlaid with the laser data. As objects are truly 3D, they are visible in any scan that can conceivably see them. Users can interact with the objects to see the object name and navigate to that object in the Project Components Browser. If there is a hierarchy present in the .xgl or .zgl file this will be reflected in the Project Components Browser.

The process of adding these objects is done during the deployment stage by the Project Administrator. This document will focus on the use of these objects in the LFM NetView project.

The display of modelled objects in the BubbleView is dynamically linked to the object hierarchy in the Project Components Browser and vice versa. This means that selecting any level in the hierarchy in the Project Components Browser will highlight that group (and all of its child items) or object as well as looking at the centre of the group or object in the current BubbleView.
For groups of objects a white arrow will be present on the right of the tab. Click on the white arrow to expand the group within the Project Components Browser and display the objects within that group.

Double clicking/tapping on a group or object will load the best BubbleView for that group/object to display it.

Clicking/tapping on an object in the BubbleView will select the corresponding object in the Project Components Browser. Hovering over an object will display its full name in a callout as seen above.

Modelled objects display can be toggled between “disabled”, “selected and hovered” and “all” in the Options.
12. The LFM NetView App Bar

Some of the features within LFM NetView can be conveniently accessed from the App Bar (see left) which is positioned at the top right corner of the interface. The buttons available on the App Bar will change according to the current view. Each of these functions is described below.
13. The LFM NetView Power Wheel

Measurement and Markup creation within LFM NetView are initiated from the PowerWheel. There are several ways to call this menu when in the BubbleView.

Calling the PowerWheel:

1. Open by selection of the "Open the PowerWheel" button on the App Bar (shown right).
2. Or by right clicking in the BubbleView.

1. Tap on the LFM logo
2. Or press and hold anywhere on the screen

Once opened, users may select from these functions which will be explained in detail later in this document:

- **Measurement** – point, distance, or diameter
  
  *Note: Diameter measurement is not available in offline mode.*

- **Markup** – spherical/point, box

- **Magnification Window**

  Tooltips will be displayed at the top of the BubbleView to provide the user with information on what to do next.

Dismiss the PowerWheel by clicking in the centre or clicking outside the PowerWheel.
14. URL Linking to a Scan

It is possible to create a direct link to an LFM NetView project, scan, position and zoom level.

To do this click the *Show BubbleView URL* button which is highlighted left.

![Share URL to navigate to BubbleView at the current focal point](https://421test.clouddapp.net/netview.html?projects=NetviewProjects/eaton_automation/ea)

To copy the link click the *Copy Link* button highlighted above. Simply paste the link into a supported browser and enter your project login details to navigate directly to the current view.
15. Full & Tiled Views

BubbleViews can be viewed separately in full screen, or in a tiled viewport (4 maximum).

To switch between the full and tiled views select the *Switch to Tile View/Switch to Full View* toggle shown left.

To load scans in the Tile View simply drag and drop the desired scan from the Project Components Browser onto the desired quadrant of the Tile View. To display a BubbleView across two tiles simply drop the scan from the Project Components Browser in between two tiles.

The name of the scan will be shown in the top left corner of the tile upon moving the mouse cursor into that tile.

You can close a tile by simply clicking on the red cross in the top left corner of the tile.
16. QR Code Scanner

When performing an inspection task in a large facility, it can be difficult to know your location, especially as facilities can be remarkably similar. To help alleviate this problem, the QR code scanner gives the user a simple method of localising themselves when using LFM NetView on a tablet if QR codes have been placed in the facility.

All tablets contain an on-board camera. Once a QR code has been identified with the camera, LFM NetView will load up the best BubbleView in and show the matching item (markup or measurement) in the laser data. The user will also see their position on the floorplan.

To initiate the QR code scanner select the video camera icon in the top right of the LFM NetView interface as highlighted left.

In most circumstances the user will have to allow the browser access to the camera via a dialogue similar to the one shown left. This only has to be done once on https://connections only.

After allowing access to the camera, the scanner window will appear as shown left. Move the camera over the QR code.

If the scanner detects the contents of the QR Code to be an entity (Markup, measurement, object or scan) that exists in the project, the appropriate BubbleView will be loaded, centred on the linked entity. The detected entity’s type and name will also appear at the bottom of the scanning window.
17. Options

The Options menu can be accessed by pressing the Options button as highlighted left. Each of the options available are explained below.

17.1 Language

The LFM NetView interface can be displayed in either English, French, German or Portuguese. If a French, German or Portuguese translation is not available, the text will be shown in English.

If LFM NetView detects that your browser is set to use French, German or Portuguese it will automatically select the relevant language to display the LFM NetView interface in.

LFM NetView will remember this setting for the next time you access the project. If LFM NetView detects a conflict between the language your browser is set to use and the language LFM NetView was last set to, you will be asked which of the two languages you would like to use.

17.2 Help

Select to view or download the LFM NetView help guide (this document).

17.3 Taking LFM NetView Offline

LFM NetView users can take their projects ‘offline’ for site visits, client meetings, and presentations. This means that a time limited snapshot of the project and up to date Markups/measurements can be quickly and efficiently downloaded to a compatible mobile device or netbook/laptop. Once finished, this project can either be discarded or synchronised back to reflect any new changes made whilst on site.
Preparing an offline session

Open the project on the device being taken to site (wired/Wi-Fi connection).

Select the Options button from the App Bar, hover over Offline and select Create Session. If this button is not visible then you do not have the required permissions to go offline. These permissions can be added in LFM Server by users with the User Administration permission.

Select the scans needed for the review from the list provided on screen. The user may choose to take a limited number – or all if the device has sufficient storage resources*.

* Microsoft IE = 250MB (can extend to 1GB) Google Chrome = 10% of free disk space.

For large projects that need to be accessed in their entirety, an option of downloading ‘compact images’ is available. The visual degradation of the images is not immediately obvious, but this will offer more efficiency with respect to storage.

The user may also save a local copy of the LFM NetView manual (this document) to the selected device for use whilst offline. Do this by ticking the Download LFM NetView Help Manual option.

The number of days the offline session is valid for should also be specified. The maximum limit for this field is set by the Project Administrator in LFM Server.

Note: Compact images will not impact on measurement or Markup due to the nature of the LFM NetView system.

This process will automatically take copies of all associated floorplans.

Once complete, the user can go offline by selecting the Options button from the App Bar, hovering over Offline and selecting Load Stored Session.
To access the project offline from the landing page, simply use the same project URL in the browser, then select the *Offline Mode* tab.

The project will be listed with an indication of how old the copy is. It is always advisable to take an up to date snapshot of the project prior to site visits & offline reviews.

If site Markups or measurements were taken whilst offline, users can synchronise the project when a suitable internet connection is made. This is accessed via the Options > Offline menu by selecting the *Sync Back Online*. 
17.4 Options menu

The Options menu is categorised as shown left.

<table>
<thead>
<tr>
<th>Options</th>
<th>FLOORPLAN</th>
<th>BUBBLEVIEW</th>
<th>SIDEBAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show legend in floorplan</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Show floorplan BubbleView labels</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17.4.1 Floorplan Options

Control the display of the floorplan legend with this option. This is switched on by default.

Scan site names (labels) can be set to be displayed at all times; dynamically (as a user hovers over the site with the cursor); or never.

The illustration (left) shows why users may wish to select dynamic display for clarity. On less densely scanned areas however, it may be desirable to label all the scan sites.

Options:
- Always
- On Mouse Hover (Default)
- Never

17.4.2 BubbleView Options

This option allows users to superimpose a small Floorplan in the BubbleView (bottom right corner). This is activated by default.

This option controls the smooth visual opening of the PowerWheel. If this is deselected, it operates as a direct switch. This may be appropriate on low specification devices.
This controls the display of the directional compass in the BubbleView. This can often be useful when using LFM NetView on a mobile device such as a tablet where screen size is limited. Un-tick the box to hide the compass in the BubbleView.

Close scan sites are displayed inside the BubbleViews. These are scaled to illustrate which are closest to the current eye position. If there are too many scan sites it can be distracting to the user. Change this option to only show scan sites within the specified range.

Untick the “Use default” box to enable the range slider. Drag the slider left and right to display fewer or more scan sites respectively. Alternatively, double click on the value to allow manual entry. Type in the desired value and press Enter to accept.

LFM NetView supports several working units: meters, millimetres, feet and inches and U.S. Survey feet and inches.

Users can set their preferences with this option. The default units are meters.

If the Floorplan is displayed in the BubbleView, the user can change the size of the Floorplan between Normal and Large. Select the desired option to change.
The display of modelled objects can be changed to one of the following options:

- Disabled – never show any modelled objects
- Selected and Hovered – only show modelled objects when they are either selected or the mouse cursor is hovered over them
- All – always display all modelled objects

The lighting of modelling objects can be changed to one of the following options:

- Shaded – this gives the modelled objects a more realistic lighting appearance but takes longer to download and consumes more memory on the machine.
- Flat – this removes the lighting effects from the modelled objects but will allow the objects to download quicker and permit a larger number of objects to be loaded.

17.4.3 Sidebar Options

This keeps the Project Component Browser (PCB) hidden after use if selected. When set, the PCB will be switched off when the user interacts with a BubbleView. This is switched off by default.

Turning this option off will hide the confirmation window that is displayed when the user deletes any entity (Markup or measurement).
18. Measurements

LFM NetView always connects back to the master LFM Server dataset. This can be seen as a simple terminal onto a potentially huge point cloud offering sub-millimetre density, operational speed and the availability of an unlimited number of project scans. This means that any measurement interaction via an LFM NetView session has LFM Server providing a detailed response to queries in moments. Measurements taken are therefore not ‘approximate’, and should be viewed as highly accurate, and in line with the expectations of engineering users of LFM Server.

Measurement functions are accessed via the LFM NetView Power Wheel. To open the PowerWheel:

1. Click the *Open the PowerWheel* button on the App Bar (shown right).
2. Or by right clicking in the BubbleView.

1. Tap on the Open the PowerWheel button on the App Bar (shown above right).
2. Or press and hold anywhere on the screen

### 18.1 Single Point Measurement

Select a single point measurement with the *Point Measurement* button (shown above left).
Left mouse click on a point of interest to make an enquiry from the project point cloud dataset.

Tap on a point of interest to take a measurement.

The point coordinate value will be returned to the LFM NetView user directly in the BubbleView.

Please note that measurements cannot be placed as accurately on mobile devices, due to the use of ‘finger picking’. If this is an issue, measurements can be repeated & replaced when back in a suitable environment.

When using an LFM NetView project offline, the central project database will be updated when a user synchronises their work. Additionally, users may not be able to extract an accurate coordinate when operating offline. In these situations, temporary field measurements may be fully resolved once back online. This guarantees the accuracy within LFM NetView sessions relates to the full laser surveyed point cloud.

The Project Components Browser has provision for the user to input a relevant name for the measurement. Once this has been input, other ‘live’ users of the project will see this following a project refresh.

Once the measurement has been committed to the central database, a user may delete or rename it using the tools shown left. You can turn the deletion confirmation dialogue off in the Options under Sidebar > Confirm Entity Deletion.

18.2 Measurement between Two Points

LFM NetView users may also measure between two points. Once the Point to Point Measurement is chosen, the user will be prompted to select both points within the BubbleView. Following this, the points will be accurately resolved on screen using the laser point cloud, and the results displayed within the BubbleView.

The following picture sequence illustrates this workflow.
Measuring between 2 points:

1. Pick the 'Point to Point Measurement' tool from the PowerWheel.
2. Select the start and end point for the measurement calculation with a LH-Mouse click.

1. Tap the 'Point to Point Measurement' tool from the PowerWheel.
2. Select the start and end point for the measurement calculation with a finger tap.
The displayed results include the 2 point coordinates selected, the overall distance and the delta values between them.

As with the single point measurement the point to point measurement will be shown in the Project Components Browser. Once this has been input, other ‘live’ users of the project will see this following a project refresh.

Once the measurement has been committed to the central database, a user may delete or rename it using the tools shown left. You can turn the deletion confirmation dialogue off in the Options under Sidebar > Confirm Entity Deletion.

18.3 Pipe Diameter Enquiries

This function allows the user to quickly determine the diameter of a pipe. The user defines a line along the path of the pipe to be measured and its diameter is then calculated. Results are displayed in the BubbleView showing the diameter as an annotation, with a translucent pipe aid overlaid for clarity. The user can visually check the accuracy of results before adding a project measurement label in the Project Components Browser.

Note: This feature is not available when in offline mode.

Measuring a pipe diameter:

Left mouse click the start and end of the desired pipe.

Select the start and end points of the desired pipe with a finger tap.
LFM will then calculate the ‘best fit’ cylinder using the path between the 2 points. Please note that these points have no direct impact with the results, but offer a directional guide to the LFM fitting algorithm. Once the calculation has been processed, a pipe aid will temporarily appear on screen.

This will then be automatically committed to the project database, and will change colour on screen (green).

The results are displayed in the BubbleView.

As with the other measurements the point to point measurement will be shown in the Project Components Browser. Once this has been input, other ‘live’ users of the project will see this following a project refresh.

Once the measurement has been committed to the central database, a user may delete or rename it using the tools shown left. You can turn the deletion confirmation dialogue off in the Options under Sidebar > Confirm Entity Deletion.

Note: All measurements listed in the Project Components Browser can be located in the BubbleView by selection with a single click/tap. All visible measurements in the BubbleViews are also selectable from user input in the image, which will link back to the listing in the Project Components Browser.

If there is insufficient data to calculate a measurement, the user will be informed via the message shown left.

18.4 LFM NetView Measurement Feedback

In practice, all measurements are returned to the user within the active BubbleView. These are colour coded to represent the different axes, where X/Easting is RED; Y/Northing is GREEN and Elevation is BLUE.

The contents of these measurement call-outs can be copied to the clipboard, to include in documents and spreadsheets. This is accessed via a right-click in the measurement/Markup callout (example shown left).
The user has control over the copied information via the form shown left. To copy a part of the measurement information to the clipboard simply left click on it.

To save all the measurement/Markup information to a text file simply click the Save button.
19. 3D Markups & Fast Tag Display

3D Markups and Fast Tags can be created directly in LFM NetView or LFM Server 4.3 series onwards [hosting software].

LFM NetView projects use the same LFM Server laser dataset that is used for design. In practice, this can be a copy of the data, or the same data which is used for both purposes. LFM Server 4.3 onwards has authoring tools to create 3D Markups and add Fast Tags from coordinate/description spreadsheets. There is also provision to add and maintain project ‘labels’. These can be adapted to suit the needs of the project, but could include routine maintenance tasks; inspection items; discussion points; etc.

Please read the LFM Server guide for further information about these possibilities.

This guide will focus primarily on the tools available via an LFM NetView session.

Markups can be made directly within LFM NetView. If field Markups are defined these can be edited further upon return to the office if needed. For example, anomalies can be quickly identified and ‘marked-up’ on a tablet in the field, and reworked when connected back to the main project.

Markup functions are accessed via the LFM NetView Power Wheel. To open the PowerWheel:

1. Click the *Open the PowerWheel* button on the App Bar (shown right).
2. Or by right clicking in the BubbleView.

1. Tap on the Open the PowerWheel button on the App Bar (shown above right).
2. Or press and hold anywhere on the screen
19.1 Making a Point Markup in LFM NetView

Select the *Point Markup* button (shown left) on the PowerWheel.

Left mouse click and release on a point of interest, then move the mouse cursor to drag the sphere to an appropriate size. Left click again to complete.

Press and hold your finger on a point of interest in the BubbleView; then drag away to control the size of the spherical Markup.

Once Markups are committed to the database they will appear in the Project Components Browser and will turn green in the BubbleView.

To delete the Markup click the *Delete Markup* button shown left.

To edit the Markup click the *Edit Markup* button shown left.

Here you can rename the Markup and edit the labels/URLs associated with the Markup. To add a new label/URL simply enter the information in the *Enter Label or URL* field and press Enter. To delete a label/URL simple click on the cross next to that label/URL. Once the desired changes have been made click the *Submit* button to commit these changes to the project. To exit this dialog without committing any changes, click the *Cancel* button or click the cross in the top right of the dialog.

Markups/Fast Tags appear in the floorplan to guide users to the most appropriate BubbleView to load. This a useful feature when visiting sites for project/inspection reviews and identifies the area where the Markup resides.
19.2 Making a Box Markup in LFM NetView

Start the box Markup process by selecting the illustrated button.

Follow the on screen instructions to define the extents and depth of the box.

This works in a similar way with mobile devices. Press on screen at the appropriate position to define the footprint and depth of the box.

Please note that this can deliver a larger or misplaced box than you expect. If you are not happy with the results you can edit the size and position of the box. See the instructions below (Editing a Markup) for guidance on how to do this.
Once Markups are committed to the database they will appear in the Project Components Browser and will turn green in the BubbleView.

To delete the Markup click the *Delete Markup* button shown left.

To edit the Markup click the *Edit Markup* button shown left.

Here you can rename the Markup and edit the labels/URLs associated with the Markup. To add a new label/URL simply enter the information in the *Enter Label or URL* field and press Enter. To delete a label/URL simple click on the cross next to that label/URL. Once the desired changes have been made click the *Submit* button to commit these changes to the project. To exit this dialog without committing any changes, click the *Cancel* button or click the cross in the top right of the dialog.

Markups/Fast Tags appear in the floorplan to guide users to the most appropriate BubbleView to load. This a useful feature when visiting sites for project/inspection reviews and identifies the area where the Markup resides.

**19.3 Additional Markup/Fast Tag Information**

One important feature about the Markup process is that all markups are stored as 3D volumetric shapes in the project database. This means that they will be automatically displayed in any BubbleView that can conceivably see them.
19.4 Editing a Markup

To edit a Markup once it has been created, right click on the desired Markup. Alternatively select the Markup in the Project Components Browser and click on the pencil icon. This applies to both box and point Markups.

Tap and hold, then release on the desired Markup. Alternatively select the Markup in the Project Components Browser and click on the pencil icon. This applies to both box and point Markups.

This will display arrows on the faces of the selected Markup.

Choose between resizing and repositioning the Markup using the buttons at the bottom right of the interface as shown left.
Left click and release on the arrow corresponding with the face you wish to edit. Moving the mouse cursor will move/resize the markup in the specified direction. Left click to finish. Further adjustments can be made at this point in the same manner. Once you are happy with the new size/position, left click away from the Markup to commit to the project database. To cancel editing press Escape or right click to return to the original Markup size and position.

Tap and drag on the arrow corresponding with the face you wish to edit. Release to finish. Further adjustments can be made at this point in the same manner. Once you are happy with the new size/position, tap away from the Markup to commit to the project database. To cancel editing press tap on the blue X on the callout at the top of the screen (as shown below) to return to the original Markup size and position.

19.5 Markup Location Displayed in the Floorplan

Markups/Fast Tags can be quickly identified in the floorplan. Users double clicking on a Markup in the Project Components Browser will be able to identify all the close scans to that object. This makes the process of finding individual Markups/tags on often large complex facilities straightforward.

Simply click on the nearest viewpoint to view the Markup.

19.6 External Document, URL and Drawing Linking

Markups can be assigned external links to documents and URLs either in LFM Server or directly in LFM NetView. Users can quickly call up inspection method sheets, diagrams, or equipment specification information. Several external links can be applied to a single 3D Markup to aid the different sets of people reviewing a particular item.
To add a URL to a Markup click on the pencil icon at the side of the Markup name in the Project Components Browser. Enter in the desired URL and select the *Submit* button to commit this to the project database.

The URL will appear under the specified Markup with a yellow link icon next to it. Clicking on any of the URLs (when not in editing mode) will open the URL in a new tab.

To remove a URL, simply click on the X at the end of the URL and click the *Submit* button.

*Note: Any invalid URLs will be displayed in red.*

*Note: In Internet Explorer if the http(s):// prefix is missing this typically results in a search being initiated.*

### 19.7 Grouping Markups & Tags

The Project Components Browser will support the Markup hierarchy set by the administration team. This requires access to the master dataset via an LFM Server session. The illustration (left) shows the presence of a Markup category.

It is desirable to configure several repositories to store categorised Markups. This could reflect the needs of differing users of LFM NetView, ranging from inspectors; maintenance operatives; designers and operations staff. Alternatively, design annotations could be compartmentalised into structural; HVAC; electrical and piping etc. If a grouping structure is not adopted, all the Markups & Fast Tags will be listed at the same level in the Project Components Browser.

### 19.8 Markup Labels

All Markups can be assigned ‘labels’. These can be added directly in LFM NetView or by interaction with the master project via an LFM Server session. Labels allow users to add important additional information to a 3D Markup. Labels can be seen as work lists that require user input/action. They are searchable and simple to use.

There are many different use case scenarios for these. Two examples are listed below.
Predefined Markups and labels by a project administration team using LFM Server

Maintenance and Inspection. All process valves are marked up and assigned several labels. These range from ‘condition’, ‘inspection date’, ‘operational status’, and ‘manufacturer’. Personnel conducting site visits can search for relevant labels; locate in the images and on site; then clear or alter the relevant states of these items. These will then be synchronised with the project database upon return.

Field Markups by staff visiting site

A Maintenance Engineer is conducting a routine site walkthrough. An anomaly was witnessed which may develop into a serious incident if not rectified. The item was located in the LFM NetView BubbleView and a Markup was made. This was then given an ‘anomaly’ attribute, and ‘severity’. These are then collated and actioned by project staff when committed to the annotation database upon return.

Adding Labels

Select the pencil button on the Markup being labelled.

![Image of LFM NetView BubbleView with pencil button highlighted]

The Markup will expand to allow the user to add all necessary labels. LFM NetView supports single or multiple labels within the project.

Click on Enter Label or URL, then type the required name/description. To commit the label to the LFM NetView project database select Submit.

Note: If several labels need to be added at the same time it is preferable to follow this workflow:

- Add label – [RTN]
- Add label – [RTN]
- Add label – [RTN] etc.

Then select Submit. This will keep all interactions local until all the labels are uploaded to the master project database in one pass. Once the project database has been updated, the labels are displayed with the marked-up item.
**Inspection example workflow**

- Search for inspection items for this site visit.
- Click on the name of the parent Markup and locate in the floorplan.
- Using the floorplan as a guide, walk to the item to perform the inspection. Then call a near BubbleView from the LFM NetView project and look at the requirements described by the labels and/or external linked documentation.
- For the example above: if the inspection was passed, the inspector could add an inspection completed/date/recharged label or additional information to be passed back to the project coordinator. These can then be actioned by the correct personnel or linked through to external Asset Management Systems as appropriate.
20. Magnification Window

Due to factors such as scan quality and distance of scanned points, it can sometimes be difficult to read data from items such as signs and labels etc. The magnification window can be used to achieve greater clarity in a specified area of the BubbleView.

To use the magnification window:

Select the Magnification Window button as illustrated left.

Click on the first corner of the area you wish to magnify then release the mouse button. Drag the mouse cursor over the area you wish to magnify (the red magnification box will track your mouse cursor). Click again when you are satisfied with the magnification area.

Tap on the first corner of the area you wish to magnify then release. Tap and drag over the area you wish to magnify (the red magnification box will track your finger). Release your finger when you are satisfied with the magnification area.

The magnification window will now appear, magnifying and clarifying the specified area.

Click/tap outside the magnification window or click/tap on the red cross in the top right corner of the magnification window to dismiss it.

Note: The Magnification Window requires HyperBubble resources to be available in the LFM Server dataset that is connected to the project. If HyperBubble resources are not available the Magnification Window button will not be present in the PowerWheel.

Note: This feature is not available when in offline mode.
21. Filtering Options Within LFM NetView

LFM NetView projects have the capability to hold and present many forms of data to users. Users are reminded that categories can be created within the master dataset by project administration staff using LFM Server. This allows similar information to be grouped together, and thereby reduces the amount of data initially presented to LFM NetView users. Information stored in the LFM NetView database can be filtered by name, whether it is in the general list or in a defined project category.

21.1 Searching and Filtering of Scans, Measurements, & Markups

Start typing in the filtering box to reduce the number of items displayed to the user for clarity.

21.2 Markup Label Filtering

Label filtering can be applied to reduce the information provided to the LFM NetView user.

Markups present in the Projects Components Browser may have labels associated with management or inspection of the plant or facility. To focus on a given label, simply call the ‘label filtering’ dialogue, and begin to type a relevant name in the input field. LFM NetView will automatically remove any Markup that does not match the typed name. LFM NetView allows multiple filters to be applied.
This example illustrates how to find several fire extinguishers on plant. The pictures below show a user filtering all data to highlight anything due for an annual inspection.
21.3 Scan Date Filtering

If one or more of the scans within the project have scan metadata, you may filter the list of scans by date. Simply fill in the minimum and maximum date using the fields shown left (these are displayed when the Sidebar is displaying the dataset or scan list) and only scans captured between these dates will be displayed.
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