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1 SAP Predictive Asset Insights

SAP Predictive Asset Insights is an Internet of Things (IoT) application. You can reach all the functions from the SAP Fiori launchpad.

The business benefits include:

- Avoidance of costly disruptions by predicting equipment malfunctions before they happen by processing huge volumes of information technology (IT) and operational technology (OT) data using sophisticated machine learning algorithms.
- Use insights from sensor data to improve product quality, reliability, and customer satisfaction
- Manage complex asset (equipment) structures
- Build an asset network collaboration for better service and maintenance processes

The functions are organized in the following categories:

- Analytics [page 12]
- Processes [page 65]
- Master Data [page 77]
- Machine Learning Engine [page 269]
- Administration [page 371]

Supported Languages

The following languages are supported:

- English (default UI language)
- German
- Italian
- Simplified Chinese (locale: zh-CN)
- Japanese
- French
- Russian
- Spanish
- Czech Republic (locale: cs-CZ)
- Korean (locale: ko-KR)
- Hungarian (locale: hu-HU)
- Polish (pl)
- Portuguese (locale: pt-BR, only UI texts and Web Assistant)
- Romanian

The language in which the UI is displayed depends on the language you have set in your browser settings. If you have set a language that is not one of the supported languages, the UI of SAP Predictive Asset Insights is displayed in the default language.
1.1 Accessing Applications and Functions

Here is an overview of how to reach the various applications and functions for SAP Predictive Asset Insights.

Access URLs

The SAP Intelligent Asset Management Fiori launchpad URL provides access to all the available applications for SAP Predictive Asset Insights. For information about subscribing to the launchpad, see Subscribing to SAP Predictive Asset Insights and Other Solutions.

The following table provides you with an overview of all URLs depending on your licenses:

<table>
<thead>
<tr>
<th>Access To</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP Intelligent Asset Management Fiori launchpad for a standard license</td>
<td>https://&lt;tenant subdomain&gt;.iam.cfapps.&lt;region&gt;.hana.ondemand.com</td>
</tr>
<tr>
<td>SAP Intelligent Asset Management Fiori launchpad for a test and demo license</td>
<td>https://&lt;tenant subdomain&gt;.iam-pr.cfapps.&lt;region&gt;.hana.ondemand.com</td>
</tr>
</tbody>
</table>

Please contact your Identity Management Administrator if you cannot see the applications you require. They will ensure the appropriate role collection is assigned to your user.

Related Information

SAP Fiori Launchpad with SAP Predictive Asset Insights [page 9]

1.2 Supported Browsers and Devices

You can use the SAP Predictive Asset Insights applications on a number of devices and browsers.

The browser support for the solution is aligned with the browsers supported by SAP Cloud Platform cockpit. For more information, see the Browser Support sub-section in the topic Prerequisites and Restrictions for SAP Cloud Platform.

Some of the features are not supported on few devices or browsers. The following list provides you this information:

- You cannot work with hotspots or 3D visual files on any of the handheld devices other than a PC and a MAC.
- In the Equipment Overview application, you can scan the barcode of an item of equipment on handheld devices that use SAP Fiori client only. For PCs and MACs you must enter the barcode manually.
- You cannot upload files on an iPad that is using an SAP Fiori Client.
- Personal dashboard is preconfigured for end users only and does not include administrator relevant transactions. However, administrator can directly access the URL to navigate to each individual Admin app.

1.3 Terminology

Here we describe the meanings of some fundamental terms in SAP Predictive Asset Insights.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset</td>
<td>A resource with economic value that a company owns or controls with the expectation that it will increase the value of a firm or benefit the firm's operations. An asset can be thought of as something that will generate income, reduce expenses, improve production, and so on. The asset is managed and modeled holistically, comprising, for example, systems, locations, model, and parts.</td>
</tr>
<tr>
<td>Equipment</td>
<td>Technical entity, for example, a pump that is maintained as an autonomous unit.</td>
</tr>
<tr>
<td>Top Equipment</td>
<td>Equipment that is at the top level of an equipment hierarchy.</td>
</tr>
<tr>
<td>Component</td>
<td>Subequipment of a piece of equipment</td>
</tr>
<tr>
<td>Machine</td>
<td>Thing that turns electrical energy into work.</td>
</tr>
<tr>
<td>Tool</td>
<td>Thing that that turns physical energy into work.</td>
</tr>
</tbody>
</table>

**i Note**

The term *equipment* is a noncount noun. Hence:
- A piece of equipment (singular) = one piece of equipment
- Equipment (plural) = two or more pieces of equipment

**i Note**

Search for terminology definitions for SAP Predictive Asset Insights under component IOT-PDM at [https://sapterm.com](https://sapterm.com).
You access SAP Predictive Asset Insights using the SAP Intelligent Asset Management launchpad. This launchpad includes the applications from the SAP Intelligent Asset Management relevant products on a single SAP Fiori launchpad based on your subscriptions. We provide several roles that allow the display of groups that logically group related applications. You can customize the launchpad to show and hide applications as you require.

**Supported Features**

The launchpad supports the following SAP Fiori launchpad features:

- Anchor navigation
- Search
- User actions menu
  - App Finder - find applications and add them to the SAP Fiori launchpad
  - Settings - maintain the settings for the SAP Fiori launchpad, for example, changing the appearance of the launchpad, specifying a unit of measure, or selecting an automatic data refresh interval for the analysis tools
  - Edit Home Page - change the visibility and placement of groups and applications
  - Theme Manager - create your own themes for the SAP Fiori launchpad
Groups

The applications are organized into the following groups:

<table>
<thead>
<tr>
<th>Group</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytics</td>
<td>Provides abilities to view, filter, and analyze data across all your equipment and perform follow-up tasks, as well as get an overview of applications in the personal dashboard and view analytics dashboards.</td>
</tr>
</tbody>
</table>

**i Note**

The Explorer [page 12] is the place where most of the activities for SAP Predictive Asset Insights occur, bringing together sensor and business data to analyze the health of your equipment and help you decide how to proceed.

<table>
<thead>
<tr>
<th>Processes</th>
<th>Find the important business processes for SAP Predictive Asset Insights.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Data</td>
<td>If you are a business user you can browse all kinds of related information about your equipment. Additionally create and edit master data.</td>
</tr>
</tbody>
</table>
Group | Functions
---|---

**Machine Learning Engine**  
Find tools for your data science tasks:
- For health indicators, data scientists can use the algorithms of the machine learning engine to calculate the health status and predict failures for their equipment. In that process, they configure data sets, configure, train, and score models.
- For failure mode analytics, they can use the algorithms of the machine learning engine to analyze their notifications in order to get insights and analytics about the patterns of failures for their equipment and equipment models. In that process, they configure, train, and score models, and also perform validation tasks.
- For leading indicators, they can use an algorithm to determine the leading indicators that have the highest influence on failures for their equipment. In that process, they configure and train models.
- For failure curve analytics, they can use an algorithm to calculate the probability of failure for their equipment. In that process, they create, train, and score model configurations.

**Administration**  
Access applications for user management and configuration of the Explorer and its analysis tools

**Roles**

The role collections assigned to your user determine which groups and applications are visible. For an overview of the roles that need to be assigned to see and use the applications, see the Security Information for SAP Predictive Asset Insights.
3 Analytics

The tiles under Analytics on the SAP Fiori launchpad provide you the abilities to view, filter, and analyze data across equipment, perform follow-up tasks, as well as overview the dashboards.

Overview of Analytics

<table>
<thead>
<tr>
<th>Tile</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explorer [page 12]</td>
<td>Use analysis tools in the Explorer to analyze data for all your equipment, and then decide on follow-up actions. The Explorer brings together sensor and business data and from here you can navigate to the Equipment page to get an overview of all the data associated with a selected piece of equipment.</td>
</tr>
<tr>
<td>Failure Mode Analytics [page 49]</td>
<td>Use failure mode analytics to get insights and analytics about the last occurring failures for your equipment and equipment models. Failure mode analytics uses machine learning to turn the human knowledge contained within the texts of notifications into insights about the nature of failures.</td>
</tr>
<tr>
<td>Personal Dashboard [page 59]</td>
<td>This app is personalized to be a one-stop point to navigate to the applications, your frequently viewed items of equipment, favorites and unread announcements.</td>
</tr>
<tr>
<td>Analytics Dashboards [page 60]</td>
<td>Analyze your data coming from SAP Analytics Cloud stories in SAP Predictive Asset Insights by using analytics dashboards.</td>
</tr>
</tbody>
</table>

3.1 Explorer

The Explorer is an application that contains analysis tools to analyze data for all your equipment.

Note

If you are using the application with a touch-enabled device, not all features work using the touch feature.

Features

Working with Analysis Tools

You can use analysis tools to analyze the health of your equipment, for example, by analyzing sensor data or displaying alerts.
For more information about the analysis tools, see Analysis Tools [page 14].

Using Filter Functions for Analysis Tools

To focus your analysis, you can use different filter functions. The following functions are available:

- Filtering in one analysis tool in the Explorer by choosing (Filter).
- Filtering across all analysis tools in the Explorer.

Note

The filter functions across all analysis tools filter based on top equipment.

To filter across all analysis tools, you can use the following options:

- Choose an analysis tool, select, for example, one or more work orders, alerts, notifications, or equipment. All of these belong to certain top equipment. By choosing Apply as Filter, all analysis tools are filtered and only show data for the same top equipment.
- Use the Explorer global filter and apply multiple filters to all analysis tools in the Explorer in one go.

You can combine the different filter functions. For example, when you filter in an analysis tool and use the global filter, the analysis tool displays data filtered by both criteria.

For more information about the different filter functions, see Analysis Tools [page 14] and Explorer Global Filter [page 38].

Using Refresh Functions for Analysis Tools

To refresh data across all your analysis tools, you can use different refresh functions. The following functions are available:

- Manually refreshing data across all analysis tools in the Explorer by choosing Refresh.
- Automatically refreshing data across all analysis tools in the Explorer by activating an automatic data refresh with a refresh interval in the Settings of the SAP Fiori launchpad.

You can combine the data refresh functions. For more information about the data refresh functions, see Analysis Tools [page 14].

Saving a Set of Analysis Tools in the Explorer as a Tile

You can save a current set of analysis tools with their selected variants in the Explorer as a new tile by choosing (Save as Tile). This allows you to save different sets of analysis tools and analysis tool variants, for example, a set of analysis tool variants that focuses on a specific piece of equipment. The new tile is then added to your selected group on the SAP Fiori launchpad. Any applied filter functions or other settings of the analysis tools are not carried over to the new tile.

To update the set in the new tile, you can select different analysis tool variants, add or remove analysis tools, and use all features of the Explorer and the analysis tools. Once you exit the tile, your updates are saved. Other settings are not saved.

To manage the tile, for example, to rename or move the tile, you can go to the user menu on the SAP Fiori launchpad and choose Edit Home Page.
Navigating to Pages from the Explorer

To go into a detailed analysis for a single piece of equipment, you can reach the Equipment page by clicking an equipment link in the analysis tools. It is also possible to navigate to the details page of alerts, notifications, and work orders from the respective analysis tools.

For more information about the Equipment page, see Equipment Page [page 48].

3.1.1 Analysis Tools

An analysis tool is a self-contained part of the application with its own user interface and functionality that provides an insight into one or more pieces of equipment.

Analysis Tools Variants

For every analysis tool, variants can be configured by an administrator. The analysis tool variants contain different settings. As a business user, you can adapt the analysis tools to work with the Explorer according to the personal business scenario. For more information about the configuration, see Explorer and Analysis Tools Configuration [page 457].

i Note

In addition to the variants configured by an administrator, we also deliver preconfigured variants entitled SAP Standard. If your administrator has deleted some of the preconfigured variants, they are not available to you. For more information about the settings for the available preconfigured variants, contact your administrator.

Analysis Tools Catalog

You can add analysis tools from the Analysis Tools Catalog to the Explorer and then select a specific variant for each analysis tool. In the Analysis Tools Catalog, you can also remove added analysis tools. For more information, see Adding Analysis Tools to the Explorer [page 18] and Removing Analysis Tools from the Explorer [page 19].

Here is an overview of the available analysis tools:

Overview of Available Analysis Tools in the Analysis Tools Catalog

<table>
<thead>
<tr>
<th>Analysis Tool</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alerts [page 20]</td>
<td>Provides a list of current alerts based on rules defined for sensor data, key figures, and health scores. Provides data visualization so that you can see when alerts have occurred.</td>
</tr>
</tbody>
</table>
## Analysis Tool

<table>
<thead>
<tr>
<th>Analysis Tool</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator Chart [page 20]</td>
<td>Provides data visualization across one or more measurements.</td>
</tr>
<tr>
<td><strong>i Note</strong></td>
<td>Besides adding the indicator chart from the Analysis Tool Catalog, you can also reach the indicator chart from the alerts analysis tool.</td>
</tr>
<tr>
<td>Work Orders [page 37]</td>
<td>Provides a list of current work orders and their details.</td>
</tr>
<tr>
<td>Notifications [page 36]</td>
<td>Provides a list of notifications and their details.</td>
</tr>
<tr>
<td>Equipment Indicators [page 29]</td>
<td>Provides a list of master data, attributes, and indicators for equipment. These indicators indicate if the behavior of equipment is normal or not.</td>
</tr>
<tr>
<td>Map [page 31]</td>
<td>Provides a geographic map with the locations of top equipment and allows you to select indicators and apply their colors to the map markers. It also allows spatial selection.</td>
</tr>
</tbody>
</table>

## Features

Functionality and behavior can differ from one analysis tool to another, depending on its purpose. However, some features are the same in most analysis tools:

### Full Screen Mode (Relevant for all analysis tools)

If you want to focus your analysis on one specific area, for example, if you only want to look at the map where your equipment are located, you can open an analysis tool in full screen mode and hide the other analysis tools by choosing \( \text{Enter Full Screen} \).

### Settings (Relevant for all analysis tools except for Map)

For all analysis tools containing a list, you can define the sorting and filtering behavior for the list, and what list columns you want to see on the UI by choosing \( \text{Settings} \).

**i Note**

Search and filter options in analysis tools are case-sensitive.
Filter in One Analysis Tool (Relevant for all analysis tools except for Map and Indicator Chart)

For all analysis tools containing a list, you can filter your analysis tool. Choose \( \text{Filter} \), select the filters, enter the values and choose \text{Go} \) to apply this selection to your current analysis tool. This function does not affect filters in other analysis tools.

Filter Across Analysis Tools (Relevant for all analysis tools)

\[ \text{i Note} \]
This filter function filters based on top equipment.

In the Explorer, you can filter across all analysis tools. Select, for example, one or more work orders, alerts, notifications, or equipment. All of these belong to certain top equipment. By choosing \text{Apply as Filter}, all analysis tools are filtered and only show data for the same top equipment. If you add a new analysis tool to the Explorer after you have selected a certain set of equipment, the newly added analysis tool automatically displays data based on your existing selection. If you want to reset the filters in all analysis tools, choose \( \text{Reset Global Filter} \).

Besides applying filters to all analysis tools by using the \text{Apply as Filter} function in an analysis tool, you can also use the global filter in the Explorer. For more information, see Explorer Global Filter [page 38].

Navigation and Editing (Relevant for all analysis tools)

You choose the selected analysis tools using anchor navigation (tabs).

\[ \text{i Note} \]
The tabs are only displayed when you have added at least two analysis tools to the Explorer.

Emerging Issue Detection (EID) (Only relevant for Indicator Chart, Alerts, Notifications, and Work Orders)

EID enables you to identify, monitor, and manage an equipment issue early. To analyze an issue, you need to gather information or ‘evidence’. This evidence is collected in improvement requests. You can add an improvement request or edit an existing improvement request by choosing \text{Add Evidence} in the analysis tools, Indicator Chart, Alerts, and Notifications.

Unit of Measure (UoM) Conversion (Only relevant for Indicator Chart and Equipment Indicators)

In the SAP Fiori launchpad, you can define if the unit of measure system for the application is metric (default) or imperial. To change the unit of measure, go to the \( \text{(User Actions Menu)} \) \text{Settings} \( \text{Unit of Measure} \).

UoM conversion deals with conversion of values across units within a dimension, and a source unit is converted to a target unit. For example, if the unit system is metric and dimension is length, any source unit (miles) must be converted to target unit (kilometers).

State Preservation (Relevant for all analysis tools)

When you navigate from the Explorer back to the SAP Fiori launchpad or to another application, any ad-hoc table settings, filter settings, and the selected variant of an analysis tool are preserved.
Automatic Data Refresh (Relevant for all analysis tools)

You can activate an automatic data refresh across all analysis tools in the Explorer. With this automatic data refresh, the data of the analysis tools is reloaded in a regular interval, so that you can view the latest data. By default, the automatic data refresh is not active.

To activate automatic data refresh and define the refresh interval, go to (User Actions Menu). Choose Settings » Automatic Data Refresh. Once you have activated and defined the automatic data refresh, the Explorer initiates the data refresh on the analysis tools based on the defined refresh interval. The last refreshed date and time is then displayed at the top of the Explorer. If you add or delete any analysis tool, the closest refresh cycle is reset, and the refresh interval starts again.

For the analysis tools, Indicator Chart and Alerts, the automatic data refresh is also applied in the Equipment application. For more information about viewing Indicator Chart and Alerts, see Viewing Time Series Data (Indicator Chart) of an Equipment [page 104] and Viewing Alerts of an Equipment [page 102].

The manual and automatic data refresh features result in refresh of all analysis tool with its data from the database. Depending on the analysis tool, its variant settings, the number of records the analysis tool need to fetch, and overall system load, the time to complete the refresh may differ. If for a scenario, the time to refresh all the analysis tools take 3 seconds, and the refresh rate is set to that interval or shorter, for instance, 1 second, a continuously refreshing analysis tools will be visible.

And, during the refresh, a major area of an analysis tool will not be functioning.

To trigger an automatic refresh, set a higher refresh rate, for instance a minute. Observe the time it takes to refresh the data. This will also indicate the lowest refresh rate you should use. For example, if the refresh takes 3 seconds, you can trigger an automatic refresh rate not lesser than 5 seconds.

Manual Data Refresh (Relevant for all analysis tools)

You can also manually refresh data across all analysis tools in the Explorer by choosing Refresh. The manually refreshed date and time is then displayed at the top of the Explorer. The manual data refresh has no effect on the automatic data refresh. That means if you have activated the automatic data refresh and you manually refresh data, the refresh interval of the automatic data refresh is not reset and continues. Once the automatic data refresh is completed, the displayed date and time of the manual refresh is overwritten by the date and time of the automatic refresh.

For the analysis tools, Indicator Chart and Alerts, the manual refresh is also possible in the Equipment application. For more information about viewing Indicator Chart and Alerts, see Viewing Time Series Data (Indicator Chart) of an Equipment [page 104] and Viewing Alerts of an Equipment [page 102].

Health Score Explanation (Only relevant for Equipment Indicators)

The Health Score Explanation gives additional information about an indicator. It shows, for example, the defined thresholds and uses color coding to show whether the value is in the value range or not.

You can display the health score information by clicking on an indicator value link in the Equipment Indicator analysis tool.

Languages

For information on the supported user interface (UI) languages, refer SAP Predictive Asset Insights [page 6].
3.1.1.1  Adding Analysis Tools to the Explorer

This topic describes how to add analysis tools to the Explorer.

Prerequisites

At least one analysis tool variant has been configured by an administrator or the respective preconfigured variant is available. For more information about the configuration, see Explorer and Analysis Tools Configuration [page 457].

Context

To analyze data of your equipment, you need to add analysis tools to the Explorer.

Procedure

1. On the SAP Fiori launchpad, go to the Analytics group and open the Explorer application.
2. At the top of the Explorer, choose Manage Tools.
   The Analysis Tools Catalog is displayed.
3. In the Analysis Tools Catalog, select the analysis tools that you want to use to analyze equipment.
4. Choose OK.
   The analysis tools are added to the Explorer and the first configured variant for each analysis tool is displayed.
5. To select a different variant, expand the variant dropdown list next to the analysis tool title.
6. From the My Views dropdown list, select the desired analysis tool variant. You can choose from all configured variants.
7. If required, repeat step 5 and 6 for all your added analysis tools.

Results

The analysis tools are added to the Explorer. You can navigate between the analysis tools by using the anchor navigation (tabs).

<i>Note</i>

The tabs are only displayed when you add at least two analysis tools to the Explorer.


Related Information

Analysis Tools [page 14]
Removing Analysis Tools from the Explorer [page 19]

3.1.1.2 Removing Analysis Tools from the Explorer

This topic describes how to remove analysis tools from the Explorer.

Context

At least one analysis tool has been added to the Explorer. For more information, see Adding Analysis Tools to the Explorer [page 18].

Procedure

1. On the SAP Fiori launchpad, go to the Analytics group and open the Explorer application.
2. At the top of the Explorer, choose Manage Tools.
   The Analysis Tools Catalog with the selected analysis tools is displayed.
3. In the Analysis Tools Catalog, deselect the analysis tools that you want to remove from the Explorer.

Results

The analysis tools are removed from the Explorer.
You can later add the removed analysis tools to the Explorer again.

Related Information

Analysis Tools [page 14]
3.1.3  Indicator Chart

This analysis tool enables you to visualize data across one or more indicators with the same unit of measure across multiple hierarchies. You can also view thresholds related to an equipment.

By default, the chart is empty on navigating to this section. You can use the Apply as Filter option to filter the top equipment in a different analysis tool. Use the Select Indicators option to select or deselect the indicators.

**i Note**
- Alerts, notifications, work orders and indicator forecast are not displayed in the indicator chart in Explorer
- Legends display equipment name in Explorer
- The Indicator Chart pop-up displays Alert Description.

For more information on features within the indicator chart, refer Features in Indicator Chart [page 41]

Related Information

Explorer [page 12]
Analysis Tools [page 14]
Fields for Configuring the Indicator Chart [page 465]

3.1.4  Alerts

This analysis tool displays a list of the current alerts that are triggered by equipment events or rules defined for sensor data and health scores.

Alerts calculated from sensor data or health scores give you information about the issues your top equipment/equipment is experiencing. Within the alert analysis tool, you can display an alert page that contains the alert details and additional information. The information provided helps you to decide on prescriptive maintenance and helps to identify potential actions to be taken for the incoming alerts.

**i Note**
- As soon as a notification status is set as complete, the alerts associated with the notification is also set as complete. This occurs only if the Alert Type for an alert has the auto close option enabled.
## Working with the Alert Analysis Tool

<table>
<thead>
<tr>
<th>Action</th>
<th>Further Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display list of alerts</td>
<td>You can display the alert list in one of the following ways:</td>
</tr>
<tr>
<td></td>
<td>• From the ExplorerAdding Analysis Tools to the Explorer [page 18].</td>
</tr>
<tr>
<td></td>
<td>• From the equipment page, by choosing Monitoring → Alerts.</td>
</tr>
<tr>
<td>Display Alert Page with additional alert information</td>
<td>Click an alert in the alert list to navigate to the Alert Page [page 24].</td>
</tr>
<tr>
<td>View related top equipment/equipment</td>
<td>Click the Top Equipment Name or Equipment Name link to view details of the top equipment or equipment for which the alerts were created. Details are available on the . by choosing/adding an analysis tool variant for alerts. For more information, see Equipment page. For more information, see Equipment Page [page 48] and Equipment [page 78].</td>
</tr>
<tr>
<td>Information on alert occurrence</td>
<td>The following alert occurrence information is available in the alert list:</td>
</tr>
<tr>
<td></td>
<td>• Column Created On: When did the alert occur for the first time?</td>
</tr>
<tr>
<td></td>
<td>• Column Updated On: When did the alert get last updated?</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>Once the deduplication period is completed or the existing alert with the specific alert type for this piece of equipment is set to Completed, a new alert instance is generated. This definition is not valid for alerts that existed before the deduplication period was defined for this alert type. For more information, see Alert Deduplication [page 24].</td>
</tr>
<tr>
<td>Sort and filter alerts</td>
<td>Sort and filter the alerts and columns you want to display. You can also use the Settings option to search for attributes for the alerts.</td>
</tr>
<tr>
<td></td>
<td>The Status column supports sorting and filtering with value help.</td>
</tr>
<tr>
<td></td>
<td>The Severity column supports sorting and filtering with value help.</td>
</tr>
</tbody>
</table>
**Action** | **Further Information**
--- | ---
Filter | Use the Filters option to enable filter settings, view default settings defined in the configuration screen, add and edit filters, and define whether these filters are shown in the filter bar. Click Go to apply the specified filters. You can also use the Show Filter Bar option to edit the filter and filter conditions.

You can filter Alerts by Date or Date Range. However, the equal (=) operation is not supported to filter the Date field.

**Overview of available features**

Some features (for example refreshing data automatically or manually, filtering or default variants) are relevant for the explorer in general or relevant for all analysis tools. For more information, see Explorer [page 12] and Analysis Tools [page 14].

**User Authorization configuration**

The alert analysis tool now complies to user and network authorization configuration for Equipment and Alert Type.

**Language-specific descriptions**

In the Alert list, language-specific descriptions are now available for Equipment, Top Equipment, Indicator and Model.

**Note**

This is displayed only when language specific descriptions are maintained in asset central foundation.

## Prerequisites

To be able to perform the activities described below for alerts, you need the following roles:

- **Role AlertProcessorAdmin**: Users can change the alert status, create notifications and set/change the processor.
- **Role AlertProcessor**: Users can change the alert status, create notifications, but cannot assign an alert to processors.

**Button** | **Contents**
--- | ---
Add Evidence | Create a new improvement request or edit an existing improvement request by choosing Add Evidence. You navigate to the Improvement Request page.

For more information, see Creating an Improvement Request [page 67] and Emerging Issue Detection (EID) [page 64].
<table>
<thead>
<tr>
<th>Button</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set in Process</td>
<td>Change alert status to in process or completed using the respective buttons.</td>
</tr>
<tr>
<td>Set to Completed</td>
<td>When you set an alert to in process, you are automatically assigned as the processor.</td>
</tr>
<tr>
<td></td>
<td>The status sequence is New → In Process → Completed or New to Completed. The changes to the alert status do not change already assigned processors.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>If you select more than 10 alerts at one time, the <strong>Set in Process</strong> and <strong>Set to Completed</strong> buttons will be disabled.</td>
</tr>
<tr>
<td>Set Processor</td>
<td>Use the <strong>Set Processor</strong> button to change the alert processor.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>If you select more than 10 alerts at one time, then the <strong>Set Processor</strong> button will be disabled.</td>
</tr>
<tr>
<td>Create Notification</td>
<td>Create a new notification for the selected alerts. The new notification added is visible as link in the alert list and on the alert page. Click the <strong>Notification</strong> link to view more details about the notification.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>You can create notifications for multiple alerts, only if the alerts belong to the same equipment. If not, the <strong>Create Notification</strong> button will be disabled.</td>
</tr>
</tbody>
</table>

**Sharing Alerts with Invitee**

Invitee will see alerts only for the equipment and alert types that are shared by premium users.

**Related Information**

- Fields for Configuring Alerts [page 460]
- Fields for Configuring the Indicator Chart [page 465]
- Features in Indicator Chart [page 41]
- Adding Alert Types [page 243]
3.1.1.4.1  Alert Deduplication

Deduplication option allows the user not to create duplicate alerts for an existing alert type and equipment. New alerts can be generated once the deduplication period is over or the status of existing alert is set to Completed.

Procedure
1. Define deduplication in alert type - Define alert deduplication at the alert type level using the Templates application. For more information, refer Adding Alert Types [page 243]
2. Assign alert type to model - Alert type must be grouped as alert type group and assigned to model. For more information, refer Assigning Alert Type Groups to a Model [page 125]
3. Create alerts - Create alerts for the alert types.
4. View alerts - View alerts for a list of equipment in the Equipment application or Explorer. For more information, refer Viewing Alerts of an Equipment [page 102] and Alerts [page 20]

3.1.1.4.2  Alert Page

You use the alert page to see an overview of data associated with a selected alert.

You can access the alert page with its holistic view of different information by clicking an alert in the alert list.

For more information about prerequisites and available functions for alerts (for example changing the status of alerts, setting processors), see Alerts [page 20].

Information Available on the Alert Page

<table>
<thead>
<tr>
<th>Section</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td>Shows information about the alert (such as alert type, processor, origin of the alert, alert occurrence and last alert occurrence), and information about the related piece of equipment and notifications. If a notification has been created for the alert, you can click the notification to display details. An occurrence count is shown to indicate how often an alert reoccurred since the deduplication mode for the particular alert was switched on. For more information, see Alert Deduplication [page 24].</td>
</tr>
</tbody>
</table>
## Indicator Chart

Indicator chart will be the default section displayed in the alert details page.

The indicator chart helps you visualize the alert in a time-based line chart, together with contributing indicators.

The default time period for the indicator chart in alert details page can be configured in the indicator chart variant. The first time period configured in the indicator chart variant will be used as the default one.

In the indicator chart, you can see the overlapping indicators as a default:

- Indicators assigned to an alert type that is assigned to the alert.
- Indicators assigned to a piece of equipment that is assigned to the alert.

You can manually add all indicators assigned to the piece of equipment that is assigned to the alert.

### Note

Depending on your configuration settings, additional alert attributes are displayed in one or more tabs next to the indicator chart.
Failure Modes and Causes

This section shows failure modes and causes, alert types and instructions related to the piece of equipment (asset). The information helps you to understand which failure modes occurred for the particular alert and helps you to decide how to proceed with an alert.

All overlapping failure modes are displayed:

- Failure modes coming from the **pieces of equipment (asset)** are assigned to the selected alert.
- Failure modes assigned to an **alert type** that is assigned to the selected alert.

**Example**

In this example, the highlighted failure modes (failure mode 1 and failure mode 6) are displayed.

The failure modes assigned to the related piece of equipment (asset) and alert type are as below:

**Failure Mode assigned to equipment:**
- Failure mode 1
- Failure mode 3
- Failure mode 4
- Failure mode 6

**Failure Mode assigned to Alert Type:**
- Failure mode 1
- Failure mode 2
- Failure mode 5
- Failure mode 6

The Failure modes table with description of each column is as follows:

- Top Failure Modes (Ranked): Displays short description and name of the failure mode. The failure modes are ranked in the table based on how often the failure modes appeared in the notifications for the equipment and equipment model.
- Causes: The list of causes associated with the failure mode are displayed.
- Recommended Actions: Displays the number of instructions associated with the failure mode.
- Occurrence Compared to Model and Equipment: Displays the extent to which the piece of equipment
compares against all notifications analyzed for the equipment model.

**i Note**
The ranking of Failure Modes and occurrence is displayed only if Failure Model Analytics is available and the required role is assigned to the user.
Equipment Maintenance History

The maintenance history for the piece of equipment shows an overview of what maintenance has taken place for the piece of equipment up to now. The notifications/work orders of the most recent top 3 alerts assigned to the related piece of equipment are shown and ordered by creation date. The most recent one is shown first. You can navigate to the notifications and work orders and display them to see details.

Which top 3 alerts are relevant? All alerts for the related piece of equipment for the last 365 days until now are taken into account. All alerts for which a notification has been created, and to which the same alert type has also been assigned, are relevant for display. The notifications/work orders of the 3 most recent alerts are then displayed in the Equipment Maintenance History section.

If a notification has been created for the currently displayed alert, the notification is be shown under section Information.

Example

You display the alert page with detailed information about an alert. Alert type ABC is assigned. In this example the highlighted notifications and work orders are shown as top 3.

The following alerts have been created for the related piece of equipment:

- Alert 2 (Alert type ABC) - Has no notification.
- Alert 3 (Alert type DEF) - Has no notification.
- Alert 4 (Alert type ABC) - Notification 1 - Work order 1
- Alert 5 (Alert type DEF) - Notification 2
- Alert 6 (Alert type ABC) - Notification 3
- Alert 7 (Alert type ABC) - Notification 4 - Work order 2
- Alert 8 (Alert type ABC) - Notification 5 - Work Order 3

Related Information

Adding Alert Types [page 243]
Indicator Chart [page 20]
Failure Modes [page 142]
Failure Mode Analytics [page 49]
3.1.1.5 Equipment Indicators

This analysis tool provides a list of equipment with their indicators, attributes, and master data. You can also assess the equipment status.

It is also possible to view equipment, their hierarchy, attributes, and indicator by navigating to the Equipment Details page. The Apply as Filter option also provides the flexibility to filter all analysis tools in the Explorer.

---

**i Note**

The indicator value is not in real time. A job, which is scheduled every 15 minutes, pulls the data from the timeseries store that is displayed in the Equipment Indicator analysis tool.

---

The Equipment Indicators provide you the following options:

- Select columns for the equipment
- Identify health status of an equipment
- Sort and filter
- Apply filter
- Search

---

**i Note**

Equipment Indicator Analysis Tool displays all equipment records.

The equipment indicator only shows equipment where Predictive Maintenance is selected as the product relevance or no product relevance is selected.

---

**Equipment Columns**

The columns marked as default while configuring a variant by the administrator display in this analysis tool. Choose the Settings option and either select or deselect the required columns from the available list. Use the move up and down option to change the column position. You can restore the previous position of columns.

On clicking an indicator, additional information of that particular indicator displays. For more information, refer Analysis Tools [page 14]

---

**Sort and Filter**

You can sort the equipment in an ascending or descending order. Possible to filter equipment according to all selected filters. By default, the list of equipment and their columns in this analysis tool are sorted and filtered according to sort and filter defined in the configuration variant.

---

**i Note**

- The search, sort, and filter options will display only the columns configured in the variant by the administrator.
- The attributes of data type Currency are treated as strings in equipment indicators and all the operation on the field will work as string operations.
Apply Filter

The Apply as Filter option provides the flexibility to filter all the analysis tools in the analysis tool catalog according to the selection in the Equipment Indicators.

Select the Reset Global Filter option to reset your filtered selection in the analysis tool.

Search Equipment

Using this analysis tool, you can search for equipment, their master data, attributes, and indicators.

Unit of Measure (UoM) Conversion

The numeric values displayed in the equipment indicators complies with the unit system configured in the SAP Fiori launchpad. Choose Unit of Measure Variant in the Settings option of the SAP Fiori launchpad to personalize. For more information on UoM, see Analysis Tools [page 14].

Auto Refresh

Possible to refresh data automatically. For more information, refer Analysis Tools [page 14].

Indicator Threshold

Using this analysis tool, it is possible to visualize the indicator threshold range where in the indicator value lies. These thresholds are visible as colored icons on the page. The indicator thresholds are configured in the Indicators application. For more information, refer Adding Indicator Groups and Indicators [page 234].

Sharing Equipment with Invitee

Invitee will be able to see only the shared equipment and its shared indicators and attribute values.

Related Information

Fields for Configuring Equipment Indicators [page 461]
Adding Analysis Tools to the Explorer [page 18]
3.1.1.6  Map

This analysis tool provides a geographic map with the locations of equipment and allows you to select indicators and apply their colors to the map markers. It also allows spatial selection.

You can use the map to display where equipment are located and analyze equipment on a map.

**Note**

Consider the following:

- The map displays top equipment.
- The map displays a maximum of 10,000 top equipment.
- The map displays top equipment for a maximum of 50 selected models.
- If you are filtering across the analysis tools, the map filters and displays a maximum of 150 top equipment.
- The map only shows top equipment where *Predictive Maintenance* is selected as the product relevance or no product relevance is selected.

**Layers**

On the map, you can use different layers to display specific types of equipment. The following example displays three different layers in one map as follows:

- Pipelines are displayed as lines.
- Top equipment is displayed as markers.
- Mines are displayed as polygons.
Equipment Information

You can hover over a marker to view information represented by that marker. The following information is displayed:

- Equipment ID
- Equipment description
- Model description

**Note**
If you hover over a line or polygon equipment, the equipment ID, equipment description, and model description are not displayed.

If you want to get more information about the piece of equipment, you can choose a marker or line. The details include links to the Equipment, Model or Indicator detail pages.

**Note**
If a line equipment is fully covered by a polygon equipment, you cannot choose it to show the details.

Also, markers can be visualized by different indicators that you create in Indicators section of the Templates application, for example, Bearing Temperature. In general, all markers on the map are displayed in blue. When you select an indicator, only the relevant top equipment for this indicator is displayed on the map and the color of the marker changes to visualize the indicator value of the equipment according to the thresholds configuration of the indicator, for example:

- Yellow: Warning
- Red: Critical
- Grey: Unknown

If the selected indicator has no value, the marker remains blue.

Additional details about the indicator can be seen by choosing a marker. The details include, for example, the indicator value, color, threshold, a link to view indicator details, and more. If you have questions about indicators for your business scenario, ask your administrator.

**Note**
The map only correctly displays data for an indicator that is assigned to a single indicator group. If an indicator is assigned to two indicator groups, and both groups are assigned to the same model template, the data is not displayed correctly. If your data is displayed incorrectly, contact your administrator who can ensure that indicators are only assigned to one indicator group or that indicator groups are only assigned to one model template.

Map Views

You can switch between different map views by hovering over 📍. By hovering over this icon, the related models are also displayed, and you can focus your analysis by selecting or deselecting models.
You can choose from multiple map views if these are configured accordingly by your administrator. If you have questions about the map views for your business scenario, ask your administrator.

**Note**

The map views list does not have a scroll bar. That means if you have a list with multiple map views and models, you only see the map views and models, which are located within the display size of the map. If the list is longer than the display size of the map, you cannot see all map views and models. Therefore, we recommend to limit the list of map views and models.

The following list shows some sample map views that can be configured:

- **Open Street Maps**

![Open Street Maps](image)

- **Satellite**

![Satellite](image)

- **Streets**

![Streets](image)
Features

Zoom In and Zoom Out
Depending on which area you want to focus, you can zoom in and zoom out by:

- Using the corresponding buttons
- Using the mouse wheel

Spatial Selection

ℹ️ Note
If you want to draw geofences using a touch-enabled device, consider that the touch feature does not work in Internet Explorer. In Internet Explorer, you need to turn the touch feature off in your device manager and use the mouse. Depending on your device, once you have turned the touch feature off, you may also need to do a restart so that your change becomes effective.

You can select specific top equipment by drawing one or more geofences around them, as follows:

- Choose 🖊️ (Draw Polygon) to activate the drawing cursor.
- To draw the geofence, use single mouse clicks/ taps to set points that form the polygon.
- To close the geofence, either double-click/ double-tap at the area on the map where you want the last point to be or single-click/ tap on the first point. You can draw several polygons.
- To cancel the geofence, choose 🔄️ (Clear All).
- After selecting top equipment on the map in this way, you can choose Apply As Filter to filter all analysis tools by that selection. Thus, you can narrow down your equipment analysis and focus only on the top equipment you want to analyze in more detail.

Indicator Selection
You can select indicators by using the Select Indicator dropdown list to view markers by different colors and values that you created in the Indicators section of the Templates application.

Panning the Map
You can pan the map by dragging and dropping it. If you zoomed out to the lowest level, the world maps repeat horizontally. Once you drag the map to the next map, the equipment on the map is also moved.

Data Refresh
You can refresh data automatically or manually. For more information, see Analysis Tools [page 14].

Related Information

Explorer [page 12]
Adding Analysis Tools to the Explorer [page 18]
3.1.7 Notifications

We use the term notification to describe an object created in a back end system (for example, Enterprise Asset Management) that has been replicated into SAP Predictive Asset Insights and is visible in the Notifications analysis tool. You use this analysis tool to view notifications for all equipment.

Using this analysis tool, you can perform the following:

- Click a notification in the notification list to view details. You can view details such as failure modes and causes
- Click the Equipment, Top Equipment, Equipment Description, and Top Equipment Description links to view details of the top equipment and equipment for which the notifications are created. Details are available in the Equipment page. For more information, refer Viewing and Creating Equipment Notifications [page 104]
- View the progress of notifications, defined as Planned, Pending, and Completed
  - Planned: All notifications with the basis start date greater than the current date
  - Pending: All notifications with the basic complete date greater than the current date or all notifications with the basic start date lesser than the current date
  - Completed: All notifications with the status Completed or Closed
- Create a new improvement request or edit an existing improvement request using the Add Evidence button. You navigate to the Improvement Request page. For more information, refer Creating an Improvement Request [page 67] and Emerging Issue Detection (EID) [page 64]
- Create a new notification and assign it to a top equipment. You can provide additional information such as type, priority, and description. The newly added notification displays as Notification among the attributes. Click the Notification to view more details about the notification.
- Use the Filters option to enable filter settings, view default settings defined in the configuration screen, add and edit filters, and define whether these filters are shown in the filter bar. Click Go to apply the specified filter(s). In addition, you can also use the Show Filter Bar option to edit the filter and filter conditions
- You can filter Notifications by Date or Date Range. However, the equal (=) operation is not supported to filter the Date fields.
- Using the Settings option, sort and filter notifications. In addition, search the attributes for a notification
- Automatic or manual refresh of data. For more information, see Analysis Tools [page 14]

Related Information

Fields for Configuring Notifications [page 473]
Equipment [page 78]
Analysis Tools [page 14]

3.1.7.1 Locations to Add Notifications

You can create notifications from the following locations:

- In the Alerts analysis tool, select one or multiple alerts and create a notification. The notification ID is updated and you can navigate to view further details of the notification
In the **Notifications** analysis tool, create a new notification for a piece of equipment. The newly created notification appears in the analysis tool and you can navigate to view more details.

On the **Equipment** page, navigate to the alerts view on the **Monitoring** tab. Select one or multiple alerts and create a notification. The notification ID is updated in the alerts view with the status. You can navigate to view more details.

On the **Equipment** page, navigate to the notifications view on the **Maintenance and Services** tab. In this view, choose **Manage Notification** to create a new notification for a piece of equipment. The newly created notification is displayed in the notification view. You can navigate to view more details.

**Note**

The notifications are saved in SAP Predictive Asset Insights. They can be pushed to the back end system using the integration possibilities.

### Related Information

*Notifications* [page 36]

### 3.1.1.8 Work Orders

We use the term work order to describe an object created in a back end system that has been replicated into SAP Predictive Asset Insights and is visible in the **Work Orders** analysis tool.

Using this analysis tool, you can perform the following functions:

- Get an overview of all existing work orders, or just those for a particular top equipment by selecting it and choosing **Apply as Filter**. Alternatively, you can view the work orders for just one piece of equipment when using this analysis tool on the **Equipment List** page.

- Get more information about the work order, for example, view details such as associated documents and spare part details. Your administrator can configure tabs and organize the information you would like to see, for example, the service organization or group of subject matter experts to which the work order is assigned (planner group).

- On clicking the **Equipment**, **Top Equipment**, **Equipment Description** and **Top Equipment Description** link, the details of the equipment for which the work order is created displays in the Equipment page. For more information, refer *Viewing Work Orders of an Equipment* [page 106] and *Equipment Page* [page 48].

- **View progress of work orders**, that is, **Planned**, **Pending**, and **Completed**.
  - **Planned**: All work orders with the basic start date greater than the current data
  - **Pending**: All work orders with the basic end date greater than the current date or all work orders that have start date lesser than the current date
  - **Completed**: All work orders with the status **Completed** or **Closed**

- **Start date and end date of work orders** display the dates that signify the progress of work orders, which is as follows:
  - If the work order progress is **Planned or Pending**, the basic start and end dates display
  - For **Completed** work order, the actual start and end dates display
• Create an improvement request or edit an existing improvement request using the Add Evidence button. You navigate to the Improvement Request page. For more information, see Emerging Issue Detection (EID) [page 64] and Creating an Improvement Request [page 67]
• Use the Filters option to enable filter settings, view default settings defined in the configuration screen, add and edit filters, and define whether these filters are shown in the filter bar. Click Go to apply the specified filters(s). In addition, you can also use the Show Filter Bar option edit the filter and filter conditions.
• You can filter Work Orders by Date or Date Range. However, the equal (=) operation is not supported to filter the Date fields.
• Using the Settings option, sort and filter the work orders. In addition, search the attributes for a work order.
• Automatic or manual refresh of data. For more information, see Analysis Tools [page 14]

Related Information

Explorer [page 12]

3.1.2 Explorer Global Filter

The Explorer global filter is a filter function in the Explorer that enables you to filter all your analysis tools in the Explorer based on several attributes, for example, class or location in one go.

The Explorer global filter is displayed at the top of the Explorer.

Note
Consider the following:
• The Explorer global filter filters based on top equipment.
• The Explorer global filter filters a maximum of 10,000 top equipment across all analysis tools.
• The Explorer global filter only filters top equipment where Predictive Maintenance is selected as the product relevance or no product relevance is selected.

Explorer Global Filter Variants

For the Explorer global filter, variants can be configured by an administrator. The variants contain different filters. When you select a variant in the Explorer, the defined filters are applied to all analysis tools in the Explorer. When you then leave the Explorer and later open it again, the variant is selected and automatically applied. For more information about the configuration, see Explorer and Analysis Tools Configuration [page 457].

Note
In addition to the variants configured by an administrator, we also deliver a preconfigured variant entitled SAP Standard. This variant contains no filters so that the analysis tools show data for all top equipment. If your administrator has deleted this preconfigured variant, it is not available to you.
As a business user, you can also adjust variants in the Explorer by defining additional filters or removing filters to work with the Explorer according to the personal business scenario. These filters are only temporary and are not adapted to the variant.

### Using the Explorer Global Filter

For more information about using the Explorer global filter with variants and filters, see Using the Explorer Global Filter with Variants [page 39] and Using the Explorer Global Filter with Filters [page 40].

### Related Information

- Explorer [page 12]
- Analysis Tools [page 14]

### 3.1.2.1 Using the Explorer Global Filter with Variants

This topic describes how to use variants to filter all analysis tools in the Explorer.

### Prerequisites

- At least one analysis tool has been added to the Explorer. For more information, see Adding Analysis Tools to the Explorer [page 18].
- At least one variant for the Explorer global filter has been configured by an administrator or the preconfigured variant is available. For more information about the configuration, see Explorer and Analysis Tools Configuration [page 457].

### Procedure

1. On the SAP Fiori launchpad, go to the Analytics group and open the Explorer application.
   
   The Explorer global filter with the preconfigured variant is displayed. If the preconfigured variant has been deleted, another configured variant or the last selected variant is displayed.

2. To select a different variant, expand the variant dropdown list next to the variant title.
   
   The My Views pop over is displayed.

3. In the pop over, select the desired variant. You can choose from all configured variants.
Results

The filters are applied to all analysis tools in the Explorer and the analysis tools show data for the same top equipment. Below the variant title, you can view which filters are applied, for example, Model (1).

To view the number of returned top equipment, expand the filter bar by choosing (Expand Header) below the Explorer global filter. You can later collapse the filter bar again.

To reset the applied filters in the analysis tools, choose (Reset Global Filter).

Related Information

Explorer Global Filter [page 38]

3.1.2.2 Using the Explorer Global Filter with Filters

This topic describes how to select a combination of filters from scratch to filter all analysis tools in the Explorer.

Prerequisites

- At least one analysis tool has been added to the Explorer. For more information, see Adding Analysis Tools to the Explorer [page 18].
- At least one variant for the Explorer global filter has been configured by an administrator or the preconfigured variant is available. For more information about the configuration, see Explorer and Analysis Tools Configuration [page 457].

Procedure

1. On the SAP Fiori launchpad, go to the Analytics group and open the Explorer application.
   
   The Explorer global filter with the preconfigured variant is displayed. If the preconfigured variant has been deleted, another configured variant or the last selected variant is displayed.

2. Expand the filter bar by choosing (Expand Header) below the Explorer global filter.

3. Define the filters. You can choose between the following options:
   - Select the filters and values for the filters in the filter bar directly.
   - Choose Adapt Filters and select the filters and values for the filters in the dialog box. In the dialog box, you can also deselect filters. The filters are then hidden in the filter bar.

4. Choose Go.
Results

The filters are applied to all analysis tools in the Explorer and the analysis tools show data for the same top equipment. In the filter bar, you can view the number of returned top equipment.

You can also collapse the filter bar by choosing \(\text{(Collapse Header)}\). Below the variant title, the applied filters are then displayed, for example, \(\text{Model (1)}\).

To reset the applied filters in the analysis tools, choose \(\text{(Reset Global Filter)}\).

Related Information

Explorer Global Filter [page 38]

3.2 Features in Indicator Chart

This analysis tool enables you to visualize data across one or more indicators. You can also view the alerts, notifications, work orders, and threshold related to an equipment.

Variants

You can select variants created using the configuration screen. Depending on the selected variant, the default time range and number of points on the chart varies. SAP delivers two preconfigured variants \text{Indicator Chart - SAP Default} and \text{Indicator Chart - SAP Default Indicators for a Model}.

\[\text{i Note}\]

The variant \text{Indicator Chart-SAP Default Indicators for a Model} is available only in Equipment page and not in Explorer.

For more information, see Fields for Configuring the Indicator Chart [page 465]

Duration

You can choose the time interval for your analysis as follows:

- By selecting an analysis tool variant with the required time interval
- By picking a specific start and end date from the calendar by clicking the \text{Custom Data option}
By selecting dates accordingly, it is possible to visualize work orders and notifications that are yet to be created/added.

Add Evidence

You can create an improvement request or edit an improvement request. The selected date range in the indicator chart and selected indicators are available within the Description tab of an improvement request. For more information, see Emerging Issue Detection (EID) [page 64] and Creating an Improvement Request [page 67]

Select Indicators

You select, group, and sort indicators using the Select Indicators dialog box (maximum of 30 indicators). By default, indicators set as Favorite displays. To select the maximum number of indicators for a piece of equipment with indicators more than 30, select the checkbox in the header row. The first 30 indicators are selected.

Depending on the indicator color selected in the Templates application, the indicator chart displays in the same color.

This feature is not enabled for the indicator chart from the Explorer.

Legend

You have the following options:

- Hide and display legend. Remove indicators via legends.
- Icons in the legend represent different indicator types. On clicking the indicator, the respective indicator types display (highlighted) on the chart:
  - Circle represents flow
  - Triangle represents level
  - Square denotes the indicator type discrete

Reset

You can reset time selections you made for the indicator chart to their initial state by choosing Reset Selection.
**Settings**

You can decide the settings required on the chart. The following options are available:

- **Indicators**: Select the option to decide whether indicators must display as points or lines or as both on the chart.
- **Threshold**: On selecting, the primary thresholds selected in the Indicator’s application displays in the indicator. The number of thresholds defined as primary in the Indicator’s application displays.
- **Forecast**: On selecting a duration, the forecast data for the highlighted indicator displays on the chart. The duration starts from the day you select the duration.
- **Values**: Select to view a maximum or minimum value or both value of the displayed indicator points on the chart.
- **Events**: Select to view alerts, work orders, and notifications, if any on the chart.

**Autoscaling**

You can scale the Y axis of the indicator chart automatically or manually. Click any of the Y axis labels to view the Y-Axis Setting popup. Automatic scaling is activated by default. If you deselect the Default Values checkbox, you can enter minimum and maximum values to manually scale the Y axis.

**Time Selector**

Using the time line selector available at the bottom of a chart, you can select a particular time period within the time interval to narrow down your analysis and zoom into the indicator chart. The shorter the time period, the higher the granularity of the indicator chart. You can also select a time period directly in the indicator chart. To do so, place your cursor directly in the chart at the starting point of the time period. Then click and drag the cursor to the end point of the time period. When you release the mouse button, the indicator chart is focused on the selected time period.

**Indicators**

There are three categories of indicator in the indicator charts, that is, flow, level, and discrete. Depending on the indicator chosen, the corresponding graph is displayed.

---

**i Note**

Consider the following:

- Only numeric indicators are supported.
- The included indicator values are within the retention period. The retention period is maintained for the SAP Internet of Things store and can have a maximum range of 5 years. For more information, see Create Retention Period for Time Series Data Store.
Flow: These variables are visible as continuous variations on the chart.

Level: These variables remain unchanged until a new value exists, that is, level variables are not interpolated linearly between indicators, but a step function is used (the last value is repeated until a new value exists). An example of a level variable is stock inventory.

Discrete: Three statuses are considered for discrete, that is, 0, 1 and 2.

<table>
<thead>
<tr>
<th>Value</th>
<th>Status</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Off</td>
<td>Nil</td>
</tr>
<tr>
<td>1</td>
<td>On</td>
<td>Dark shade</td>
</tr>
<tr>
<td>2</td>
<td>Idle</td>
<td>Light shade</td>
</tr>
</tbody>
</table>

**Note**

Any other value apart from 0, 1 and 2 represents a null status and will be hatched.

The mouseover for a value displays the value as a string. The strings are hard coded, but language dependent. You can find more information on SAP Help Portal under Templates in the API Tutorial.

Let’s take the pump as an example. From the Select Indicators option, choose pressure (flow), waterlevel (level), and the blower status (discrete) as the indicator.

- Flow variable: Pressure displays the line graph for values that are available within the selected range.
- Level variable: Waterlevel displays the step graph for values that are available within the selected range.
- Discrete variable: Blower status displays the active (On, Off) or inactive (Idle) status of the indicator in colors.

The legend is displayed at the side of the chart.

**Indicator Forecasting**

The indicator chart supports the forecasting of indicator values of an equipment of an equipment model. You can select the duration for which the forecast needs to be displayed. The supported duration is one day, one week, one month, and 3 months. The duration starts from the day you select the duration.
The indicator that is forecasted displays as a dotted line. The blue area displays the confidence interval with the upper and lower boundary. The confidence interval also indicates how reliable the forecasting is. A small confidence interval indicates a reliable forecasting. If no data is available for a particular time in the time range of historical time series data, no lines display within the indicator chart.

**Prerequisite:** You should configure forecasting for the indicator in the Models application. For more information, refer to [Configuring Indicator Forecasting for a Model](page 128).

---

**i Note**

Consider the following:

- This feature is available only within the indicator chart in the equipment page.
- To view the indicator forecast after the configuration, the related piece of equipment needs to be synchronized with SAP Internet of Things.

---

**Alerts**

The indicator chart visualizes alerts for the selected indicators and selected equipment hierarchy. Same type of alerts for a top equipment or equipment aggregate within small intervals and are visible on the chart. By default, alerts that are related to an equipment and not linked to an indicator display in the indicator chart. On adding the indicators, the alerts linked to the selected indicator also display in the chart.

You can control the visibility of alerts using the **Settings** option.
**Work Orders**

The indicator chart visualizes work orders for the selected equipment or component hierarchy. Same type of work orders for a top equipment or equipment aggregate and are visible on the chart as a line. Click the corresponding icon to view the work order details.

**Notifications**

The indicator Chart visualizes notifications for the selected equipment or component hierarchy. Same type of notifications for a top equipment or equipment aggregate and are visible on the chart as a line. Click the corresponding icon to view the notification details.

**Threshold**

You can view the thresholds for the highlighted indicators in the indicator chart. The primary thresholds selected in the Indicator’s application displays on the chart. The number of thresholds defined as primary in the Indicators application displays. By default, except for the border lines, the threshold color appears transparent. Transparency is maintained to prevent overlapping of chart details.

<table>
<thead>
<tr>
<th>i Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thresholds are only displayed for the indicator category, Flow and Level.</td>
</tr>
</tbody>
</table>

**Unit of Measure (UoM) Conversion**

**Global UoM Settings**

The values displayed in the indicator chart complies with the unit system configured in the SAP Fiori launchpad. Choose Unit of Measure in the Settings option of the SAP Fiori launchpad to personalize. For more information on UoM, see Analysis Tools [page 14]

**Indicator Chart Specific UoM Conversion**

The indicator chart support conversion of indicator values from one UoM to another. Click the Y axis to display the UoM conversion popover. Once the conversion is performed for a UoM, all indicators of that particular UoM will be converted.

When you switch from regular chart to multi chart, the unit of measure conversion also reflects accordingly. You cannot perform the new UoM conversion in the multi chart.

<table>
<thead>
<tr>
<th>i Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>After the conversion, the target unit of measure will be displayed in the Y axis and tooltip. The select indicator popup will display the previous unit of measure.</td>
</tr>
</tbody>
</table>
**Multi Chart**

Multi chart provides capability to display multiple charts and segregate indicators according to unit of measure (UoM). Click the *Multi Chart* option in the indicator chart to perform this action.

When switching from regular chart to multi chart, the indicators within the indicator chart is segregated into multiple charts according to unit of measure. You can add or delete chart of unit of measure using the new select indicators option. A maximum of 5 charts is supported with 6 indicators per chart. If any of the conditions are not met, a corresponding indicator selection popup with warning message displays.

---

**i Note**

You cannot view events, threshold, indicator forecast, and values.

---

**i Note**

Any changes with respect to multi chart persists when navigating from the indicator chart to multi chart and back only if there are no changes to the indicators.

---

**AutoRefresh**

Possible to refresh data automatically or manually. For more information, refer [Analysis Tools](#) [page 14]

---

**Sharing Indicator with Invitee**

Invitee will be able to see the time-series data only of the shared equipment and shared indicators.
3.3 Equipment Page

You use the Equipment page to get an overview of all the data associated with a selected piece of equipment.

You can access the Equipment page in the following ways:

- From the Explorer by choosing an equipment link in the Alerts, Indicator Chart, Work Orders, Notifications, Equipment Scores (obsolete), Equipment Indicator, or Map analysis tools.
- From the Equipment List via the Equipment application under Master Data on the SAP Fiori launchpad.

### Overview of Information Available on the Equipment Page

<table>
<thead>
<tr>
<th>Tab</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td>• Highlights</td>
</tr>
<tr>
<td></td>
<td>• Data Sheet</td>
</tr>
<tr>
<td></td>
<td>• Model Information</td>
</tr>
<tr>
<td></td>
<td>• Equipment Information</td>
</tr>
<tr>
<td></td>
<td>• Business Partner</td>
</tr>
<tr>
<td></td>
<td>• Sales Organization Data</td>
</tr>
<tr>
<td></td>
<td>• Installation Location</td>
</tr>
<tr>
<td></td>
<td>• Life Cycle Information</td>
</tr>
<tr>
<td></td>
<td>• Systems</td>
</tr>
<tr>
<td></td>
<td>• Groups</td>
</tr>
<tr>
<td>Structure and Parts</td>
<td>• Highlights</td>
</tr>
<tr>
<td></td>
<td>• Structure</td>
</tr>
<tr>
<td></td>
<td>• Spare Parts</td>
</tr>
<tr>
<td></td>
<td>• Visual Parts</td>
</tr>
</tbody>
</table>
### Related Information

**Explorer [page 12]**

### 3.4 Failure Mode Analytics

Failure mode analytics uses machine learning to turn the human knowledge contained within the texts of notifications into insights about the nature of failures. This provides you with insights and analytics about the patterns of failures for your equipment and equipment models.

### Background Information

- Failure mode analytics uses unsupervised and supervised machine learning to analyze notification texts and extract the most related topics and words from notification texts. It then assigns them to standard failure modes for your equipment and equipment models.
The system uses various metrics and visualizations to provide you with insights and analytics about the patterns of failures for your equipment and equipment models.

**Failure Mode Analytics for Multiple Applications**

Failure mode analytics is displayed in multiple applications for different analyses:

- **On the equipment and model pages of the business object applications**
  On these object pages, the failure mode cards show how often the failure modes appeared in the notifications for the equipment and equipment model. On the failure mode cards, you can also view details that include KPIs for MTTR (Mean Time To Repair), MTTF (Mean Time To Failure), MTBF (Mean Time Between Failure), and the top bad actors.

- **In the Failure Modes and Failure Mode Analytics applications**
  In these applications, you can find the top words found within the notifications for the selected failure mode and equipment model. For the top words, you can also view the top-related notifications with their work orders.

**Example**

Rose, a reliability engineer, spots a problematic asset, Pump-00554, which pumps crude through a pipeline. She reviews its alerts in the Explorer. The alerts point towards a bearing problem, so Rose checks on two influencing factors: the oil lubrication level, and the temperature of the inflow. She suspects that the inflow temperature is an issue and that the root cause could be a crack in the pump casing. To confirm her assumption, she uses failure mode analytics to get more information. The failure mode OHE (Overheating) has the most occurrences and the MTBF (Mean-Time-Between-Failure) is 1515 hours. She views the detailed analysis for OHE (Overheating) and the top words from the notification text data are Oil level and Temperature High. She looks at the notification that is ranked as most relevant and sees that it was created 1440 hours ago, which means that the next failure is predicted to occur soon because the MTBF is 1515 hours. She also looks up the related work order to see how it was fixed.

**Related Tasks**

- Using Failure Mode Analytics on the Equipment or Model Pages [page 51]
- Using Failure Mode Analytics in the Failure Modes Application [page 57]
- Using the Failure Mode Analytics Application [page 58]

**Related Information**

- Failure Modes [page 142]
3.4.1 Using Failure Mode Analytics on the Equipment or Model Pages

This topic describes how to use failure mode analytics on the equipment or model pages.

Prerequisites

- Failure mode analytics has been configured. For more information, see Configuring Failure Mode Analytics [page 412].
- The roles AC_ORG_DATA_READ and APP_READ are assigned to your user.

Procedure

1. On the SAP Fiori launchpad, go to the Master Data group and open the Equipment or Models application.
2. Choose the piece of equipment or equipment model that you want to analyze.
   
   ![Note]
   
   Only choose the piece of equipment for which equipment model failure mode analytics has been configured, or the equipment model for which failure mode analytics has been configured. Otherwise, the results are empty. If you are unsure for which equipment model failure mode analytics has been configured, contact your administrator.

3. Choose ANALYTICS Failure Modes.

Results

The top 5 failure modes for the equipment model within the last 365 days are displayed in cards.

![Note]

You can also select a different time period and choose the Go button to apply your selection. Be aware that if you, for example, select the time period from January 8 to January 9, this is a 48 hour time span, not a 24 hour time span.

The failure modes are ranked by the number of occurrences, depending on how often specific words related to the failure mode occurred in the notifications for this piece of equipment or equipment model. You can view details about a failure mode by choosing the failure mode description on the card. You can also display all failure modes that are assigned to the equipment model by choosing All Failure Modes.

On the failure mode cards, the following KPIs are displayed:

- The number of times this failure mode was identified in the notifications created during the time period
For the piece of equipment, to what extent this figure compares against all notifications analyzed for the equipment model

The MTTR (Mean Time To Repair), MTTF (Mean Time To Failure), and MTBF (Mean Time Between Failure = The sum of MTTR + MTTF) for each failure mode. For more information about the calculation of these KPIs, see Calculation of Mean Time KPIs [page 52].

For the equipment model, the top bad actors for each failure mode

**Note**
If there are more than 5 failure modes found for the equipment model and some failure modes were removed from the equipment model after the configuration of failure mode analytics (after the model scoring), the following can happen: when you switch from the top 5 failure modes cards to all failure modes, the card data might change for the same failure mode, for example, the occurrence of the failure mode in notifications.

**Next Steps**

To view the top words of a specific failure mode and the top-related notifications with their work orders, you can now navigate to the Failure Mode Analytics application by choosing View Analytics on a failure mode card. For more information about the results when using the application, see Using the Failure Mode Analytics Application [page 58].

**Related Information**

Failure Mode Analytics [page 49]

### 3.4.1.1 Calculation of Mean Time KPIs

On the failure mode cards, you can view KPIs for Mean Time to Repair (MTTR), Mean Time to Failure (MTTF), and Mean Time Between Failures (MTBF) for each failure mode at equipment level and model level. This topic provides you with an overview of how these KPIs are calculated including examples.

**Overview**

During the failure mode analysis, notifications for all equipment of a model are collected within the time range. Based on these collected notifications, the downtimes caused by failures and the subsequent uptimes when a failure has been rectified, can be identified. Failures are notifications with a breakdown. That means these notifications have the breakdown attribute set to True or the notificationTypeDescription attribute set to Breakdown. For more information about viewing the notificationTypeDescription attribute, see
Viewing and Creating Equipment Notifications [page 104]. For more information about viewing the breakdown attribute, see Notifications.

These failures and corresponding downtimes as well as uptimes are the basis for the calculation of the KPIs for MTTR, MTTF, and MTBF. The following graphic illustrates these dependencies:

![Graphic illustrating dependencies between downtime, uptime, mean time to repair, and mean time to failure.]

**Mean Time to Repair (MTTR)**

The mean time to repair is the expected average time period that it takes to repair a piece of equipment or model that is down because of a failure or planned maintenance. It is the downtime of a piece of equipment or model. The KPI for this mean time is calculated as follows:

\[
\text{Mean Time to Repair} = \frac{\text{The total time period when the piece of equipment or model is down for a repair during the time range}}{\text{the number of repairs during the time range}}
\]

The total time period when the piece of equipment or model is down for a repair during the time range is the time period between the malfunction start date and the malfunction end date of a notification. The number of repairs during the time range is the total number of collected notifications for which the time to repair (downtime) is known.

**Example**

You have selected 1 month as a time range for your failure mode analysis. Within this period, 1 notification was collected. This notification has a malfunction start date at 4:30 a.m. January 1, 2019 and a malfunction end date at 4:30 p.m. January 1, 2019.

\[
12 \text{ Hours}
\]

\text{Repair 1}

<table>
<thead>
<tr>
<th>Start of failure</th>
<th>End of failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notification 1 4:30 a.m.</td>
<td>Notification 1 4:30 p.m.</td>
</tr>
</tbody>
</table>

This means that the total time period when the piece of equipment or model is down for a repair is 12 hours and the number of repairs for which the time to repair (downtime) is known is 1. The resulting mean time to repair is 12 hours (12/1).
Example

You have selected 2 months as a time range for your failure mode analysis. Within this period, 3 notifications were collected. For all these 3 notifications, the time to repair (downtime) is known:

- The first notification has a malfunction start date at 3:00 a.m. January 1, 2019 and a malfunction end date at 3:00 p.m. January 1, 2019.
- The second notification has a malfunction start date at 3:00 a.m. January 2, 2019 and a malfunction end date at 3:00 p.m. January 2, 2019.
- The third notification has a malfunction start date at 3:00 a.m. January 3, 2019 and a malfunction end date at 9:00 a.m. January 3, 2019.

This means that the total time period when the piece of equipment or model is down for a repair is 30 hours (12+12+6) and the number of repairs for which the time to repair (downtime) is known is 3. The resulting mean time to repair is 10 hours (30/3).

Mean Time to Failure (MTTF)

The mean time to failure is the expected average time period between an ended failure and the next expected failure. It is the uptime of a piece of equipment or model and a basic measure of how reliable an ideally non-repairable system is. Furthermore, the mean time to failure is a statistical value and is meant to be the mean over a long period of time and a large number of units. The KPI for this mean time is calculated as follows:

Mean Time to Failure = (The total time period when the piece of equipment or model is up before a failure during the time range) / (the number of failures during the time range)

The total time period when the piece of equipment or model is up before a failure during the time range is the time period between the malfunction end date of a notification and the malfunction start date of the next notification with a breakdown. The number of failures during the time range is the total number of collected notifications that have a breakdown and for which the uptime before a failure is known.

Example

You have selected 1 month as a time range for your failure mode analysis. Within this period, 2 notifications with a breakdown were collected. For the second notification, the uptime before a failure is known. For the first notification, the uptime before the first failure is not known:

- The first notification with a breakdown has a malfunction start date at 2:00 a.m. January 1, 2019 and a malfunction end date at 2:00 p.m. January 1, 2019.
- The second notification with a breakdown has a malfunction start date at 8:00 p.m. January 1, 2019 and a malfunction end date at 2:00 a.m. January 2, 2019.
This means that the total time period when the piece of equipment or model is up before a failure is 6 hours and the number of failures for which the uptime before a failure is known is 1. The resulting mean time to failure is 6 hours (6/1).

Example
You have selected 2 months as a time range for your failure mode analysis. Within this period, 3 notifications with a breakdown were collected. For 2 of these notifications, the uptimes before a failure are known. For the first notification, the uptime before the first failure is not known:

- The first notification with a breakdown has a malfunction start date at 2:00 a.m. January 1, 2019 and a malfunction end date at 2:00 p.m. January 1, 2019.
- The second notification with a breakdown has a malfunction start date at 8:00 p.m. January 1, 2019 and a malfunction end date at 2:00 a.m. January 2, 2019.
- The third notification with a breakdown has as malfunction start date at 10:00 a.m. January 2, 2019 and a malfunction end date at 1:00 p.m. January 2, 2019.

This means that the total time period when the piece of equipment or model is up before a failure is 14 hours (6+8) and the number of failures for which the uptime before a failure is known is 2. The resulting mean time to failure is 7 hours (14/2).

Mean Time Between Failures (MTBF)

The mean time between failures is the expected average time period between the last failure and the next upcoming failure. It is a measure of how reliable a system is. The KPI for this mean time is calculated as follows:

$$\text{Mean Time Between Failures} = \frac{\text{The total time period between two subsequent failures during the time range}}{\text{the number of failures during the time range}}$$

The total time period between two subsequent failures during the time range is time period between the malfunction start date of a previous notification with a breakdown and the malfunction start date of the next notification with a breakdown. The number of failures during the time range is the total number of collected notifications that have a breakdown and for which the time period between two subsequent failures is known.

Example
You have selected 1 month as a time range for your failure mode analysis. Within this period, 2 notifications with a breakdown were collected. For the first notification, the time period between the subsequent failures
is known. For the second notification, the time period between the subsequent failures is not known as the next failure has not yet started:

- The first notification with a breakdown has a malfunction start date at 8:00 a.m. January 1, 2019 and a malfunction end date at 1:00 p.m. January 1, 2019.
- The second notification with a breakdown has a malfunction start date at 5:00 p.m. January 1, 2019 and a malfunction end date at 2:00 a.m. January 2, 2019.

This means that the total time period between subsequent failures is 9 hours and the number of failures for which the time period between the subsequent failures is known is 1. The resulting mean time between failures is 9 hours (9/1).

**Example**

You have selected 2 months as a time range for your failure mode analysis. Within this period, 3 notifications with a breakdown were collected. For 2 of these notifications, the time period between the subsequent failures is known. For the third notification, the time period between the subsequent failures is not known as the next failure has not yet started:

- The first notification with a breakdown has a malfunction start date at 8:00 a.m. January 1, 2019 and a malfunction end date at 1:00 p.m. January 1, 2019.
- The second notification with a breakdown has a malfunction start date at 5:00 p.m. January 1, 2019 and a malfunction end date at 2:00 a.m. January 2, 2019.
- The third notification with a breakdown has a malfunction start date at 10:00 a.m. January 2, 2019 and a malfunction end date at 2:00 p.m. January 2, 2019.

This means that the total time period between subsequent failures is 26 hours (9+17) and the number of failures for which the time period between the subsequent failures is known is 2. The resulting mean time between failures is 13 hours (26/2).
3.4.2 Using Failure Mode Analytics in the Failure Modes Application

This topic describes how to use failure mode analytics in the Failure Modes application.

Prerequisites

- Failure mode analytics has been configured. For more information, see Configuring Failure Mode Analytics [page 412].
- The roles AC_ORG_DATA_READ and APP_READ are assigned to your user.

Procedure

1. On the SAP Fiori launchpad, go to the Master Data group and open the Failure Modes application.
2. In the Failure Mode List window, select the failure mode that you want to analyze.
3. Choose the ANALYTICS tab.
4. Select the equipment model to which the failure mode belongs.

   **Note**
   
   Only choose the equipment model for which failure mode analytics has been configured. Otherwise, the results are empty. If you are unsure for which equipment model failure mode analytics has been configured, contact your administrator.

5. Choose Go.

Results

The failure mode analysis is complete and the following results are displayed:

- In the Top words bar graph, the most frequently occurring words found within the notifications for the selected failure mode and equipment model are displayed. This helps you to see if there is a term that seems relevant to the issues you may have with the related equipment. The top words are ranked by relevancy. The ranking contains values from 1 as the most relevant, to 0 as the least relevant.

- In the Top Notifications table, the top-related notifications for the top words are displayed. This helps you to find a solution for your issues. The top notifications are ranked by relevancy, and likelihood of belonging to a failure mode. The ranking contains values from 1 as the most relevant, to 0 as the least relevant. The colors for the ranking are provided in three groups:
  - Green scores = 0.670 to 1
  - Yellow scores = 0.340 to 0.669
  - Red scores = 0 to 0.339

You can view details of a notification by clicking the notification link.
• Under Related Order in the Top Notifications table, the work orders for the notifications are displayed. From the work orders, you can derive the actions taken for equipment of the same equipment model. You can view details of a work order by clicking the work order link.

Related Information

Failure Mode Analytics [page 49]

3.4.3 Using the Failure Mode Analytics Application

This topic describes how to use the Failure Mode Analytics application.

Prerequisites

• Failure mode analytics has been configured. For more information, see Configuring Failure Mode Analytics [page 412].
• The role APP_READ is assigned to your user.

Note

If the required role is not assigned to your user, you cannot see the application on the launchpad. Contact your Identity Management Administrator if the role has not been assigned to your user yet.

Procedure

1. On the SAP Fiori launchpad, go to the Analytics group and open the Failure Mode Analytics application.
2. Select the equipment model that you want to analyze. You can choose from all equipment models for which failure mode analytics has been configured.
3. Select a failure mode that belongs to the equipment model. You can choose from all failure modes that have been assigned to the equipment model during the failure mode analytics configuration.
4. Choose Go.

Results

The failure mode analysis is complete and the following results are displayed:

• In the Top words bar graph, the most frequently occurring words found within the notifications for the selected failure mode and equipment model are displayed. This helps you to see if there is a term that
seems relevant to the issues you may have with the related equipment. The top words are ranked by relevancy. The ranking contains values from 1 as the most relevant, to 0 as the least relevant.

- In the Top Notifications table, the top-related notifications for the top words are displayed. This helps you to find a solution for your issues. The top notifications are ranked by relevancy, and likelihood of belonging to a failure mode. The ranking contains values from 1 as the most relevant, to 0 as the least relevant. The colors for the ranking are provided in three groups:
  - Green scores = 0.670 to 1
  - Yellow scores = 0.340 to 0.669
  - Red scores = 0 to 0.339

  You can view details of a notification by clicking the notification link.

- Under Related Order in the Top Notifications table, the work orders for the notifications are displayed. From the work orders, you can derive the actions taken for equipment of the same equipment model. You can view details of a work order by clicking the work order link.

Related Information

Failure Mode Analytics [page 49]

3.5 Personal Dashboard

This app is personalized to be a one-stop point to navigate to the applications, your frequently viewed items of equipment, favorites, and unread announcements.

Personal Dashboard has the following sections:

- **Overview**: Contains a search bar to find objects from applications such as Equipment, Models, and Instructions.

- **Applications**: Allows you to navigate directly to applications from this section.

  i Note
  The application links are displayed based on roles assigned to you.

- **Frequently Viewed**: Displays your frequently viewed items of equipment, locations, models, and systems as thumbnails. You can navigate to an item of equipment, location, model, or system through these thumbnails.

- **My Favorites**: Shows up to 20 items of equipment, locations, models, and systems that you’ve marked as favorites on the object page.

- **Suggested Tasks**: Displays unread announcements.
3.6 Analytics Dashboards

Analytics dashboards visualize data, for example, by using interactive charts or tables. This provides you with insights and allows you to analyze and explore your data.

SAP Analytics Cloud

The source of the analytics dashboards is SAP Analytics Cloud. In SAP Analytics Cloud, an administrator can create stories (dashboards) based on different data and then configure analytics dashboards to display these stories in SAP Predictive Asset Insights. To bring data into the stories, SAP Predictive Asset Insights provides the following options:

- Your administrator can copy data of multiple business objects from SAP Predictive Asset Insights, for example, equipment header into a story using an import data connection.
- Your administrator can use data “live” in a story based on an own SAP HANA database with a live data connection. In the SAP HANA database, master data and time series data from SAP Predictive Asset Insights can be combined with data from other databases.

i Note
The live data connection is only available with Amazon Web Services (AWS).

The following graphic shows an example of a story:
Analytics Dashboards for Multiple Applications

Your administrator can configure analytics dashboards that are displayed in multiple applications for different analyses:

- **Analytics dashboards for the Analytics Dashboards application**
  These dashboards are displayed in this dedicated application itself. With this dashboard, you can view analytics on data that is related to multiple business objects, for example, for all equipment or models with their related data like notifications.

- **Analytics dashboards for object pages of business object applications**
  These dashboards are displayed on object pages of certain business object applications. With this dashboard, you can view analytics on data that is related to a single business object, for example, one piece of equipment or one model. One analytics dashboard is displayed per business object. The business objects for which dashboards can be configured include:
    - Equipment
    - Models
    - Locations
    - Spare Parts

Features

To analyze and explore your data, you can perform different actions in the dashboards depending on what features you have configured when creating your story in SAP Analytics Cloud. Possible features are, for example:

**Filtering**

You can focus on a specific set of data on a chart or in a table by filtering table cells or chart data points or excluding non-relevant cells / data points. To apply filters to multiple charts, you can also group filters. Filtering also allows you to rank data and focus on a specified number of data points with the highest or lowest values, or on a specified number of the lowest or highest ranked members. You can later also reset all filters.

**Sorting**

On a table or a chart, you can sort data using different sort directions, for example, sorting dimensions alphabetically.

**Entering Full Screen Mode**

To focus on data for example, for only one chart, you can open the chart in full screen mode.

For more information about all available features, see the related SAP analytics cloud help link.

Related Tasks

- Viewing Analytics Dashboards in the Application [page 62]
- Viewing Analytics Dashboards on Object Pages [page 63]
3.6.1 Viewing Analytics Dashboards in the Application

This topic describes how to view analytics dashboards in the Analytics Dashboards application.

Prerequisites

- At least one dashboard for the application has been configured by an administrator. For more information, see Analytics Dashboards Configuration [page 419].
- The role ANALYTICS_DASHBOARDS_LEGACY is assigned to your user.

Procedure

1. On the SAP Fiori launchpad, go to the Analytics group and open the Analytics Dashboards application.
   - The Analytics Dashboards table is displayed with all configured dashboards. The titles are sorted alphabetically.
2. To view a dashboard, click the respective dashboard title link.

Results

The dashboard is displayed and you can view the data.
You can later close the analytics dashboard and go back to the table by choosing the back button on the SAP Fiori launchpad.
3.6.2 Viewing Analytics Dashboards on Object Pages

This topic describes how to view analytics dashboards on certain object pages.

Prerequisites

- A dashboard for one of the business objects and if required the object page has been configured by an administrator. For more information, see Analytics Dashboards Configuration [page 419].
- The role AC ORG DATA READ is assigned to your user.
- (Only relevant for configuring the settings on the object pages): The following roles are assigned to your user:
  - Model page: MODEL_EDIT or MODEL_DELETE
  - Equipment page: EQUIPMENT_EDIT or EQUIPMENT_DELETE
  - Location page: FUNCTIONAL_LOCATION_EDIT or FUNCTIONAL_LOCATION_DELETE

Procedure

1. On the SAP Fiori launchpad, go to the Master Data group and open the respective business object application for which you want to view the analytics dashboard. Depending on the configured dashboards, you can choose between the following applications:
   - Equipment application
   - Models application
   - Locations application
   - Spare Parts application

   → Tip
   You can also navigate to the equipment page from the Explorer. For more information, see Explorer [page 12].

2. Choose the business object that you want to analyze, for example, the piece of equipment or model.
   The object page is displayed.

3. View the analytics dashboard for the business object. Choose between the following options:
   - On the equipment and model page, choose ≥ ANALYTICS ≥ Analytics Dashboard ≥.
   - On the location and spare part page, choose ANALYTICS DASHBOARD.
i Note

If the tab for the analytics dashboard is not displayed, choose **Configure Sections** and activate the checkbox for **Analytics Dashboard**. For some of the object pages, the checkbox is within the **Analytics** checkbox. In this case, activate both checkboxes. The roles that are required to configure the sections are listed in the prerequisites.

**Results**

The dashboard is displayed and you can view the data.

**Related Information**

Analytics Dashboards [page 60]

### 3.7 Emerging Issue Detection (EID)

Emerging Issue Detection (EID) enables you to identify, monitor, and manage an equipment issue early. As part of this process, you gather information such as issue history, relevant documents, and investigation details that will help to make a more detailed analysis of the issue.

The evidence is collected in an improvement request [page 67], using the **Add Evidence** button.

During your evidence collection, you can create a new improvement request or edit an existing improvement request. You can manually collect the evidence related to an issue and attach it to an improvement request using the following analysis tools:

- Indicator Chart
- Features in Indicator Chart [page 41]
- Alerts [page 20]
- Notifications [page 36]
- Work Orders [page 37]

**Related Information**

Creating an Improvement Request [page 67]
4 Processes

The tiles under Processes on the SAP Fiori launchpad give you access to the various business processes offered by SAP Predictive Asset Insights.

Overview of Processes

<table>
<thead>
<tr>
<th>Tile</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Improvement [page 65]</td>
<td>Get suggestions or a solution for an equipment issue by creating an improvement request.</td>
</tr>
<tr>
<td>Obsolescence Management [page 72]</td>
<td>A report that graphically illustrates deadlines for manufacturer support for a model or a piece of equipment.</td>
</tr>
<tr>
<td>Lookup [page 73]</td>
<td>Search for error codes and look up related information for an equipment or a model.</td>
</tr>
<tr>
<td>Smart Matcher [page 75]</td>
<td>Use this application to assign models to a lean (equipment with no model assignment to it) equipment.</td>
</tr>
</tbody>
</table>

4.1 Performance Improvement

While using an equipment, you could face issues with regard to its process or maintenance. To get suggestions or a solution, you can create an improvement request. By creating this request, you involve the relevant stakeholders who can collaborate and provide you with a suggestion or even a solution.

If stakeholders within your organization can resolve your request, create an internal improvement request. If you want to involve stakeholders outside your organization, create an external improvement request.

The parties involved in this workflow are:

- **Requester**: The user who requests for a suggestion or a solution by creating an improvement request.
- **Reviewer**: The user who reviews the improvement request sent by the improvement requester.
- **Provider**: The user who suggests a solution for the improvement request sent by the requester.

**i Note**

The user who is currently processing the improvement request is referred to as the **Processor**. The processor can be the requester, reviewer or the provider.

Using the Performance Improvement application, you can perform the following tasks:

- Create, Review and submit an improvement request
  - Creating an Improvement Request [page 67]
  - Reviewing an Improvement Request [page 68]
- Complete or reject an improvement request
  - Completing an Improvement Request [page 69]
- Resubmit an improvement request
  Resubmitting an Improvement Request [page 69]
- Confirm an improvement request
  Confirming an Improvement Request [page 70]
- Reopen a confirmed improvement request
  Reopening a Confirmed Improvement Request [page 70]

The following table describes the statuses of an improvement request:

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draft</td>
<td>The requester has created an improvement request.</td>
</tr>
<tr>
<td>In Review</td>
<td>The requester has created an improvement request and sent it to the reviewer for review.</td>
</tr>
<tr>
<td>Submitted</td>
<td>The requester has submitted the improvement request to the provider;</td>
</tr>
<tr>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>The reviewer has submitted the improvement request (created by the requester) to the provider.</td>
</tr>
<tr>
<td>In Process</td>
<td>The improvement request is being processed by the provider.</td>
</tr>
<tr>
<td>Author Action</td>
<td>The provider sends the improvement request to the reviewer or requester for more details.</td>
</tr>
<tr>
<td>Rejected</td>
<td>The provider has rejected the case as invalid.</td>
</tr>
<tr>
<td>Completed</td>
<td>The provider has provided a suggestion or a solution.</td>
</tr>
<tr>
<td>Confirmed</td>
<td>The reviewer has closed the case after it was processed by the provider.</td>
</tr>
</tbody>
</table>
The following figure illustrates the process flow of an improvement request between an requester, reviewer and the provider:

![Process Flow Diagram]

4.1.1 Creating an Improvement Request

You create an improvement request when you want suggestions or solutions about a piece of equipment, its process, or maintenance.

Procedure

1. Open the Performance Improvement application.
2. To create an internal improvement request, choose **New Internal**.
   
   The system displays the Improvement Request window.
3. To define a case, enter the following details in the New Improvement Request dialog box:
   a. Enter a request description
   b. Choose a reference object type (Model, Equipment, Location)
   c. Choose a reference object ID, based on reference object type chosen.
   d. Select an improvement category
In case the selected improvement category is **Master Data Improvement**, a new revision has to be created for the reference object.

**Note**

In revision is created in the following cases.
- Only if the reference object ID is either a model or equipment.
- Requestor must have write access to reference object ID.
- Reference object must not have an active in revision, that is, if reference object must be in a published state.

e. Choose a priority
f. Select a reviewer to review your improvement request.
g. Select a provider who can provide a resolution to your improvement request.
h. Choose **OK**.

4. To add one or more items of equipment, choose **Edit → Affected Equipment** and perform the following tasks:
   a. Choose **Add**
   b. Select one or more items of equipment
c. Choose **Assign**

5. To add additional information to the case, choose **Request → Description** and provide the necessary description of the case in the **Description** text box.

6. To assign instructions to the case, choose **Request → Instructions** and perform the following tasks:
   a. Choose the **Assign** button in the **Instructions** section.
   b. Select one or more instructions from the **Select Instructions** popup.
c. Choose **Assign** in the popup.

7. To add additional information to the case using documents, choose **Request → Documents** and perform the following tasks:
   a. Choose **Add → Assign**
   b. Select the relevant document.
c. Choose **Assign**.

8. Choose **Save**.

9. Choose **Send for Review** to submit the case to the reviewer.
   - Choose **Submit** to submit the request directly to the provider.

### 4.1.2 Reviewing an Improvement Request

As an reviewer, you perform this procedure to review an improvement request created by an requester.

**Context**

You have a case assigned to you for review by an requester.
**Procedure**

1. Open the **Performance Improvement** application. The system displays the **Improvement Requests** window with a list of existing cases.
2. Choose a request from the improvement requests list, or search for a request that you want to review.
3. You can modify information in the request as necessary and add comments in the comments section to enhance the information required for the processing the request.
4. To submit the request to a provider, choose **Submit**.
   - To request additional information from the requester, choose **Send to Requester for Update**.

**4.1.3 Completing an Improvement Request**

You perform this task to provide a suggestion or a solution to an improvement request created by a requester, or submitted by a reviewer.

**Context**

As a provider, you have a request assigned to you that requires resolution either by the reviewer or by the requester.

**Procedure**

1. Open the **Performance Improvement** application. The system displays the improvement requests window with a list of existing requests.
2. Choose a request from the improvement requests list, or search for a request that you want to resolve.
3. To process the improvement request, choose **In Process**.
4. To provide a solution for the request, add comments or documents, as required, in the **Recommendation** section.
5. Choose **Completed**.
   - To request additional information from the requester, choose **Author Action**.
   - To reject the request as an invalid request, choose **Reject Improvement Request**.

**4.1.4 Resubmitting an Improvement Request**

As an requester or a reviewer, you can resubmit an improvement request to the provider for further processing.

You can resubmit an improvement request in the following scenarios:
When the provider sends the improvement request for **Author Action** asking for additional details from the requester or reviewer.

- When the provider has already provided the recommendation for the improvement request.
- When the provider has rejected the improvement request.

### 4.1.5 Confirming an Improvement Request

As an reviewer, you can confirm a request after the provider has provided a recommendation or rejected the improvement request.

**Context**

You have received an improvement request that either has a recommendation from a provider, or has been rejected by the provider.

**Procedure**

1. Open the **Performance Improvement** application.
   
   The system displays the **Improvement Cases** window with a list of existing cases in statuses **Recommendation Provided** or **Rejected**.
2. To add any additional comments, choose **Edit**.
3. For an improvement request in status **Recommendation Provided**, choose **Confirm** to close the request.
   
   - For a rejected improvement request, you can perform either of the following:
     
     - Choose **Confirm Rejection** to close the rejected request.
     - Choose **Resubmit to Provider** to resubmit the request.

### 4.1.5.1 Reopening a Confirmed Improvement Request

You perform this activity if you need more information about an improvement request after a recommendation has been provided or the case has been rejected by the provider.

**Prerequisites**

- You are either the requester or the reviewer.
- You have an improvement request in the status **Confirmed** in your **Improvement Cases** window. For more details about statuses of improvement cases, refer to the table in **Performance Improvement** [page 65].
Procedure

1. Open the *Performance Improvement* application.
2. Choose the improvement request in the status **Confirmed**.
3. Choose **Reopen Request**.
4. Choose **Yes**.
5. Add comments and edit the improvement request as necessary.
6. Click the **More** icon and choose **Resubmit to Provider**.
7. Add a comment and choose **OK**.
   
   The reopened improvement request is sent to the provider.

4.1.6 Viewing the List of Improvement Requests

As a reviewer, provider or requester you might want to see the improvement requests based on certain filters.

Context

The user has an easier way to see the requests based on different statuses and roles.

Procedure

1. Open the *Performance Improvement* App and view the list of the requests. Now, you want to see the requests that you need to process as a requester.
2. Choose **For Processing** in the drop down next to the table.
3. Choose `<My Processing Role>` from the filter bar. Automatically, the request list will be filtered out based on the statuses set on the filter bar.

4.1.7 Deleting an Improvement Request

You can delete an improvement request that you no longer want to have on the network.

Prerequisites

Your user ID has the roles **IMPROVEMENT_DELETE** assigned.
Procedure

1. Open the Performance Improvement app.
2. Select the Improvement Request which is one of the following status: Draft, Rejected, Completed, In Review or Author Action and go to the details screen.
3. Select Delete Request.
   
   You get a confirmation message. Choose OK to delete the request.

Results

You can view the improvement request in the list screen with status as Deleted.

i Note

You can still submit the deleted request to external providers.

4.2 Obsolescence Management

An application that graphically illustrates deadlines for manufacturer support for a model or a piece of equipment. These deadlines pertain to:

- Support for repair
- Accepting model or equipment orders
- Calibration services
- Availability of spare parts

This application allows timely tracking of the model or equipment lifecycle.

For more information, refer to Viewing the Obsolescence Management [page 72].

4.2.1 Viewing the Obsolescence Management

You use this application to visualize models that will be obsolete in the next 3 years and affected equipment.

Procedure

1. Launch the Obsolescence Management application.
2. In the Obsolescence Management details page, you can set the following filters:
In the Expiry Date dropdowns, choose the option for which you want to view the items due for expiry.

**Note**
The report displays information for every month in the time period that you have selected.

b. Choose the manufacturer.
c. Choose the relevant expiry date.
d. Choose Class and Subclass from the filters as necessary.

### Results

You see a graphical representation of the number of models and items of equipment that are due for expiry for your given time period.

**Note**
The tabular view below the graphical representation displays information about the Model Count and Equipment Count that are clickable links. Clicking on the Equipment Count, you can navigate to the equipment list. You can select equipment from the list to view the details page.

You have an option in the chart tool bar to view this data in the following views:

- Chart and Tabular View
- Chart View
- Tabular View

For chart view, you can use Select Chart Type to visualize the data in different chart types, for example, line chart, bar chart, and so on.

By default, the chart view displays data based on month/year dimension. You can also add additional dimensions to drill down the data using the View By option on the chart tool bar.

You can select a segment from the interactive chart and use the Details option on the chart tool bar to view details of the selected option. You can personalize the data in the chart using the Settings option from the chart tool bar.

You can opt to view all the details in the tabular view or details of only the selected segment from the interactive chart by using the options from the table tool bar. You can personalize the data in the table using the Settings option from the table tool bar.

### 4.3 Lookup

You use this app to search the error code and look-up related information for an equipment or a model.

Lookup application also allows you to find troubleshooting information for an equipment or a model. You can use the Scan Bar Code option to find the equipment and its details.
Due to the common pattern across manufacturer, field technicians and engineers in the field can look up error codes much faster using this app. Regardless of the manufacturer, operating, and service providing, companies will always find error codes and solutions to it in the same place.

You can use the look-up option to search for a model or a piece of equipment. Manufacturers can maintain error codes on the model level:

- Error code descriptions and failure modes for a particular error code can be provided
- Breakdown instructions assigned to the respective model and failure mode are automatically displayed for each model

For more information, refer to Managing Lookup [page 74].

In devices that support RFID, in addition to scanning of QR/barcodes you can also scan NFC tags to identify equipment (Custom Fiori client needed). Set up the bar code configurations under General Application Settings > Bar Code Configurations, you have to define the <Prefix> and <Suffix> in order to use this feature.

### 4.3.1 Managing Lookup

You can perform various operations on lookup such as lookup and error code-related information for an equipment or a model.

#### Context

You can use this app to search for <Error Code> and <Lookup>. You can perform the following operations using the lookup application:

- Lookup a model using it’s <ShortDescription> or <Model ID> or <PrimaryExternalID> or <ExternalID>
- Lookup an equipment using its <ShortDescription> or <Equipment ID> or <PrimaryExternalID> or <ExternalID> or <SerialNumber>
- Search for specific:
  - Lookup of equipment
  - Error code of equipment
  - Lookup of Model
  - Error code of model
- Scan bar code on devices for equipment
- Publish equipment details
- Search by both Equipment ID and Model ID irrespective of whether the equipment has been assigned to a model
- Display Alert Types of type error code for the selected equipment or model.
- NFC enabled for devices that support RFID.
  With devices that support RFID, in addition to scanning of QR/barcodes you can also scan NFC tags to identify equipment (Custom Fiori client needed). Set up the bar code configurations under General
**Application Settings > Bar Code Configurations** you have to define the `<Prefix>` and `<Suffix>` in order to use this feature.

Then the app looks for equipment ID, Description, and Serial Number. So, write anything on the tag where you have an equivalent equipment object in SAP Asset Intelligence Network to look it up.

- If you perform an exact search for equipment based on Equipment ID, Description, UID, or Serial No, then the search also displays equipment owned by connected partners.

In case the connected business partner also has authorizations to create equipment requests, then you also get an option create an equipment request.

You can view the list of connected business partners who have authorizations to create equipment request under **Application Settings > General Application Settings > Equipment Requests**.

### 4.4 Smart Matcher

Operator can use this information during their maintenance processes.

Manufacturer provides the information on the model level. The operator in turn synchronizes installed base information from **SAP Plant Maintenance** (SAP PM) to **SAP Predictive Asset Insights**. With this, operator owns a significant amount of equipment from SAP PM in SAP Predictive Asset Insights. If the data quality of the equipment is sufficient enough, the smart matcher can help you link a lean equipment (equipment with no model assignment to it) to the respective model it belongs to.

The above is based on an algorithm that involves fuzzy search. In case of poor or incomplete data on equipment level, the smart matcher application provides a card view in which you can match recommended models to equipment. The recommendation is again based on the same algorithm. The output of the algorithm is a match factor between 0.6 (60%) and 1 (100%).

For more information, refer to **Performing a Smart Match** [page 75].

### 4.4.1 Performing a Smart Match

You can perform various operations on smart matcher such as matching an equipment to model or updating the model details in model app and checkin Smart Matcher application.

**Context**

You use the Smart Matcher application to assign models to a lean (equipment with no model assignment to it) equipment. You can perform the following operations using the Announcements application:

- **Assign model to a lean equipment**
  
  All equipment that have an active model request associated with it will not be visible in the equipment list. Equipment in `<Sold>` and `<Retired>` are not displayed.

- **Identify lean equipment without a fitting model to create model requests**
- Update the equipment details using the Equipment application and check this using Smart Matcher
- Search for a model in the Equipment application and check the equipment for a given matching factor
- View the count on the smart matcher tile. This depicts the probable matches for lean equipment
- Remove visibility of equipment for a particular model by choosing the **NO MATCH** button
- Display equipment both in list and grid view
- Match equipment to a model by choosing the Match button on the equipment file
- Remove the visibility of equipment for a particular model by selecting No Match button
- You can **Match** or **No Match** model assignments for multiple equipment.
5 Master Data

The tiles under Master Data on the SAP Fiori launchpad enable you, as a business user, to browse all kinds of related information about your equipment. If you are an administrator you can additionally create and edit master data.

**i Note**

Unit of Measure (UoM) Conversion: SAP provides a basic set of unit of measures. And, unit of measure conversion is applicable only for this basic set of unit of measures.

<table>
<thead>
<tr>
<th>Tile</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment [page 78]</td>
<td>Create/display equipment. An item of an equipment is a physical instance of a model. An operator maintains additional information specific to an item of an equipment such as installation information, installation location, documents.</td>
</tr>
<tr>
<td>Models [page 112]</td>
<td>Create/display models. A model is an abstract representation from the manufacturer that defines all maintenance and specification information related to a new or existing product. A physical equipment is an instance of a model.</td>
</tr>
<tr>
<td>Locations [page 131]</td>
<td>Create/display a location is a virtual record of the location where an equipment is installed.</td>
</tr>
<tr>
<td>Functions [page 140]</td>
<td>Defines how the assigned objects are intended to operate. For example, you can assign functions to equipment, models etc.</td>
</tr>
<tr>
<td>Failure Modes [page 142]</td>
<td>Create/display failure modes. A failure mode is a probable failure that could occur to piece of equipment.</td>
</tr>
<tr>
<td>Fingerprints [page 150]</td>
<td>Defined as a collection of snapshot of the indicator chart derived from a set of indicators and meta data (type, data and time, description, equipment state) for a specific time period. It describes the reference state of a single equipment that can be used for further process steps, for example, equipment documentation, trending, failure analytics.</td>
</tr>
<tr>
<td>Spare Parts [page 154]</td>
<td>Create/display spare parts. Spare parts are components that are kept in your inventory as spare. Typically, these components are not fitted into your equipment, but can be fitted into a piece of equipment when needed.</td>
</tr>
<tr>
<td>Groups [page 164]</td>
<td>Create/display groups. You can group together different business objects for multiple purposes.</td>
</tr>
<tr>
<td>Systems [page 171]</td>
<td>Define systems based on a system model and assign system template to it.</td>
</tr>
<tr>
<td>Documents [page 180]</td>
<td>Create/assign/download/display documents for your equipment.</td>
</tr>
<tr>
<td>Announcements [page 204]</td>
<td>Create/display announcements. An announcement is information communicated to equipment owners or operators, for example, to inform that an instruction has been updated.</td>
</tr>
</tbody>
</table>
5.1 Equipment

A piece of equipment is a physical instance of a model. An operator maintains additional information specific to an item of an equipment such as the following:

- **Installation information:**
  An operator maintains installation information related to an equipment such as serial number of the equipment, tag number of the equipment, installation date of the equipment, and build date of the equipment.

- **Installation location:**
  An operator maintains geographical coordinates of the item of an equipment to locate the location of an item of an equipment.

- **Documents:**
  An operator maintains some best practices information while using the item of an equipment using unstructured documents.

An equipment can be in any of the following states:

- **Unpublished**
- **In Revision**
- **Published**

For more information, see State Transitions [page 267].
### 5.1.1 Managing Equipment

You can create, view, update, and delete a piece of equipment.

#### Context

<table>
<thead>
<tr>
<th>Features</th>
<th>More Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a piece of equipment and assign additional information such as installation information, location information, and attach documents.</td>
<td>For more information, see Adding Equipment Components [page 90].</td>
</tr>
<tr>
<td>Add and remove equipment components.</td>
<td>For more information, see Viewing and Updating a Piece of Equipment [page 97].</td>
</tr>
<tr>
<td>View details of an existing equipment and update an existing equipment.</td>
<td>For more information, see Deleting a Piece of Equipment [page 101].</td>
</tr>
<tr>
<td>View work orders for a piece of equipment</td>
<td>Viewing Work Orders of an Equipment [page 106]</td>
</tr>
<tr>
<td>View notifications for a piece of equipment</td>
<td>Viewing and Creating Equipment Notifications [page 104]</td>
</tr>
<tr>
<td>View and edit indicators</td>
<td>Viewing and Editing Indicators [page 108]</td>
</tr>
<tr>
<td>View and analyze leading indicators for a piece of equipment.</td>
<td>Viewing and Analyzing Leading Indicators for Equipment</td>
</tr>
<tr>
<td>View an analytics dashboard for a piece of equipment.</td>
<td>Viewing Analytics Dashboards on Object Pages [page 63]</td>
</tr>
<tr>
<td>View the top failure modes for a piece of equipment.</td>
<td>Using Failure Mode Analytics on the Equipment or Model Pages</td>
</tr>
<tr>
<td>View a failure curve with different insights for a piece of equipment.</td>
<td>Viewing a Failure Curve for Equipment [page 111]</td>
</tr>
</tbody>
</table>

**Note**

In addition, you can use the Lookup application to scan the bar code, or the QR code of an item of equipment to view the details related to an item of equipment and perform actions such as update equipment phase, or edit header information for an item of equipment.
5.1.1.1 Creating a Piece of Equipment

You create a piece of equipment based on an existing model, and add additional information such as operator, equipment installation information, equipment location information, and assign documents relevant to the equipment.

Prerequisites

- You have created an operator.
- You have identified your organization’s profile on the SAP Predictive Asset Insights.
- Your user ID has the roles EQUIPMENT_DELETE or EQUIPMENT_EDIT assigned.

Context

You use the Equipment application to:

- Create a piece of equipment for your own operations purposes
- Create a piece of equipment for another customer
  For simplicity purpose, we describe the procedure to create a piece of equipment for your own operations.

<table>
<thead>
<tr>
<th>Step #</th>
<th>Description</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Open the Equipment application.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Choose New.</td>
<td></td>
</tr>
</tbody>
</table>
In the New Equipment dialog box:

1. You can optionally assign a model template for the equipment. Select the model template in the Model ID.
   In the Model ID dropdown, select an existing model from which you want to inherit the properties for the item of the equipment.
   If SAP Predictive Asset Insights is available, once the model template is selected the <IoT Sync> field is enabled. This field enables you to replicate the selected object in SAP Internet of Things and maintain connection between these systems. You can choose a <Yes> or <No>. By default, the sync is always set to <Yes>.

2. In the Equipment ID field, enter a unique name for an item of equipment.
3. In the Description field, enter a short description for an item of equipment.
4. In the Equipment Templates dropdown, choose the equipment template you have created and want to assign to the equipment.
   For more information about creating an equipment template, see Creating an Equipment Template [page 252].
5. In the Long Description field, enter a long description for an item of equipment.
6. In the Operator field, enter an operator for the equipment. Your company is selected as default value.
7. In the Phase, select:
   ○ Fully Operational or Partially Operational status if a piece of physical equipment exists.
   ○ Planned if a piece of physical equipment does not exist, or you have chosen to update the physical equipment details later.
   ○ Not Operational
8. In the Product Relevance, you can select the relevant products in which you intend to use this equipment:
   ○ Asset Network
   ○ Strategy and Performance Management
   ○ Predictive Maintenance
9. In the UID field, enter the unique ID that could be used to identify the equipment in any system.

i Note
- UID must be in the following format: <Unique company identifier>/ <Model-ID>/<Serial No>.
<table>
<thead>
<tr>
<th>Step #</th>
<th>Description</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>Choose <strong>Save</strong> to create a single piece of equipment. Enable the <strong>Create Components</strong> switch to create equipment hierarchy from the model template. In the <strong>Set Components</strong> tab, you can define the individual subequipment. <strong>Create Components</strong> creates the individual items of equipment, use <strong>Save</strong> to finalize the activity.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong> Component hierarchy is added to the equipment when a model is assigned to it.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Add values/information to the attributes of the underlying templates in the data sheet section, model information, equipment information, business partner information, installation location, lifecycle information, system, or groups</td>
<td>Adding Data in the Information Section [page 85]</td>
</tr>
<tr>
<td>5</td>
<td>Add structure components, spare parts or visual parts information</td>
<td>Adding Structure &amp; Parts [page 88]</td>
</tr>
<tr>
<td>6</td>
<td>Add equipment component</td>
<td>Adding Equipment Components [page 90]</td>
</tr>
<tr>
<td>7</td>
<td>Add documents, instructions, failure modes, alert types announcements or create improvement request for the equipment</td>
<td>Adding Information in the Documentation Section [page 91]</td>
</tr>
<tr>
<td>8</td>
<td>Configure indicator or component indicator</td>
<td>Adding Information in the Maintenance &amp; Service Section [page 96]</td>
</tr>
<tr>
<td>10</td>
<td>View changes made on the equipment data</td>
<td>Timeline [page 96]</td>
</tr>
<tr>
<td>11</td>
<td>To publish an item of equipment, choose <strong>Publish</strong> Once equipment is published, it is synchronized with SAP Internet of Things. System publishes the item of the equipment and creates a first revision of the item of the equipment.</td>
<td>Publishing Multiple Equipment [page 100]</td>
</tr>
<tr>
<td>12</td>
<td>To create revisions of an item of an equipment and to switch between the published and revision states, see the steps provided in the procedure <strong>Creating Revisions and Switching Between Revisions and Published State</strong> [page 268].</td>
<td></td>
</tr>
</tbody>
</table>
5.1.1.1   Editing Header Information

The object page of the equipment displays the header information that includes information like Phase/System Status, External IDs, Status (of the equipment), Languages and so on.

Context

You can view or edit the following in the header information:

Procedure

1. Phase/System Status

   You can view the phase of the equipment using the icon next to the equipment name in the header. The icon displays the following symbols for the relevant phases:

<table>
<thead>
<tr>
<th>Icon</th>
<th>Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>△</td>
<td>Planned</td>
</tr>
<tr>
<td>✔</td>
<td>Partial or Fully Operational</td>
</tr>
<tr>
<td>☐</td>
<td>Not Operational</td>
</tr>
<tr>
<td>✱</td>
<td>Dispose, Retired, Sold</td>
</tr>
</tbody>
</table>

   You can also view the system status, the date when the record was created and also navigate to the Manage Phase feature.

   You can document the different life cycle phases of the equipment using Manage Phase. Equipment can be in one of the following phases:

   ○ Current phase: It has three subsections:
     ○ Planned
     ○ Actual
     ○ Phased out
     These main phases are followed by a subsequent status schema, for example, Fully Operational.

   ○ Fully Operational
     ○ Planned => (Not <=> Partially <=>Fully) Operational
       ○ Operational <=> Dispose => Retire
         ○ Retire => Sold

   i Note
   Legends:
=> one time step, not reversible

<= back and forth

Dependencies:

○ Dismantle the equipment assigned to location, otherwise they can’t reach the state of Dispose, Retire, and Sell.

○ The Sold phase needs a Published status and an assigned model to the equipment.

○ Sold means a Transfer of Ownership. Equipment in that stage is not furthermore editable for the old Owner, but listed in their repository with the app. Date of ownership transfer.

Equipment exposed as a System can have an additional(optional) status (ISO 14224):

○ Redundant or Passive Standby:
  Redundancy wherein parts of the system for performing a required function are operational, while the remaining parts of the system are inoperative until needed.

○ Standby or Active Standby:
  Redundancy wherein all the parts of the system for performing a required function are intended to operate simultaneously.

- Next Phase
  With the next phase, you can document or plan the upcoming, multiple phase changes.
  ○ This planned phase change does not have a mandatory phase change as consequence.
  ○ This selectable phase here, do not follow a status schema or dependency.

○ Current and planned phase will be exposed in the Manage Phase dialog and on the related highlight card. In addition, all current phase changes are notified in the Timeline of the Equipment with information of status change, timestamp, and changes done by internal person or business partner.

Equipment can be in one of the following phases:

You can document the different life cycle phases of the equipment.

2. If a UID is available for the equipment, then you can view the UID field.
   You can click on the UID field and choose Copy to copy the UID.

3. External IDs: You can view the Object ID of the equipment and also view the IDs used for the equipment in the external systems. You can also use Add button to add external IDs.

4. Status: You can view the status of the equipment.

5. Languages: You can view the languages supported.

6. Manage:
   You can perform the following actions using the Manage button in the published equipment:
   ○ New Revision: This option is available only if the equipment is already in Published state.
   ○ View Last Published/View Last Revision: This option is available only if the equipment is in In Revision state.
   ○ Update Model: You can update the model associated with the equipment. This option is available only if the equipment is already in Unpublished or In Revision state.
   ○ Remove Model: You can remove the model associated with the equipment. This option is available only if the equipment is already in Published or In Revision state.
   ○ View Lifecycle Changes
   ○ Delete
   ○ Edit Header: You can edit the equipment information like equipment ID, description, and image. This option is available only if the equipment is already in Unpublished or In Revision state.
Request Model: This option is available only if the equipment is already in Published state.

When creating a new model request using Manage Request Model:

- If the equipment manufacture is also configured as the model’s provider then the Provider field in the New Request dialog box is by default prepopulated as the equipment manufacturer. You also have the option to change this, if required.
- If the equipment manufacture is not configured as the model’s provider then the Provider field in the New Request dialog box is not prepopulated. You will have to set it manually.

New Notification: Create a notification.

5.1.1.1.2 Adding Data in the Information Section

Context

You can add data in the Information section.

Procedure

1. Highlights: You can view the highlight cards and also set their visibility using the Settings button.
2. To add values to the attributes of the underlying templates, choose INFORMATION Data Sheet and perform the following steps:
   a. Choose Edit and enter values for the attributes as defined by the underlying templates.
      You can select the values if codelist are defined for the attributes. You can do multiple selections for datatypes of type String and Date.
   b. You can reorder the attribute groups using Reorder Groups.
   c. If you have not assigned any equipment template while creating the equipment, you can add it later using Add Template. You can add or remove multiple equipment templates.
   d. You can display the alternate unit of measure using Show Alternate UoM.
      You can set the default unit of measurement system in the Unit of Measure Variant under User Account(icon on the left corner of the launchpad) Settings Unit of Measure.
   e. Choose Save.
3. To view the model-related information, select INFORMATION Model Information
4. To add installation information, select the INFORMATION Equipment Information tab and perform the following tasks:
   a. Choose Edit and enter the fields as described in the table:
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Serial Number</strong></td>
<td>Update the serial number issued by the manufacturer.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>Serial number is not mandatory for equipment with model assigned to them. Serial numbers can be added at a later lifecycle phase of the equipment.</td>
</tr>
<tr>
<td><strong>Equipment Tag Number</strong></td>
<td>Specify the tag number issued by your organization when the manufacturer has not specified any serial number or batch number.</td>
</tr>
<tr>
<td><strong>Batch Number</strong></td>
<td>Specify the batch number issued by the manufacturer, if applicable.</td>
</tr>
<tr>
<td><strong>Technical Identification Number</strong></td>
<td>Enter the Technical Identification Number for the equipment</td>
</tr>
<tr>
<td><strong>Operator Equipment ID</strong></td>
<td>Enter an alternative key for stakeholder equipment identification.</td>
</tr>
<tr>
<td><strong>Procurement Number</strong></td>
<td>Enter Purchase Order Number to reference purchasing process or Order Code.</td>
</tr>
<tr>
<td><strong>Long Description</strong></td>
<td>Enter a description for the piece of equipment.</td>
</tr>
<tr>
<td><strong>Manufacturer Part Number</strong></td>
<td>Enter manufacturer part number.</td>
</tr>
<tr>
<td><strong>Model ID</strong></td>
<td>Enter a model ID.</td>
</tr>
<tr>
<td><strong>Subclass</strong></td>
<td>Select a subclass.</td>
</tr>
<tr>
<td><strong>Build Date</strong></td>
<td>Specify the date of manufacture issued by the manufacturer.</td>
</tr>
</tbody>
</table>

b. To assign the equipment location, proceed as follows:
   1. Choose Assign/Unassign Location.
   2. In the Assign/Unassign popup, enter the location if you have created from the Locations application.

   **i Note**
   - When a location is assigned or unassigned to a piece of equipment, the location is adjusted based on parent equipment.
   - You can now inherit the address from the location to the equipment.

c. Choose Save.

   ○ To assign a tag, choose Assign/Unassign Tag and type in your tag.
You can use tags to help you logically categorize activities, information, or reminders about your equipment. You can now inherit the address from the location to the equipment.

5. To add business partner information, select the **INFORMATION > Business Partners** tab and perform the following tasks:
   a. Choose *Edit* and enter the fields as described in the table:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Business Partner Role</td>
<td>Update the source business partner role, if necessary.</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Select the manufacturer.</td>
</tr>
<tr>
<td>Service Providers</td>
<td>Select the name of the service provider for the piece of equipment.</td>
</tr>
<tr>
<td>Regulators/Authority</td>
<td>Select the official who certifies if the equipment is installed or assembled correctly.</td>
</tr>
<tr>
<td>Insurers</td>
<td>Select the name of the insurer for the piece of equipment.</td>
</tr>
<tr>
<td>Suppliers/Dealers</td>
<td>Select the name of the dealer for the piece of equipment.</td>
</tr>
<tr>
<td>Sold-to Party</td>
<td>Select the name of the party to which the equipment is sold.</td>
</tr>
<tr>
<td>Ship-to Party</td>
<td>Select the name of the party to which the equipment is shipped to.</td>
</tr>
<tr>
<td>Bill-to Party</td>
<td>Select the name of the party to which the equipment is billed.</td>
</tr>
</tbody>
</table>

6. To add Sales Organization Data, select **INFORMATION > Sales Organization Data** tab and perform the following tasks:
   a. Choose *Edit* and select inputs for the fields as described in the table:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Organization</td>
<td>Enter the sales organization details.</td>
</tr>
<tr>
<td>Distribution Channel</td>
<td>Enter the distribution channel.</td>
</tr>
<tr>
<td>Division</td>
<td>Enter the division.</td>
</tr>
<tr>
<td>Sales Office</td>
<td></td>
</tr>
</tbody>
</table>
b. Choose **Save**.

7. To add installation location information, select **INFORMATION** ➔ **Installation Location** tab and perform the following tasks:
   a. Choose **Edit** and enter the fields as described in the table:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object Address</strong></td>
<td>Enter an address at which the equipment is installed and any additional information.</td>
</tr>
<tr>
<td><strong>Contact Person</strong></td>
<td>Enter the contact person details for the location.</td>
</tr>
<tr>
<td><strong>Geospatial Data</strong></td>
<td>Specify the latitude, longitude coordinates of the installed location.</td>
</tr>
</tbody>
</table>

   **i Note**
   Optionally you can specify the geo coordinates using the visual map.

   b. Choose **Save**.

8. You can view the successor to the current model information under **INFORMATION** ➔ **Life Cycle Information**

9. You can view the list of systems to which the equipment is assigned under **INFORMATION** ➔ **Systems** ➔
   - All parent systems are displayed.
   - A piece of equipment can be part of one or more systems. The equipment page now displays the associated system information.
   For example, a compressor can be a part of the compressed air system in a plant.

10. To add the equipment to a group, go to **INFORMATION** ➔ **GROUPS** ➔ **Add**.
    You can view the list of groups to which the equipment is added.

5.1.1.3 Adding Structure & Parts

**Context**

You can add, view, edit, or delete equipment components, spare parts, and visual parts to a piece of equipment.
You can also view the equipment hierarchy using the button.

- Adding and removing location to equipment. When location is added or removed, equipment structure is adjusted based on the location.
- You can change the order of equipment subcomponents in the structure.
- You can link equipment to an existing location hierarchy. You can do this by selecting a location and equipment relationship. The status of the assignment to a location is saved with a future or past date. This is used for calculating the due date status.

**Procedure**

1. **Highlights**: You can view the highlight cards and also set their visibility using the Settings button.
2. To add equipment components, navigate to STRUCTURE AND PARTS > Structure > Edit and perform the following tasks:
   a. To add equipment, choose Assign > Equipment.
   b. From the Select Component dialog box, select the appropriate component.
      You can also filter the equipment based on Source and Product Relevance.
   c. Choose Add.
   d. To add systems, choose Assign > Systems.
   e. From the Select Systems dialog box, select the appropriate system.
   f. Choose Assign.
   g. Choose Save.

   **Note**
   You can now inherit the address from the location. You can publish a component directly from the Structure section. Select the component and use the Publish button.

3. To add equipment spare parts, navigate to STRUCTURE AND PARTS > Spare Parts > Assign and perform the following tasks:
   a. From the Assign Spare Parts dialog box, select the appropriate spare parts.
   b. Choose Provide Quantity to specify the quantity of each spare part. You can also enter a comment if necessary.
   c. Choose Assign.

   Assign new spare parts or maintain existing spare parts for an equipment using the Edit and Remove buttons. Similarly, you can view the associated documents when a spare part is being shared.

   **Note**
   If you have integration with SAP Hybris Commerce, then you can also view the Add to Cart button for each spare part. Currently, you can only add one spare part for each order request.

4. To view Visual Parts for an item of equipment, upload a relevant 3D visual file in the DOCUMENTATION > DOCUMENTS section and view them under STRUCTURE AND PARTS > Visual Parts.

   Shopping cart enabled on VE file for mapped visual parts.
The viewer search is extended to search for part name, description, manufacturer part number, and EAM number. You can select search result and display it in the viewer window.

5.1.1.3.1  Adding Equipment Components

You can alter equipment components to suit your equipment needs.

Prerequisites

- You have created an item of equipment in SAP Predictive Asset Insights.
- The item of equipment is in status Unpublished or In Revision.
- Ensure that the component you want to add already is created in the network as equipment.

Procedure

1. Launch the Equipment application.
2. Open your item of equipment.
3. From the Equipment object page, choose New Revision.
4. Choose the Structure section.
5. Choose Assign.
6. In the Select Component dialog box, select the component you want to add.
7. Choose Add.
8. Choose Save.

Results

The equipment components have been added.

- To remove an equipment component, proceed as follows:
  ○ From the Structure section, choose Edit.
  ○ Select the components from the list, choose Remove.
  ○ Choose Save.
- To publish a component directly from the Structure section, select the component from the list that is in Unpublished or In Revision state and choose Publish.
- To replace a component, proceed as follows:
  ○ From the Structure section, choose Edit.
  ○ Select the components from the list, choose Replace.
  ○ Select a component from the dialog box and choose Replace.
5.1.1.4 Adding Information in the Documentation Section

Context

Procedure

1. **Highlights**: You can view the highlight cards and also set their visibility using the Settings button.

2. To add, or assign, or edit an existing document to the equipment, choose the Documentation tab, and perform the following tasks:

   In the Documents section, choose Add menu to upload a new document, and perform the following steps.

   a. Choose Add Add Image to add an image
      1. In the Add Image pop-up, browse for a file.
      2. In the Additional Information section:
         ○ Assign a Main Category to classify the document. You can also assign additional categories in the More Categories field. You can also assign a Phase, if necessary.
         ○ Select the type of sensitive data available in the document from the Data Sensitivity list.
         ○ Select the language from the dropdown that corresponds to the documents.
         ○ Enter a description. You can also enter a long description, if necessary.
         ○ Select the confidentiality of the document if it’s not shared with everyone.
      3. Choose Upload.
         You can use Check and Upload to check if there are any duplicates that exist in the system. If duplicate files exist, you will then view the files in the Similar Files Detected dialog box. You then can Continue Uploading the New File or you can select a file from the duplicate file list and Use Selected File option to upload it.

   b. Choose Add Add Document to add a document.
      1. In the Add Document popup browse for a file.

      ![Note]
      
      ○ Maximum upload file size for a document is 2 GB.
      ○ Different files with different MIME types can be uploaded for a document. You can assign the same or different languages for each file. For example, a document can now have files with ".doc", ".pdf", ".txt" extensions.

      2. In the Additional Information section:
○ Assign a Main Category to classify the document. You can also assign additional categories in the More Categories field. You can also assign a Phase, if necessary.

○ Select the type of sensitive data available in the document from the Data Sensitivity list.

○ Select the language from the dropdown that corresponds to the documents.

○ Enter a description. You can also enter a long description, if necessary.

○ Select the confidentiality of the document if it’s not shared with everyone.

3. Choose Upload.
   You can use Check and Upload to check if there are any duplicates that exist in the system. If duplicate files exist, you will then view the files in the Similar Files Detected dialog box. You then can Continue Uploading the New File or you can select a file from the duplicate file list and Use Selected File option to upload it.

c. Choose Add Add Link to add a document link.
   1. In the Add Link popup, provide a URL link to the document along with a Display Name.

   i Note
   ○ You cannot upload private domains such as .corp as links.
   ○ Different files with different MIME types can be uploaded for a document. You can assign the same or different languages for each file. For example, a document can now have files with “.doc”, “.pdf”, “.txt” extensions.

   2. In the Additional Information section:
      ○ Assign a Main Category to classify the document. You can also assign additional categories in the More Categories field. You can also assign a Phase, if necessary.
      ○ Select the type of sensitive data available in the document from the Data Sensitivity list.
      ○ Select the language from the dropdown that corresponds to the documents.
      ○ Enter a description. You can also enter a long description, if necessary.
      ○ Select the confidentiality of the document if it’s not shared with everyone.

   3. Choose Upload.
      You can use Check and Upload to check if there are any duplicates that exist in the system. If duplicate files exist, you will then view the files in the Similar Files Detected dialog box. You then can Continue Uploading the New File or you can select a file from the duplicate file list and Use Selected File option to upload it.

d. You can add a new version of a document by selecting the document from the list and choose Add Add New Version.
   1. In the Add New Version popup browse for a file.

   i Note
   ○ Maximum upload file size for a document is 2 GB.
   ○ Different files with different MIME types can be uploaded for a document. You can assign the same or different languages for each file. For example, a document can now have files with “.doc”, “.pdf”, “.txt” extensions.

   2. In the Additional Information section, enter a Description for the document. You can also enter a long description, if necessary.

   3. Choose Upload.
3. In the Documents section, from the Add menu choose Assign to upload an existing document and perform the following steps:
   a. In the Select Documents dialog box, search for an appropriate file.
   b. From the Documents search results list, select a document.
   c. Choose Assign.

You can also use Remove and Download to remove or download any of the documents assigned to the model.

4. To add instructions to the equipment, go to DOCUMENTATION INSTRUCTIONS and perform the following tasks:
   a. Choose Assign.
   b. From the Select Instructions dialog box, select the appropriate instruction.
   c. Choose Assign.

5. To assign failure modes to the equipment, go to DOCUMENTATION Failure Modes and perform the following tasks:
   a. Choose Assign.
   b. Select a failure mode.
   c. Choose Assign.

If you have write access to the equipment even though you do not have write access to the failure mode, you can still edit the failure mode instance page of the equipment.

When you copy a failure mode and Save & Publish it:
   ○ A new failure mode is created with the same causes and instructions from the source failure mode
   ○ The newly created failure mode is directly assigned to the object
   ○ The new failure mode is in published state
   ○ You navigate to the new failure mode instance page that includes all the copied failure mode instances: effects, causes, instructions, and detection method
   ○ The new failure mode appears in the failure mode section list.

You can view the failure mode instance, which is inherited and directly assigned (at the same time), you can now view different object icons in the <From> field of the failure mode section if the failure mode is inherited or assigned directly to the equipment.

You can now flag inherited failure modes to not relevant using the Not Relevant button. This excludes the failure modes from any assessments relevant to the equipment. Inherited failure modes that are marked as Not Relevant, when assigned explicitly, will be set to Relevant.

In the failure mode instance page, you can Add Effect Details like:
   ○ Local Effect Description: describes the direct effect on the equipment or the how it affects the equipment it is part of.
   ○ Higher-Level Effect Description: describes how is the system affected the equipment is part of.
   ○ End Effect Description: describes the ultimate effect that the failure has on safety and/or the environment (if any) and any impact on production or operational capability.
   ○ Potential Worst-Case Effect Description: specifies what would happen in case no measures would be taken to anticipate, prevent, or detect the failure.

6. You can view the alert types associated with the equipment under DOCUMENTATION Alert Types.

You can also view the list of rules or create rules using the Manage Rule.
7. To view announcements assigned to the equipment, choose DOCUMENTATION Announcements.

8. To create an improvement request for the equipment, perform the following tasks:
   1. Choose DOCUMENTATION New Improvement Request.
   2. Enter the relevant details in the New Improvement Request dialog box.
   3. Choose OK.

9. View and create baselines

   Baselines are snapshot that is used as a reference point. Multiple snapshots can be created over a period of period to view and monitor the full extent of the data change over time. Baselines provide you the ability to travel back in time to see how the equipment data was, and where & when data has changed.

   You can create a baseline:
   ○ Using the New button in the Baseline section.
   ○ Using the Create Baseline option in the Phase Manage Phase.

   **Note**
   You need to have the BASELINE_EDIT role to view and create baselines, and BASELINE_READ role to view baselines.

10. You can also view the list of fingerprints assigned to the equipment under DOCUMENTATION Fingerprints.

   You can create a fingerprint using the New button.

   You can also directly access fingerprints using the Fingerprints [page 150] app.

   **Note**
   For more information you can refer to the following topics:
   ○ Creating a Fingerprint [page 150]
   ○ Viewing a Fingerprint [page 151]
   ○ Editing a Fingerprint [page 152]
   ○ Deleting a Fingerprint [page 153]

---

**5.1.1.1.5 Adding Information in the Monitoring Section**

**Context**
Procedure

1. You can view and configure the list of indicators inherited from the model or equipment templates under Monitoring.

You can add/remove an indicator to the favorites list using the star icon in the <My Favorites>.

For numeric and numeric flexible datatypes, <Reset>, <Normal>, <Max>, and <Min> fields are available while definition the threshold. You can also define threshold value range for these datatypes (only threshold value not range is available for other data types). The Reset button is functional only for these two datatypes and will delete all the existing values and insert the reset value wherever applicable.

i Note
○ You can set upto a maximum of 10 thresholds. In the case of indicators of data type Boolean, the maximum number of thresholds selected must be 2 with values True and False. By default, its set to 0. Anything else can lead to inconsistency.
○ You can personalize the indicator filters and columns in the Indicator section. When you logon again the same filters and columns are displayed.
○ If you are assigned the role AC_CUSTOMER_ADMIN, then a new variant Default Indicators is available to display the indicators marked as default at model and equipment level in the Indicators section.
○ You can select a maximum of 4 Primary Thresholds. The primary threshold is mainly used in the indicator chart of SAP Predictive Asset Insights.

If the same indicator is assigned to the model and also to the equipment, you can define different threshold values for the indicator at the model level and at the equipment level. If the values are defined both at the equipment and model level, the values defined at the equipment level will be considered. If not, the values defined at the model level are considered.

To map the indicators of your item of equipment with an external system, follow the procedure in Mapping Indicators with an External System [page 101].

You can maintain a manual entries for the indicators by selecting an indicator and choosing New Manual Entry. You can edit or delete these manual entries by selecting the indicator and choosing Manage Manual Entry > Edit or Manage Manual Entry > Delete.

i Note
If URL is provided by the source application (using API), then the value in Context column will be a hyperlink. Click on the hyperlink to open the underlying URL in a new tab.

2. You can also view Alerts and Indicator Chart under Monitoring.
5.1.1.6 Adding Information in the Maintenance & Service Section

Context

In the Maintenance & Service section, you can:

Procedure

1. **Highlights**: You can view the highlight cards and also set their visibility using the Settings button.
2. **View Notifications**
   - Use Add Evidence to assign/add improvement requests.
   - You can also create notifications using the New button. You can also create new notifications using Manage New Notifications.
3. **View the Work Orders** assigned to the equipment.
   - You can view a list of completed, planned and pending work orders for the equipment.

5.1.1.7 Timeline

Context

Procedure

To view changes on the performance improvement cases, attributes, components, documents, announcements, functional locations, status, equipment header, and firmware for the selected equipment, choose the Timeline tab.
- Maintain comments or tags for a timeline event.
If a comment is owned by your organization, you can delete it. You can also see the person’s name if the user belongs to your organization, otherwise the company name is displayed as the creator of the comment.

- Old and new images are shown on the `<Timeline>` if image relevant fields have been updated in the `Model` and the `Equipment`.
- Field names are displayed in the logon language with English as default language in the `<Timeline>`.

### 5.1.1.2 Viewing and Updating a Piece of Equipment

You can update information such as installation information, installation location, and documents that relate to an existing item of equipment.

**Prerequisites**

- To view an item of equipment, your user ID has the roles `EQUIPMENT_READ` assigned.
- To update an item of equipment, your user ID has the roles `EQUIPMENT_DELETE` or `EQUIPMENT_EDIT` assigned.

**Procedure**

1. Open the `Equipment` app.
2. You can perform the following tasks by selecting one or more items of equipment from the list:
   - Request Model
   - Publish
   - Group
   - Assess
   - Delete
3. Search for an item of equipment that you want to update using the search filters.
4. Select the item of equipment from the search results.
5. You can perform the following actions using the `Manage` button in the published equipment:
   - New Revision
   - View Lifecycle Changes
   - Delete
   - Request Model
   - Sync with SAP Internet of Things:

```
**Note**

Note: This option is available only if the equipment is in Published state, the `<IoT Sync Flag>` is set to Yes and SAP Cloud Platform Internet of Things 4.0 system is configured.
```
6. If you choose an item of equipment that is in a published state, choose Manage New Revision from the Equipment screen.

7. View and navigate to the open model request for the equipment from the icon in the <Model ID> under INFORMATION Model Information
   - You can view only the icon in <Model ID> for a piece of equipment if it not assigned to any model.
   - If the equipment is assigned to a model or if you have entered a free text, you can view the icon together with the model ID or free text.

   ![i Note]
   You can only assign model request for items of equipment that are published at least once.

8. To update additional attributes related to an item of equipment, select tab INFORMATION Data Sheet and perform these substeps.
   a. Choose Edit.
   b. You can reorder the attribute groups using Reorder Groups.
   c. You can assign equipment templates using Add Template after the equipment is created.
   d. You can select templates from the list and choose Remove Template to remove the template.
   e. You can display the alternate unit of measure using Show Alternate UoM.
   f. Choose Save.

9. To update attributes such as installation information, select tab INFORMATION Equipment Information and perform the following tasks:
   a. Choose Edit in the Equipment Information section.
   b. Choose Save.

10. To view the parent systems associated with the equipment, select tab INFORMATION Systems.

11. To assign Documents, Instructions, and Announcements, choose the DOCUMENTATION tab.
   a. To add documents related to the item of the equipment, choose the tab DOCUMENTATION DOCUMENTS and perform the following tasks:
      1. Choose Add New to add a document to the equipment.
      2. Choose Add Assign to assign an existing document to the equipment.
      3. Choose Edit to edit the properties of the document.
      4. To remove a document, select the document or documents from the list and choose Remove.
   b. To assign existing planned maintenance instructions, or troubleshooting and breakdown instructions to the equipment; or to unassign the instructions related to the equipment, choose the DOCUMENTATION INSTRUCTIONS tab and perform the following tasks:

      ![i Note]
      You must have instructions created.

      1. Choose Edit in the Instructions section.
      2. To assign an instruction, choose Assign.
3. To remove an instruction, choose **Remove**.

c. To view announcements assigned to the equipment, choose **DOCUMENTATION** ➤ **Announcements** ➤.

d. View the list of failure modes assigned to the equipment. You can also assign failure modes by choosing **Failure Modes** ➤ **Assign** ➤.

You can view the causes and effects of the failure modes assigned to the equipment in this section.

If you have write access to the equipment even though you do not have write access to the failure mode, you can edit the failure mode instance page of equipment.

When you copy a failure mode and **Save & Publish** it:
- A new failure mode is created with the same causes and instructions from the source failure mode
- The newly created failure mode is directly assigned to the object
- The new failure mode is in published state
- You navigate to the new failure mode instance page that includes all the copied failure mode instances: effects, causes, instructions, and detection method
- The new failure mode appears in the failure mode section list

You can view the failure mode instance which is inherited and directly assigned (at the same time), you can now view different object icons in the `<From>` field of the failure mode section if the failure mode is inherited or assigned directly to the equipment.

You can now flag inherited failure modes to not relevant using the **Not Relevant** button. This excludes the failure modes from any assessments relevant to the equipment.

e. View the improvement requests assigned to the equipment.

To create an improvement request for the equipment, perform the following tasks:
1. Choose **New Improvement Request**.
2. Enter the relevant details in the **New Improvement Request** dialog box.
3. Choose **OK**.

f. You can view the alert types associated with the equipment under **DOCUMENTATION** ➤ **Alert Types** ➤.

12. You can perform the following activities in the **MONITORING** tab:

   a. View the indicators related to the equipment in the **Indicators** section.

      To define, model, and edit additional properties of the indicators and their thresholds, select an indicator and choose **Configure**.

      You can also view the aggregated indicator value and trend for the indicators in this section.

   b. View indicators related to the equipment components in the **Component Indicators** section.

13. You can perform the following activities in the **MAINTENANCE & SERVICE** tab:

   a. View notifications related to the equipment in the **Notifications** section.

      Use **Add Evidence** to assign/add improvement requests. You can also create notifications using the **New** button.

   b. View work orders related to the equipment in the **Work Orders** section.

   c. View the list of fingerprints assigned to the equipment under **Fingerprints**.
You can create a fingerprint using the New button.

14. View the modifications made on the equipment data in the Timeline tab.

You can view the update statistics based on:

- Updates By Type
- Time Range
- Updates by Partner
- Updates on model or equipment data

You can click the equipment time range to perform the following the Filter By dialog box:

- **Show Timeline Events for**: Select if you want to view the changes only on the equipment or the model associated with the equipment or all the changes made on the equipment data.
- **Time Range**: Select a time range to view only the changes during that timeframe.

**Note**

You can track addition and removal of component and parent equipment. Sharing activities are also tracked in the timeline.

15. Choose Publish to publish the updated equipment.

---

### 5.1.1.3 Publishing Multiple Equipment

When you have more items of Equipment created using public APIs provided by SAP Predictive Asset Insights, you can view these items of equipment using the Equipment application and also publish multiple equipment.

**Prerequisites**

- Your user ID has the roles EQUIPMENT_DELETE or EQUIPMENT_EDIT assigned.
- You have created an item of equipment and the item of equipment is in any of the following states:
  - Unpublished
  - Published
  - In Revision

**Procedure**

1. Open the Equipment application.
2. Search for items of equipment that are either in unpublished, or in revision state.
3. Select one or more items of equipment from the search results.
4. Choose Publish.
5.1.1.4 Deleting a Piece of Equipment

You can delete an item of equipment that you do not want to have on the network.

**Prerequisites**

- Your user ID has the role `EQUIPMENT_DELETE` assigned.
- You have created an item of equipment and the item of equipment is in any of the following states:
  - `Unpublished`
  - `Published`
  - `In Revision`

**Procedure**

1. Open the `Equipment` application.
2. Search for an item of equipment.
3. Select an item of equipment from the search results.
4. Choose `Delete`.

5.1.1.5 Mapping Indicators with an External System

You perform this activity to retrieve the indicator values of your equipment from an external system of type SAP Internet of Things. When you have equipment data or machine data existing in an external system, you can retrieve that data by mapping your equipment with the external system.

**Prerequisites**

- The external system is configured with SAP Predictive Asset Insights. For more information, see [Configuring External Systems](#).
- Make sure that the `IoT Sync Flag` is set to "No".
- Your user ID has the roles `EQUIPMENT_DELETE` or `EQUIPMENT_EDIT` assigned.
- You have created an item of equipment. Equipment must be in `Fully Operational` or `Partially Operational` phase. For more information, see [Creating a Piece of Equipment](#).
You have created indicators from the Templates app, and the equipment in question has inherited this template. For more information, see Adding Indicator Groups and Indicators [page 234].

Context

In this procedure, you map indicators of equipment between an external system and SAP system.

Procedure

1. Launch the Equipment application.
2. Open the item of equipment in question.
3. In the Monitoring tab, go to Indicators section.
4. Select the relevant indicator and click Map Indicators.
5. In the Map Indicators window, enter the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Name</td>
<td>Choose the name of the external system.</td>
</tr>
<tr>
<td>Equipment</td>
<td>The corresponding equipment name in the external system.</td>
</tr>
</tbody>
</table>

6. Under the Indicators section, select an indicator and choose the corresponding indicator from the listed equipment indicators (external system) by choosing Map.
7. Choose Save.

You see that the new indicator values appear on the Equipment object page.

Note

In order to unmmap an indicator go to Monitoring ➤ Indicators ➤ Map Indicators ➤ select the indicator form the indicator list, and choose the corresponding delete/close icon.

5.1.1.6 Viewing Alerts of an Equipment

Visualize all the alerts related to the top equipment and the relevant equipment.

Prerequisites

- View only alerts for the equipment for which you are authorized.
• You need to have Edit authorization to perform action on alerts.

**Context**

Using this option, it is also possible to sort and filter the alerts and columns that should display on the screen. Click the respective icons to perform these actions. Click an alert to view the same on the indicator chart. This chart displays the alert in a time-based line chart together with contributing sensor or score values.

You can view the following alert details: status, type, severity, code, code description, source and indicator.

**i Note**

By default, the default variant displays. It is possible to override the default variant. On navigating from this page or relogging, the user selected variant persists.

It is also possible to create a notification for an alert. Select the alerts for which you want to create notifications and click the Create Notification button. The newly created notification displays as `<Notification ID>` within the Alerts details. For more details of the newly created notification, click the Notification ID hyperlink.

Using the Add Evidence button, it is possible to create a new improvement request or edit an existing improvement request.

Click the Set to In Process and Set to Completed button to change the status of alerts. The change in status do not result in change in processor. To change the processor, click the Set Processor button. The sequence of status is from New -> In Process -> Completed and from New -> Completed. The change in alert status do not change the processor. And, click Set Processor to change the processor.

**i Note**

Only users with the role, AlertProcessor can change the alert status.

The role AlertProcessorAdmin can set/change the processor and change the alert status.

Use the Manage Rules button to navigate to the Rules page. You can view all the rules related to the model. For more information, refer Rule Management [page 265].

**Related Information**

Performance Improvement [page 65]
5.1.1.7 Viewing Time Series Data (Indicator Chart) of an Equipment

This analysis tool enables you to visualize data across one or more indicators for one hierarchy. By default, the indicators selected as favorite for a user displays on the chart.

Prerequisites

The scope `pdms.AppAccess` is required.

Context

The analysis tool, indicator chart enables you to visualize time series data across one or more indicators for an equipment hierarchy. You can also view the alerts, notifications, work orders, threshold, and indicator forecast related to a particular equipment.

By default, the first variant displays. You can override the existing variant by selecting from the dropdown. On navigating from this page or relogging, the user selected variant persists.

Note

For more information about indicator chart, refer to Features in Indicator Chart [page 41].

Procedure

1. Open the Equipment application
2. From the Equipment List screen, use the search filters to select equipment.
3. In the Monitoring tab, select Indicator Chart to view the chart.

5.1.1.8 Viewing and Creating Equipment Notifications

You can view all the notifications associated with a piece of equipment and also create a notification.

Prerequisites

You must have the role EQUIPMENT_READ assigned to your user ID in the SAP Cloud Platform account.
Context

Using this option, it is also possible to sort, filter, group notifications, and create notifications. Click the respective icons to perform these actions. Depending on the action performed on these notifications, the progress status - completed, planned, and pending displays against each notification. It is also possible to create an improvement request or edit an improvement request using the Add Evidence button. Also, create a notification using the <New> option.

Click a notification ID to view more details of the same in the object page. An indicator chart displays with the notification details. You can view the start and end date of notifications. If these dates are not available, the current date of notification is plotted on the chart, with the measurement point time series data.

**i Note**

In case of notifications that do not have an assigned equipment, then the indicator chart will not work.

For more information about indicator chart, refer Viewing Time Series Data (Indicator Chart) of an Equipment [page 104].

To view the details of notification, click the respective notification ID. The progress of notifications is as below:

- **Completed** - All notifications with status Completed or Closed.
- **Planned** - All notifications that have start date equal or greater than the current date.
- **Pending** - All notifications that have end date greater than current date or all notifications that have the start date lesser than the current date.

Procedure

Viewing Notifications

1. Open the Equipment application.
2. From the Equipment list screen, select the equipment for which you want to view notifications.
3. In the MAINTENANCE & SERVICE tab, select Notifications.
   - You can view a list of notifications associated with the piece of equipment.

Creating a New Notification

   - You are navigated to the New Notification dialog box. Enter the following details:

<table>
<thead>
<tr>
<th>Fields</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type (*)</td>
<td>Select the type of notification:</td>
</tr>
<tr>
<td></td>
<td>◦ Breakdown</td>
</tr>
<tr>
<td></td>
<td>◦ Maintenance Request</td>
</tr>
</tbody>
</table>

Application Help for SAP Predictive Asset Insights

Master Data
### Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priority (*)</td>
<td>Select the priority of the notification:</td>
</tr>
<tr>
<td></td>
<td>○ Emergency</td>
</tr>
<tr>
<td></td>
<td>○ Very High</td>
</tr>
<tr>
<td></td>
<td>○ High</td>
</tr>
<tr>
<td></td>
<td>○ Medium</td>
</tr>
<tr>
<td></td>
<td>○ Low</td>
</tr>
<tr>
<td>Description (*)</td>
<td>Enter a description.</td>
</tr>
<tr>
<td>Long Description</td>
<td>Enter the detailed description for the notification.</td>
</tr>
<tr>
<td>Required Start Date</td>
<td>Select the start date.</td>
</tr>
<tr>
<td>Required End Date</td>
<td>Select the end date.</td>
</tr>
<tr>
<td>Malfunction Start Date</td>
<td>Select the start date when the malfunction occurred.</td>
</tr>
<tr>
<td>User Proposed Failure Mode</td>
<td>Select a failure mode. If no relevant failure mode is available, you can select <em>No appropriate failure mode available</em>.</td>
</tr>
<tr>
<td>Instruction</td>
<td>Select an instruction.</td>
</tr>
</tbody>
</table>

**i Note**

All the mandatory fields are marked as (*).

5. Choose Create.

The notification is displayed in the notification section. Choose the notification to view details.

### Related Information

Performance Improvement [page 65]

### 5.1.1.9 Viewing Work Orders of an Equipment

You can use this procedure to view a list of work orders related to an equipment.

### Prerequisites

To view a piece of equipment, your user ID has the roles `EQUIPMENT_READ` assigned to it.
Context

You can view the following work orders details: work order ID, order short description, order status, order type, order priority, order long description, start date, end date, actual duration, or planned duration.

Click a work order ID to view more details of the same in the object page. A indicator chart displays with the work order details. You can view the start and end date of work orders. If these dates are not available, the current date of work order is plotted on the chart, with the measurement point time series data.

i Note
In case of work orders that do not have an assigned equipment, then the indicator chart will not work.

For more information about indicator chart, refer Viewing Time Series Data (Indicator Chart) of an Equipment [page 104].

You can perform the following actions:

- Sort the work orders by - Ascending, Descending, Type, Priority, Start Date, or End Date.
- Group work orders by- Ascending, Descending, Type, or Priority.
- Filter work orders by - Type or Priority.

You can have more than one service provider for a piece of equipment. Multiple business partners can have the same role.

i Note
If the order status is &TECO& or closed, then the actual duration is displayed, otherwise the planned duration is displayed.

Procedure

1. Open the Equipment application.
2. From the Equipment screen, select an equipment for which you want to view work orders.
3. To view information related to work orders, go to MAINTENANCE & SERVICE→ Work Orders section.

You can view the list of work orders associated with the equipment. Select and open a work order to view more details of work order.
5.1.1.10 Viewing and Editing Indicators

You can view and edit the indicators associated with a piece of equipment and its relevant components and add additional properties to it.

Context

i Note
Component indicators section displays all the indicators associated with the equipment components (components of the equipment in the Structure section of the equipment object page) and cannot be edited.

Procedure

1. Open the Equipment application.
2. From the Equipment list screen, select a piece of equipment for which you want to view the indicators.
3. In the Monitoring tab, select Indicators.
4. To add additional properties to the indicator, select an indicator and choose Edit.
   You can maintain the following properties for an indicator:
   - Unit of Measurement (UoM)
   - Threshold Range
   - Indicator Category
     The following values are valid:
     - Continuous
     - Discrete
     - Level
   - Indicator type: Following values are valid:
     - Calculated
     - Measured
     - Assessed
   You can maintain values for the indicators for which you have defined the properties by using New Manual Indicator.
5. To view indicators associated with the equipment component, go to Component Indicators section.

i Note
- Component Indicators are displayed only if any indicators are assigned to the equipment component and cannot be edited.
5.1.11 Viewing and Analyzing Leading Indicators for Equipment

Use this procedure to view and analyze the leading indicators for a piece of equipment.

Prerequisites

- You have trained a model in the Leading Indicators Model Management application. For more information, see Managing Models for Leading Indicators [page 352].
- The roles AC_ORG_DATA_EXPERT and DataScienceRead are assigned to your user.

Context

To monitor and predict the performance of your equipment, you can view and analyze leading indicators for a piece of equipment of an equipment model.

Leading indicators are the indicators whose conditions are most related to failures of the piece of equipment. The leading indicators are automatically determined by a machine learning algorithm using historical sensor data and notification data as input. Identifying these leading indicators and their conditions helps you to prevent upcoming failures by proactively maintaining the piece of equipment and creating effective condition-based maintenance (CBM) rules to monitor the performance and predict upcoming failures.

Example

Rose, a reliability engineer, suspects potential failures for her Pump-0054 due to overheating. She reviews the leading indicators for the failure mode OHE (Overheating) of her pump. From the top indicators table, she sees that the temperature has the highest influence on failures. To get a better understanding, she reviews the most related conditions and sees that a temperature higher than 70 degrees has the highest influence. To prevent failures from occurring, she creates a rule for the condition to get notified when the pump is about to fail because of the condition and she can proactively maintain the pump.

Procedure

1. Open the Equipment application.
2. From the Equipment screen, select the piece of equipment for which you want to view and analyze the leading indicators.
   The equipment page is displayed.
3. To view and analyze the leading indicators, choose ANALYTICS > Leading Indicators
   The leading indicators for the piece of equipment are displayed as follows:
For the piece of equipment regardless of any failure mode: By default, the leading indicators are displayed for the piece of equipment regardless of any failure mode. In this case, all failures that occurred in the past are included.

For a failure mode related to the piece of equipment: If there are one or more failure modes available for the piece of equipment, you can also display the leading indicators for a specific failure mode by selecting the failure mode. You can choose from all failure modes that are assigned to the piece of equipment.

The indicators are ranked by their strength indicating which indicators have the highest influence on failures. You can view details about the strength threshold values by clicking the strength link.

To view and analyze the conditions for the leading indicators, choose Conditions.

The top conditions for the selected indicator are displayed. The conditions are ranked by their strength indicating which conditions have the highest influence on failures. You can view details about the strength threshold values by clicking the strength link.

i Note
Only conditions whose strength is above 50% are displayed. Conditions below this strength are considered as having no influence on failures and the piece of equipment is operating under normal conditions.

To create a new rule for one condition, select the condition and choose New Rule. For more information about rules and how to create rules, see Rules [page 261].

Results
You have viewed and analyzed the leading indicators for your piece of equipment.

Related Information
Viewing and Analyzing Leading Indicators for a Model [page 126]

5.1.1.12 Viewing Alert Type Groups of Model Assigned to Equipment
You can view the alert type groups assigned to a model of an equipment.

Prerequisites
Your user ID has the role EQUIPMENT_READ assigned.
Context

i Note
It is not possible to assign or unassign alert type groups to an equipment template or an equipment.

Procedure

1. Open the Equipment application.
2. Select an equipment for which you want to view the assigned alert type group.
3. Click Alert Types from the Documentation tab.
   List of assigned alert types display.

Related Information

- Rules [page 261]
- Adding Alert Types [page 243]
- Adding Alert Type Groups [page 247]
- Assigning Alert Type Groups to a Model [page 125]

5.1.1.13 Viewing a Failure Curve for Equipment

Use this procedure to view a failure curve for a piece of equipment.

Prerequisites

- The model configuration has been trained and scored successfully at least once. For more information, see Failure Curve Analytics Model Configuration Management [page 358].
- One of the following roles is assigned to your user:
  - FailureCurveAnalyticsUser
  - FailureCurveAnalyticsRead
  - FailureCurveAnalyticsEdit
  - FailureCurveAnalyticsDelete
Procedure

1. Open the Equipment application.
2. Choose the piece of equipment for which you want to view the failure curve.
3. Choose ANALYTICS > Failure Curve.
   Per default, the failure curve is displayed for the latest scored model configuration and for the failure mode with the most notifications. If multiple failure modes have the same notification count, the alphabetically earliest is selected. On the curve, a flag with the current age and the (conditional) probability of failure for the current age is displayed.
4. To view the failure curve for a different model configuration or failure mode, select the respective model configuration and failure mode from the dropdown lists.
   **Note**
   If you select another model configuration, the related failure mode with the most notifications is automatically selected.
   The failure curve for the selected model configuration or failure mode is displayed with the flag.
5. To view further insights for a specific age, select a point on the failure curve.

Results

The failure curve with the further insights is displayed. The further insights are displayed in the Current Selection dialog box.

**Note**
The actual age value of the data point may have decimals, for example, 27.6. In the Current Selection dialog box, a rounded version of the value is displayed, for example, 28. That has the effect that sometimes the age in the Current Selection dialog box slightly differs from the age on the x-axis.

5.2 Models

A model is an abstract representation from the manufacturer that defines all maintenance and specification information related to a new or existing product. A physical equipment is an instance of a model.

A model is based on a template and allows users to add values to the definitions used in the underlying template.

A model maintains maintenance information using the following business entities:

- **Instruction:**
  An instruction is a collection of steps from the manufacturer that make up a procedure on how to carry out a service by an operator. An instruction consists of information that help the operator to maintain the
equipment better. There are five types of instructions: Planned Maintenance Instruction, Troubleshooting and Breakdown Instruction, Installation instructions, Operations instruction, Disposal instruction.

- **Announcement:**
  An announcement is a way of communicating structured information from a manufacturer to an operator, or a set of operators. For example: change in instruction

- **Parts**
  A part is a single piece of an equipment. A manufacturer provides a list of parts used in the model along with the visual representation of each one of them. An operator can select a specific part of the model from the list to view the manufacturer details, spare part number, and the quantity of the part used in the model and use these details for procurement purposes.

- **Document**
  A document is a material of reference provided by the manufacturer and contains information relevant to a specific phase in the life cycle of the model.

- **Hotspot**
  A hotspot is an area on the visual image that is of more interest. A hotspot allows you to view detailed information of a model component in a pictorial way. You can assign additional information to a hotspot such as model, equipment, and instruction to which users can navigate to.

A model can be in any of the following states:

- **Unpublished**
- **In Revision**
- **Published**

For more information, see State Transitions [page 267].
5.2.1 Managing Models

You use the *Models* app to work with a model. You can perform the following operations using the *Models* app:

**Context**

<table>
<thead>
<tr>
<th>Features</th>
<th>More Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a model and assign business entities such as instructions, documents, announcements, parts information of the model.</td>
<td>Creating a Model [page 115]</td>
</tr>
<tr>
<td>Update successor model information.</td>
<td></td>
</tr>
<tr>
<td>Add hotspots to the images of a model.</td>
<td></td>
</tr>
<tr>
<td>Old and new images are shown on the timeline if image-relevant fields are updated on model and equipment level.</td>
<td></td>
</tr>
<tr>
<td>Create a model request to contact another business partner when you do not find respective models for equipment in the network. The newly-created model request is saved with the status &lt;Draft&gt;. While in Draft status, the model request is not visible to the provider. You can edit the model request and save the changes. Changes or updates saved are logged in the timeline.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Features</th>
<th>More Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add and remove model components.</td>
<td>Adding Model Components [page 122]</td>
</tr>
<tr>
<td>View details of an existing model and update an existing model.</td>
<td>Updating a Model [page 123]</td>
</tr>
<tr>
<td>Delete a model to clean up the data that is not required to be on the network.</td>
<td>Deleting a Model [page 124]</td>
</tr>
<tr>
<td>Reuse the created models within your organization.</td>
<td></td>
</tr>
<tr>
<td>View and analyze leading indicators for a model.</td>
<td>Viewing and Analyzing Leading Indicators for a Model</td>
</tr>
<tr>
<td>View an analytics dashboard for a model.</td>
<td>Viewing Analytics Dashboards on Object Pages [page 63]</td>
</tr>
<tr>
<td>Configure indicator forecasting to forecast indicator values for your equipment of an equipment model.</td>
<td>Configuring Indicator Forecasting for a Model</td>
</tr>
<tr>
<td>View the top failure modes for a model.</td>
<td>Using Failure Mode Analytics on the Equipment or Model Pages</td>
</tr>
<tr>
<td>Create models relevant for systems.</td>
<td></td>
</tr>
</tbody>
</table>

You can create a system using *Manage > Create System* option. You can also create multiple systems from a model as components.

You can view all the indicators associated with a model using the *Indicators* section under *Monitoring*. You can define, model, and edit additional properties of the indicators and their thresholds using the *Edit* option in the *Indicators* section.
5.2.1.1 Creating a Model

You use this procedure to: create a model and add business entities to it such as instructions, documents, announcements, parts information, hotspots to the images uploaded as documents for a model.

Prerequisites

- Your user ID has the roles `MODEL_DELETE` or `MODEL_EDIT` assigned.
- To create a model, you must have a subclass or a model template to inherit from.
- You have identified a manufacturer profile to assign to a model.

Procedure

1. Launch the `Models` app.
2. Choose `New`.
3. In the `New Model` dialog box, enter the following details:
   a. In the `Type` field, select if the model is relevant for equipments, systems, or functional locations.
   b. In the `Model ID` field, enter the ID for the model.
   
   i Note
   Provide a unique model ID, as ID is unique for a specific manufacturer.
   c. In the `Short Description` field, enter a short description for the model.
   d. In the `Long Description` field, enter a long description for the model.
   e. In the `Tracking` drop-down, select the type of tracking you want to assign to an item of equipment that is based on the model.
   The following list helps you to select an appropriate value:
   - **Serial number tracking at model level**: As a manufacturer, you want to track an item of equipment within a model using unique serial number. An operator uses the unique serial number while creating an item of equipment.
   - **Serial number tracking at manufacturer level**: As a manufacturer, you want to track all items of equipment using unique serial number. An operator uses the unique serial number while creating an item of equipment.
   - **Batch number tracking at batch level**: As a manufacturer, you want to track all items of equipment within a batch using a batch number. An operator uses the batch number while creating an item of equipment.
   
   i Note
   This field is not relevant when creating models for functional location.
   f. In the `Parent Subclass/Model Template` field, select a subclass or model templates.
If you select more than one template, then the **Primary Template** field is displayed where you need to select one of the templates as the primary template.

You can assign one or more parent subclasses or model templates to a model. If you enter more than one parent subclass/model template, you must additionally select a primary template in the dropdown of field **Primary Template**. This primary template is used for class/subclass/template display in the breadcrumb as well as in the model list. The assignment of the primary template can later be changed in the Data Sheet section of the model.

**Note**

All assigned templates and subclasses (as well as associated classes) are available in the Model Information section. If there are more than one class/subclass/template, count values are displayed in the respective fields. When clicking on one of the count values, you can view the complete template hierarchy for your model.

g. **Note**

In the **Manufacturer** field, select the manufacturer name.

**Note**

This field is not relevant when creating models for functional location.

h. Choose **OK**.

4. To add values to the attributes of the underlying templates, choose **INFORMATION > Data Sheet** and perform the following steps:

a. Choose **Edit** and enter values for the attributes as defined by the underlying templates.

b. You can reorder the attribute groups using **Reorder Groups**.

c. You can display the alternate unit of measure using **Show Alternate UoM**.

You can set the default unit of measurement system in the **Unit of Measure Variant** under **User Account (icon on the left corner of the launchpad) > Settings > Unit of Measure**.

d. You can add additional Templates or Subclasses using **Add Template**.

If there are multiple templates assigned, you get filtering options on the data sheet:

- **All** = displays all attribute groups and attributes
- **<Industry Standard>** = displays all attribute groups and attributes that have the respective industry standard maintained
- **<Custom>** = displays all attribute groups and attributes that are coming from customer-created model templates

e. If there are multiple Subclasses and Templates assigned, you can change the Primary Template using **Update Primary Template**.

f. If there are multiple Subclasses and Templates assigned, you can remove assigned objects using **Remove Template**.

**Note**

It is mandatory to have at least one parent object assigned, that is, it is not possible to remove all assigned objects.

g. Choose **Save**.

5. To add model-specific information, choose **INFORMATION > Model Information** and perform the following steps:
a. Choose Edit. As a manufacturer, you want and enter the following fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracking</td>
<td>Update the tracking mechanism, if necessary.</td>
</tr>
<tr>
<td>Safety Risk</td>
<td>Select a recommended safety risk for the model during its operating condition.</td>
</tr>
<tr>
<td>Generation</td>
<td>Specify a number that indicates the version of the model.</td>
</tr>
<tr>
<td>Model Release Date</td>
<td>Enter a date by which the model will be released.</td>
</tr>
<tr>
<td>Description</td>
<td>Enter a model description.</td>
</tr>
<tr>
<td>Firmware Support</td>
<td>Specify if the model supports firmware.</td>
</tr>
</tbody>
</table>

b. To assign a tag, choose Add/Remove Tags.

c. In the Add/Remove Tags dialog box, assign a tag.

d. Choose OK.

You can assign such tags that logically categorize model information, maintenance, and other model-relevant data.

e. Choose Save.

6. In the Model Usage section, you can view the extent of model's usage.

If consumer or operator is sharing equipment based on the model relation, the usage is linked to the related equipment and operators.

**i Note**
When the model is published, you can also create an equipment using this model from the Create Equipment button.

7. To update a model as the successor to the current model, choose INFORMATION → Life Cycle Information and perform the following steps:

a. Choose Assign in the Successor Model section.

b. In the Assign Successors popup, select the model you want to assign as successor.

c. Choose Assign.

**i Note**
The successor model you want to assign must have the same subclass as the current model.

8. To add the model to a group, go to INFORMATION → Groups → Add.

You can view the list of groups to which the model is added.

9. To add model components, perform the following:


a. Choose Assign. From the Select Component dialog box, select the model component.
b. Choose Add.

c. You can define if an assigned structure component is mandatory or optional for a model.

d. You can adjust the quantity and the item description for the structure components. You can change the Quantity to a quantity range using the Define Quantity Range.

e. You can select an enum attribute to define default list of description to be assigned to the components using Select Description Attribute.

f. Choose Save.

10. To assign spare parts to a model, perform the following:

a. Choose STRUCTURE AND PARTS ➔ Spare Parts ➔ Assign.

b. From the Assign Spare Parts dialog box, select the spare part, and choose Provide Quantity.

c. In the Provide Quantity dialog box, enter values for Default Delivered Quantity, Advised Stock Quantity, and BoM Quantity. You can also enter a comment if necessary.

d. Choose Assign.

11. To assign a visual part to a model, perform the following steps:

a. Go to Documentation ➔ Documents section.

b. Choose Add. You can assign an existing or a new document.

c. To assign a visual part, you must add a document of type .vds.

d. Choose Assign. You can now view the visual parts under Structure & Parts ➔ Visual Parts.

The viewer search is extended to search for part name, description, manufacturer part number, and EAM number. You can select search result and display it in the viewer window.

12. To add an instruction to the model, choose the Documentation ➔ Instructions tab and perform the following tasks:

a. In the Instructions section, choose Assign to perform the following steps:

b. In the Assign Instructions to a Model dialog box, search for an appropriate instruction.

c. From the Instructions search results list, select an instruction.

d. Choose Assign.

You can view the different instruction types in the following tabs: Planned Maintenance, Breakdown, Installation, Operations, and Disposal.

13. To add, or assign, or edit an existing document to the model, choose the Documentation ➔ Documents tab, and perform the following tasks:

In the Documents section, choose Add menu to upload a new document, and perform the following steps.

a. Choose Add ➔ Add Image to add an image

   1. In the Add Image pop-up, browse for a file.

   2. In the Additional Information section:

      ○ Assign a Main Category to classify the document.
      
      You can also assign additional categories in the More Categories field. You can also assign a Phase, if necessary.

      ○ Select the type of sensitive data available in the document from the Data Sensitivity list.

      ○ Select the language from the dropdown that corresponds to the documents.
Enter a description. You can also enter a long description, if necessary.
Select the confidentiality of the document if it’s not shared with everyone.

3. Choose Upload.
   You can use Check and Upload to check if there are any duplicates that exist in the system. If
duplicate files exist, you will then view the files in the Similar Files Detected dialog box. You then
can Continue Uploading the New File or you can select a file from the duplicate file list and Use
Selected File option to upload it.

b. Choose Add Add Document to add a document.
   1. In the Add Document popup browse for a file.

   i Note
   ○ Maximum upload file size for a document is 2 GB.
   ○ Different files with different MIME types can be uploaded for a document. You can assign
     the same or different languages for each file. For example, a document can now have files
     with ".doc", ".pdf", ".txt" extensions.

   2. In the Additional Information section:
      ○ Assign a Main Category to classify the document.
        You can also assign additional categories in the More Categories field. You can also assign a
        Phase, if necessary.
      ○ Select the type of sensitive data available in the document from the Data Sensitivity list.
      ○ Select the language from the dropdown that corresponds to the documents.
      ○ Enter a description. You can also enter a long description, if necessary.
      ○ Select the confidentiality of the document if it’s not shared with everyone.

   3. Choose Upload.
      You can use Check and Upload to check if there are any duplicates that exist in the system. If
duplicate files exist, you will then view the files in the Similar Files Detected dialog box. You then
can Continue Uploading the New File or you can select a file from the duplicate file list and Use
Selected File option to upload it.

c. Choose Add Add Link to add a document link.
   1. In the Add Link popup, provide a URL link to the document along with a Display Name.

   i Note
   ○ You cannot upload private domains such as .corp as links.
   ○ Different files with different MIME types can be uploaded for a document. You can assign
     the same or different languages for each file. For example, a document can now have files
     with ".doc", ".pdf", ".txt" extensions.

   2. In the Additional Information section:
      ○ Assign a Main Category to classify the document.
        You can also assign additional categories in the More Categories field. You can also assign a
        Phase, if necessary.
      ○ Select the type of sensitive data available in the document from the Data Sensitivity list.
      ○ Select the language from the dropdown that corresponds to the documents.
      ○ Enter a description. You can also enter a long description, if necessary.
      ○ Select the confidentiality of the document if it’s not shared with everyone.

   3. Choose Upload.
You can use Check and Upload to check if there are any duplicates that exist in the system. If duplicate files exist, you will then view the files in the Similar Files Detected dialog box. You then can Continue Uploading the New File or you can select a file from the duplicate file list and Use Selected File option to upload it.

d. You can add a new version of a document by selecting the document from the list and choose Add New Version.

1. In the Add New Version popup browse for a file.

i Note
- Maximum upload file size for a document is 2 GB.
- Different files with different MIME types can be uploaded for a document. You can assign the same or different languages for each file. For example, a document can now have files with ".doc", ".pdf", ".txt" extensions.

2. In the Additional Information section, enter a Description for the document. You can also enter a long description, if necessary.

3. Choose Upload.

14. In the Documents section, from the Add menu choose Assign to upload an existing document and perform the following steps:
   a. In the Select Documents dialog box, search for an appropriate file.
   b. From the Documents search results list, select a document.
   c. Choose Assign.

You can also use Remove and Download to remove or download any of the documents assigned to the model.

15. To assign a failure mode, choose Documentation Failure Modes perform the following steps:
   a. Choose Assign.
   b. In the Select Failure Modes dialog box, select the failure modes that you want to assign to the model.
   c. Choose Assign.

You can create a copy of the failure mode using Copy.

i Note
When you copy a failure mode and Save & Publish it:
- A new failure mode is created with the same causes and instructions from the source failure mode
- The newly created failure mode is directly assigned to the object
- The new failure mode is in published state
- You navigate to the new failure mode instance page that includes all the copied failure mode instances: effects, causes, instructions, and detection method
- The new failure mode appears in the failure mode section list

You can navigate to the instance page of a failure by double-clicking on it in the failure mode list. In the failure mode instance page, you can:
- View the failure mode information.
- Add or remove effects from the failure mode.
- Add or remove causes from the failure mode.
○ View the maintenance strategy for the failure mode.
○ Assign or remove instructions for the failure and manage cause for the instructions.

If you have write access to the model even though you do not have write access to the failure mode, you can edit the failure mode instance page of the model.

In the failure mode instance page, you can Add Effect Details like:
○ **Local Effect Description**: describes the direct effect on the equipment or the how it affects the equipment it is part of.
○ **Higher-Level Effect Description**: describes how is the system affected the equipment is part of.
○ **End Effect Description**: describes the ultimate effect that the failure has on safety and/or the environment (if any) and any impact on production or operational capability.
○ **Potential Worst-Case Effect Description**: specifies what would happen in case no measures would be taken to anticipate, prevent, or detect the failure.

16. In the [Documentation > Alert Types] section, you can Assign or Remove alert type group.

17. To add an announcement to the model, choose the [Documentation > ANNOUNCEMENTS] tab and perform the following steps:
   a. In the **Announcements** section, choose **Assign** to assign an existing announcement and perform the following steps.
   b. In the **Assign Announcements to a Model** dialog box, search for an appropriate announcement using the filters – **Announcement Type**, or **Priority**, or **Status**.
   c. From the **Announcements** search results list, select an announcement.
   d. Choose **Assign**.

18. You can create an improvement request for the model using [Documentation > Improvement Requests > New Improvement Requests](#).

     You can enter the details in the **New Improvement Request** dialog box. Choose **OK**.

     You are navigated to the new improvement request object page where you can further edit the request and save it.

     **i Note**
     
     This section is not available for models created for functional location.

19. In the **Indicators** section, you can view the list of indicators associated with the model. You can select an indicator from the list and use **Configure** to define the Threshold values for the indicator.

     For Numeric and Numeric Flexible datatypes, you can also define the `<Reset>, <Min>, <Max>,` and `<Normal>` values. You can also define threshold range for these datatypes. **Reset** button is functional only for these two datatypes and will delete all the existing values and insert the reset value wherever applicable.

     **i Note**
     
     ○ You can set upto a maximum of 10 thresholds. In the case of indicators of data type Boolean, the maximum number of thresholds selected must be 2 with values **True** and **False**. Anything else can lead to inconsistency.
     ○ You can personalize the indicator filters and columns in the **Indicator** section. When you log in again the same filters and columns are displayed.
If you are assigned the role AC_CUSTOMER_ADMIN, then a new variant Default Indicators is available to display the indicators marked as default at model and equipment level in the Indicators section.

You can select a maximum of 4 Primary Thresholds. The primary threshold is mainly used in the indicator chart of SAP Predictive Asset Insights.

20. To publish model, choose Publish.

System publishes the model and creates a first revision of the model in SAP Predictive Asset Insights. Users of your organization can view the published model. If you navigate away from the Models application without saving the model, the model remains in the unpublished state and is not visible to any users in the organization until you publish the model.

21. You can view the changes made on the model data in the Timeline section.

You can click the model date range to open the Filter By dialog box. You can select to show the event for a particular object and define the time range during which you want to see the changes.

For each change entry, you can view changes made in other languages on the timelines using the Show Details button.

5.2.1.1 Adding Model Components

You perform this activity when you need to alter the model components to customize to your requirement.

**Prerequisites**

- You have already created a model in SAP Predictive Asset Insights. For information about creating a model, see Creating a Model [page 115].
- The model is in status Unpublished or In Revision.
- Ensure that the component you want to add already is created in the network as a model.

**Procedure**

1. Launch the Models application.
2. Open the relevant model.
3. From the Model object page, choose New Revision.
4. Choose the Model Component icon.
5. Choose Add Component.
6. In the Select Component pop-up box, select the component you want to add.
7. Choose Add.
   - To remove component, proceed as follows:
     - From the Model Component page, select the model and choose Remove Component.
From the Select Component page, select the component you want to remove.
Choose Remove.

5.2.1.2 Updating a Model

You use this procedure to update an existing model that has either incorrect or missing information.

Prerequisites

- You have created a model that is either in an unpublished state, or in the in revision state.
- Your user ID has the roles MODEL_DELETE or MODEL_EDIT assigned.

Procedure

1. Open the Models application.
2. Search for a model that you want to update using the search filters.
3. Select the model from the search results.
4. If you choose a model that is in a published state, choose New Revision from the Model screen and perform the following tasks:
   a. To update attributes such as manufacturer’s name, or model name, or any of the model related attributes select INFORMATION Model Information tab and perform the following tasks:
   b. Choose Edit in the Model Information section and update the relevant fields. For more information on the field descriptions, see Creating a Model [page 115].
   c. Choose Save.
5. To update additional attributes related to the model, select INFORMATION Attributes tab and perform the following tasks:
   a. Choose Edit in the Attributes section and update the relevant fields. For more information on the field descriptions, see Creating a Model [page 115].
   b. Choose Save.
6. To assign existing planned maintenance instructions, or troubleshooting and breakdown instructions to the model; or to unassign the instructions related to the model, choose the INSTRUCTIONS tab and perform the following tasks:
   a. Choose Edit in the Instructions section.
   b. To assign an instruction, choose Assign.
      If you are unable to see the Assign button, change your browser zoom and re-try.
c. To unassign an instruction, choose UnAssign.
7. Choose Publish to publish the updated model.

5.2.1.3 Publishing a Model

When you have more models created using public APIs provided by SAP Predictive Asset Insights, you can view these models using the Models application and perform a mass publish of such models.

Prerequisites

Your user ID has the roles MODEL_DELETE or MODEL_EDIT assigned.

Procedure

1. Open the Models application.
2. Search for models that are either in unpublished, or in the in revision state.
3. Select one or more models from the search results.
4. Choose Publish.

5.2.1.4 Deleting a Model

You can delete a model that you do not want to have on the network.

Prerequisites

- Your user ID has the role MODEL_DELETE assigned.
- You have created a model and the model is in any of the following states:
  - Unpublished
  - Published
  - In Revision
Procedure

1. Open the Models app.
2. Search for a model.
3. Select a model from the search results.
4. Choose Delete.

5.2.1.5 Assigning Alert Type Groups to a Model

You can assign alert type groups to a model of an equipment.

Prerequisites

- You have created a model that is in the revision state.
- Your user ID has the scopes MODEL_DELETE or MODEL_EDIT assigned.

Context

On assigning an alert type group, the alert types are automatically assigned to a model.

i Note
You cannot assign alert type group to a model template.

Procedure

1. Open the Models application.
2. Search for a model or models that you want to assign an alert type group.
   
   i Note
   You can assign the same alert type group to more than one model.

3. Click Alert Types from the Documentation tab.
   List of alert types assigned to a particular alert type group displays.

4. Click Assign Alert Type Group to assign.
   You can view details of the alert type such as category, severity, alert type group, indicator, origin, and failure modes.
If rules are maintained for the alert type, the message **Rules Maintained** display against the alert type. This is visible within the **Documentation** section in the model and equipment page. The message **Rules not maintained** displays if rules are not maintained for the alert type. You can navigate to the **Rules** page and view the list of rules related to a model using the **Manage Rules** option. For more information, refer **Rule Management** [page 265].

It is not possible to unassign an alert type group from a model, if its alert types are used in the rules.

**Note**

- Make sure that you add only the alert groups having alert types that have indicators matching with the indicators of the model. In case this criteria is not met, the rules created using these alert types will not be functional. For example, indicator I1 and I2 are assigned to alert types A1 and A2, respectively. These alert types are grouped within an alert type group, AG1. This alert type group (AG1) can be assigned to a model only if the indicators I1 and I2 are already part of the model. This is not applicable to failure modes.
- Do not delete indicators that are assigned to a model and used in an alert type. Considering the above example, I1 or I2 should not be deleted as these indicators are used in the alert type groups, as well.
- Alert types without indicators can be assigned to models with or without indicators.

**Related Information**

- [Rules](#)
- [Adding Alert Types](#)
- [Adding Alert Type Groups](#)

**5.2.1.6 Viewing and Analyzing Leading Indicators for a Model**

Use this procedure to view and analyze the leading indicators for an equipment model.

**Prerequisites**

- You have trained a model in the **Leading Indicators Model Management** application. For more information, see [Managing Models for Leading Indicators](#).
- The roles **AC_ORG_DATA_EXPERT** and **DataScienceRead** are assigned to your user.
**Context**

To monitor and predict the performance of your equipment, you can view and analyze leading indicators for all your equipment of an equipment model.

Leading indicators are the indicators whose conditions are most related to failures of the equipment. The leading indicators are automatically determined by a machine learning algorithm using historical sensor data and notification data as input. Identifying these leading indicators and their conditions helps you to prevent upcoming failures by proactively maintaining the equipment and creating effective condition-based maintenance (CBM) rules to monitor the performance and predict upcoming failures.

---

**Example**

Rose, a reliability engineer, is interested in activating data-driven condition-based maintenance (CBM) for all her equipment of a specific equipment model to prevent failures. She reviews the leading indicators for her equipment model EM202 and sees that output voltage has the highest influence on failures. To get a better understanding, she reviews the most related conditions and sees that an output voltage less than 600 volt has the highest influence. To prevent failures from occurring and activate condition-based maintenance (CBM), she creates a rule for the condition to get notified when any of her equipment of the equipment model is about to fail because of the condition so she can proactively maintain all equipment of the equipment model.

---

**Procedure**

1. Open the Models application.
2. From the Models screen, select the equipment model for which you want to view and analyze the leading indicators.

The model page is displayed.

3. To view and analyze the leading indicators, choose Analytics > Leading Indicators.

The leading indicators for the equipment model are displayed as follows:
   - **For the model regardless of any failure mode**: By default, the leading indicators are displayed for the model regardless of any failure mode. In this case, all failures that occurred in the past are included.
   - **For a failure mode related to the model**: If there are one or more failure modes available for the model, you can also display the leading indicators for a specific failure mode by selecting the failure mode. You can choose from all failure modes that are assigned to the model.

The indicators are ranked by their strength indicating which indicators have the highest influence on failures. You can view details about the strength threshold values by clicking the strength link.

4. To view and analyze the conditions for the leading indicators, choose Conditions.

The top conditions for the selected indicator are displayed. The conditions are ranked by their strength indicating which conditions have the highest influence on failures. You can view details about the strength threshold values by clicking the strength link.
Only conditions whose strength is above 50% are displayed. Conditions below this strength are considered as having no influence on failures and the equipment of the equipment model are operating under normal conditions.

5. To create a new rule for one condition, select the condition and choose **New Rule**. For more information about rules and how to create rules, see [Rules](#).

**Results**

You have viewed and analyzed the leading indicators for your equipment model.

**Related Information**

[Viewing and Analyzing Leading Indicators for Equipment](#)

### 5.2.1.7 Configuring Indicator Forecasting for a Model

Use this procedure to configure indicator forecasting to forecast indicator values for the equipment of an equipment model.

**Prerequisites**

- The role **ConfigUser** is assigned to your user.
- The Indicators are assigned to your equipment model. For more information, see [Adding Indicator Groups and Indicators](#).
- The equipment model is published. For more information, see [Publishing a Model](#).

**Context**

To get insights about the expected behavior of your equipment of an equipment model in the future, you can forecast indicator values for a certain time period in the future by configuring indicator forecasting. This helps you to recognize any potential issues with your equipment early, for example, breakdowns and proactively maintaining your equipment.

**i Note**

Consider the following:
You can only configure indicator forecasting for indicators, which have the *Continuous* category. Once you have configured indicator forecasting, the configuration cannot be deleted, you can only deactivate it. This is also the case if the indicators are not assigned to equipment any more or the equipment model and indicators are deleted. When you create new indicator forecasting configurations, the current configuration is overwritten by the new configuration.

The indicator values are forecasted based on historical indicator time series data within a defined time range. This data is aggregated within the time range in a certain aggregate interval. The aggregate interval is determined automatically. The aggregated data is then used to calculate averages. Each average is calculated based on the aggregated data within the time interval, for example, 2 minutes and then divided by this time interval. The collection of these averages is then used as input for a linear regression algorithm to calculate the indicator values. For more information about the linear regression algorithm, see *Simple Linear Regression*.

The forecasted indicator values are then displayed in the indicator chart.

**Example**

Rose, a maintenance planner, wants to get insights about the operating hours of her equipment and wants to see the future behavior of the operating hours. She forecasts the indicator values. In the indicator chart, she views the forecasted operating hours values for the next two weeks and she sees that the operating hours will decrease and may reach a threshold in the next days, which can lead to a potential breakdown. To prevent the breakdown from occurring, she can then perform follow-up tasks based on her analysis.

**Procedure**

1. Open the *Models* application.
2. From the *Models* screen, select the equipment model for which you want to forecast indicators.
   The model page is displayed.
3. Choose *INDICATORS*.
   The list with all configured indicators for the equipment model is displayed.
4. From the list, select the indicator for which you want to forecast indicator values.
5. Choose *Configure Indicator*.

   **i Note**

   If the button is not enabled, create a new revision of the model by choosing *Manage* and then *New Revision*. For more information about creating revisions, see *Updating a Model* [page 123].

   The dialog box for the indicator is displayed.
6. In the dialog box, choose *Forecasting*.
7. Fill in the following fields:
   - **Activate Indicator Forecasting**
     Activate this checkbox to forecast indicator values. You can later also deactivate already created configuration.
Data Range

**Data from within the last**

Define the time range of the historical time series data that you want to use for forecasting.

**Reset Option**

**Reset on Notifications**

Activate this checkbox to include failure modes of notifications in the calculation.

If you activate this checkbox, your time range is shortened based on notifications that are assigned to a failure mode. This means that once a notification with a malfunction end date was collected within the time range, only the data after the end date is used for the calculation.

**Example**

You have defined 10 days as a time range for the indicator forecasting. On the 8th day, a notification was collected indicating an end of failure. This means that only the data from the last 2 days is used for the forecasting because only within this time the equipment is up and the 8 days before the equipment was down due to a breakdown and this data is useless.

**Failure Mode**

Select the failure mode for which the assigned notifications should be included in the calculation.

8. Choose **OK**.

**Results**

The indicator forecasting is configured, and the indicator values are forecasted.

**Next Steps**

You can now view the forecasted indicator values for a specific piece of equipment of the equipment model in the indicator chart. For more information, see Features in Indicator Chart [page 41].
## 5.3 Locations

A location corresponds to the geo-spatial location where an equipment is installed.

Using the Locations application, you can create a location and assign it to your item of equipment. This assignment is made based on the functionality of the items of equipment.

A location is based on a template and allows users to add values to the definitions used in the underlying template.

A location can be in any of the following states:

- Unpublished
- In Revision
- Published

For more information, see State Transitions [page 267]

You can perform the following operations using the Locations app:

- Create a Location and add location information and location attributes. For more information, see Creating a Location [page 132].
- View details of an existing location and update an existing location. For more information, see Updating a Location [page 137].
- Delete a location to clean up the data that is not required to be on the network. For more information, see Deleting a Location [page 137].
- View the Completeness status. This is calculated based on values in header, Location Information, and Installation Location section
- Create Extensions for a location. A new tab Extensions is displayed. This provides the custom specific information that you created
- View the list of child locations under STRUCTURE Locations

---

**Note**

You can remove a child location from a parent location and assign it to a different location.

Assign child locations to existing locations from the Structure section.

- Add or remove inherited address.
- RFID is enabled in Lookup application for devices that support RFID.
  If the Prefix and Suffix are defined in the Bar Code Configurations under Application Settings General Application Settings, then RFID feature can be used to scan the RFID tag.
- View an analytics dashboard for a location. For more information see Viewing Analytics Dashboards on Object Pages [page 63].
5.3.1 Creating a Location

You use this procedure to create a location where an item of equipment is installed, and add location-specific attributes to the location.

Prerequisites

- Your user ID has the role FUNCTIONAL_LOCATION_EDIT assigned to it.
- You have already created a location template from the Templates application.
  For more information, see Creating a Location Template [page 254]

Procedure

1. Launch the Locations application.
2. From the Locations landing page, choose New.
3. In the Create New Location dialog box, enter the location ID, address, description, template, and parent details.

  ![Note](image)

  *And address is optional.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter a unique name for the functional unit</td>
</tr>
<tr>
<td>Short and Long Description</td>
<td>Provide a description denoting the functional nature of the unit.</td>
</tr>
<tr>
<td>Template</td>
<td>Select a location template if you want the functional unit to inherit the location template attributes.</td>
</tr>
<tr>
<td>Subclass</td>
<td>Select a subclass. You can classify a location based on class or subclass.</td>
</tr>
<tr>
<td></td>
<td>It enables you to perform location object classification through location template inheritance or manual assignment.</td>
</tr>
</tbody>
</table>
4. To update additional attributes related to a location, select [INFORMATION] [Data Sheet] tab and perform these substeps.
   a. Choose [Edit].
   b. You can assign templates using [Add Template].
   c. You can select the assigned templates and choose [Remove Template] to remove the template.
   d. You can display the alternate unit of measure using [Show Alternate UoM].
      You can set the default unit of measurement system in the [Unit of Measure Variant] under [User Account (icon on the left corner of the launchpad)] [Settings] [Unit of Measure].
   e. Choose [Save].

5. In the [Locations] object page, navigate to [INFORMATION] [Location Information] and choose [Edit].
   a. In the [Location Information] field autopolitates by inheriting the address from the section, enter details as necessary.
      In the [Designed Operating State] dropdown, specify the operational state of the location.
      You can also specify the [Criticality] and [Safety Risk] for the location.
   b. Choose [Save].

6. To update the installation information about the location, choose [INFORMATION] [INSTALLATION LOCATION] and choose [Edit].
   a. In the [Installation Location] section, enter details as necessary.
      You can enter the relevant [Object Address], [Contact Person], and [Geospatial Data].
      In the [Geospatial Data] section, specify the latitude and longitude coordinates of the location.
b. Choose Save.

7. To add the location to a group, go to Information > Groups > Add.

You can view the list of groups to which the location is added.

8. To assign a piece of equipment to the functional location, choose Structure > Equipment > Assign.
   a. From the Select Equipment dialog box, select the equipment. You can also inherit the address of the location to the equipment. Choose Assign.

9. To assign a location to the functional location, choose Structure > Locations > Assign.
   a. From the Select Locations dialog box, select the location. Choose Assign.

10. To add, or assign, or edit an existing document to the location, choose the Documentation Documents tab, and perform the following tasks:

   In the Documents section, choose Add menu to upload a new document, and perform the following steps.

   a. Choose Add > Add Image to add an image
      1. In the Add Image pop-up, browse for a file.
      2. In the Additional Information section:
         ○ Assign a Main Category to classify the document.
         You can also assign additional categories in the More Categories field. You can also assign a Phase, if necessary.
         ○ Select the type of sensitive data available in the document from the Data Sensitivity list.
         ○ Select the language from the dropdown that corresponds to the documents.
         ○ Enter a description. You can also enter a long description, if necessary.
         ○ Select the confidentiality of the document if it’s not shared with everyone.
         3. Choose Upload.
            You can use Check and Upload to check if there are any duplicates that exist in the system. If duplicate files exist, you will then view the files in the Similar Files Detected dialog box. You then can Continue Uploading the New File or you can select a file from the duplicate file list and Use Selected File option to upload it.

   b. Choose Add > Add Document to add a document.
      1. In the Add Document popup browse for a file.

      | Note |
      |------|
      | ○ Maximum upload file size for a document is 2 GB. |
      | ○ Different files with different MIME types can be uploaded for a document. You can assign the same or different languages for each file. For example, a document can now have files with “.doc”, “.pdf”, “.txt” extensions. |

      2. In the Additional Information section:
         ○ Assign a Main Category to classify the document.
         You can also assign additional categories in the More Categories field. You can also assign a Phase, if necessary.
         ○ Select the type of sensitive data available in the document from the Data Sensitivity list.
         ○ Select the language from the dropdown that corresponds to the documents.
         ○ Enter a description. You can also enter a long description, if necessary.
         ○ Select the confidentiality of the document if it’s not shared with everyone.
         3. Choose Upload.
You can use **Check and Upload** to check if there are any duplicates that exist in the system. If duplicate files exist, you will then view the files in the **Similar Files Detected** dialog box. You then can **Continue Uploading the New File** or you can select a file from the duplicate file list and **Use Selected File** option to upload it.

c. Choose ![Add ![Add Link](#)] to add a document link.
   1. In the **Add Link** popup, provide a URL link to the document along with a **Display Name**.

   ![i Note](#)
   - You cannot upload private domains such as `.corp` as links.
   - Different files with different MIME types can be uploaded for a document. You can assign the same or different languages for each file. For example, a document can now have files with `.doc`, `.pdf`, `.txt` extensions.

   2. In the **Additional Information** section:
   - Assign a **Main Category** to classify the document. You can also assign additional categories in the **More Categories** field. You can also assign a **Phase**, if necessary.
   - Select the type of sensitive data available in the document from the **Data Sensitivity** list.
   - Select the language from the dropdown that corresponds to the documents.
   - Enter a description. You can also enter a long description, if necessary.
   - Select the confidentiality of the document if it’s not shared with everyone.

   3. Choose **Upload**.
   You can use **Check and Upload** to check if there are any duplicates that exist in the system. If duplicate files exist, you will then view the files in the **Similar Files Detected** dialog box. You then can **Continue Uploading the New File** or you can select a file from the duplicate file list and **Use Selected File** option to upload it.

d. You can add a new version of a document by selecting the document from the list and choose ![Add ![Add New Version](#)]
   1. In the **Add New Version** popup browse for a file.

   ![i Note](#)
   - Maximum upload file size for a document is 2 GB.
   - Different files with different MIME types can be uploaded for a document. You can assign the same or different languages for each file. For example, a document can now have files with `.doc`, `.pdf`, `.txt` extensions.

   2. In the **Additional Information** section, enter a **Description** for the document. You can also enter a long description, if necessary.

   3. Choose **Upload**.

11. In the **Documents** section, from the **Add** menu choose **Assign** to upload an existing document and perform the following steps:
   a. In the **Select Documents** dialog box, search for an appropriate file.
   b. From the **Documents** search results list, select a document.
   c. Choose **Assign**.

   You can also use **Remove** and **Download** to remove or download any of the documents assigned to the model.
12. To assign existing documents to the location, choose DOCUMENTATION > Documents > Add > Assign and perform the following tasks:
   a. In the Select Documents dialog box, select the relevant document.
   b. Choose Assign.

13. To add instructions to the location, choose DOCUMENTATION > Instructions > Assign and perform the following tasks:
   a. From the Select Instructions dialog box, select the appropriate instruction.
   b. Choose Assign.

14. To add Failure Modes to the location, choose DOCUMENTATION > Failure Modes > Assign and perform the following tasks:
   a. From the Select Failure Modes dialog box, select the appropriate failure modes.
   b. Choose Assign.

   If you have write access to the location even though you do not have write access to the failure mode, you can edit the failure mode instance page of the location.

   When you copy a failure mode and Save & Publish it:
   ○ A new failure mode is created with the same causes and instructions from the source failure mode
   ○ The newly created failure mode is directly assigned to the object
   ○ The new failure mode is in published state
   ○ You navigate to the new failure mode instance page that includes all the copied failure mode instances: effects, causes, instructions, and detection method
   ○ The new failure mode appears in the failure mode section list

   You can now flag inherited failure modes to not relevant using the Not Relevant button. This excludes the failure modes from any assessments relevant to the location.

   In the failure mode instance page, you can Add Effect Details like:
   ○ Local Effect Description: describes the direct effect on the equipment or the how it affects the equipment it is part of.
   ○ Higher-Level Effect Description: describes how is the system affected the equipment is part of.
   ○ End Effect Description: describes the ultimate effect that the failure has on safety and/or the environment (if any) and any impact on production or operational capability.
   ○ Potential Worst-Case Effect Description: specifies what would happen in case no measures would be taken to anticipate, prevent, or detect the failure.

15. To publish the location, choose Publish.

Results

You have created a location and published it.

- You can view the list of child locations under Structure > Locations.
- You can view notifications and work orders, which are associated with the location under Maintenance and Service. Notifications and work orders can be uploaded from an external system using available public APIs.
  ○ View the Maintenance Plans associated with the location.
    You can view the maintenance plans based on the following categories as well:
5.3.2 Updating a Location

You use this procedure to update information such as location information, installation location, and documents that relate to an existing location.

Prerequisites

Your user ID has the role FUNCTIONAL_LOCATION_EDIT assigned to it.

Procedure

1. Launch the Locations application.
2. Search the location you want to update using search filters.
3. Select the location from the search results.
4. If you choose a location that is in status Published, choose Manage New Revision from the Locations object page.
5. Edit the Location Information section, Installation Location section and the Documents section as necessary.
   For more information about field descriptions in each section, see Creating a Location [page 132].
6. Choose Save.
7. Choose Publish.

5.3.3 Deleting a Location

You use this procedure to delete a location that you do not want to have on the network.

Prerequisites

- Your user ID has the role FUNCTIONAL_LOCATION_EDIT assigned to it.
- You have created a location and the location is in any of the following states:
Procedure

1. Launch the Locations application.
2. Using search filters, search for the location you want to delete.
3. Select the relevant location.
4. Choose Delete.

5.3.4 Viewing Work Orders of a Location

You can use this procedure to view a list of work orders related to a location.

Prerequisites

To view a location, your user ID has the roles FUNCTIONAL_LOCATION_READ assigned to it.

Context

You can view the following work orders details: work order ID, order short description, order status, order type, order priority, order long description, start date, end date, actual duration, or planned duration.

Click a notification ID to view more details of the same in the object page. An indicator chart displays with the notification details. You can view the start and end date of notifications. If these dates are not available, the current date of notification is plotted on the chart, with the measurement point time series data.

In case of work orders that do not have an assigned equipment, then the indicator chart will not work.

For more information about indicator chart, refer Viewing Time Series Data (Indicator Chart) of an Equipment [page 104].

You can perform the following actions:

- Sort the work orders by - Ascending, Descending, Type, Priority, Start Date, or End Date.
- Group work orders by- Ascending, Descending, Type, or Priority.
- Filter work orders by - Type or Priority.

You can have more than one service provider for a location. Multiple business partners can have the same role.
If the order status is <TECO> or closed, then the actual duration is displayed, otherwise the planned duration is displayed.

Procedure

1. Open the Locations application.
2. From the Location screen, select a location for which you want to view work orders.
3. To view information related to work orders, go to MAINTENANCE & SERVICE → Work Orders section.
   
   You can view the list of work orders associated with the location. Select and open a work order to view more details of work order.

5.3.5 Viewing Notifications of Location

You use this procedure to visualize all the notifications associated with a location.

Prerequisites

You must have the roles FUNCTIONAL_LOCATION_READ assigned to your user ID in the SAP Cloud Platform account.

Context

Using this option, it is also possible to sort, filter, group notifications, and create new notifications. Click the respective icons to perform these actions. Depending on the action performed on these notifications, the progress statuses - completed, planned, and pending displays against each notification. It is also possible to create an improvement request or edit an improvement request using the Add Evidence button. Also, create a notification using the <New> option.

Click a work order ID to view more details of the same in the object page. A indicator chart displays with the work order details. You can view the start and end date of work orders. If these dates are not available, the current date of work order is plotted on the chart, with the measurement point time series data.

Note

In case of work orders that do not have an assigned equipment, then the indicator chart will not work.

For more information about indicator chart, refer Viewing Time Series Data (Indicator Chart) of an Equipment [page 104].
To view the details of notification, click the respective notification ID. The progress of notifications is as below:

- **Completed** - All notifications with status **Completed** or **Closed**.
- **Planned** - All notifications that have start date equal or greater than the current date.
- **Pending** - All notifications that have end date greater than current date or all notifications that have the start date lesser than the current date.

### Procedure

1. Open the **Locations** application.
2. From the **Location** list screen, select a location for which you want to view notifications.
3. In the **MAINTENANCE & SERVICE** tab, select **Notifications**.

### Results

You can view all the notifications related to the location.

### 5.4 Functions

Functions are used to define how the assigned objects are intended to operate. You can assign functions to equipment, models, locations and systems.

You can currently use this feature in the Reliability Centered Maintenance (RCM) assessment. Generally, in asset central foundation, it takes you to the list page.

<table>
<thead>
<tr>
<th>i Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Functions once saved are published.</td>
</tr>
</tbody>
</table>

### 5.4.1 Creating and Editing Functions

You can use this procedure to create a function.
Procedure

1. Open the *Functions* app.
2. Choose *New*.
3. Enter the following details in the *New Function* dialog box:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Description (*)</td>
<td>Enter a short description for the function.</td>
</tr>
<tr>
<td>Long Description</td>
<td>Enter a long description for the function, if necessary.</td>
</tr>
<tr>
<td>Type (*)</td>
<td>Select the type for the function from the list. These are the categories that the functions have an impact on.</td>
</tr>
<tr>
<td>Type Description</td>
<td>Enter a collective description for the type, if necessary.</td>
</tr>
</tbody>
</table>

4. Choose *Save*.
5. Once saved, the function is listed in the list page.
   
   There is no status for functions, once saved the function is directly published.
6. Choose the function from the list, the *Basic Information* section lists all the details that you have entered while creating a function.
   
   You can choose to edit the information using *Edit*.
7. In the Documents section, you can use *Add* to add any relevant document.
   
   You can use *Remove* to remove any existing document and, download the documents using *Download*.
8. In the *Assignments* section, you can assign equipment, models, locations, or systems to the function.

### 5.4.2 Deleting Functions

You can use this procedure to delete a function.

Procedure

1. Open the *Functions* app.
2. Select the functions to be deleted from the list.
3. Choose *Delete*. 
5.5 Failure Modes

A failure mode is a probable failure that could occur to piece of equipment. In case SAP Asset Intelligence Network is available, the manufacturer shares the failure modes with the operator; else the operator has to upload or enter the failure modes on their own. The failure mode keeps the operator informed about possible failures and helps them to handle the failure modes efficiently.

A failure mode is always associated with a subclass and may have more than one category.

The following types of failure modes can occur to any of the following business objects associated with a piece of equipment (equipment, models, spare parts, locations, groups):

- Design function is not obtained
- Specified function lost or outside accepted operational limit
- Non-Critical failures

You can now view the Reliability, Availability, Maintainability, and Safety (RAMS) figures for the failure modes.

5.5.1 Managing Failure Modes

You can perform various operations; such as creating a failure mode, viewing a failure mode, updating a failure mode, deleting a failure mode, and assigning models, pieces of equipment, spare parts, groups, and locations to a failure mode.

Context

You use the Failure Modes application to perform the following operations:

- Creating a Failure Mode [page 143]
- Viewing and Publishing a Failure Mode [page 146]
- Updating a Failure Mode [page 147]
- Deleting a Failure Mode [page 148]
- Copying a Failure Mode [page 148]
- Assigning Failure Modes to Business Objects [page 149]
- View the causes associated with a failure mode
- View the top words and top notifications with work orders for a failure mode and model. For more information, see Using Failure Mode Analytics in the Failure Modes Application.

You can change the following assignments in failure modes:

- Model assigned to the failure mode
- Equipment assigned to the failure mode
- Location assigned to the failure mode
- Spare part assigned to the failure mode
5.5.1.1 Creating a Failure Mode

You use this procedure to create a failure mode and assign business objects such as models, items of equipment, spare parts, groups, and locations to the failure mode.

Prerequisites

Your user ID has the roles FAILURE_MODE_DELETE or FAILURE_MODE_EDIT assigned to it.

Procedure

1. Open the Failure Modes app.
2. From the Failure Mode List window, choose New.
3. In the Failure Modes dialog box, perform the following tasks:
   a. Enter the following details as described in the table:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description (*)</td>
<td>Enter a short description for the failure mode.</td>
</tr>
<tr>
<td>Long description</td>
<td>Enter a short description for the failure mode.</td>
</tr>
<tr>
<td>Subclass</td>
<td>Select a subclass for the failure mode.</td>
</tr>
<tr>
<td>Category (*)</td>
<td>Select one or more categories relevant for the failure mode.</td>
</tr>
</tbody>
</table>

   i Note
   By default, Others is selected.
### Field Description

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type (*)</strong></td>
<td>Select the type of failure mode. The following list provides the descriptions for each type of failure mode:</td>
</tr>
<tr>
<td></td>
<td>○ 1 - Designed function is not obtained</td>
</tr>
<tr>
<td></td>
<td>○ 2 - Specified function lost or outside accepted operational limit</td>
</tr>
<tr>
<td></td>
<td>○ 3 - Non critical failures</td>
</tr>
</tbody>
</table>

**i Note**

As a default, **3 - Non Critical failures** is selected.

<table>
<thead>
<tr>
<th>Detection Method</th>
<th>Select a detection method to support detectability. You can select from the following list:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>○ Periodic maintenance</td>
</tr>
<tr>
<td></td>
<td>○ Functional testing</td>
</tr>
<tr>
<td></td>
<td>○ Inspection</td>
</tr>
<tr>
<td></td>
<td>○ Periodic condition monitoring</td>
</tr>
<tr>
<td></td>
<td>○ Continuous condition monitoring</td>
</tr>
<tr>
<td></td>
<td>○ Production interference</td>
</tr>
<tr>
<td></td>
<td>○ Casual observation</td>
</tr>
<tr>
<td></td>
<td>○ Corrective maintenance</td>
</tr>
<tr>
<td></td>
<td>○ On demand</td>
</tr>
<tr>
<td></td>
<td>○ Other</td>
</tr>
</tbody>
</table>

**i Note**

All the mandatory fields are marked as (*) in the table.

4. Choose **Save** to create the failure mode.
5. To add the RAMS figures, follow these steps:
   a. In the **RAMS Figures** section, choose **Edit**.
   b. Select a **Failure Pattern**.
   c. Enter the **KPI** values for mean time to failure, mean time to repair, and mean time between failures.
   d. Save your entries.
6. To assign a model, follow these steps:
   a. In the **ASSIGNMENTS > Models** section, choose **Assign**.
   b. From the **Select Model** dialog box, select the relevant equipment.
   c. Choose **Assign**.
7. To assign a piece of equipment, follow these steps:
   a. In the **ASSIGNMENTS > Equipment** section, choose **Assign**.
   b. From the **Select Equipment** dialog box, select the relevant equipment.
   c. Choose **Assign**.
To assign a location, follow these steps:

a. In the ASSIGNMENTS Locations section, choose Assign.
b. From the Select Location dialog box, select the relevant location.
c. Choose Assign.

Note
You can only assign a maximum of 50 locations to a failure mode.

To assign a spare part, follow these steps:

a. In the ASSIGNMENTS Spare Parts section, choose Assign.
b. From the Select Spare Parts dialog box, select the relevant spare part.
c. Choose Assign.

To assign a group, follow these steps:

a. In the ASSIGNMENTS Groups section, choose Assign.
b. From the Select Group dialog box, select the relevant group.
c. Choose Assign.

To assign a system, follow these steps:

a. In the ASSIGNMENTS Systems section, choose Assign.
b. From the Select System dialog box, select the relevant system.
c. Choose Assign.

To add causes, follow these steps:

a. In the CAUSES section, choose Add.
   You can choose New to add new causes or Assign to add existing causes.
b. From the Select Causes dialog box, select the relevant cause or create a new cause using the Create Cause dialog box.
c. Choose Assign.

To add instructions, follow these steps:

a. In the INSTRUCTIONS section, choose Assign.
   You can choose New section, choose to add new causes or Assign to add existing causes.
b. From the Select Causes dialog box, select the relevant cause or create a new cause using the Create Cause dialog box.
c. Choose Assign.

To publish the failure mode, choose Publish.

To create a revision of a failure mode or to work with the last published failure mode, or last revision of failure mode, see section, choose Creating Revisions and Switching Between Revisions and Published State [page 268].

Results

The failure mode is published.

When you copy a failure mode and Save & Publish it:
A new failure mode is created with the same causes and instructions from the source failure mode
The newly created failure mode is directly assigned to the object
The new failure mode is in published state
You navigate to the new failure mode instance page that includes all the copied failure mode instances: effects, causes, instructions, and detection method
The new failure mode appears in the failure mode list

5.5.1.2 Viewing and Publishing a Failure Mode

You can view a failure mode to verify whether the information contained in a failure mode is appropriate.

Prerequisites

- To publish a failure mode, your user ID has the roles FAILURE_MODE_DELETE or FAILURE_MODE_EDIT assigned to it.
- To view a failure mode, your user ID has the role FAILURE_MODE_READ assigned to it.

Context

If you have assigned a business object to a failure mode, you can navigate to the business object details and work on the business object.

Procedure

1. Open the Failure Modes application.
2. In the Failure Mode List window, use the filters to search for an appropriate failure mode.
3. Choose a failure mode from the search list and double-click to view details.
4. On the Failure Mode screen, choose the Assignments tab to view the details of all the business objects assigned to the failure mode. On the Assignments tab:
   a. Choose Models to view the models assigned to the failure mode.
      For more information about working with models, see Models [page 112].
   b. Choose Equipment to view the pieces of equipment assigned to the failure mode.
      For more information about working with equipment, see Equipment [page 78].
   c. Choose Locations to view the locations assigned to the failure mode.
      For more information about working with locations, see Locations [page 131].
   d. Choose Spare Parts to view the spare parts assigned to the failure mode.
      For more information about working with spare parts, see Spare Parts [page 154].
e. Choose Groups to view the group assigned to the failure mode.

For more information about working with groups, see Groups [page 164].

5. On the Failure Mode screen, choose the Causes tab to view all the possible causes related to the failure mode.

Choose Add to add a new cause to the failure mode.

6. Choose Publish to publish the failure mode.

If you want to view details of the relevant business object, double-click it.

5.5.1.3 Updating a Failure Mode

You can delete or update existing information within a failure mode or add missing information to a failure mode.

Prerequisites

- You have identified the failure mode that you want to update.
- To update a failure mode, your user ID has the roles FAILURE_MODE_DELETE or FAILURE_MODE_EDIT assigned to it.

Context

You can add possible causes or create new causes for a failure mode.

Procedure

1. Open the Failure Modes app.
2. In the Failure Modes app, search for an appropriate failure mode using the filters.
3. From the search results list in the Failure Modes section, select an appropriate failure mode.
4. Double-click the failure mode to view details.
5. If you have opened a failure mode that has been published, choose Manage -> New Revision.
6. To update all the relevant business objects assigned to a failure mode, select the different sections on the ASSIGNMENTS tab.

For more information, see Creating a Failure Mode [page 143].
7. To add a new cause, select the CAUSES tab.

For more information, see Creating a Failure Mode [page 143].
8. To publish the failure mode, choose Publish.

5.5.1.4 Deleting a Failure Mode

You can delete a failure mode that you no longer want to have on the network.

Prerequisites

To delete a failure mode, your user ID has the role `FAILURE_MODE_DELETE` assigned to it.

Procedure

1. Open the Failure Modes application.
2. In the Failure Mode List screen, search for a failure mode.
3. Choose a failure mode from the search list.
   You can select more than one failure mode for deletion.
4. On the Failure Mode List screen, choose Delete.

5.5.1.5 Copying a Failure Mode

You can copy a failure mode to create a new failure mode similar to the existing failure mode.

Prerequisites

To copy a failure mode, your user ID has the role `FAILURE_MODE_DELETE` and `FAILURE_MODE_EDIT` assigned to it.

Procedure

1. Open the Failure Modes application.
2. In the Failure Mode List screen, search for a failure mode.
3. Choose a failure mode from the search list.
4. In the Failure Mode List screen, choose Copy.
Assigning Failure Modes to Business Objects

You can use this procedure to assign a business object to a failure mode.

Prerequisites

- You have identified the business object that you want to assign.
- Your user ID has the roles FAILURE_MODE_DELETE or FAILURE_MODE_EDIT assigned to it.

Context

You can assign a failure mode to the following objects:

- Models
- Announcements
- Equipment
- Instructions
- Locations
- Improvement Cases
- Spare Parts

**Note**

- You can only assign a maximum of 50 locations to a failure mode.
- All the equipment belonging to a group or model will also inherit the failure modes assigned to that model or group.
- All the locations belonging to a group will also inherit the failure modes from that group.

For simplicity’s sake, we will describe the procedure for assigning a failure mode to a model.

Procedure

1. Open the *Failure Modes* application.
2. In the *Failure Mode List* screen, use the filters to search for an appropriate failure mode.
3. In the *Failure Mode* screen, go to ASSIGNMENTS-> Models section.
4. Choose *Assign*.
   
   You can select one or more models from the list and choose *Assign*. 
5.6 Fingerprints

Fingerprint is defined as a collection of snapshot of indicator chart derived from a set of indicators and metadata (type, data & time, description, equipment state, documents) for a specific time period. It describes the reference state of a single piece of equipment that can be used for further process steps, for example, equipment documentation.

Fingerprints help operators and manufacturers to define normal, reference, or failure states for equipment. They can use these states at a later point in time to detect deviations/distances/trends from the normal behavior and plan actions to get the equipment back to the normal state.

5.6.1 Creating a Fingerprint

You can use this procedure to create a fingerprint.

Prerequisites

You must have the authorized role FINGERPRINT_DELETE or FINGERPRINT_EDIT.

Procedure

1. From the equipment app:
   a. On the launchpad, choose Equipment application.
   b. Choose equipment from the list.
   c. Go to Documentation ➔ Fingerprints ➔ New. Enter the <Fingerprint Name> and <Short Description> in the Create New Fingerprint dialog box.
   d. Choose New. You can adjust the capture screen to select a specific period in the indicator chart.
   e. Go to SNAPSHOTs.
   f. Click New.
   g. Go to Select Indicators. Select the indicators that you want to record the fingerprint for.
   h. Choose Capture.
   i. Choose OK and provide the snapshot description.
   j. Choose Save.
   k. You can also provide any relevant comments in the Comments section.

2. From Fingerprints app:
a. On the launchpad, choose **Fingerprints** application.
b. Choose fingerprint from the list.
c. Go to **SNAPSHOTS**.
d. Click **New**.
e. Go to **Select Indicators**. Select the indicators that you want to record the fingerprint for.
f. Choose **Capture**.
   - You can adjust the capture screen to select a specific period in the indicator chart.
g. Choose **OK** and provide the snapshot description.
h. Choose **Save**.
i. You can also provide any relevant comments in the **Comments** section.

**Results**

You have created a fingerprint for a piece of equipment.

### i Note
- You can capture multiple snapshots with different indicator set and time-periods in a fingerprint.
- Once you have created a snapshot, you cannot edit them.

### 5.6.2 Viewing a Fingerprint

You can use this procedure to view a fingerprint.

**Prerequisites**

You must have the authorized role **FINGERPRINT_READ, FINGERPRINT_DELETE, or FINGERPRINT_EDIT**.

**Procedure**

1. From the equipment app:
   a. On the launchpad, choose **Equipment** application.
   b. Choose equipment from the list.
   c. Go to **Documentation \(\rightarrow\) Fingerprints**
   d. Click on a fingerprint from the list.

2. From **Fingerprints** app:
   a. On the launchpad, choose **Fingerprints** application.
b. Click on a fingerprint from the list.

**Results**

You can view the snapshot and perform basic functions like sort, filter on the snapshot. Any changes on the fingerprint will be recorded in the *Timeline* section.

**5.6.3 Editing a Fingerprint**

You can use this procedure to edit a fingerprint.

**Prerequisites**

You must have the authorized role `FINGERPRINT_DELETE` or `FINGERPRINT_EDIT`.

**Procedure**

1. From the equipment app:
   a. On the launchpad, choose *Equipment* application.
   b. Choose equipment from the list.
   c. Go to *Documentation > Fingerprints*.
   d. Click on a fingerprint from the list.
   e. Choose *Edit*.
   f. You can change the status of a fingerprint from *Created* to *Approved*.
   g. You can also post any relevant comments in the *Comments* section.
   h. You can create a new snapshot or delete an existing one from the list.
   i. Choose *Save*.

2. From *Fingerprints* app:
   a. On the launchpad, choose *Fingerprints* application.
   b. Choose fingerprint from the list.
   c. Choose *Edit*.
   d. You can change the status of a fingerprint from *Created* to *Approved*.
   e. You can also post any relevant comments in the *Comments* section.
   f. You can create a new snapshot or delete an existing one from the list.
   g. Choose *Save*. 
Results

**i Note**
Once the status is set to **Approved**, you can no longer edit the fingerprint. However, you can still post relevant comments.

You can use the *Edit Header* to edit the header information.

### 5.6.4 Deleting a Fingerprint

You can use this procedure to delete a fingerprint.

**Prerequisites**

You must have the authorized role **FINGERPRINT_DELETE**.

**Procedure**

1. From the equipment app:
   a. On the launchpad, choose *Equipment* application.
   b. Choose equipment from the list.
   c. Go to [Documentation](#) > *Fingerprints*.
   d. Click on a fingerprint from the list.
   e. Choose **Delete**.
      A confirmation message is displayed.
   f. Choose **OK**.
2. From *Fingerprints* app:
   a. On the launchpad, choose *Fingerprints* application.
   b. Choose fingerprint from the list.
   c. Choose **Delete**.
      A confirmation message is displayed.
   d. Choose **OK**.
5.7    Spare Parts

Spare parts are components that are kept in your inventory as spare. Typically, these components are not fitted into your item of equipment, but can be fitted into the item of equipment when needed.

With SAP Predictive Asset Insights, you can create and maintain a record of these spare parts. Also, if these spare parts are fitted into the physical item of equipment, you can assign these spare parts to the corresponding model on the network.

In SAP Predictive Asset Insights, you can record the spare part’s manufacturing information, dimensions, quantity, shelf life, to name a few. A spare part inherits attributes from a subclass. You can assign a spare part to a model.

Note
After the spare part is assigned to a model, we refer to the spare part as “Part”.

Using the Spare Parts application, you can:

- Create spare parts (see Creating Spare Parts [page 155])
- Delete spare parts (see Deleting Spare Parts [page 158])

5.7.1 Managing Spare Parts

You can perform various operations on a spare part such as creating spare parts, viewing spare parts, and deleting spare parts

Context

You can use the Spare Parts application to perform the following operations:

- Creating Spare Parts [page 155]
- Deleting Spare Parts [page 158]
- Assign new spare parts or maintain existing spare parts for an equipment using the Edit and Remove buttons.
- Assign more than one spare part template to a spare part. You can also remove the templates that have already been assigned and assign more templates.
- View and maintain the attributes and values for a spare part.
- Assign or remove documents for a spare part.
- Displays the break down instructions details such as <Expected Duration>, <Number of Steps>, <Criticality>, <Activity>, <Primary Document>, and <Long Description>.
- View an analytics dashboard for a spare part. For more information see Viewing Analytics Dashboards on Object Pages [page 63].

Note
Spare parts can only be optionally assigned to one sub-class.
5.7.1.1 Creating Spare Parts

You perform this procedure to maintain manufacturing information, technical data, and assignment information pertaining to spare parts.

Prerequisites

- Your user ID has the roles PART_DELETE or PART_EDIT assigned.
- You have identified the subclass for creating the spare part.

Procedure

1. Launch the Spare Parts application.
2. To create a single spare part, navigate to New Single Spare Part. To create spare parts by mass upload, follow these substeps:
   a. Navigate to New Mass Upload of Spare Parts.
   b. From the Mass Upload of Spare Parts dialog box, download the template.
   c. Fill in the necessary details and upload the template.

   Note
   The CSV file must be in UTF-8 format in order to consider all the special characters.
3. In the New dialog box, enter the following details:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spare Part ID (*)</td>
<td>Provide a unique name</td>
</tr>
<tr>
<td>Subclass</td>
<td>Choose the appropriate subclass from the dropdown</td>
</tr>
<tr>
<td>Template</td>
<td>Select a spare part template</td>
</tr>
<tr>
<td>Short (*) and Long Description</td>
<td>Provide a description for the spare part</td>
</tr>
<tr>
<td>Unit of Measure (*)</td>
<td>Choose the appropriate unit of measure</td>
</tr>
<tr>
<td>Phase</td>
<td>Choose if the spare part is in Planned or Released phase</td>
</tr>
<tr>
<td>Manufacturer (*)</td>
<td>Choose the name of the manufacturer of the spare part</td>
</tr>
<tr>
<td>Manufacturer Part Number (*)</td>
<td>Provide the manufacturer part number</td>
</tr>
</tbody>
</table>
4. Choose Save.
5. In the Spare Parts details screen, to add the unit of measure and long description perform the following steps:
   a. Go to the INFORMATION section and choose Edit.
   b. Select the unit of measure from Unit of Measure.
c. Choose Save.

6. In the **Spare Parts** details screen, to update manufacturer information perform the following steps:
   a. Go to the **INFORMATION > Part Number** section and choose Edit.
   b. Enter the details.
   c. Choose Save.

7. In the **Spare Parts** details screen, to update availability and procurement information perform the following steps:
   a. Go to the **INFORMATION > Availability and Procurement** section and choose Edit.
   b. Enter the required details like delivery time, manufacturer stock level, shelf life, quality, contract, and standard. You can also specify if the spare part is hazardous or is 3D printable.
   c. Choose Save.

8. In the **Spare Parts Details** screen, to maintain information about dimensions of the spare part, perform the following steps:
   a. Go to the **DIMENSIONS AND WEIGHT DATA** section and choose Edit.
   b. Provide the appropriate dimensions for size, length, width, height, and weight.
   c. Choose Save.

9. In the **Spare Parts Details** screen, to maintain attributes pertaining to the spare part, perform the following steps:
   a. Go to the **INFORMATION > Data Sheet** section and choose Edit.
   b. Choose Add Templates. The attributes are derived from the selected templates. You can also edit or remove templates.
   c. You can select a template and choose Remove Template to remove the template.
   d. You can display the alternate unit of measure using Show Alternate UoM.
   e. Choose Save.

In the **ASSIGNMENTS** section, you can view the details of models, equipment, locations, or instructions that are assigned to the spare part.
- By assigning models to the spare part, the model owner can provide specific information about **Default Delivery Quantity** and **Advised Stock Quantity** of the spare part.
- Instructions are for the operator about the spare part use.

10. In the **Spare Parts Details** screen, to add the spare part to a group perform the following steps:
    a. Go to **INFORMATION** section.
    b. Choose Add and select if you want to add a spare part to a new group or to an existing group. Similarly, you can remove a spare part from a group by using Remove.
    c. Choose Save.

11. In the **Spare Parts Details** screen, to view or assign spare part successor information about, perform the following steps:
    a. Go to the **INFORMATION > Life Cycle Information > Successor Spare Part** section and choose Assign.
    b. Select one or more spare parts in the Assign Successor dialog box.
    c. Choose Assign.
d. You can edit the spare part successor information by choosing Edit on the selected spare part in the Successor Spare Part section.

e. Enter the date until when the spare part can be ordered in the Valid From of the Edit Successor Information dialog box.

f. Choose Save.

12. In the DOCUMENTS section, you can view the list of documents assigned to the spare part. You can also add, remove, or download a document from the list.

When uploading a new document, you can:
- Upload a document without a duplicate check using the Upload button.
- Run a duplicate check and if no duplicates, only then upload a document using the Check and Upload button.

13. In the ASSOCIATIONS section, you can view all the business objects to which the spare part is assigned.

14. In the FAILURE MODES section, you see details of failure modes assigned to the spare part. You can also assign a failure mode to the spare part using Assign.

If you have write access to the spare part even though you do not have write access to the failure mode, you can edit the failure mode instance page of the spare part.

When you copy a failure mode and Save & Publish it:
- A new failure mode is created with the same causes and instructions from the source failure mode
- The newly created failure mode is directly assigned to the object
- The new failure mode is in published state
- You navigate to the new failure mode instance page that includes all the copied failure mode instances: effects, causes, instructions, and detection method
- The new failure mode appears in the failure mode section list

In the failure mode instance page, you can Add Effect Details like:
- **Local Effect Description:** describes the direct effect on the equipment or the how it affects the equipment it is part of.
- **Higher-Level Effect Description:** describes how the system affected the equipment is part of.
- **End Effect Description:** describes the ultimate effect that the failure has on safety and/or the environment (if any) and any impact on production or operational capability.
- **Potential Worst-Case Effect Description:** specifies what would happen in case no measures would be taken to anticipate, prevent, or detect the failure.

**Results**

You have created a spare part.

If you have integration with SAP Hybris Commerce, then you can also view the Add to Cart icon on the page.
5.7.1.2 Deleting Spare Parts

You perform this activity when you want to remove a spare part from the network.

Prerequisites

Your user ID has the role PART_DELETE assigned.

Procedure

1. Open the Spare Parts application.
2. Search for the spare part you want to delete.
3. Select the spare part from the search results.
4. Choose Delete.

5.7.1.3 Uploading of Spare parts from Visual Design Stream Document

Context

To get familiar with SAP 3D Visual Enterprise Author tool. Please refer https://help.sap.com/viewer/8e4c65bb3a6c4ef6b56dc27d1d95cde6/9.0.0.4/en-US

To maintain spare part metadata according to the relevant product standards, please go through following steps:

Procedure

1. Open SAP 3D Visual Enterprise Author.
2. Open Metadata panel, refer to https://help.sap.com/viewer/67c291fba1bd10148bea8dce7b0caa3e/9.0.0.4/en-US/a46817d5f087472b0caa3e/a46817d5f087472b0caa3e.html

3. Export the current metadata of VDS Viewer to maintain spare parts metadata according to product standards. Refer to https://help.sap.com/viewer/67c291fba1bd10148bea8dce7b0caa3e/9.0.0.4/en-US/0fd8ec37c0574419bb7a7487f5f47741.html

**Note**
Before exporting select all the spare parts of the VDS to see all the metadata with respect to each node by moving to Display panel and pressing **CTRL+A**.

4. Open excel and try to open the file, which you have just exported as .txt file.
On opening .txt file in excel following should be marked:

a. Choose the **Delimited** file type that best describes your data and click Next.
b. Set the Tab as the delimiters your data contains.
c. Set the data format of each column to Text.

5. Please add following columns in the excel:

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>These are the unique Locator ID for each spare part of the VDS. This is already provided as part of the VE document.</td>
</tr>
<tr>
<td>VE Name</td>
<td>This is the Name of the spare part and is already provided as part of the VE document.</td>
</tr>
<tr>
<td>AIN / Manufacturer</td>
<td>It describes the manufacturer of the spare part and will also play vital role in mapping these spare part to any AIN object.</td>
</tr>
<tr>
<td>AIN / ManufacturerDescription</td>
<td>This describes any additional description about the Manufacturer of the spare part.</td>
</tr>
<tr>
<td>AIN / ManufacturerPartID</td>
<td>It describe the Part ID given by the manufacturer to the spare part. This will also play a vital role in mapping these to any AIN object.</td>
</tr>
<tr>
<td>Column Name</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>AIN / EANNumber</td>
<td>It describes the standard bar code symbology and numbering system used in global trade to identify a specific spare part in VDS.</td>
</tr>
<tr>
<td>AIN / PartName</td>
<td>It describes any other part name given to the spare part</td>
</tr>
<tr>
<td>AIN / Quantity</td>
<td>It describes how many of these spare parts are used in a certain VDS.</td>
</tr>
<tr>
<td>AIN / UOM</td>
<td>It describes what will be the unit of measure for this spare part.</td>
</tr>
<tr>
<td>AIN / ShortDescription_XX</td>
<td>It describes the short description for spare parts. Here XX can be any valid language code.</td>
</tr>
<tr>
<td></td>
<td>Example: en, de</td>
</tr>
<tr>
<td>AIN / LongDescription_XX</td>
<td>It describes the long description for spare parts. Here XX can be any valid language code.</td>
</tr>
<tr>
<td></td>
<td>Example: en, de</td>
</tr>
</tbody>
</table>

6. Import the excel created with the product-specific data to the same VDS. Refer to https://help.sap.com/viewer/67c291fba1bd10148bea8dce7b0caa3e/9.0.0.4/en-US/3569c3003f0f443da3f702a2c25268ee.html
To validate if your metadata is successfully added to the VDS, click *Select Metadata Keys To Show* on *Metadata* menu panel and select the new columns and click *OK*.

### 5.8 Groups

You can group together different business objects for multiple purposes.

A group can be any of the following types:

- **Criticality Assessment**
  Allowed object types: Equipment, Locations
- **Fleet**
  Allowed object types: Equipment
- **FMEA (Failure Mode Effect Analysis)**
  Allowed object types: Equipment, Locations
- **Training**
  Allowed object types: Equipment, Models, Instructions, Locations, Spare Parts, Templates, Documents, Announcements
- **Handover and Commissioning**
  Allowed object types: Equipment, Models, Instructions, Locations, Spare Parts, Templates, Documents, Announcements
- **Maintenance Planner**
  Allowed object types: Equipment, Locations, Notifications, Work Orders, Work Order steps
- **Organization**
  Allowed object types: Equipment, Models, Locations
- **Project**
  Allowed object types: Equipment, Models, Instructions, Locations, Spare Parts, Templates, Documents, Announcements
- **Spare Parts Kit**
  Allowed object types: Spare Parts
- **Variant**
  Allowed object types: Models, Spare Parts
• Work Center
  Allowed object types: Equipment, Locations, Notifications, Work Orders, Work Order steps

A group moves from one state to another during its process of creation and maintenance. The different states that a group goes through are listed here:

• Unpublished
• Published
• In Revision

5.8.1 Managing Groups

You can perform various operations on a group such as creating, viewing, updating, and deleting a group. You can also assign equipment, models, instructions, locations, spare parts, templates, documents, and announcements to a group.

Context

The following group types are available:

• Risk and Criticality
• Fleet
• FMEA
• Training
• Handover and Commissioning
• Maintenance Planner
• Organization
• Project
• Spare Parts Kit
• Variant
• Work Center

You can perform the following operations using the Groups application:

• Creating a Group [page 166]
• Viewing and Publishing a Group [page 167]
• Updating a Group [page 168]
• Deleting a Group [page 169]
• Copying a Group [page 170]
• Assigning Business Objects to a Group [page 170]
5.8.1.1 Creating a Group

You use this procedure to create a group and assign business objects such as equipment, models, instructions, locations, spare parts, templates, documents, and announcements to the groups.

Prerequisites

Your user ID has the roles `GROUP_DELETE` or `GROUP_EDIT` assigned.

Procedure

1. Open the `Groups` app.
2. From the type of group from the card view, choose `New`.
3. In the `Create Group` dialog box, perform the following tasks:
   a. Enter the following details as described in the table:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short description(*)</td>
<td>Enter a short description for the group.</td>
</tr>
<tr>
<td>Long description</td>
<td>Enter a long description for the group.</td>
</tr>
<tr>
<td>Allowed Member Types(*)</td>
<td>Lists the type of business objects that can be assigned to the group type.</td>
</tr>
</tbody>
</table>

   **i Note**
   Mandatory fields are marked as (*) in the table.

4. Choose `Ok` to create the group.
5. To assign a model, follow these steps:
   a. In the `Members > Models` section, choose `Assign`.
   b. From the `Select Models` dialog box, select the relevant model.
   c. Choose `Assign`.
6. To assign a piece of equipment, follow these steps:
   a. In the `Members > Equipment` section, choose `Assign`.
   b. From the `Select Equipment` dialog box, select the relevant equipment.
   c. Choose `Assign`.
7. To assign a location, follow these steps:
   a. In the `Members > Locations` section, choose `Assign`.
b. From the Select Locations dialog box, select the relevant location.
c. Choose Assign.

8. To assign a spare part, follow these steps:
   a. In the Members > Spare Parts section, choose Assign.
   b. From the Select Spare Parts dialog box, select the relevant spare part.
   c. Choose Assign.

9. To assign a template, follow these steps:
   a. In the Members > Templates section, choose Assign.
   b. From the Select Templates dialog box, select the relevant templates.
   c. Choose Assign.

10. To assign an instruction, follow these steps:
    a. In the Members > Instructions section, choose Assign.
    b. From the Select Instructions dialog box, select the relevant instructions.
    c. Choose Assign.

11. To assign documents, follow these steps:
    a. In the Members > Documents section, choose Assign.
    b. From the Select Documents dialog box, select the relevant documents.
    c. Choose Assign.

12. To assign announcements, follow these steps:
    a. In the Members > Announcements section, choose Assign.
    b. From the Select Announcements dialog box, select the relevant announcements.
    c. Choose Assign.

13. To assign failure modes to a group, follow these steps:
    a. In the Failure Modes section, choose Assign.
    b. From the Select Failure Modes dialog box, select the relevant failure modes.
    c. Choose Assign.

14. To publish the group, choose Publish.

   To create a revision of a group or to work with the last published group, or last revision of group, see Creating Revisions and Switching Between Revisions and Published State [page 268].

5.8.1.2 Viewing and Publishing a Group

You can view a group to verify whether the information contained in a group is appropriate.

Prerequisites

- To publish a group, your user ID has the roles GROUP_DELETE or GROUP_EDIT assigned.
- To view a group, your user ID has the role GROUP_READ assigned.
Context

If you have assigned a business object to a group, you can navigate to the business object details and work on the business object.

Procedure

1. Open the Groups application.
2. In the Groups window, use the filters to search for an appropriate group.
3. Choose a group from the search list and double-click to view details.
4. In the Group screen, choose the Group Information tab to view the details that are specific to the group.
5. In the Group screen, choose the Members tab to view the business objects assigned to the group.
6. In the Group screen, choose the Analytics tab to view the graphical representation of equipment assigned to the group based on population and age.
7. View the failure modes assigned to a group under Failure Modes.

i Note

Relevant for Risk and Criticality and FMEA group types.

8. In the Group screen, choose the Timeline tab to view the relevant changes made on the group.

5.8.1.3 Updating a Group

You can correct the information within a group, or add any missing information to a group.

Prerequisites

- You have identified the group that you want to update.
- To update a group, your user ID has the roles GROUP_DELETE or GROUP_EDIT assigned.

Context

You can update a group to change any of the following:

- Properties of a group such as – group type, group ID, created by, or allowed object types.
- Business objects assigned to the group.
Procedure

1. Open the Groups app.
2. In the Groups app, search for an appropriate group using the filters.
3. From the search results list in the Groups section, select an appropriate group.
4. Double-click the selected group to view details.
5. If you have opened the group that has been published, in the Group window, choose Manage -> New Revision.
6. To update all relevant details to a group, select the GROUP INFORMATION section.
   For more information, see Creating a Group [page 166].
7. To update business objects assigned to a group, select the OBJECT section.
   For more information, see Creating a Group [page 166].
8. To save the group, choose Save.
9. To publish the group, choose .

5.8.1.4 Deleting a Group

You can delete a group that you no longer want to have on the network.

Prerequisites

To delete a group, your user ID has the role GROUP_DELETE assigned.

Procedure

1. Open the Groups application.
2. In the Groups List screen, search for a group.
3. Choose a group from the search list.
   You can select more than one group for deletion.
4. In the Group screen, choose Delete.
5.8.1.5 Copying a Group

You can copy a group to create a new group similar to an existing group.

Prerequisites

To copy a group, your user ID has the role GROUP_DELETE and GROUP_EDIT assigned to it.

Procedure

1. Open the Groups application.
2. In the Groups List screen, search for a group.
3. Choose a group from the search list.
4. In the Groups List screen, choose .

5.8.1.6 Assigning Business Objects to a Group

You can use this procedure to assign business objects, such as equipment, models, instructions, locations, spare parts, templates, documents, and announcements to a group.

Prerequisites

- You have created a group to which you want to assign a business object.
- You have created a business object that you want to assign to the group.
- To copy a group, your user ID has the role GROUP_DELETE and GROUP_EDIT assigned.

Context

You can assign failure modes to different business objects.

Procedure

1. Open the Groups application.
2. In the Groups List screen, use the filters to search for an appropriate group.

3. Select a group and in the Group screen, go to Members section, depending on the business object that you want to assign, choose Assign in the relevant section.

4. In the selection window, use the search filters to find an appropriate business object.

5. Select the appropriate business objects and choose Assign.

5.9 Systems

A system is defined as a set of interrelated equipment or subsystems that regularly interact or are interdependent. In a defined context, they are considered whole and separated from their environment serving a common purpose. For example, control system, transmission system, brake system, and so on.

You can define a system based on a system model and assign system template to it.

- Information
  You can view the following information in this section:
  - Data Sheet
  - Model Information
  - Installation Information
  - Installation Location
  - Lifecycle Information

- Structure
  You can view a list of subsystems and equipment associated with the system.

- Documentation
  You can view the documents and instructions assigned to a system.

5.9.1 Managing Systems

You can create, view, update, and delete a system. You can share a system using the Authorizations app.

Context

You can perform the following operations using the Systems app:

- Create a system and assign additional information such as installation information, location information, and attach documents and instructions to it.
- Assign or remove equipment or subsystems.
- Add and remove documents or instructions.
- Publish a system.
- Delete a system.
5.9.1.1 Creating a System

You use this procedure to create a system based on an existing system model, and add additional information such as system installation information, and related equipment and subsystems to the system. You can also assign documents and instructions relevant to the system.

Prerequisites

Your user ID has the roles SYSTEM_DELETE or SYSTEM_EDIT assigned.

Context

You use the Systems application to:

- Create a system for your own operations purposes.
- Create a system for another customer.

For simplicity purpose, we describe the procedure to create a system for your own operations.

Procedure

1. Open the Systems application.
2. Choose New.
3. In the New System dialog box, enter the following details:
   a. In the <Model ID> dropdown, select an existing system model from which you want to inherit the properties for the system.
      
         You can now create a system without assigning a model to it. You can also remove a model assigned to a system by using ]Manage ] Remove Model [.
   b. In the <System ID> field, enter a unique name for a system.
   c. In the <Short Description> field, enter a short description for the system.
   d. In the <System Templates> dropdown, choose the system template you have created.
      For more information about creating an equipment template, see Creating a System Template [page 257].
   e. In the <Long Description> field, enter a long description for the system.
   f. In the <Operator> field, select an operator for the equipment. Your company is selected as default value.
   g. In the <Phase> field, select:
      ○ An Operation status if a physical system exists.
      ○ Planned if a physical system does not exist, or you have chosen to update the physical system details later.
h. Choose Save to create a single system.

4. To update additional attributes related to a system, select INFORMATION > Data Sheet tab and perform these substeps.
   a. Choose Edit.
   b. You can add a template using Add Template.
   c. You can select a template and choose Remove Template to remove the template.
   d. You can display the alternate unit of measure using Show Alternate UoM.
      You can set the default unit of measurement system in the Unit of Measure Variant under User Account (icon on the left corner of the launchpad) > Settings > Unit of Measure.
   e. Choose Save.

5. To add installation information, select the INFORMATION > Installation Information tab and perform the following tasks:
   a. Choose Edit and enter the fields as described in the table:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Business Partner Role</td>
<td>Update the source business partner role, if required.</td>
</tr>
<tr>
<td>Build Date</td>
<td>Specify the date of manufacture issued by the manufacturer.</td>
</tr>
<tr>
<td>Dealer</td>
<td>Select the name of the dealer for the system.</td>
</tr>
<tr>
<td>Service Provider</td>
<td>Select the name of the service provider for the system.</td>
</tr>
<tr>
<td>Regulators/Authority</td>
<td>Select the official who certifies if the system is installed or assembled correctly.</td>
</tr>
<tr>
<td>Insurers</td>
<td>Select the name of the insurer for the system.</td>
</tr>
<tr>
<td>Long Description</td>
<td>Enter a description for the system.</td>
</tr>
</tbody>
</table>

   To assign a tag, choose Add/Remove Tags and enter your tags. You can use tags to help you logically categorize activities, information, or reminders about your system.

6. To add system components, navigate to STRUCTURE > Structure tab and perform the following tasks:
   a. To add systems:
      1. Go to Systems tab.
      2. Choose Assign > Systems.
      3. Select the systems in the Select Systems dialog box.
      4. Choose Assign.
   b. To add equipment:
      1. Go to Equipment tab.
      2. Choose Assign > Equipment.
      3. Select the equipment in the Select Equipment dialog box.
      4. Choose Assign.
You can reorder the system components by using the ordering buttons on the structure in the edit mode.

1. In the Structure section, choose Edit.
2. Select a system or equipment from the list.
3. Choose Move to Top, Move Up, Move Down, or Move to Bottom to reorder.

7. To add instructions to the system, go to DOCUMENTATION Instructions and perform the following tasks:
   a. Choose Assign.
   b. From the Select Instructions dialog box, select the appropriate instruction.
   c. Choose Assign.

8. To assign documents relevant to the system, select DOCUMENTATION Documents:
   a. To add a document, choose Add New and perform the following tasks:
      1. In the Add Document dialog box, browse for a file.
          ○ Select a Phase.
          ○ Select a Category.
          ○ Select your Language.
          ○ Enter a Short Description.
          ○ Set the confidentiality for the document, if required.
          ○ Choose Upload.

         **Note**
         When uploading a new document, you can run a duplicate check and if no duplicates, only then upload a document using the Check and Upload button.

      2. Enter a document link in the Add Document dialog box.
   b. To add an existing document, choose Add Assign and perform the following tasks:
      1. In the Select Documents, search for a document using the filters - Phase, Category, or Source.
      2. Select a document from the search results.
      3. Choose Assign.

9. You can assign, copy, or remove failure modes relevant to the system in the DOCUMENTATION Failure Modes section.
   a. To assign failure modes:
      1. Choose Assign.
      2. Select the failure modes from the Select Failure Modes dialog box.
      3. Choose Assign.
   b. To copy a failure mode, select the failure mode from the list and choose Copy.
      A confirmation message is displayed. Choose Copy.
   c. To remove failure modes that are assigned to the system, select the failure modes and choose Remove.
      A confirmation message is displayed. Choose OK.

If you have write access to the system even though you do not have write access to the failure mode, you can edit the failure mode instance page of the system.

When you copy a failure mode and Save & Publish it:
A new failure mode is created with the same causes and instructions from the source failure mode. The newly created failure mode is directly assigned to the object. The new failure mode is in published state. You navigate to the new failure mode instance page that includes all the copied failure mode instances: effects, causes, instructions, and detection method. The new failure mode appears in the failure mode section list.

You can view the failure mode instance which is inherited and directly assigned (at the same time), you can now view different object icons in the $<From>$ field of the failure mode section if the failure mode is inherited or assigned directly to the system.

In the failure mode instance page, you can Add Effect Details like:
- **Local Effect Description**: describes the direct effect on the equipment or the how it affects the equipment it is part of.
- **Higher-Level Effect Description**: describes how is the system affected the equipment is part of.
- **End Effect Description**: describes the ultimate effect that the failure has on safety and/or the environment (if any) and any impact on production or operational capability.
- **Potential Worst-Case Effect Description**: specifies what would happen in case no measures would be taken to anticipate, prevent, or detect the failure.

10. To publish a system, choose Publish.

The system is published and a first revision of the system is created.

11. To create revisions of a system and to switch between the published and revision states, see the steps provided in the procedure Creating Revisions and Switching Between Revisions and Published State [page 268].

### 5.9.1.2 Viewing and Updating a System

You use this procedure to view and update information such as installation information, instructions, and documents that are related to a system.

#### Prerequisites

- To view a system, your user ID has the roles SYSTEM_READ assigned.
- To update a system, your user ID has the roles SYSTEM_DELETE or SYSTEM_EDIT assigned.

#### Procedure

1. Open the **Systems** application.
2. Search for a system that you want to update using the search filters.
3. Select the system from the search results.
4. If you choose a system that is in a published state, choose Manage New Revision from the System object page.

5. To update attributes such as installation information, select INFORMATION Installation Information tab and perform the following tasks:
   a. Choose Edit in the Installation Information section.
   b. Enter the required details.
   c. Choose Save.

6. To add or remove systems (subsystems) or equipment to a system, go to Structure tab.

7. To assign documents and instructions, choose the DOCUMENTATION tab.
   a. To add a document, choose DOCUMENTATION Documents and perform the following tasks:
      1. Choose Add New to add a new document to the system.
      2. Choose Add Assign to assign an existing document to the equipment.
      3. To remove a document, select the document or documents from the list and choose Remove.
   b. To assign existing planned maintenance instructions, or troubleshooting and breakdown instructions to the system, or to remove the instructions related to the system, choose DOCUMENTATION Instructions tab and perform the following tasks:
      1. To assign an instruction, choose Assign.
      2. To remove an instruction, choose Remove.

8. View the modifications made on the system data in the Timeline tab.

   You can view the update statistics based on:
   ○ Updates By Type
   ○ Time Range
   ○ Updates by Partner
   ○ Updates on model or system data

   You can view any changes in the sharing activities in the timeline section. You can also select a time period to view only the changes during that timeframe using the Filter By dialog box.

   You can also choose to view all the changes or only changes made on the associated model or system data using the Filter By dialog box. By default, it shows changes on system data only in the timeline.

9. View the system topology under the Topology section. You can also save a topology for future reference.

10. Choose Publish to publish the updated system.

### 5.9.1.3 Publishing a system

**Prerequisites**

- To update a system, your user ID has the roles SYSTEM_DELETE or SYSTEM_EDIT assigned.
- You have created systems in any of the following states:
Context

You can view the list of systems using the Systems app and perform a mass publish when you have to publish many systems.

Procedure

1. Open the Systems application.
2. Search for systems that are either in unpublished, or in revision state.
3. Select one or more systems from the search results.
4. Choose Publish.

5.9.1.4 Deleting a System

You can delete a system that you do not want to have on the network.

Prerequisites

- To update a system, your user ID has the roles SYSTEM_DELETE or SYSTEM_EDIT assigned.
- You have created systems in any of the following states:
  - Unpublished
  - Published
  - In Revision

Procedure

1. Open the Systems application.
2. Search for systems.
3. Select one or more systems from the search results.
4. Choose Delete.
5.9.1.5  Viewing System Topology

The system topology displays the network of equipment and subsystems, and how these are connected within this specific system.

**Example:**

EQ1 to EQ10 are part of a system called Bottling Machine and are displayed in the topology according to their connections.

The topology feature allows you to:

- View how your digital assets are connected.
- Drilldown to individual equipment or subsystem to get detailed information on the equipment or subsystem itself as well as how interfaces and ports are connected.
- Visually identify newly added equipment, removed equipment and – in general – equipment where there was a discrepancy when comparing the reference structure and the actual structure.

**Prerequisites:**

- You have created a system.
- You must have the SYSTEM_EDIT or SYSTEM_DELETE roles assigned to configure and manage the topology.
- You must have – at least – the SYSTEM_READ role assigned to view the topology, and – at least – the EQUIPMENT_READ role assigned to view the Equipment Details, the Connection Details as well as to navigate to the Equipment object page.

**Procedure**

1. Use the delivered System APIs (/systems(systemId)/topologyConfiguration, and /systems(systemId)/topologyConnections to initially post data to the topology of a system. For more details, see the Systems API under API Tutorial for SAP Asset Intelligence Network documentation.
   1. First use the /systems(systemId)/topologyConfiguration API to load the interface and port information for your pieces of equipment.
   2. Then use the /systems(systemId)/topologyConnections API to create the connections between the configured interfaces and ports of your loaded pieces of equipment.
i Note
- Ports communicated in the configuration API call are considered active, any ports that were defined in a previous configuration API call, but have removed ports in a subsequent configuration API call are considered inactive.
  Example:
  - configuration API call 1 communicates: Interface 1 – Port 1 and Port 2 (i.e. Port 1 and Port 2 are considered active);
  - configuration API call 2 communicates: Interface 1 – Port 1 (i.e. Port 1 is considered active, and Port 2 is now considered inactive)

1. Go to the Systems app and open the system into which you loaded the topology data.
2. Select the Topology tab to view the topology after initial load.
   1. View the Connection Details by clicking on a connection line between 2 pieces of equipment. This will show you:
      - the Equipment ID and Equipment Short Description
      - the interface and port information for each of the connected pieces of equipment for the selected connection
   2. Open the detailed information in the side panel by clicking on an equipment in the topology. This will show you:
      - the Equipment ID and Equipment Short Description
      - Equipment Status
      - Manufacturer
      - Path information of parent objects of the Equipment
      - List of all interfaces and all (that is, connected as well as disconnected) ports for each interface for the selected equipment.

i Note
- By clicking on the Equipment links in the side panel you open the Equipment Details quick view where you can get additional information for the selected equipment.
- You can also navigate to the Equipment object page from quick view (via Display Equipment Details).

   Click Save as Reference to save the actual loaded structure as reference structure, that is, this saved topology structure will be considered as planned structure until you save a new reference structure.
5. Comparison of Reference Structure with Actual Structure.
   The next time you upload the actual data via the /topologyConfiguration and actual /topologyConnection APIs, this actual structure will be compared to the reference (= planned) structure and changes will be visualized in the topology display.
   As general information, you will see either Actual is same as planned (if there was no change to the network since the last upload) or Actual is different from planned (if there was a change to the network since the last upload).
   For the latter, you will get additional information on the changes directly in the topology visualization:
   - All new equipment (= equipment that is not in the planned/reference topology, but in the actual topology) and their connections are displayed in green.
   - All removed equipment (= equipment that is in the planned/reference topology, but not in the actual topology) are displayed in red.
   Click **Save as Reference** to save the actual structure as new reference structure.

You can save a planned topology for future reference using the **Save as Reference** button. The API always refer to the actual topology. The APIs always compare an actual topology with a planned/reference topology that was saved as reference and display the differences between the two topologies. The following legends are used to depict the differences:

- All the new equipment and their networks are displayed in green.
- All the equipment in the planned/reference topology that are removed in the actual are displayed in red.

### 5.10 Documents

You use the **Documents** application to perform the following operations:

- View all the documents that are used by your organization in your product.
- Upload new documents and assign the document to business objects such as models, items of equipment, announcements, requests, locations, spare parts, and instructions (see Uploading a Document [page 181] and Assigning Documents to Business Objects [page 190])
- Edit attributes of multiple documents centrally so that the changes apply to all associated business objects (see Editing Document Attributes [page 187])
- Delete documents that are not required on the network (see Deleting a Document [page 191])
- Upload a link as document and assign the document to business objects such as models, items of equipment, announcements, requests, locations, spare parts, and instructions. Documents with links allow reference to documents in external DMS and other document systems.
- Add the documents to different groups.
- Search for a document based on origin, phase category, file type, and so on.
- Download the documents using the **Download** option. You can also opt to download all the versions of a document.
- You can view the number of available versions in the **Version** field on the list page. If there are more than one version of the file in the same or different languages, you can view and download these versions by choosing the version number. It will open a dialog box with the file details.
- Improved SAP ERP synchronization of documents:
  - Mapping document content to DIRs considering the version and language assignments.
  - Synchronizing various changes, including versioning between the DIRs and document files in asset central foundation.

**i Note**

You must have configured a prefix for the object ID of your organization to perform above operations on the documents. For more information, refer to Configuring the Prefix for the Object ID of your Organization [page 388].
Updating Language Files

- Overwrite any language file of a document record for business partner with write permission.
- Delete any language files even if uploaded by another business partner, except for the last remaining language file of the document record. The last remaining language file for a document record can only be deleted by the owner of the overall document record.

Supported Document Size

You can upload a document up to 25 MB. To upload a document of a higher size, configure using the Application Settings app. For more details, see Configuring Document Upload Size [page 388]

5.10.1 Uploading a Document

Prerequisites

- Your user ID has the roles DOCUMENT_DELETE or DOCUMENT_EDIT assigned.
- The document you want to upload is among the supported document formats and the configured file size. For more details, see Documents [page 180]

Procedure

1. Open the Documents application.
2. Choose Add.
   You can add an image, document, or link.
3. Choose Add Image to add an image
   a. In the Add Image pop-up, browse for a file.
   b. In the Additional Information section:
      - Assign a Main Category to classify the document. You can also assign additional categories in the More Categories field. You can also assign a Phase, if necessary.
      - Select the type of sensitive data available in the document from the Data Sensitivity list.
      - Select the language from the dropdown that corresponds to the documents.
      - Enter a description. You can also enter a long description, if necessary.
      - Select the confidentiality of the document if it’s not shared with everyone.
c. Choose **Upload**.

You can also run a duplicate check and if no duplicates, only then upload a document using the **Check and Upload** button.

4. Choose **Add Add Document** to add a document.
   a. In the **Add Document** popup browse for a file.

   **i Note**
   - Maximum upload file size for a document is 2 GB.
   - Different files with different MIME types can be uploaded for a document. You can assign the same or different languages for each file. For example, a document can now have files with ".doc", ".pdf", ".txt" extensions.

   b. In the **Additional Information** section:
      - Assign a **Main Category** to classify the document.
        You can also assign additional categories in the **More Categories** field. You can also assign a **Phase**, if necessary.
      - Select the type of sensitive data available in the document from the **Data Sensitivity** list.
      - Select the language from the dropdown that corresponds to the documents.
      - Enter a description. You can also enter a long description, if necessary.
      - Select the confidentiality of the document if it’s not shared with everyone.

   c. Choose **Upload**.

   You can also run a duplicate check and if no duplicates, only then upload a document using the **Check and Upload** button.

5. Choose **Add Add Link** to add a document link.
   a. In the **Add Link** popup, provide a URL link to the document along with a **Display Name**.

   **i Note**
   - You cannot upload private domains such as .corp as links.
   - Different files with different MIME types can be uploaded for a document. You can assign the same or different languages for each file. For example, a document can now have files with ".doc", ".pdf", ".txt" extensions.

   b. In the **Additional Information** section:
      - Assign a **Main Category** to classify the document.
        You can also assign additional categories in the **More Categories** field. You can also assign a **Phase**, if necessary.
      - Select the type of sensitive data available in the document from the **Data Sensitivity** list.
      - Select the language from the dropdown that corresponds to the documents.
      - Enter a description. You can also enter a long description, if necessary.
      - Select the confidentiality of the document if it’s not shared with everyone.

   c. Choose **Upload**.

   You can also run a duplicate check and if no duplicates, only then upload a document using the **Check and Upload** button.

6. Choose **Upload**.
## Results

The following table lists the MIME types and the MIME groups.

<table>
<thead>
<tr>
<th>File Extension</th>
<th>MIME Type</th>
<th>MIME Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>.txt</td>
<td>text/plain</td>
<td>Text Document</td>
</tr>
<tr>
<td>.jpg</td>
<td>image/jpeg</td>
<td>Image</td>
</tr>
<tr>
<td>.jpeg</td>
<td>image/jpeg</td>
<td>Image</td>
</tr>
<tr>
<td>.jpe</td>
<td>image/jpeg</td>
<td>Image</td>
</tr>
<tr>
<td>.png</td>
<td>image/png</td>
<td>Image</td>
</tr>
<tr>
<td>.bmp</td>
<td>image/jpeg</td>
<td>Image</td>
</tr>
<tr>
<td>.dib</td>
<td>image/jpeg</td>
<td>Image</td>
</tr>
<tr>
<td>.bmp</td>
<td>image/x-windows-bmp</td>
<td>Image</td>
</tr>
<tr>
<td>.tif</td>
<td>image/jpeg</td>
<td>Image</td>
</tr>
<tr>
<td>.tiff</td>
<td>image/jpeg</td>
<td>Image</td>
</tr>
<tr>
<td>.tif</td>
<td>image/jpeg</td>
<td>Image</td>
</tr>
<tr>
<td>.jif</td>
<td>image/jpeg</td>
<td>Image</td>
</tr>
<tr>
<td>.gif</td>
<td>image/gif</td>
<td>Image</td>
</tr>
<tr>
<td>.doc</td>
<td>application/msword</td>
<td>Word Document</td>
</tr>
<tr>
<td>.docx</td>
<td>application/vnd.openxmlformats-officedocument.wordprocessingml.document</td>
<td>Word Document</td>
</tr>
<tr>
<td>.docm</td>
<td>application/vnd.ms-word.document.macroenabled.12</td>
<td>Word Document</td>
</tr>
<tr>
<td>.dotx</td>
<td>application/vnd.openxmlformats-officedocument.wordprocessingml.template</td>
<td>Word Document</td>
</tr>
<tr>
<td>.dotm</td>
<td>application/vnd.ms-word.template.macroEnabled.12</td>
<td>Word Document</td>
</tr>
<tr>
<td>.rtf</td>
<td>application/rtf</td>
<td>Word Document</td>
</tr>
<tr>
<td>.pdf</td>
<td>application/pdf</td>
<td>PDF</td>
</tr>
<tr>
<td>File Extension</td>
<td>MIME Type</td>
<td>MIME Group</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------</td>
<td>------------</td>
</tr>
<tr>
<td>.pptx</td>
<td>application/vnd.openxmlformats-officedocument.presentationml.presentation</td>
<td>PowerPoint</td>
</tr>
<tr>
<td>.pptm</td>
<td>application/vnd.ms-powerpoint.presentation.macroEnabled.12</td>
<td>PowerPoint</td>
</tr>
<tr>
<td>.ppt</td>
<td>application/vnd.ms-powerpoint</td>
<td>PowerPoint</td>
</tr>
<tr>
<td>.odp</td>
<td>application/vnd.oasis.opendocument.presentation</td>
<td>Open Document</td>
</tr>
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<td>.ods</td>
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</tr>
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</tr>
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<td>.dif</td>
<td>video/x-dv</td>
<td>DIF</td>
</tr>
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<td>.prn</td>
<td>application/octet-stream</td>
<td>PRN</td>
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<td>.dib</td>
<td>application/octet-stream</td>
<td>Image</td>
</tr>
<tr>
<td>.csv</td>
<td>text/csv</td>
<td>SpreadSheet</td>
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<td>application/acad</td>
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<td>CAD</td>
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<td>.sat</td>
<td>application/sat</td>
<td>CAD</td>
</tr>
<tr>
<td>.stp</td>
<td>application/step</td>
<td>CAD</td>
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<td>.bag</td>
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<tr>
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<td>application/x-hdf</td>
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</tr>
<tr>
<td>.h5</td>
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</tr>
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</tr>
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</tr>
<tr>
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</tr>
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<td>application/octet-stream</td>
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</tr>
<tr>
<td>ELINK</td>
<td>application/xml</td>
<td>Link</td>
</tr>
<tr>
<td>.out</td>
<td>application/octet-stream</td>
<td>Data Exchange File</td>
</tr>
<tr>
<td>.mon</td>
<td>application/octet-stream</td>
<td>Data Exchange File</td>
</tr>
<tr>
<td>.zip</td>
<td>application/zip</td>
<td>Archive</td>
</tr>
<tr>
<td>.tar</td>
<td>application/x-tar</td>
<td>Archive</td>
</tr>
</tbody>
</table>
### 5.10.2 Maintaining Different Language Versions of a Document

**Prerequisites**

- Your user ID has the roles DOCUMENT_DELETE or DOCUMENT_EDIT assigned.
- The document you want to upload is among the supported document formats and the configured file size.
  
  For more details, see Documents [page 180]

**Procedure**

1. Open the *Documents* application.
2. Select the desired document for which you want to maintain a different language version.
3. Choose *Edit*.
4. In the *Files* section, choose *Add* in the *Add File* pop-up.
5. In the *Add File* pop-up, browse for a file.
6. Select the language from the dropdown that corresponds to the document.
7. Enter a description.
8. Choose *Upload*.

   When uploading a new document, you can upload the document directly without checking for duplicate documents in the system.

   You can use *Check and Upload* to check if there are any duplicates that exist in the system. If duplicate files exist, you’ll then view the files in the *Similar Files Detected* dialog box. You then can *Continue Uploading the New File* or you can select a file from the duplicate file list and *Use Selected File* option to upload it.

**Results**

You can select an existing language file and use ▶️ *Add ▶️ New Version* ▶️ to create a new version of the document.
You can view the number of available versions in the Version field on the list page. If there are more than one version of the file in the same or different languages, you can view and download these versions by choosing the version number. It will open a dialog box with the file details.

5.10.3 Editing Document Attributes

Prerequisites

Your user ID has the roles DOCUMENT_DELETE or DOCUMENT_EDIT assigned.

Procedure

1. Open the Documents application.
2. Search for the document that you want to assign to a business object.
3. Select one or more documents from the search results.
4. Choose Edit.
5. In the Edit Documents pop-up, add or update the phase and category attributes for a document.
6. Choose Save.

5.10.4 Updating a Document

Prerequisites

Your user ID has the roles DOCUMENT_DELETE or DOCUMENT_EDIT assigned.

Procedure

1. Open the Documents application.
2. Search for a document that you want to assign to a business object.
3. Select the document from the search results.
4. To replace an existing file upload a new file in the File section.
5. To update the attributes, update the phase and category attributes in the **File Information** section.

6. Choose **Save**.

The following table lists the MIME types and the MIME groups.

<table>
<thead>
<tr>
<th>File Extension</th>
<th>MIME Type</th>
<th>MIME Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>.txt</td>
<td>text/plain</td>
<td>Text Document</td>
</tr>
<tr>
<td>.jpg</td>
<td>image/jpeg</td>
<td>Image</td>
</tr>
<tr>
<td>.jpeg</td>
<td>image/jpeg</td>
<td>Image</td>
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<td>.jpe</td>
<td>image/jpeg</td>
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<tr>
<td>.jfif</td>
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<td>Image</td>
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<td>image/jpeg</td>
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<tr>
<td>.doc</td>
<td>application/msword</td>
<td>Word Document</td>
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<tr>
<td>.pdf</td>
<td>application/pdf</td>
<td>PDF</td>
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<tr>
<td>.png</td>
<td>image/png</td>
<td>Image</td>
</tr>
<tr>
<td>.bmp</td>
<td>image/bmp</td>
<td>Image</td>
</tr>
<tr>
<td>.dib</td>
<td>image/bmp</td>
<td>Image</td>
</tr>
<tr>
<td>.bmp</td>
<td>image/x-windows-bmp</td>
<td>Image</td>
</tr>
<tr>
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<td>image/tiff</td>
<td>Image</td>
</tr>
<tr>
<td>.bmp</td>
<td>image/x-ms-bmp</td>
<td>Image</td>
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<td>application/powerpoint</td>
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<td>Word Document</td>
</tr>
<tr>
<td>.docm</td>
<td>application/vnd.ms-word.document.macroenabled.12</td>
<td>Word Document</td>
</tr>
<tr>
<td>File Extension</td>
<td>MIME Type</td>
<td>MIME Group</td>
</tr>
<tr>
<td>---------------</td>
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</tr>
<tr>
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<td>application/vnd.openxmlformats-officedocument.wordprocessingml.template</td>
<td>Word Document</td>
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<td>application/vnd.oasis.opendocument.text</td>
<td>Open Document</td>
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</tr>
<tr>
<td>.xlsb</td>
<td>application/vnd.ms-excel.sheet.binary.macroenabled.12</td>
<td>SpreadSheet</td>
</tr>
<tr>
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<td>application/vnd.ms-excel.sheet.macroenabled.12</td>
<td>SpreadSheet</td>
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<tr>
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<tr>
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<td>SpreadSheet</td>
</tr>
<tr>
<td>File Extension</td>
<td>MIME Type</td>
<td>MIME Group</td>
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<tr>
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</tr>
<tr>
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<td>video/avi</td>
<td>Video</td>
</tr>
<tr>
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<td>Video</td>
</tr>
<tr>
<td>.dif</td>
<td>video/dv</td>
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<td>DIF</td>
</tr>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>.msz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5.10.5 Assigning Documents to Business Objects

#### Prerequisites

- You have identified the business object that you want to assign to and the business object is in either an Unpublished state, or in In Revision state.
- Your user ID has the roles `DOCUMENT_DELETE` or `DOCUMENT_EDIT` assigned.

#### Context

You can assign a document to the following objects:

- Models
- Announcements
- Equipment
i Note

You can assign multiple documents to a spare part using this application. The where used list of a document displays the assigned spare part.

Procedure

1. Open the Documents application.
2. Search for a document that you want to assign to a business object.
   For this activity, we are assigning the document to Models.
3. Select one or more documents from the search results.
4. To assign the document to a model, choose Assign > Models.
5. In the Assign Models pop-up, select one or more models.
6. Choose Assign.

5.10.6 Deleting a Document

Prerequisites

Your user ID has the role DOCUMENT_DELETE assigned.

Procedure

1. Open the Documents application.
2. Search for a document that you want to delete.
3. Select one or more documents from the search results.
4. Choose Delete.
5.10.7 Creating Hotspots

A hotspot is an area on the visual image that is of more interest. A hotspot allows you to view detailed information of a model component in a pictorial way. You can assign additional information to a hotspot such as model, equipment, and instruction to which users can navigate to. A published object can be tagged to a hotspot, allowing you to tag supported objects without the need to create a new revision for the object. You can assign hotspots to models, equipment, instruction steps, documents, locations, spare parts, and systems and include relevant specifications.

Prerequisites

Your user ID has the roles DOCUMENT_DELETE, or DOCUMENT_EDIT assigned.

Procedure

1. Open the image.
   System opens the file in the image viewer.

2. Choose Maintain Hotspot.
3. Choose Create from the toolbar.
4. Click on the area of the image where you want to create a hotspot, drag and drop the pointer to a next point in the image. Click and continue the previous pointers until you have covered a hotspot area on the image. Finally, end the hotspot area with a double click.
5. In the Create Hotspot pop-up, fill in:
   a. Name, description and color under Basic info
   b. Assign the model, equipment, step or document under Assignment Info as necessary.
6. Choose Save.
   System adds the image file that has the hotspots to the Document section of the above mentioned objects.
5.10.8 Guided Procedures

5.10.8.1 Adding a New Document

Procedure

1. Choose the Documents application to commence the process.

2. Choose Add New to add a new document.

i Note
The document you are about to add might already exist in your organization’s library. Use the search to sweep for similar documents first.
3. Two different sources for adding a new document are provided. You can either browse for a file or provide a URL link to the document along with a display name.

**Note**
- The name of the uploaded file will be displayed as the file name in Asset central.
- You cannot upload private domains such as .corp as links.
4. Provide additional information to specify the added document.

5. Assign one of the VDI 2770 categories that your document corresponds to the best, to classify the document.
6. You can assign a phase if desired. Assigning a phase specifies the document and helps other users to find relevant documents.

7. If you want the document to be confidential, you can tick the checkbox. With classifying the document as confidential, the document will stay within your application and will not be shared with other business partners at any time.

### Note

- If you are a premium account holder, all the private documents uploaded by your invitees can be accessed by you. Your invitees cannot have private documents without your knowledge.
- Confidentiality set by your invitee for a particular document applies to the you as well.

8. Select a language from the dropdown that corresponds to the document. Your browser language is set as default.

### Note

To add a new language version, you need to navigate back to the document list.
9. Enter a description (compulsory) and a long description if desired.

10. Choose upload.
5.10.8.2 Assigning Documents to Business Objects

Context

We will take you through the process of assigning documents to business objects. You can assign documents to the following objects:

- Models
- Announcements
- Equipment
- Instruction steps
- Locations
- Improvement cases
- Spare Parts
- Systems

In this tour we will assign documents to equipments.

Procedure

1. Choose the Documents application to commence the process.
2. Search for one or more documents you want to assign to an equipment.

3. Select one or more desired documents from the search result you want to assign by ticking the check boxes.

4. To assign the selected documents to an Equipment, choose <Assign> and <Equipment> from the list of all business objects.
5. In the **Select Equipment** pop-up, select one or more Equipments you want to assign the documents to by ticking the appropriate check boxes.

6. Choose **<Assign>** to complete the process.
5.10.8.3 Maintaining Different Language Versions of a Document

Context

We will take you through the process of maintaining different language versions of an already existing document.

Procedure

1. Choose the Documents application to commence the process.

2. Select the desired document you want to maintain a different language version for by ticking the check box.
3. Choose **Add New Language Version**.

4. In the pop-up a list of all existing language versions is displayed. Choose **Add** to add a new language file.
5. In the New Document pop-up, browse for the desired file.

6. Select the language from the dropdown that corresponds to the document.
7. Enter a description (mandatory) and a long description if desired.

8. Choose Upload.

5.11 Announcements

An announcement is an information record that can communicate between the various business partners that have a relationship with a Model or an Equipment. For example: an existing instruction has been updated, or
spare parts of an item of an equipment has been updated. In addition, announcements can be used within a single company or between companies.

An announcement can be any of the following types:

- **Availability**: An announcement to communicate about the availability or non-availability of an item of equipment or location.
- **Instruction Change**: An announcement to communicate that an instruction has changed. For example, a manufacturer can notify operators that an improvement to an instruction has been performed.
- **Service Bulletin**: An announcement (typically from the manufacturer) to communicate information that may require a change in the installation or usage of an equipment.
- **Recall**: An announcement (typically from the manufacturer) to request the operator to return equipment related to certain models due to the discovery of safety issues to prevent the risk of legal action.
- **New Policy**: An announcement to communicate the new policy of usage for certain models.
- **New Model**: An announcement on the news of a new model. For example, a manufacturer can notify operators that a new model is available.
- **Document Change**: An announcement when the document related to a model has changed.
- **Spare Parts Change**: An announcement when the spare parts have changed. For example, a manufacturer can notify operators that there is change in the spare parts of the equipment.
- **Model Information Change**: An announcement when the information related to the model specification or maintenance has changed.
- **New Firmware**: An announcement to communicate that a new firmware version is available for a model.

An announcement moves from one state to another during its process of creation and maintenance. The different states that an announcement goes through are listed below:

- Unpublished
- Published
- In Revision

For more information, see [State Transitions](#page-267).

### 5.11.1 Managing Announcements

You can perform various operations on an announcement such as creating an announcement, viewing an announcement, updating an announcement, deleting an announcement, and assigning documents, models, items of equipment and locations (of type Availability) to an announcement.

**Context**

You use the *Announcements* application to work with an announcement. You can perform the following operations using the *Announcements* application:

- Create an announcement (see, [Creating an Announcement](#page-206))
- View and publish an announcement (see, [Viewing and Publishing an Announcement](#page-209))
- Update an announcement (see, [Updating an Announcement](#page-210))
• Delete an announcement (see, Deleting an Announcement [page 211])
• Assign business objects to an announcement (see, Assigning a Model to an Announcement [page 212])
• Display report cards on the header and view the count of <Equipment Impacted> and <Customers Impacted>.
• Maintain serial number ranges and build date ranges for announcement types <Service Bulletin> and <Recall>. You can add serialization ranges on the service bulletin or recall by:
  ○ Enabling <Serialization Ranges> (in announcement header)
  ○ Maintaining the serialization ranges (serial numbers, batch date) and also comments in the <Serialization Ranges> section on announcement
• Add announcement to a group.

5.11.1.1 Creating an Announcement

You use this procedure to create an announcement and assign entities such as documents, instructions, and models to an announcement.

Prerequisites

• If you want to assign a new or an existing document, you have identified the file that you want to attach.
• Your user ID has the roles ANNOUNCEMENT_DELETE or ANNOUNCEMENT_EDIT assigned.

Procedure

1. Open the Announcements app.
2. From the Announcements window, choose New.
3. In the New Announcement pop-up, perform the following tasks:
   a. In the Information section, enter details as described in the table below:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter a unique name for the announcement.</td>
</tr>
</tbody>
</table>
Select an announcement type. The following list provides the descriptions for each of the types of announcements:

- Availability
- Instruction Change
- Service Bulletin
- Recall
- New Policy
- New Firmware
- New Model
- Document Change
- Spare Parts Change
- Model Information Change

Select a priority of the announcement

Enter a description for the announcement

4. For an announcement of type *Availability*, you must assign an equipment or location. To assign an item of equipment, follow these steps:
   a. In the *Equipment* section, choose *Assign*.
   b. From the *Select Equipment* pop-up, select the relevant equipment.
   c. Choose *Assign*.

   **i Note**

   You now have the **Fully Available** for the announcement type *Availability*. You can now announce if a piece of equipment is available or not available.

5. To assign a location, follow these steps:
   a. In the *Locations* section, choose *Assign*.
   b. From the *Select Location* pop-up, select the relevant location.
   c. Choose *Assign*.

6. For an announcement of type *Instruction Change* you must assign an instruction. To assign an instruction follow the tasks:
   a. In the *Assign Instructions* pop-up, search for an appropriate instruction using the filters *Instruction Type* and *Activity*.
   b. From the *Instructions* search list, select an instruction.
   c. Choose *OK*.

   **i Note**

   To unassign an instruction that is assigned to the announcement, select an appropriate instruction from the instructions list in the *New Announcement* screen, and choose *Unassign*. 
7. In the *Documents* section, you can add a new document or assign an existing document. To add a new document, choose **Add New** and perform the following tasks:
   a. In the *Add Document* pop-up, enter values for the fields as described in the table below:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>File Name</td>
<td>Browse for a file name that you want to upload.</td>
</tr>
<tr>
<td>Phase/Category</td>
<td>Select a phase and category corresponding to the phase that the document is relevant to in the lifecycle of an item of equipment. Category is mandatory, whereas Phase is optional.</td>
</tr>
<tr>
<td>Language</td>
<td>Select the language of the document you want to add.</td>
</tr>
<tr>
<td>Description</td>
<td>Enter an announcement description</td>
</tr>
</tbody>
</table>

   b. Choose **Upload**.

   **Note**
   To unassign a document, select an appropriate document from list choose **Remove**.

8. In the *Documents* section, if you want assign an existing document, choose **Add Assign** and perform the following tasks:
   a. In the *Assign Documents* pop-up, search for an appropriate document using the filters *Phase*, or *Category*.
   b. From the search results list, select an appropriate document.
   c. Choose **OK**.

9. To add a hotspot to image file, see *Creating Hotspots [page 192]*.

10. In the *Models* section, to assign a model to the announcement choose **Assign** and perform the following tasks:
    a. In the *Assign Models* pop-up, search for an announcement using the filters *Class Name*, *Subclass Name*, *Manufacturer*, or *Source*.
    b. From the search results list, select a model.
    c. Choose **OK**.

11. To save the announcement, choose **Save**.

12. To publish the announcement, choose **Save and Publish**.

13. To create a revisions of an announcement, or to work with the last published or last revision announcement, see *Creating Revisions and Switching Between Revisions and Published State [page 268]*.
5.11.1.2 Viewing and Publishing an Announcement

You can view an announcement to verify if the information contained in an announcement is appropriate or not.

Prerequisites

- To publish an announcement, your user ID has the roles `ANNOUNCEMENT_DELETE` or `ANNOUNCEMENT_EDIT` assigned.
- To view an announcement, your user ID has the role `ANNOUNCEMENT_READ` assigned.

Context

When you create many announcements using public APIs provided by SAP AIN, you can view these announcements using the Announcements app and perform a mass publish of such announcements. In addition, if you have assigned a model to an announcement, or an instruction to an announcement, you can navigate to the model details or the instruction details and work with a model or an instruction.

The following procedure applies to all types of announcements (Instruction change, Service Bulletin, RecallNew Policy, New Model, Document Change, Spare Parts Change, Model Information Change, New Firmware, Availability). For simplicity, we only describe the Instruction Change procedure.

Procedure

1. Open the Announcements application.
2. In the Announcements window, search for an appropriate announcement using the filters - Announcement Type, Status, Read Status, Change On Date and Priority.

   **i Note**

   To publish one or more unpublished announcements that are created either using APIs, or using the Announcements application, select the announcements from the list and choose Publish.

3. Choose an announcement from the search list and select View Details.
4. In the Announcement screen, choose the Information tab to view the details that are specific to the announcement. These details can include Name, Type, Priority, and Description.
5. In the Announcement screen, choose the Instructions tab to view the instructions assigned to the announcement.

   For more information on working with instructions, see Instructions [page 212].
6. In the Announcement screen, choose the Documents tab to view the relevant documentation available for an announcement.

   You can also view the confidentiality of the assigned documents.
In the Announcement screen, choose the Assignments tab to view the models to which the announcements are relevant.

If you want to view details of a model, select the model and choose View Details.

For more information on working with models, see Models [page 112].

5.11.1.3 Updating an Announcement

You update an announcement to correct the information within an announcement, or add any missing information.

Prerequisites

- You have identified the announcement that you want to update.
- To update an announcement, your user ID has the roles ANNOUNCEMENT_DELETE, or ANNOUNCEMENT_EDIT assigned.

Context

You can update an announcement to change any of the following:

- Properties of an announcement such as - type of an announcement, name of an announcement, or priority of an announcement.
- Model assigned to an announcement
- Instruction assigned to an announcement
- Document assigned to an announcement
- Add the numbers of affected models and related serial number ranges or build date ranges to certain announcement type

Procedure

1. Open the Announcements app.
2. In the Announcements app, search for an appropriate announcement using the filters – Announcement Type, Priority, Status or statuses, as such, Read Status, and Changed On and Source.
3. From the search results list in the Announcements section, select an appropriate announcement.
4. Choose View Details.
5. If you have opened the announcement that is published, in the Announcement window, choose New Revision.
6. To update all relevant details to an announcement, select the INFORMATION section. For more information, see Creating an Announcement [page 206].

7. To update an instruction assigned to an announcement, select the INSTRUCTIONS section. For more information, see Creating an Announcement [page 206].

8. To add a new document, select DOCUMENTS section. For more information, see Creating an Announcement [page 206].

9. To update any models assigned to the announcement, select the ASSIGNMENTS section. For more information, see Creating an Announcement [page 206].

10. To save the announcement, choose Save.

11. To publish the announcement, choose Save and Publish.

### 5.11.1.4 Deleting an Announcement

You can delete an announcement that you no longer want to have on the network. For simplicity, we only describe the procedure to delete an instruction change announcement.

#### Prerequisites

To delete an announcement, your user ID has the role ANNOUNCEMENT_DELETE assigned.

#### Procedure

1. Open the Announcements application.
2. In the Announcements screen, search for an announcement.
3. Choose an announcement from the search list and select View Details.
4. In the Announcement screen, choose Delete.
5.11.1.5 Assigning a Model to an Announcement

You use this procedure to assign a model to an announcement.

Prerequisites

- You must have created an announcement, to which you want to assign a model. (see Creating an Announcement [page 206].)
- You must have created a model that you want to assign to the announcement. (see Creating a Model [page 115])
- Your user ID has the roles ANNOUNCEMENT_DELETE or ANNOUNCEMENT_EDIT assigned.

Procedure

1. Open the Announcements application.
2. In the Announcements screen, search for an appropriate announcement using the filters – Announcement Type, Priority, or Status.
3. In the Announcements screen, select a model using the check box and choose Assign Models.
4. In the Assign Models, search for an appropriate model using the search filters – Class Name, Subclass Name, Source and Manufacturer.
5. From the search list, select an appropriate model using the check box and choose Assign.

5.12 Instructions

An instruction is a set of steps that help the user to carry out a specific task. The instructions help the operator to maintain the equipment better. The following instruction types are available:

- Planned maintenance instruction: An instruction that has information about a task that the operator has to perform at regular intervals. However, these are not mandatory instructions and the operator can choose to apply them based on local conditions such as climatic conditions.
- Breakdown instruction: An instruction that has information about a task that the operator has to perform when dealing with unplanned situations such as an item of equipment fails to open on demand, or an item of equipment fails to operate due to an internal leak.
- Installation instruction: An instruction that provides information while installing an equipment.
- Operations instruction: An instruction that provides information on how to use an equipment.
- Disposal instruction: An instruction that provides information on how to dispose an equipment.

In addition, you can use the following key information to define an instruction:

- Activity type: Defines the primary context where the instruction is applicable.
• **Failure mode**: Defines the effect by which a failure is observed on a failed item.
• **Frequency**: Defines the interval at which you must execute the instruction.
• **Document**: Unstructured document attached to an instruction that is relevant to a specific phase of an item of equipment.
• **Safety rule**: Specifies the recommended guidance from the manufacturer for executing the instructions safely.
• **Model**: Specifies an abstract representation from the manufacturer that defines all maintenance information related to a new or existing product.
• **Precondition**: Specifies an activity that needs to be completed before executing the instruction.
• **Step**: Specifies a single instruction.
• **Post check**: Specifies an activity that needs to be completed after executing the instruction.

An instruction moves from one state to another during its process of creation and maintenance. The different states that an instruction goes through are listed below:

- **Unpublished**
- **Published**
- **In Revision**

For more information, see State Transitions [page 267].

---

**5.12.1 Managing Instructions**

You can perform various operations on an instruction such as creating an instruction, viewing an instruction, updating an instruction, deleting an instruction, and assigning models to an instruction.

**Context**

You use the Instructions app to work with an instruction. You can perform the following tasks:

**Procedure**

1. Create an instruction (see Creating an Instruction [page 214]).
2. Create an instruction by reusing an existing instruction (see Creating an Instruction by Reusing an Existing Instruction [page 219]).
3. Update an existing instruction (see Updating and Publishing an Instruction [page 221]).
4. Viewing an instruction (see Viewing an Instruction [page 220]).
5. Deleting an instruction (see Deleting an Instruction [page 222])
6. Assign models to an instruction (see Assigning a Model to an Instruction [page 223])

5.12.1.1 Creating an Instruction

Using the Instructions application you can create five types of instructions - planned maintenance, breakdown, installation, operations, and disposal. You can also specify useful key information such as activity type, failure mode, frequency, document, safety rule, preconditions, steps, and post checks for an instruction.

Prerequisites

- Your user ID has the roles `INSTRUCTION_DELETE` or `INSTRUCTION_EDIT` assigned.
- You have identified the subclass that you want to use for your instruction.

**Note**
You must use the same subclass as the model uses to which you assign the instruction.

- If you want to assign a model to an instruction, you must ensure that models already exist in SAP Predictive Asset Insights.

Context

For simplicity, we only describe the planned maintenance instruction and a breakdown instruction procedure. In addition, you can assign a model to the instruction so that the operator using the model can use the instruction information for equipment maintenance.

Procedure

1. Open the Instructions app.
2. On the Instructions screen, choose New.
3. In the New Instruction pop-up, perform the following tasks:
   a. In the Instruction Type field, choose Planned Maintenance to create a planned maintenance instruction, a Breakdown instruction to create an unplanned instruction, a Disposal, an Installation, or an Operations instruction type.
   b. In the Subclass field, enter a subclass to which you want to assign an instruction. This is an optional field.

   **Note**
   Use the same subclass as the model uses to which you assign the instruction.
c. Choose OK.

4. In the Planned Maintenance Instruction screen, perform the following tasks:
   a. In the Header section, enter the following information:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Description</td>
<td>Enter the short description for the instruction.</td>
</tr>
<tr>
<td>Expected Duration</td>
<td>Enter the total time required to execute the instruction and also the unit of time.</td>
</tr>
<tr>
<td>Criticality</td>
<td>Specify the importance of the instruction.</td>
</tr>
</tbody>
</table>

   b. In the Information section, enter the following information:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity(*)</td>
<td>Select an activity type.</td>
</tr>
</tbody>
</table>
   | Failure Mode Category(*)| For a breakdown instruction, select an appropriate value from the drop down. The list below describes what each failure mode means  
   |                         | ○ Fail to function: equipment does not function.                           |
   |                         | ○ Fail to open: equipment does not open.                                   |
   |                         | ○ Fail to close: equipment does not close.                                 |
   |                         | ○ Operation delay: equipment operation is delayed.                         |
   |                         | ○ Output is high: output of the equipment is high.                         |
   |                         | ○ Output is low: output of the equipment is low.                           |
   | Long Description(*)    | Enter a description for the instruction.                                   |
   | Frequency              | For a planned maintenance instruction, enter the recurring time interval at which the instruction must be executed. In the adjacent drop-down, specify the unit of time |
### Field | Description
---|---
**Primary Document** | An unstructured document that provides more information about the instruction. To add a new document, follow the steps below: 1. Choose *New*. 2. In the *Add Document* dialog box, browse for a file name. 3. In the *Phase* drop down, specify a phase. 4. In the *Category* drop down, choose a category that corresponds to a phase. 5. In the *Description* field, enter a description. 6. Choose *Upload*. To assign an existing document, follow the steps below: 1. In the *Assign Documents to Instruction* window, search for a document using the filters *Phase*, or *Category*. 2. Select a document from the search results list. 3. Choose *Assign*. To view the list of supported MIME types, see the Supported MIME Types table under the Documents documentation.

**3D Visual** | Add either a new 3D visual file, or assign an existing 3D visual file. You can refer to the steps mentioned for the Primary Document to upload a new 3D visual file, or to assign an existing 3D visual file.

| i Note | System captures a snapshot of the 3D visual file to use it as a preview image for the instruction. |

**Relevant to Warranty** | Specify if the instruction is relevant for warranty.

| i Note | Mandatory fields are marked as (*) in the table. |

5. On the *Safety Rules* screen area, choose *Add* to add a new safety rule and perform the following tasks: a. In the *Safety Rules* dialog box, select a safety rule and choose *OK*. For example, if you want the user to wear safety boots while performing the step in the instruction, choose *Safety boots must be worn*.

| i Note | You can maintain safety rule comments in multiple languages. |
6. In the Models screen area, choose **Assign** to assign an existing model to the instruction and perform the following tasks:
   a. In the Select Models dialog box, search for an appropriate model using the search filters Class or Manufacturer.
   b. From the Models search list, select an appropriate model.
   c. Choose **Assign**.

   i Note
   To unassign a model to the instruction, select the model in the Models section and choose **Unassign**.

7. In the Equipment screen area, to assign an equipment, choose **Assign** and perform the following tasks:
   a. In the Select Equipment, select the appropriate equipment.
   b. Choose **Assign**.

8. In the Preconditions screen area, choose **Add** to add an activity that must be performed before executing the instruction.

9. In the Steps screen area, to add individual instructions to the overall instruction, choose **Add**.

10. In the Post Checks screen area, to add an activity that needs to be performed after the instruction execution, choose **Add** and enter values in the Post Checks field.

11. Save the instruction, or Save and Publish the instruction.

12. To add the instruction to a group, go to the instruction detail page and navigate to GROUPS → Add.

13. To create a new revision, and to switch between published and revision states, see Creating Revisions and Switching Between Revisions and Published State [page 268].

### 5.12.1.2 Adding Steps to an Instruction

You use this procedure to add a set of steps to an instruction. Each steps consists of information such as documents, 3D visual file, or spare parts that help the operator during the maintenance of an item of equipment.

#### Prerequisites

- If you want to add spare parts information to an instruction, you must have uploaded 3D visual files into SAP Predictive Asset Insights for a model, a piece of equipment, an instruction, or an announcement.
- Your user ID has the roles INSTRUCTION_DELETE or INSTRUCTION_EDIT assigned.
- You have created an instruction. For more details see Creating an Instruction [page 214].
Procedure

1. Launch the Instructions application.
2. From the Instructions list page, open the instruction in question.
3. In the Instructions object page, scroll down to the Step section and perform the following tasks:
   a. In the Step object page, scroll down to the Step section and perform the following tasks:
      
      | Field                  | Description                        |
      |------------------------|------------------------------------|
      | **Step Name**          | Enter a step name.                 |
      | **Step Description**   | Enter a step description.          |
      | **3D Visual / Image**  | Upload either an image file, or a 3D visual. |

   b. In the Information section, enter the following details:
      
      | Field           | Description                                               |
      |-----------------|-----------------------------------------------------------|
      | **People Required** | Enter the number of people required to completed the step. |
      | **Expected Work**     | Enter the total time required to complete the step.       |
      | **Tools**         | Enter the list of tools required to execute the step.    |
      | **Roles**         | Specify a role.                                          |
      | **Risk Category**  | Specify the risk category                                |
      | **Risk Description**| Enter a risk description.                                |

   c. In the Parts section, to add new parts choose Add and perform the following tasks:
      1. Choose the drop-down for Material.
      2. In the Select Parts pop-up, select an appropriate spare part that is relevant to the instruction and choose OK.
      3. In the Quantity field, enter the quantity for the spare part.

   d. In the Documents section, to add a new document choose Add and perform the following tasks:
      1. In the Add Document screen, browse for a file name in the File Name field.
      2. In the Phase drop down, choose a phase in the lifecycle of the item of equipment.
      3. In the Category drop down, choose a category that corresponds to a phase.
      4. In the Description field, enter a description for the document.
      5. Choose Upload.
In the Documents screen area, to assign an existing document choose Assign and perform the following tasks:
1. In the Assign Documents to Step screen, search for an appropriate document using the filters.
2. Select an appropriate document from the search results list.
3. Choose Assign.

Note
To remove a document that is assigned to a step, select the assigned document from the list in the Documents screen area, and choose Remove.

4. Choose Save.
5. Choose Save and Publish to publish the updated instruction.

5.12.1.3 Creating an Instruction by Reusing an Existing Instruction

You use this procedure to create an instruction by reusing an existing instruction. For simplicity the procedure below describes the planned maintenance instruction.

Prerequisites

Your user ID has the roles INSTRUCTION_DELETE or INSTRUCTION_EDIT assigned.

Procedure

1. Open the Instructions app.
2. In the Instructions screen, search for an appropriate instruction using the filters Instruction Type, Activity, Status, or Model Name.
3. Select an instruction from the search results list.
4. Select Copy.

System creates a new instruction reusing the characteristics of the underlying instruction.
5. In the Header section, you must update name of the instruction as instruction names must be unique.

You must update other fields as appropriate.
6. To add additional information to the newly created instruction, see Creating an Instruction [page 214].
7. To save the instruction, choose Save.
8. To publish the instruction, choose Save and Publish.

The app displays a dialog box to check if you want to create an announcement for the instruction. In the Create Announcement pop-up, choose yes and then OK.
5.12.1.4 Viewing an Instruction

You can view an instruction to verify if the information contained in an instruction is appropriate or not.

Prerequisites

- To publish an instruction, your user ID has the roles `INSTRUCTION_DELETE` or `INSTRUCTION_EDIT` assigned.
- To view an instruction, your user ID either belongs to the group `ORG_DATA_READ`, or has the roles `INSTRUCTION_READ` assigned.

Context

When you have more instructions created using public APIs provided by SAP Predictive Asset Insights, you can view these instructions using the Instructions app and perform a mass publish of such instructions.

In addition, if you have assigned a model to an instruction, or an announcement to an instruction you can navigate to the model details, or the announcement details and work with a model or an announcement.

The following procedure applies to all types of instructions (Planned Maintenance, Breakdown, Installation, Operations, or Disposal). For simplicity, we only describe the planned instruction procedure.

Procedure

1. Open the Instructions app.
2. In the Instructions screen, search for an instruction using the filters – `Instruction Type`, `Activity`, `Status`, or `Model Name`.
   
   **Note**
   
   To publish one or more unpublished instructions created either using APIs, or using the Instructions app, select multiple instructions from the list and choose Publish.

3. Choose an instruction from the search list and select View Details.
4. In the Planned Maintenance Instruction screen, choose the Information tab to view the details that are specific to the instruction. These details can include activity type, failure mode, frequency, documents, preconditions, steps, and post checks.
5. Choose the Safety Rules tab for any information about safety measures to follow.
6. Choose the Tools and Spare Parts tab for information pertaining to spare parts during maintenance.

7. Choose the Roles tab for information regarding number of people, expected duration and the person’s roles while carrying out the activity.

8. Choose the Models tab to view the models assigned to the instruction. If you want to view details of a model, double-click on the selected the model.

9. Choose the Equipment tab to view the models assigned to the instruction. If you want to view details of an equipment, double-click on the selected the equipment.

10. Choose the Announcements tab to view the announcements assigned to the instruction. If you want to view details of an announcement, double-click on the selected the announcement.

11. Choose Groups tab to view the list of groups to which the instruction is assigned.

12. Choose Failure Modes tab to view the list of failure modes to which the instruction is assigned.

13. Choose the Preconditions tab to view the recommended guidance to be followed before executing an instruction.

14. Choose the Steps tab to view the instruction steps.

15. Choose the Post Checks tab to view the recommended guidance to be followed after executing an instruction.

### 5.12.1.5 Updating and Publishing an Instruction

You can update a planned maintenance instruction or a troubleshooting and breakdown instruction.

#### Prerequisites

Your user ID has the roles INSTRUCTION_DELETE or INSTRUCTION _EDIT assigned.

#### Context

The following procedure applies to all types of instructions. For simplicity, we only describe the planned instruction procedure.

#### Procedure

1. Open the Instructions app.
2. In the Instructions screen, search for an appropriate instruction.
3. Choose an instruction from the search list and select View Details.
If the instruction is already published, choose *New Revision* in the *Planned Maintenance Instruction* window.

To update any of the sections of an instruction, see *Creating an Instruction* [page 214].

Choose *Save*.

To publish the instruction, choose *Save and Publish*.

The app displays a pop-up to check if you want to create an announcement for the instruction. In the *Create Announcement* pop-up, choose *Yes* and then *OK*.

### 5.12.1.6 Deleting an Instruction

You can delete an instruction that you no longer want to have on the network. For simplicity, we only describe the procedure to delete planned instruction.

**Prerequisites**

Your user ID has the role *INSTRUCTION_DELETE* assigned.

**Procedure**

1. Open the *Instructions* app.
2. In the *Instructions* screen, search for an instruction.
3. Choose an instruction from the search list and select *View Details*.
4. In the *Instruction Type* *Instruction* screen, choose *Delete*. 
5.12.1.7 Assigning a Model to an Instruction

You can assign a model to an instruction so that the operator can use the instruction information for the items of equipment that are based on the model.

Prerequisites

- Your user ID has the roles INSTRUCTION_DELETE or INSTRUCTION_EDIT assigned.
- You have identified the instruction to which you want to assign a model (see Creating an Instruction [page 214]).
- You have ensured that the instruction in question is in Unpublished or In Revision states.
- You have identified a model that you want to assign to the instruction (see Creating a Model [page 115]).

Context

The following procedure applies to all types of instructions. For simplicity, we only describe the planned instruction procedure.

Procedure

1. Open the Instructions app.
2. In the Instructions screen, search for an instruction using the filters – Instruction Type, Activity, Status, or Model Name.
3. In the Instructions screen, select a model and choose Assign Models.
4. In the Assign Models to InstructionClass, or pop-up, search for a model using the search filters Manufacturer.
5. From the search results list, select a model using the check box and choose Assign.

5.13 Templates

A template is an object created by SAP Predictive Asset Insights organization (for example, manufacturer, operator, or service provider) to maintain metadata, that is, attributes and attribute groups, related to a model, equipment, location, system, or spare part. A template inherits metadata from its parent objects, for example, parent subclass templates or other parent templates, and can have additional attribute groups and attributes.

Example:

A model template inherits the structure from a parent model template, a parent subclass template, other related parent subclasses, and the parent class.
Classes and subclasses are provided by SAP Predictive Asset Insights or classification standard providers. The classification structure as well as assigned attributes and attribute groups are based on a classification industry standard. Classes and Subclasses can be reused, but not edited.

Classes and subclasses for the following industry standards are predelivered:

- ISO 14224
- ISO 15926
- ISO 15380

You can create hierarchies of template from an existing template.

A template in SAP Predictive Asset Insights is identified by a unique name and is composed of attribute groups and attributes. An attribute group is a logical grouping of related attributes of the equipment, model and location, and an attribute is a qualifier to define the equipment.

**Example for a classification structure and the relationship to model and equipment**

The following example explains how classification objects delivered by SAP Predictive Asset Insights, classification objects that can be created by customers, and type and instance information also created by customers relate.

1. **Class** – delivered by SAP Predictive Asset Insights based on an industry standard or by a classification standard provider – can be considered the top-node of the classification used in SAP Predictive Asset Insights.
   A class does not have a parent object, but can have multiple subclasses as child objects.

2. **Subclasses** – also delivered by SAP Predictive Asset Insights based on an industry standard or by a classification standard provider – are the child objects of a class. It is possible to model multiple subclasses under the top-level subclass. Each child subclass will inherit attributes or attribute groups from its parent objects, that is, class and subclasses.
   In the example:
○ Subclass 1 (Power transformer) would inherit from Class (Transformer)
○ Subclass 2 (Dry-type transformer) would inherit from Subclass 1 (Power transformer) and Class (Transformer)

3. **Model Templates** – created by manufacturers – can be child objects of a subclass, or be used without a parent object. It is possible to have multiple model templates under the top-level model template. Each child model template will inherit attribute or attribute groups from its parent objects, that is, class and subclasses and model templates.

When creating a model, you do this with reference to a model template.

In the example:
○ Model Template 1 (SDT) would inherit from Subclass 2 (Dry-type transformer), Subclass 1 (Power transformer), and Class (Transformer)
○ Model Template 2 (SDT-100x) would inherit from Model Template 1 (SDT), Subclass 2 (Dry-type transformer), Subclass 1 (Power transformer), and Class (Transformer)
○ Model would be created with reference to Model Template 2 (SDT-100x), and therefore the Model would have all attributes or attribute groups coming from the model template itself as well as the ones inherited.

4. **Equipment Templates** – created by operators – are used to provide equipment-specific attributes or attribute groups. You can use equipment templates as only reference for an equipment or in combination with the templates coming via a model.

  **Note**

Similar to the model template it is possible to have multiple equipment templates under the top-level equipment template. Each child equipment template will inherit attribute or attribute groups from its parent object, that is, equipment templates.

In the example:
○ Equipment was created in reference to Model, and therefore this equipment would have all attributes /attribute groups associated with the model, that is, inherit from Model Template 2 (SDT-100x), Model Template 1 (SDT), Subclass 2 (Dry-type transformer), Subclass 1 (Power transformer), and Class (Transformer)
○ Since Equipment was also created in reference to Equipment Template, this equipment would additionally have all attributes or attribute groups associated with the equipment template.

5.13.1 Managing Templates

You use the **Templates** app to work with a template. The templates are grouped as cards by <Template> types, <Attribute Groups>, and <Attributes>. This provides easier visualization of the template hierarchy. You can drill down the template hierarchy using the navigation on the cards.

You can perform the following operations using the **Templates** app:

- Create a model template to define the attributes and attribute groups related to a model. For more information, see **Creating a Model Template** [page 249].
- Create an equipment template to include equipment-specific attributes and attribute groups. For more information, see **Creating an Equipment Template** [page 252].
- Create a system template to include system-specific attributes and attribute groups. For more information, see **Creating a System Template** [page 257].
• Create a spare part template to include spare part-specific attributes and attribute groups. For more information, see Creating a Spare Part Template [page 256]
• View details of a template and update the existing template with new information, or update the incorrect information. For more information, see Viewing and Updating a Template [page 259].
• View <External IDs> for attribute groups, attributes, and causes.
• If more than one language is maintained for a template, <Available Language> field is displayed in all the templates.

5.13.1.1 Adding, Updating, and Deleting Code Lists

You can create code lists to be used in string, numeric, and date data types.

Context

You can create, update, or delete code lists using the following procedure.

Procedure

2. Choose New Code List to create a new code list. Perform the following tasks:
   a. In the New Code List Code List Details window, enter the values for the fields as described in the table:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID(*)</td>
<td>Enter an ID for the code list.</td>
</tr>
</tbody>
</table>

   i Note
   ○ There are no spaces allowed in the ID.
   ○ You cannot change the ID of the code list once it has been created.
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description(*)</td>
<td>Enter an appropriate short description that describes the code list.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>You should always have a code description in a code list before assigning</td>
</tr>
<tr>
<td></td>
<td>the indicator to a piece of equipment. There is no possibility to update</td>
</tr>
<tr>
<td></td>
<td>the code description later once it is been used for an Indicator. In case</td>
</tr>
<tr>
<td></td>
<td>the code description is not provided, it will be empty and user will not</td>
</tr>
<tr>
<td></td>
<td>be able to update it later.</td>
</tr>
<tr>
<td>Long Description</td>
<td>Enter an appropriate long description that describes the code list.</td>
</tr>
<tr>
<td>Data Type (*)</td>
<td>Select the data type from the list:</td>
</tr>
<tr>
<td></td>
<td>○ Date</td>
</tr>
<tr>
<td></td>
<td>○ String</td>
</tr>
<tr>
<td></td>
<td>○ Numeric</td>
</tr>
<tr>
<td></td>
<td>○ Numeric Flexible</td>
</tr>
<tr>
<td>Values (*)</td>
<td>Enter the values for the code list using +.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>All the mandatory fields are marked as (*) in the table.</td>
</tr>
</tbody>
</table>

b. You can add industry standards by choosing *Add Industry Standard* under *New Code List > Industry Standards*.

c. Choose *OK*.

3. To edit a code list, select the code list from the *Code List Details* page. Choose *Edit* from the code list object page.

4. You can delete a code list by:
   ○ selecting the code lists from the *Code List Details* page and choosing *Delete*.
   ○ choosing *Delete* from the code list object page.
5.13.1.2 Adding Attribute Groups and Attributes

You perform this procedure to add attributes and attribute groups either directly on a template object or from the Attribute Groups tab or Attributes card.

Context

Using this procedure, you can add attribute groups/attributes directly on a template object.

**i Note**

You can use this approach for the creation of attribute groups or attributes on a template object.

SAP Operations can now deliver attribute groups & attributes that can be commonly reused:
- Global attribute groups & attributes are displayed in the attribute group/attribute lists with Source = SAP
- Global attribute groups & attributes can be reused, but not edited

Procedure

1. Select a template and choose [Add Attribute Groups](#). In the Add Attribute Groups window, to add new attribute group, select New and perform the following tasks:
   a. In the New Attribute Group window, enter the values for the fields as described in the following table:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID(*)</td>
<td>Enter an ID for the attribute group.</td>
</tr>
<tr>
<td>i Note</td>
<td><a href="#">i Note</a></td>
</tr>
<tr>
<td></td>
<td>○ There are no spaces allowed in the ID.</td>
</tr>
<tr>
<td></td>
<td>○ You can’t change the ID of the attribute group once it has been created.</td>
</tr>
<tr>
<td>Short Description(*)</td>
<td>Enter an appropriate short description that describes the attribute group.</td>
</tr>
<tr>
<td>Long Description</td>
<td>Enter an appropriate long description that describes the attribute group.</td>
</tr>
<tr>
<td>Industry Standards</td>
<td>Add the relevant industry standards.</td>
</tr>
</tbody>
</table>
b. Choose OK.
c. You can add the attributes and also the industry standards by selecting the attribute group and choosing the Edit button.

2. In the Add Attribute Groups window, to edit an existing attribute group, search for an existing attribute group, and perform the following tasks:
   a. From the search results, select an appropriate attribute group.
   b. Choose OK.

3. To save the attribute group, choose Save in the <Name of the Attribute Group> section.

i Note
Each time you save the attribute group of a template, system updates the template automatically. You don’t have to save the template explicitly.

4. To remove the attribute group, choose Remove in the <Name of the Attribute Group> section.

i Note
Each time you remove an attribute group from a template, system updates the template automatically.

5. To add attributes to the attribute group, perform the following tasks:
   a. In the <Name of the Attribute Group> section, choose Edit to add attributes to the attribute group.
   b. To add a new attribute, in the <Name of the Attribute Group> Attributes Add perform the following tasks:
      1. In the Add Attributes pop-up, to add new attribute, select New.
      2. In the New Attribute window, enter values for the fields as described in the following table:

```
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID(*)</td>
<td>Enter a name for the attribute.</td>
</tr>
<tr>
<td></td>
<td>i Note</td>
</tr>
<tr>
<td></td>
<td>○ There are no spaces allowed in the ID.</td>
</tr>
<tr>
<td></td>
<td>○ You can’t change the ID of the attribute group once it has been created.</td>
</tr>
<tr>
<td>Short Description(*)</td>
<td>Enter a short description.</td>
</tr>
<tr>
<td>Long Description</td>
<td>Enter a long description.</td>
</tr>
</tbody>
</table>
```
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Data Type(*)** | Select any of the following options:  
  ○ **boolean**: select boolean if you want the data type to support boolean values such as true or false.  
  ○ **string**: select string if you want the data type to support alpha numeric values. You can now also define string data type as hyperlink.  
  ○ **date**: select date if you want the data type to support a date value. If you select a code list for the data type, then you can also maintain the attribute conditions like **Allow Additional Values** and **Multi Select** to allow additional dates and multiple date selections to be maintained with the code for the codelist values.  
  ○ **numeric**: select numeric if you want the data type to support a numeric value. You can now also have numeric as relational operators. |

**i Note**

If you want the string data type to be language-dependent, under the Attribute Conditions section, choose Yes from the Language Dependency radio button.

**i Note**

You can create code lists for Numeric data type and assign the code list to attributes based on data type, scale, and precision match.

For a numeric data type, you can define additional properties. To do so, in the **Attribute Conditions** section, enter values for the fields as described:

○ If you select a code list for the data type, then you can also maintain the attribute conditions like **Allow Additional Values** and **Multi Select** to allow additional dates and multiple date selections to be maintained with the code for the codelist values.
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>i Note</strong></td>
<td>You cannot use the <em>Multi Select</em> option in combination with any of other attribute conditions like <em>Threshold</em>, <em>Dependent Dimension</em>, and <em>Relational Operator</em>. However, <em>Multi Select</em> can be used with <em>Dimension</em> attribute condition.</td>
</tr>
<tr>
<td>○ Dimension:</td>
<td>Select an appropriate dimension from the drop-down.</td>
</tr>
<tr>
<td>○ Threshold:</td>
<td>If the dimension has a suitable threshold that you want to use when entering attribute values, select an appropriate value from the drop-down.</td>
</tr>
<tr>
<td>○ Dependent Dimension:</td>
<td>If you want to use an additional dimension dependent on the dimension you selected before, choose yes for the Create Dependent Dimension and select the dependent dimension from the drop-down for <strong>Entry field At</strong>.</td>
</tr>
<tr>
<td><strong>i Note</strong></td>
<td>Numeric attributes can also be created without dimension and without an associated unit of measure.</td>
</tr>
<tr>
<td>○ Relational Operator:</td>
<td>Check this setting if you want to be able to maintain values with relational operators (for example, &lt;, &lt;=, =&gt;, &gt;). For example, Number of gears: &lt;= 5.</td>
</tr>
<tr>
<td>○ enum (deprecated):</td>
<td>as announced in the previous releases, enum data type was deprecated and can’t be maintained (= created/edited) via the UI anymore.</td>
</tr>
<tr>
<td><strong>i Note</strong></td>
<td>Business objects that are using attributes of data type enum can still be read/displayed on the UI.</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>Use code lists now instead. For more information, see <em>Adding, Updating, and Deleting Code Lists</em> [page 226].</td>
<td></td>
</tr>
</tbody>
</table>

**i Note**

Enum data type is currently still usable via API, but API use will also be deprecated and won’t be available from the next release.

- **picture**: select picture if you want to maintain images with an attribute.
- **Currency**: select currency if you want to maintain currency values.
- **numeric flexible**: select numeric flexible if you want the data type to support decimal value.

**i Note**

You can create code lists for Numeric Flexible data type and assign the code list to attributes based on data type, scale, and precision match.

For a numeric flexible data type, you can define additional properties. To do so, in the *Attribute Conditions* section, enter values for the fields as described:

- If you select a code list for the data type, then you can also maintain the attribute conditions like *Allow Additional Values* and *Multi Select* to allow additional dates and multiple date selections to be maintained with the code for the codelist values.

**i Note**

You cannot use the *Multi Select* option in combination with any of other attribute conditions like *Threshold*, *Dependent Dimension*, and *Relational Operator*. However, *Multi Select* can be used with *Dimension* attribute condition.
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension</td>
<td>Select an appropriate dimension from the drop-down.</td>
</tr>
<tr>
<td>Threshold</td>
<td>If the dimension has a suitable threshold, select an appropriate value from the drop-down.</td>
</tr>
<tr>
<td>Dependent Dimension</td>
<td>If you want to use an additional dimension dependent on the dimension you selected before, choose yes for the Create Dependent Dimension and select the dependent dimension from the drop-down for Entry field At.</td>
</tr>
<tr>
<td>Total Length of the Number</td>
<td>Enter the total length of the number including decimals.</td>
</tr>
<tr>
<td>Decimal Places Allowed</td>
<td>Enter the number of decimal places allowed for the number.</td>
</tr>
</tbody>
</table>

**i Note**
- Total length of the number must be greater than zero.

**i Note**
- The allowed number of decimal places can’t be greater than the total length of the number.
- Decimal places can’t be less than zero.

**i Note**
- To accommodate attributes that are already shared, the difference between new and old value of decimal places must not be greater than difference between new and old value of total length of the number.
- Data type Integer is covered by the newly introduced data type Numeric.
### Field Description

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible</td>
<td>If the Decimal Places Allowed is equal to 0.</td>
</tr>
<tr>
<td></td>
<td>○ If you edit an attribute and change the data type of the attribute, the existing values of the attribute maintained in the previous data type are lost. You have to enter new values in the expected format of the newly set data type.</td>
</tr>
</tbody>
</table>

| Priority(*) | Specify if using the new attribute is **Recommended**, **Mandatory**, or **Optional**. |

3. To add an industry standard, choose **Add Industry Standard**.
4. From the **Industry Standards** dropdown, choose your relevant industry standard.
5. Specify a standard ID.
6. Choose **OK**.

c. To assign an existing attribute, choose `<Name of the Attribute Group> > Attributes > Add` in the **Add Attributes** pop-up, to use an existing attribute from SAP Predictive Asset Insights, search for an existing attribute using the **Search** text box and perform the following tasks:
   a. From the search results list, select an appropriate attribute.
   b. Choose **OK**.

### 5.13.1.3 Adding Indicator Groups and Indicators

You perform this procedure to add indicators and indicator groups either directly on a template object or from the **Indicator Groups or Indicators** card.

### Context

Using this procedure, you can add indicator groups or indicators directly on a template object.

#### i Note

You can use this approach for the creation of indicator groups or indicators on a template object.

SAP Operations can now deliver indicator groups and indicators that can be commonly reused:
- Global indicator groups & indicators are displayed in the indicator group or indicator lists with Source = SAP
- Global indicator groups & indicators can be reused, but not edited.
Procedure

1. Select the template and choose Add Indicator Groups in the Add Indicator Groups window. To add a new indicator group, select New and perform the following tasks:
   a. In the New Indicator Group window, enter the values for the fields as described in the table:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID(*)</td>
<td>Enter an ID for the indicator group.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>i Note</td>
<td></td>
</tr>
<tr>
<td></td>
<td>○ There are no spaces allowed in the ID.</td>
</tr>
<tr>
<td></td>
<td>○ You cannot change the ID of the indicator group once it has been created.</td>
</tr>
<tr>
<td>Short Description(*)</td>
<td>Enter an appropriate short description that describes the indicator group.</td>
</tr>
<tr>
<td>Long Description</td>
<td>Enter an appropriate long description that describes the indicator group.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>i Note</td>
<td></td>
</tr>
<tr>
<td>All the mandatory fields are marked as (*) in the table.</td>
<td></td>
</tr>
</tbody>
</table>

   b. Choose OK.
   c. You can add the attributes by selecting the attribute group and choosing the Edit button.

2. In the Add Indicator Group option from the template object window, to use an existing indicator group, search for an existing indicator group, and perform the following tasks:
   a. From the search results, select an appropriate indicator group.
   b. Choose OK.

3. To save the indicator group, choose Save in the relevant indicator group section.

   i Note
   Each time you save the indicator group of a template, system updates the template automatically. You do not have to save the template explicitly.

4. To remove the indicator group, choose Remove in the relevant indicator group section.

   i Note
   Each time you remove an indicator group from a template, system updates the template automatically.

5. To add indicators to the indicator group, perform the following tasks:
   a. In the selected indicator group section, choose Edit to add indicators to the indicator group.
   b. In the indicator group window, go to Indicators tab and choose Add and perform the following tasks:
1. In the **Add Indicators** dialog box, to add new indicator, select **New**.
2. In the **New Indicator** window, enter values for the fields as described in the table:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID(*)</td>
<td>Enter a name for the indicator.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td></td>
</tr>
<tr>
<td>○ There are no spaces allowed in the ID.</td>
<td></td>
</tr>
<tr>
<td>○ You cannot change the ID of the indicator group once it has been created.</td>
<td></td>
</tr>
<tr>
<td>Description(*)</td>
<td>Enter a short description.</td>
</tr>
<tr>
<td>Long Description</td>
<td>Enter a long description.</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Data Type(*)</td>
<td>Select any of the following options:</td>
</tr>
<tr>
<td></td>
<td>- <strong>Date</strong>: select date if you want the data type to support a date value.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Indicator Type</strong>: select the indicator type. It can measured, calculated, and assessed.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Code List</strong>: Assign code list for the indicator.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Boolean</strong>: select boolean if you want the data type to support boolean values. <strong>Indicator Type</strong>: select the indicator type. It can measured, calculated, and assessed.</td>
</tr>
<tr>
<td></td>
<td>- <strong>String</strong>: select string if you want the data type to support alpha numeric values.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Numeric</strong>: select numeric if you want the data type to support a numeric value. You can now also have numeric as relational operators.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Dimension</strong>: Select an appropriate dimension from the dropdown.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Expected Behaviour(*)</strong>: Specify if the expected behaviour of the new indicator is <strong>Increasing</strong>, <strong>Decreasing</strong>, <strong>Unknown</strong>, or <strong>None</strong>.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Indicator Type</strong>: select the indicator type. It can measured, calculated, and assessed.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Color</strong>: You can specify if you want a specific color for the indicator. You can select a color value from the palette.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Indicator Category</strong>: Define the indicator category.</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>○ Continuous</td>
<td></td>
</tr>
<tr>
<td>○ Level</td>
<td></td>
</tr>
<tr>
<td>○ Discrete</td>
<td></td>
</tr>
<tr>
<td>○ <strong>Code List</strong>: Assign code list for the indicator.</td>
<td></td>
</tr>
<tr>
<td>○ <strong>Numeric Flexible</strong>: select numeric flexible if you want the data type to support decimal value.</td>
<td></td>
</tr>
<tr>
<td>○ <strong>Dimension</strong>: Select an appropriate dimension from the dropdown.</td>
<td></td>
</tr>
<tr>
<td>○ <strong>Expected Behaviour</strong>: Specify if the expected behaviour of the new indicator is <strong>Increasing</strong>, <strong>Decreasing</strong>, <strong>Unknown</strong>, or <strong>None</strong>.</td>
<td></td>
</tr>
<tr>
<td>○ <strong>Indicator Type</strong>: select the indicator type. It can measured, calculated, and assessed.</td>
<td></td>
</tr>
<tr>
<td>○ <strong>Color</strong>: You can specify if you want a specific color for the indicator. You can select a color value from the palette.</td>
<td></td>
</tr>
<tr>
<td>○ <strong>Indicator Category</strong>: Define the indicator category:</td>
<td></td>
</tr>
<tr>
<td>○ Continuous</td>
<td></td>
</tr>
<tr>
<td>○ Level</td>
<td></td>
</tr>
<tr>
<td>○ Discrete</td>
<td></td>
</tr>
<tr>
<td>○ <strong>Total Length of the Number</strong>: Enter the total length of the number including decimals.</td>
<td></td>
</tr>
<tr>
<td>○ <strong>i Note</strong>: Total length of the number should be greater than zero.</td>
<td></td>
</tr>
<tr>
<td>○ <strong>Decimal Places Allowed</strong>: Enter the number of decimal places allowed for the number.</td>
<td></td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| i Note  | - The allowed number of decimal places cannot be greater than the total length of the number.  
- Decimal places cannot be less than zero.  
- Code List: Assign code list for the indicator. |
| i Note  | - To accommodate attributes that are already shared, the difference between new and old value of decimal places must not be greater than difference between new and old value of total length of the number.  
- Data type Integer is covered by the newly introduced data type Numeric Flexible if the Decimal Places Allowed is equal to 0. |

**Indicator Type**

Define if the indicator is of type:
- Measured  
  Quantitative indicators that help you to monitor whether you are doing what you planned (outputs) but do not give us an idea of the effect that is brought about by these outputs.
- Calculated  
  Indicators derived using algorithms or some kind of calculation.
- Assessed  
  Indicators that can be used in assessments.

**Global**

Select if the indicator is a global indicator or not.

**i Note**

- Aggregation Concept: Aggregation concept is only applicable if the values for the indicators are derived from multiple applications or the same application through different methods.
- Minimum: Minimum of the values is displayed
○ Maximum: Maximum of the values is displayed
○ Average: Average of the values is displayed
○ Sum: Sum of the values is displayed
○ Last Available Value: latest value is displayed

○ Expected Behaviour: Is only relevant for suggesting the color codes for threshold values. For the number of thresholds available for the indicator, the relevant color codes are defined by default. You can also customize the color codes for the thresholds. For suggested colors in case of <Expected Behaviour> as Increasing, refer to the below diagram:

For suggested colors in case of <Expected Behaviour> as Decreasing, refer to the above diagram by reversing the colors
For suggested colors in case of <Expected Behaviour> as None or Unknown:

○ Code Lists: You can specify a list of predefined values for the attribute or indicator datatype. You can create code lists using the Codelist feature, see Adding, Updating, and Deleting Code Lists (page 226).
○ Color: This color is used in the indicator chart (SAP Predictive Asset Insights specific feature). You can define a color for each indicator and the relevant lines in the indicator chart will be of that color.
○ **Indicator Category:** This is used in the indicator chart (SAP Predictive Asset Insights specific feature). According to the category selected the way the indicator values are plotted in indicator chart differs.
  - Flow: These variables are visible as continuous variations on the chart. Flow is line graph, the indicator values in the indicator chart are connected by line.
  - Level: These variables remain unchanged until a new value exists, that is, level variables are not interpolated linearly between indicators, but a step function is used (the last value is repeated until a new value exists). An example of a level variable is stock inventory. It is displayed similar to a step chart.
  - Discrete: Displays the state of the equipment as a horizontal bar on top of the chart.

3. Choose **OK**.

6. In the *Add Indicators* dialog box, to use an existing indicator from SAP Predictive Asset Insights, search for an existing indicator using the **Search** text box and perform the following tasks:
   a. From the search results list, select an appropriate indicator.
   b. Choose **OK**.

**Results**

1. Go to the relevant app *Equipment* or *Models*. You have created the indicators. To instantiate the indicators:
2. Select a piece of equipment or a model from the list.
3. Choose **Indicators** under the **Monitoring** tab.
4. Select the indicator that you want to instantiate and choose **Configure**.
   You can define the indicator type, unit of measure, indicator category, indicator space, and threshold values for the indicator.
5. Choose **Confirm**.

**5.13.1.3.1 Global Indicators**

A set of most common and widely accepted indicator are available as predefined indicators.

Preshipped indicators with a suggested definition as Templates are available. The Indicators are available to all the business objects based on the template selection.

- All global indicators are published/available in all accounts regardless of if you have the license for SAP Asset Intelligence Network, SAP Asset Strategy and Performance Management, or SAP Predictive Asset Insights.
- Global indicator groups & indicators are displayed in the indicator group or indicator lists with Source = SAP
- Global indicator groups & indicators can be reused, but not edited.

The following list of global indicators are available:
<table>
<thead>
<tr>
<th>ID</th>
<th>Description</th>
<th>Long Description</th>
<th>Data Type</th>
<th>Dimension</th>
<th>Expected Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEALTH_SCORE</td>
<td>Health score</td>
<td>Reflects the asset condition based on historical performance, generally ranges from 0 to 100.</td>
<td>numeric</td>
<td>No dimension</td>
<td>decreasing</td>
</tr>
<tr>
<td>RELATIVE_HEALTH_SCORE</td>
<td>Relative health score</td>
<td>Comparison of the health score between two groups of assets.</td>
<td>numeric</td>
<td>Proportion</td>
<td>decreasing</td>
</tr>
<tr>
<td>RUL</td>
<td>Remaining useful life</td>
<td>Remaining time to the end of life, disposal, or next maintenance activity of an asset.</td>
<td>numeric</td>
<td>Time</td>
<td>decreasing</td>
</tr>
<tr>
<td>POF</td>
<td>Probability of failure</td>
<td>Probability that an asset fails at a particular point in time; this is defined as a unit of time.</td>
<td>numeric</td>
<td>No dimension</td>
<td>increasing</td>
</tr>
<tr>
<td>RELATIVE_POF</td>
<td>Relative probability of failure</td>
<td>Comparison of probability of a failure occurrence between two groups of assets.</td>
<td>numeric</td>
<td>Proportion</td>
<td>increasing</td>
</tr>
<tr>
<td>MTTF</td>
<td>Mean time to failure</td>
<td>Expected time before the asset fails.</td>
<td>numeric</td>
<td>Time</td>
<td>decreasing</td>
</tr>
<tr>
<td>MTTR</td>
<td>Mean time to repair</td>
<td>Expected time to repair a failed asset.</td>
<td>numeric</td>
<td>Time</td>
<td>increasing</td>
</tr>
<tr>
<td>MTBF</td>
<td>Mean time between failures</td>
<td>Expected duration of the operating time between failures of an asset.</td>
<td>numeric</td>
<td>Time</td>
<td>decreasing</td>
</tr>
<tr>
<td>RISK</td>
<td>Risk</td>
<td>Likelihood of a specific event happening that may expose an asset to damage or failure.</td>
<td>numeric</td>
<td>No dimension</td>
<td>increasing</td>
</tr>
<tr>
<td>RELATIVE_RISK</td>
<td>Relative risk</td>
<td>Comparison between two groups of assets of the risk of an event happening.</td>
<td>numeric</td>
<td>Proportion</td>
<td>increasing</td>
</tr>
<tr>
<td>ID</td>
<td>Description</td>
<td>Long Description</td>
<td>Data Type</td>
<td>Dimension</td>
<td>Expected Behaviour</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-----------</td>
<td>-----------</td>
<td>--------------------</td>
</tr>
<tr>
<td>RPN</td>
<td>Risk priority number</td>
<td>Calculation to sort the risk from highest to lowest; this is the product of severity, occurrence, and the ability to be detected.</td>
<td>numeric</td>
<td>No dimension</td>
<td>increasing</td>
</tr>
<tr>
<td>CRITICALITY</td>
<td>Criticality</td>
<td>Importance rating of an asset from a maintenance and monitoring perspective.</td>
<td>string</td>
<td>No dimension</td>
<td>None</td>
</tr>
<tr>
<td>Connection Status</td>
<td>Connection Status</td>
<td>Connection Status with the Physical Asset.</td>
<td>string</td>
<td>No Dimension</td>
<td>None</td>
</tr>
</tbody>
</table>

**5.13.1.4 Adding Alert Types**

You perform the following procedure to add alert types directly on a template object page. The alert type definition allows you to define the alerts that are based on equipment error codes or based on certain computation on the data for example by applying Rules on the data. The definition can also define associations with an indicator and possible failure modes. The association with failure mode data allows you to identify associations like instructions.

**Prerequisites**

- To update a template, your user ID must have the scopes `TEMPLATE_DELETE` or `TEMPLATE_EDIT` assigned.
- To view a template, your user ID has the scope `TEMPLATE_READ` assigned.
- You have identified the template that you want to update.
Context

In the Template Explorer window, to add a new alert type, select the New button and perform the following tasks:

Procedure

1. In the Template Explorer window, enter the values for the fields as described in the following table:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert Type ID</td>
<td>Define a unique alphanumeric ID for the alert type.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>1. No spaces allowed in the ID.</td>
</tr>
<tr>
<td></td>
<td>2. Only the following characters are supported:</td>
</tr>
<tr>
<td></td>
<td>◦ Uppercase and lowercase alphabets a through z and A through Z.</td>
</tr>
<tr>
<td></td>
<td>◦ Numeric digits 0 through 9</td>
</tr>
<tr>
<td></td>
<td>◦ Punctuation marks underscore (_), hyphen (-), colon (:), and full-stop (.)</td>
</tr>
<tr>
<td></td>
<td>◦ Maximum number of characters allowed is 29</td>
</tr>
<tr>
<td></td>
<td>You cannot change the ID of the alert type once created.</td>
</tr>
<tr>
<td>Category</td>
<td>Select an alert category from the dropdown list:</td>
</tr>
<tr>
<td></td>
<td>◦ Environment</td>
</tr>
<tr>
<td></td>
<td>◦ Health</td>
</tr>
<tr>
<td></td>
<td>◦ Equipment</td>
</tr>
<tr>
<td></td>
<td>◦ Operation</td>
</tr>
<tr>
<td></td>
<td>◦ Process</td>
</tr>
<tr>
<td></td>
<td>◦ Safety</td>
</tr>
<tr>
<td></td>
<td>◦ Other</td>
</tr>
<tr>
<td>Description</td>
<td>Enter an appropriate description that describes the alert type.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>Maximum number of characters allowed is 255.</td>
</tr>
<tr>
<td>Severity</td>
<td>Select the severity of the alert type:</td>
</tr>
<tr>
<td></td>
<td>◦ Information (1)</td>
</tr>
</tbody>
</table>
### Field Description

- **Warning (2)**
- **Error (3)**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Assign indicator to the alert type by selecting from the list.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Origin</td>
<td>This allows you to differentiate between the alert type that is defined for the alert arising from a machine or rule.</td>
</tr>
<tr>
<td></td>
<td>Select from the dropdown:</td>
</tr>
<tr>
<td></td>
<td>○ Machine: On selecting, you can enter an error code (this is optional)</td>
</tr>
<tr>
<td></td>
<td>○ Rule: Value should be used for the alert type defined for rules.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Enter an error code. This field is available only if you select Machine as origin.</th>
</tr>
</thead>
<tbody>
<tr>
<td>i Note</td>
<td>Maximum number of characters allowed is 32.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Failure Modes</th>
<th>Assign failure modes to the alert type by selecting from the list.</th>
</tr>
</thead>
<tbody>
<tr>
<td>i Note</td>
<td>Multiple failure codes can be assigned to an alert type.</td>
</tr>
</tbody>
</table>

2. Choose Save.

You cannot create same alert type with the same ID.

An alert type will get external ID only after it is assigned to a model, equipment is created out of that model and the equipment is published.

If corresponding external ID is not populated, SAP Internet of Things replication of alert type has failed. In such a scenario, republish an equipment.

### Results

In the **Alert Type** window, the newly created alert type displays. You can search and sort, group by alert types, filter, and export details in an excel.

### Editing Alert Type

Using the **Edit** option, you can edit an existing alert type or newly creating alert type. For this, click the alert type you want to edit.
You can:

- Edit the Alert Type Details under Information and Settings. Under the Settings, you can manage settings like deduplication, allowing updates, auto close, and so on. The Allow Updates flag is available only if the Deduplication field is enabled. You can enable the allow updates flag to decide the update strategy based on the updates received. For example, in case you have subscribed to SAP Predictive Assets Insights, you may have machine alarms generated alerts, so you can use this flag to decide the update strategy based on the incoming updates from the alarm.

You can also reassign failure modes to the alert types. To view the instructions assigned with the failure mode, click the number visible within the <Instructions> column.

### iNote

- Alert type cannot be deleted if assigned to an alert type group. Unassign from alert type group to delete an alert type.
- Shared indicators are not available to be used for creating a new alert type.
- Shared alert types will also be displayed in the list page. Shared alert types are read-only, you cannot edit/delete them. You can only edit the description of the alert type.
- Alert types must be explicitly shared along with relevant failure mode, indicator group, and indicator while sharing a model. Also, such shared alert types can be used in rules. Shared alert types can be added to another alert type group but you cannot edit a shared alert type group.
- Multiple languages are now supported for alert types.
- Alert type contains the auto close option. If you enable this option, alerts associated with the alert type is automatically set as complete as soon as the related notification status is set as complete.
- For Alert Type modification changes are not synchronized immediately to reuse alert.
- For equipment that has alert type associated, you can view the modified alert type only after the alert type is Published.

### Related Information

Failure Modes [page 142]
Viewing and Editing Indicators [page 108]

### 5.13.1.4.1 Deduplication

Deduplication option allows the user not to create duplicate alerts for an existing alert type and equipment ID. Duplicate alerts are created or generated once the stipulated deduplication period is over or the status of existing alert of that alert type is marked as completed.

During the deduplication period, in a scenario where a new alert instance of an existing not completed alert is generated, the count will increase, and a new alert is not generated. The timestamp of last occurrence of alert is visible.
When creating a new alert type, the deduplication switch is on with the default period of 30 days. If you create an alert with this alert type and same equipment ID, first alert is generated. If you create a second alert within 30 days, a new alert will not be generated. Only the count of first alert increases.

For more information, refer Alerts [page 20]

5.13.1.5 Adding Alert Type Groups

You perform the following procedure to add alert type groups directly on a template object page. Alert type group is a grouping of alert types and can be assigned to a model.

Prerequisites

- To update a template, your user ID has the scope TEMPLATE_DELETE or TEMPLATE_EDIT assigned.
- To view a template, your user ID either belongs to the group ORG_DATA_READ role template AssetCoreReader; or has the scope TEMPLATE_READ assigned.

Context

In the Template Explorer window, to add new alert type group select the New Alert Type Group button and perform the following tasks:

Procedure

1. In the Template Explorer window, enter the values for the fields as described in the following table:
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>Enter an ID for the alert type group.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>○ No spaces allowed in the ID.</td>
</tr>
<tr>
<td></td>
<td>○ Only the following characters are supported:</td>
</tr>
<tr>
<td></td>
<td>○ Uppercase and lowercase alphabets a through z and A through Z.</td>
</tr>
<tr>
<td></td>
<td>○ Numeric digits 0 through 9.</td>
</tr>
<tr>
<td></td>
<td>○ Punctuation marks underscore (_), hyphen (-), colon (:), and full-stop (.)</td>
</tr>
<tr>
<td></td>
<td>○ Maximum number of characters allowed is 32.</td>
</tr>
<tr>
<td></td>
<td>You cannot change the ID of the alert type once created.</td>
</tr>
<tr>
<td>Description</td>
<td>Enter an appropriate description that describes the alert type group.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>Maximum number of characters allowed is 255.</td>
</tr>
<tr>
<td>Long Description</td>
<td>Enter a details description, if any, for the alert type group.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>The maximum number of characters allowed is 5,000.</td>
</tr>
</tbody>
</table>

2. Choose Save.

**i Note**
You cannot create the same alert type group with the same ID.

**Results**

In the *Alert Type Group* window, the newly created alert type group displays. You can search and sort, group by alert type group, filter, and export details in an excel.

**Editing Alert Type Group**

Click the respective alert type group to edit details. You can also assign new alert types to the selected alert type group using the *Assign* option in the *Edit* mode. You can also edit the details of assigned alert type. For this, select the alert type within the *Alert Types* list and click *Edit*. 
It is also possible to create alert type from the **Assign Alert Type** dialog box.

**Note**

- You cannot delete alert type group if assigned to a model.
- Now, the shared alert type can be assigned to a alert type group. But shared alert type cannot be edited.
- You cannot add alert types to alert type group if assigned to a model.

**Related Information**

- Failure Modes [page 142]
- Instructions [page 212]

### 5.13.1.6 Creating a Model Template

You use this procedure to create a model template that helps you to define the attributes and attribute groups related to a model.

**Prerequisites**

- You have identified the subclass template provided by SAP Predictive Asset Insights, or a model template created within your organization or shared by a different organization, from which you can create the template.

**Note**

A model template can also be created without a parent object (subclass/another model template), in this case the model template acts as a top node.

- Your user ID has the roles `TEMPLATE_DELETE` or `TEMPLATE_EDIT` assigned.

**Procedure**

1. Launch the **Templates** app.
2. On the **Templates** window, navigate into **Model Templates** card and choose **New** and perform the following substeps:
   a. In the **New Model Template** popup, enter values for the fields as described in the following table:
### Field | Description
--- | ---
Template ID(*) | Enter a unique ID for the model template.

**i Note**
- There are no spaces allowed in the Template ID.
- You cannot change the ID of the template once it has been created.

Short Description(*) | Enter a short description.

Long Description | Enter a long description

Parent Subclass/Model Template | Select a subclass template, or another model template as parent template.

**i Note**
- You can create a model template without a parent template.

Industry Standards | Add an industry standard.

**i Note**
- This field is scope-specific.
- Template objects can have only one industry standard assigned to them. They can also have no industry standards assignments.
- If an industry standard is assigned to a template object, you can change or delete it.

**i Note**
All the mandatory fields are marked as (*) in the table.

b. Choose **OK**.

System creates a model template.

3. To edit the description of the template, choose **Edit Description** in the template header and perform the following tasks:
   a. In the **Edit <Name of the Model Template>** popup, enter suitable description in the **Description** text box.
   b. Choose **Save**.

4. To add attribute groups and attributes to a template, choose **Add Attribute Groups** from the template header.
For more information, see Adding Attribute Groups and Attributes [page 228].

**i Note**
Each time you save the attribute group of a template, system updates the template automatically. You do not have to save the template explicitly.

5. To add indicator groups and indicators to a template, choose **Add indicator Groups** from the template header.

For more information, see Adding Indicator Groups and Indicators [page 234].

**i Note**
Each time you save the indicator group of a template, system updates the template automatically. You do not have to save the template explicitly.

6. To add an industry standard to the template, perform the following tasks:
   a. Go to the **Industry Standard** section on the template and choose **Add Industry Standard**.
   b. In the **Industry Standard** popup, select the industry standard you want to assign to the template object.

   **i Note**
   Optionally, you can enter a standard ID or code as defined in an industry standard. You can only assign one industry standard for an object.

You can also directly add an industry standard to an attribute.

   **i Note**
   ○ Template objects can have only one industry standard assigned to them. They can also have no industry standards assignments.
   ○ If an industry standard is assigned to a template object, you can change or delete it.

   a. To add to an existing attribute, select the attribute and choose **Edit Attribute**.
   b. In the **Edit Attribute** popup, choose **Industry Standards**
   c. To add to a new attribute, choose **Add Attribute**
   d. In the **Industry Standards** section, and **Add Industry Standard**.
   e. In the **Industry Standards** popup, select an industry standard and enter an industry Standard ID.
   f. Choose **OK**.

**Next Steps**

- You can update the model template with new attribute groups and attributes.
  For more information, see Viewing and Updating a Template [page 259].
- You can create a model using the model template.
  For more information, see Creating a Model [page 115].
- You can add the template to a group using the **Group** button. For more information, see Groups [page 164].
- You can reorder the attribute groups using the Reorder button on the details screen.

5.13.1.7 Creating an Equipment Template

You use this procedure to create an equipment template that helps you to define the equipment-specific attributes and attribute groups related to an item of equipment. This template allows you to create new attributes and attribute groups that need not be inherited from a class, subclass or a model template.

Prerequisites

Your user ID has the roles TEMPLATE_DELETE or TEMPLATE_EDIT assigned.

Procedure

1. Launch the Templates application.
2. On the Templates object page, choose New Equipment Template and proceed as follows:
   a. In the New Equipment Template pop-up, enter values for the fields as described in the table below:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID(*)</td>
<td>Enter a unique ID for the equipment template.</td>
</tr>
<tr>
<td><img src="#" alt="i Note" /></td>
<td>There are no spaces allowed in the ID.</td>
</tr>
<tr>
<td><img src="#" alt="i Note" /></td>
<td>You cannot change the ID of the template once it has been created.</td>
</tr>
<tr>
<td>Short(*) and Long Description</td>
<td>Enter a template description.</td>
</tr>
<tr>
<td>Subclass/Equipment Template</td>
<td>Select a subclass template, or another equipment template as parent template.</td>
</tr>
<tr>
<td><img src="#" alt="i Note" /></td>
<td>You can also create an equipment template without a parent template.</td>
</tr>
</tbody>
</table>
### Field Description

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry Standards</td>
<td>Add an industry standard.</td>
</tr>
</tbody>
</table>

**i Note**

- This field is scope-specific.
- Template objects can have only one industry standard assigned to them. They can also have no industry standards assignments.
- If an industry standard is assigned to a template object, you can change or delete it.

---

**i Note**

All the mandatory fields are marked as (*) in the table.

b. Choose **OK**.

The system creates an equipment template.

3. To edit the description of the template, choose **Edit Description** in the template header and proceed as follows:
   a. In the **Edit** pop-up, enter a suitable description in the **Description** text box.
   b. Choose **Save**.

4. To add attribute groups and attributes to a template, choose **Add Attribute Group** from the template header.

For more information, see **Adding Attribute Groups and Attributes [page 228]**.

**i Note**

- Each time you save the attribute group of a template, system updates the template automatically. You do not have to save the template explicitly.
- Multi-level inheritance is supported, that is:
  - you can create equipment templates under another equipment template
  - you can create an equipment template with reference to a subclass

5. To add indicator groups and indicators to a template, choose **Add indicator Groups** from the template header.

For more information, see **Adding Indicator Groups and Indicators [page 234]**.

**i Note**

Each time you save the indicator group of a template, system updates the template automatically. You do not have to save the template explicitly.
5.13.1.8 Creating a Location Template

You use this procedure to create a location template that helps you to define the location-specific attributes and attribute groups related to a location.

Prerequisites

Your user ID has the roles TEMPLATE_DELETE or TEMPLATE_EDIT assigned.

Procedure

1. Launch the Templates application.
2. On the Templates object page, choose New Location Template and proceed as follows:
   a. In the New Location Template pop-up, enter values for the fields as described in the table below:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Template ID(*)</td>
<td>Enter a unique ID for the location template.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>○ There are no spaces allowed in the ID.</td>
</tr>
<tr>
<td></td>
<td>○ You cannot change the ID of the template once it has been created.</td>
</tr>
<tr>
<td>Short(*) and Long Description</td>
<td>Enter a template description.</td>
</tr>
<tr>
<td>Parent Subclass/Location Template</td>
<td>Select a subclass template, or another location template as parent template.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>○ You can also create a location template without a parent template.</td>
</tr>
</tbody>
</table>
### Field

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry Standards</td>
<td>Add an industry standard.</td>
</tr>
</tbody>
</table>

#### i Note

- This field is scope-specific.
- Template objects can have only one industry standard assigned to them. They can also have no industry standards assignments.
- If an industry standard is assigned to a template object, you can change or delete it.

b. Choose **OK**.

   The system creates a location template.

3. To edit the description of the template, choose **Edit Description** in the template header and proceed as follows:
   a. In the **Edit** pop-up, enter a suitable description in the **Description** text box.
   b. Choose **Save**.

4. To add attribute groups and attributes to a template, choose **Add Attribute Group** from the template header.

   For more information, see **Adding Attribute Groups and Attributes** [page 228].

#### i Note

- Multi-level inheritance is supported, that is:
  - you can create location templates under another location template
  - you can create a location template with reference to a subclass
- Each time you save the attribute group of a template, system updates the template automatically. You do not have to save the template explicitly.

### Next Steps

You use the location template while creating a location from the **Locations** application.
5.13.1.9 Creating a Spare Part Template

You use this procedure to create a spare part template that helps you to maintain manufacturing information, technical data, and assignment information pertaining to spare parts.

Prerequisites

Your user ID has the roles TEMPLATE_DELETE or TEMPLATE_EDIT assigned.

Procedure

1. Launch the Templates application.
2. On the Templates object page, choose ▶️ New ▶️ Spare Part Template ▶️ and proceed as follows:
   a. In the New Spare Part Template dialog box, enter values for the fields as described in the table below:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Template ID(*)</td>
<td>Enter the template ID.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>○ There are no spaces allowed in the ID.</td>
</tr>
<tr>
<td></td>
<td>○ You cannot change the ID of the template once it has been created.</td>
</tr>
<tr>
<td>Short Description(*)</td>
<td>Enter a short description.</td>
</tr>
<tr>
<td>Long Description</td>
<td>Enter a long description.</td>
</tr>
<tr>
<td>Parent Subclass/Spare Part Template</td>
<td>Select a subclass template, or another spare part template as parent template.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>You can also create a spare part template without a parent template.</td>
</tr>
</tbody>
</table>
Field Standards

Add an industry standard.

**i Note**

- This field is scope-specific.
- Template objects can have only one industry standard assigned to them. They can also have no industry standards assignments.
- If an industry standard is assigned to a template object, you can change or delete it.

b. Choose **OK**.

The system creates a spare part template.

**i Note**

Multilevel inheritance is supported, that is:
- you can create a spare part template under another spare part template
- you can create a spare part template with reference to a subclass

3. To edit the description of the template, choose **Edit Description** in the template header and proceed as follows:
   a. In the **Edit** dialog box, enter a suitable description in the **Description** text box.
   b. Choose **Save**.

4. To add attribute groups and attributes to a template, choose **Add Attribute Group** from the template header.

   For more information, see **Adding Attribute Groups and Attributes** [page 228]

5.13.10 **Creating a System Template**

You use this procedure to create a system template that helps you to maintain system information, attribute groups, industry standards, and groups assignment information pertaining to system.

**Prerequisites**

Your user ID has the roles **TEMPLATE_DELETE** or **TEMPLATE_EDIT** assigned.
**Procedure**

1. Launch the *Templates* application.
2. Choose | ![System Templates](image) » *New System Template* and proceed as follows:
   a. In the *New System Template* dialog box, enter values for the fields as described in the table below:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Template ID(*)</td>
<td>Enter the template ID.</td>
</tr>
</tbody>
</table>
| **i Note**                 | ○ There are no spaces allowed in the ID.  
|                            | ○ You cannot change the ID of the template once it has been created. |
| Short Description(*)       | Enter a short description.            |
| Long Description           | Enter a long description.             |
| Parent Subclass/System Template | Select a subclass or another system template as the parent template. |
| **i Note**                 | ○ You can also create a system template without a parent template. |
| Industry Standards         | Add an industry standard.             |
| **i Note**                 | ○ This field is scope-specific.       
|                            | ○ Template objects can have only one industry standard assigned to them. They can also have no industry standards assignments.  
|                            | ○ If an industry standard is assigned to a template object, you can change or delete it. |

b. Choose *OK*.

The system creates a system template.

**i Note**

Multi-level inheritance is supported, that is:  
○ you can create a system template under another system template  
○ you can create a system template with reference to a subclass
3. To edit the description of the template, choose *Edit Description* in the selected template header and proceed as follows:
   a. In the *Edit* dialog box, enter a suitable description in the *Description* text box.
   b. Choose *Save*.

4. To add attributes to the system template, choose *Add Attribute Groups* in the object page header and proceed as follows:
   a. In the *Add Attribute Groups* dialog box, select existing attribute groups from the list or add new attribute group using *New Attribute Group*.
   b. Choose *OK*.

### 5.13.1.11 Viewing and Updating a Template

#### Prerequisites

- To update a template, your user ID has the roles `TEMPLATE_DELETE` or `TEMPLATE_EDIT` assigned.
- To view a template, your user ID has the role `TEMPLATE_READ` assigned.
- You have identified the template that you want to update.

#### Procedure

1. Open the *Templates* app.
2. Search for a template that already exists using the search filter.
3. Select the template from the search results.
   
   **Note**
   The search result displays the number of templates by the template types.

4. Choose a template type to view more details of the templates displayed in the search results.
5. Choose a template.
   
   The template details are displayed in a flexible column layout and as a side-by-side view of the selected template in the list view or card view, and the template details in the template object page.

   **Note**
   The quick view (small and medium detailed view) only provides limited editing options. In the full screen view you have the full editing functionalities.

   System displays the attribute groups, and attributes of the template.
6. Choose *Edit Description* to update the short and long description of the template.
7. To update the description of the attribute group, choose **Edit** in the `<Name of the Attribute Group>` section and perform the following tasks:
   a. Under the `<Name of the attribute group>` section, in the **Short Description** and **Long Description** field, update the descriptions of the attribute group.
   b. Choose **Save**.

8. To update the attributes of the attribute group, in the `<Name of the attribute group>` section, choose **Edit Attribute** and perform the following tasks:
   a. In the `<Name of the attribute>` pop up, update the fields of **Attribute Details** section.

For more information, see *Adding Attribute Groups and Attributes [page 228]*

   **Note**
   - You cannot update the attributes that have been inherited from a class, subclass, or another model template.
   - You cannot update the attributes that have been used in creating any child objects such as models, items of equipment or locations.

b. Choose **OK**.

9. To remove the attributes of the attribute group, in the `<Name of the attribute group>` section, choose **Remove Attribute** and perform the following tasks:
   a. In the **Warning** pop-up, choose **OK** if you are sure that you want to remove the attribute to the attribute group.
   b. Choose **Save**.

   **Note**
   - You cannot remove attribute groups and attribute that have been inherited either from a class template, subclass, template, or a model template.

10. To add new attribute groups and attributes to the template, choose **Add Attribute Group** from the template header.

More information, see *Adding Attribute Groups and Attributes [page 228]*.

   **Note**
   - Each time you save the attribute group of a template, system updates the template automatically.

**Results**

You have created a template that you can update with additional attribute groups or attributes.
5.14 Rules

Use

You use the Rules application to manage and create rules so that the service technician is notified about possible alerts. You can set up rules for a model or equipment with this application. These rules, based on the scheduled timestamp and triggered events, will evaluate the conditions and trigger alerts of the selected alert type.

You can perform additional actions such as sending emails with rule execution status to the selected users.

It is also possible to view a list of existing and newly created rules. In addition, edit and delete a rule and view rules for models and equipment.

Procedure

1. Define alert type. Navigate to Templates > Alert Types > New. The origin should be Rules.

   i Note
   You can also define the deduplication configuration to reduce the duplication of similar alerts. For more information, refer Adding Alert Types [page 243].

2. Define alert type groups for an alert type created. For more information, refer Adding Alert Type Groups [page 247].

3. Assign the alert type group to the model that will assign all the alert types to the model. These are available for equipment derived from model. For more information on assigning, refer Assigning Alert Type Groups to a Model [page 125].

4. Create a rule for model or equipment by defining rule. You can create scheduled based rules or trigger-based rules using the Rules list page. The scheduled rules are triggered at defined frequency and trigger-based rules are executed based on the trigger created by the equipment alarms. For more information, refer Creating Rules [page 262].

5. You can view the rules defined for the model or equipment using the Rules list page. In case of equipment, you can also view the rules defined at model level and inherited to equipment. For more information, refer Rule Management [page 265].

6. You can also navigate to the Rules list page to view all the rules created against a model or equipment.

   i Note
   In case you have also subscribed to SAP Asset Intelligence Network, the shared alert types can be synchronized and used while defining rules.
5.14.1 Creating Rules

Use the New button to add a new rule.

Prerequisites

You must have the authorized role RULES_READ, RULES_DELETE, and RULES_EDIT.

Context

When a specified event occurs, for example, engine temperature exceeding a threshold, and the rule’s conditions are met, an alert is triggered. Also possible to send emails (optional).

Procedure

1. On the launchpad, click the Rules application.
2. Click New.
3. Enter a rule name and a long description (optional) for the rule.
4. Select a model or equipment.

   i Note
   ○ All the published equipment and equipment in revision status with associated model are available in the list.
   ○ Rules will only run for equipment from the same organization. Shared equipment/shared model of equipment is not supported.

5. Choose Save
6. You are navigated to the rules object page. You can edit the long description, if necessary.

Rule Details

7. Within When, if the user wants to schedule events, use Schedule Event within the Event Type option to set up an event to check for the rule conditions at a specified time interval.
The rule is executed based on Central European Time zone and not based on users time zone.

8. Within *When*, if the user wants to configure machine-generated alerts, use the *Triggered Event* within the *Event Type* option to create a rule. The rule is configured for a triggered event based on the selected alert type and is executed when a machine generated alert of the selected alert type occurs for the selected model.

**i Note**
- Only alert type with origin as Equipment are listed for the triggered events. The same alert type is automatically populated as a default alert type in the *Then* option. You can change the alert type in the *Then* option, if necessary.
- In a scenario where trigger-based rule exists for the alert type that is valid for an equipment, the rule is triggered instead of an alert creation. The condition in this rule is evaluated to create an alert.

**Set up Rule Conditions**

9. Within *If*, use the *Add Condition* option to choose values to represent the conditions that trigger an alert or you can directly enter the conditions into input field.

Optionally choose an aggregator, indicator, or attribute for the rule:
- If you choose aggregator, first create an aggregator by defining the values for aggregator function, indicator, and timeframe. The newly created aggregator defines an aggregated value for the selected indicator within a timeframe. On selecting the newly created aggregator, you can either specify a constant value from the predefined range of thresholds assigned to the indicator within the aggregator. The supported aggregators are count, first, last, minimum, maximum, some, average, and standard deviation.
  - For more information on indicators, refer *Adding Indicator Groups and Indicators* [page 234].
- If you choose indicator, you can either specify a constant value or select a threshold from the predefined range of thresholds assigned to the indicator.
  - Equipment or model used in a rule must have minimum one indicator assigned to it to execute the rule.

**i Note**
- Constant value will be numeric.
- If the duration or the time stamp of the data captured differs for different indicators used to define a condition, chances are that the results obtained are not as expected. To obtain desired results, aggregation must be used on the respective indicator so that the value obtained for the bigger duration can be used if data values are low.

**Example**

The machine running status is captured every hour and its vibration is captured every minute. To use the running status in a condition, define an hourly aggregation to return the last value so that the last value captured is used to evaluate the rule.

- Equipment or model used in a rule must have minimum one indicator assigned to it to execute the rule.
- If you choose attribute, you can specify a constant value.

**i Note**
- Add aggregators, indicators, and attributes as required, modifying the operators (AND, OR) between them to define the condition.
○ Rules will run for numeric, numeric flexible, string, and boolean type indicator only. For a condition 
<Indicator of type string or boolean> equal <constant> constant value should be in quotes ("" - 
double quotes). For a condition <Indicator of type numeric or numeric flexible> equal <constant> 
canstant value should not have any quotes.

○ Supported values for boolean type Indicators or Attributes are "True" and "False".

○ Threshold comparisons for aggregates are not supported in conditions.

Add Action

10. Choose an alert type. When the rule execution status is success, an alert of the selected alert type is 
created.

11. Within Then, perform the following optional steps:

○ Send e-mail to the selected users. For this, click Send Email within the Add Action option. Multiple 
users can be selected at the same time.
The listed users are business users defined using the Application Settings application. For more 
information, refer Application Settings [page 382]

○ When creating a rule, you can use Add Action Notification to create a corresponding notification 
and also define the type of notification and priority of the notification.

i Note

○ The notification description is obtained from the description provided for the alert types. This 
description will appear truncated if the alert type description exceeds 40 characters.

○ The notification description is always in English. However, the Alert Type description is used to 
create the Notification description. For example, if Alert Type description is in English, the 
notification description uses the alert type English description. If the Alert Type Description is 
not present in English, then the system selects a random language description.

○ The following fields are supported for notification created by Rules:

  ○ Notification Type
  ○ Description
  ○ Notification Start Date
  ○ Priority
  ○ Status
  ○ Equipment ID
  ○ Alert Type

○ The following fields are not supported for notification created by Rules.

  ○ Operator
  ○ Location
  ○ Malfunction Start Date

12. Select Status to activate or deactivate the rule.

13. Choose Save. The rule is added to the rule table.

i Note

The rules assigned at the model will not be activated for the equipment initially. To activate, you can 
use the Rules page by clicking data within the <Total Pieces of Equipment> column. From the 
popup, select and activate rule for equipment created from the model.
Results

Viewing Rules for Equipment or Model
You can view the list of the rules created for model or equipment using the Rules application. The following details are visible in the Rules page.

- List of rules created for model or equipment (in case of equipment, it is only rules created against them)

  - View rules for an equipment (created for an equipment or inherited from model) within the Equipment tab. Select the equipment to view all the rules defined for an equipment.
  - Rules are grouped according to equipment.
  - Change the status of only rules created for an equipment.
  - Activate or deactivate rules inherited from model.

- Search option
- Sort, filter and group rules using Settings option
- Number of activated equipment.
  Last execution time and status of rules. Statuses are Not executed, Execution Failed, Executed (for All), and Executed (for Few).
- Execution logs for failed rules.

  - If the rule execution is successful, execution details are not available.

Editing or Deleting Rule for Model
You can edit and delete the existing rule by clicking the Rule name on the Rules List page.

  - Changes made within this page will be visible after saving or deleting the details.

5.14.2 Rule Management

- Enabling and Disabling Rules for Model
  You decide the status of a rule for a model while creating a rule. The status can be activate or deactivate. In a rule list page, you can change the rule status corresponding to a model by activating or deactivating it.

  - By default, all the rules created against a model are executed automatically as rules are deactivated for the equipment. You must activate the rules for the equipment to execute it.

- Activating or Deactivating Rule for Equipment
  In the rule list page, you can change the status of the rule corresponding to equipment by clicking on the link within the <Number of Activated Equipment> column.
i Note
By default, all the rules created at the model level are in inactivated state (deactivated) at the equipment level.

Using the Activate Rules Dialog dialog box, it is possible to activate or deactivate rule status corresponding to the equipment.

- Execution Logs
In the rule list page, you can click the Last executed Status to view the rule execution logs. In the Execution Logs dialog box, enter the date range for which you want to display the logs. Click Go.

All the failure logs are displayed in the table with the following details:
- Time Stamp
- Execution Status
- Message

Message for Execution logs can be of following type:
- Rule for Equipment: If the rule fails for the equipment, execution log for that equipment ID is displayed.
- Rule for Model:
  - If it fails at rule level: The log displays the reason for rule failure.
  - If it fails at individual equipment level: The log displays the reason for individual equipment.

5.15 Equipment Search
You can search for an equipment using Internal ID.

Additionally, you can filter based on:
- Equipment header fields
- Equipment attribute values

i Note
- This application is only available on SAP Cloud Platform - Cloud Foundry environment (Amazon Web Services (AWS) and Azure).
- If you update model header data, this will not reflect in the equipment unless you make an update on the equipment data.
- Search on attribute values from location, which are assigned to the equipment are not supported. You can search equipment based on the model attributes. You can also search equipment based on attribute code list values.
- Filter on attributes of type picture, enum, attributes with code lists of type date, numeric, and numeric flexible having multiselect option and along with unit of measure are not supported.
- Multilanguage string attribute won’t be displayed as per your logon language.
- Search on attributes with a unit of measure is only supported with the actual value maintained. The automatic value conversion to your preferred metric even when the value is maintained in a different metric is not supported. For example, if you have saved 10 Kilograms as a value and try to search for 22 Pounds, you won’t get the results, even though the value is the same in different metrics.
- The search results are ‘near real-time’, there might be a slight delay between when the changes are made and when they are available in the search results.
5.16 State Transitions

A business object such as a model, or an equipment undergoes state transitions during its creation and maintenance in SAP Predictive Asset Insights.

The following diagram illustrates these state transitions:

Business objects such as models and items of equipment move to an unpublished state as soon as you create either a new model or a new item of equipment. You do not have to save these business objects explicitly. However, business entities such as instructions and announcements move to unpublished state on explicit save. When you further publish these business objects or business entities they move to a published state.

When the business object or entity is in its published state, and you select new revision the business object or business entity moves from published state to the in revision state. You can toggle between published state and the in revision states by choosing the View Last Published option, and View Last Revision on the UI.

You can create further versions of the business object or a business entity from the in revision state by choosing to publish the business object.
5.17 Creating Revisions and Switching Between Revisions and Published State

You can create revisions of a business object such as a model, piece of equipment, functional location, system and so on. Additionally, you can create revisions for business entities such as an instruction, or an announcement.

Procedure

1. To create a new revision of the business object or the business entity, open the business object or the business entity in the published state and choose the link **New Revision**.
   System creates the next higher revision than the published state of the business object or the business entity.

2. To switch from in revision to the last published state of the business object or the business entity, open the business object or the business entity in the revision state and choose the link **View Last Published**.

3. If multiple revisions for the business object or the business entity exists and you want to switch from last published to the last in revision state of the business object or the business entity, open the business object or the business entity in its published state, choose **View Last Revision**.

Irrespective of the number of published models and the number of revisions that exist for a business object or a business entity, SAP Predictive Asset Insights allows you to switch between the last published state or the last revision of the business object or the business entity.

5.18 Export to Excel

This feature enables you to export the data to an excel for offline reference.

This feature is available on the all the object list pages.

For easier understanding, the document refers to the exporting equipment data to an excel.

1. Choose the **Equipment** app.
   You can view the equipment list page.

2. Choose **Export to Excel**
   There is a predefined set of columns that will be exported to the excel.

Result

The data is exported to an excel as .xls file.
6 Machine Learning Engine

The tiles under Machine Learning Engine on the SAP Fiori launchpad support you in data science tasks.

## Overview of Machine Learning Engine

<table>
<thead>
<tr>
<th>Tile</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Indicator Data Set Configuration [page 269]</td>
<td>Configure data sets that you can use as input data when training and scoring models for equipment health indicators.</td>
</tr>
<tr>
<td>Health Indicator Model Management [page 276]</td>
<td>Configure models for equipment health indicators, and train and score them.</td>
</tr>
<tr>
<td>Failure Mode Analytics Model Management [page 332]</td>
<td>Configure models for failure mode analytics, and train and score them.</td>
</tr>
<tr>
<td>Failure Mode Analytics Validation [page 349]</td>
<td>Perform validation tasks to improve failure mode analytics.</td>
</tr>
<tr>
<td>Leading Indicators Model Management [page 352]</td>
<td>Configure models for leading indicators, and train them.</td>
</tr>
<tr>
<td>Failure Curve Analytics Model Configuration Management [page 358]</td>
<td>Create model configurations for failure curve analytics, and train and score them.</td>
</tr>
</tbody>
</table>

### 6.1 Configuring Data Sets for Equipment Health Indicators

This topic describes how to configure data sets for models used for equipment health indicators.

**Prerequisites**

The role **DataScienceUser** or the two roles **DataScienceRead** and **DataScienceWrite** are assigned to your user.

**Note**

If the required role or roles are not assigned to your user, you cannot see the application on the launchpad. Contact your Identity Management Administrator if the role or roles have not been assigned to your user yet.
Context

You need to configure data sets that you can then use as training input and scoring input for your models for equipment health indicators.

**Note**

Once you have configured a data set and you use this data set in a model, you cannot delete the data set as long as it is in use.

Procedure

1. On the SAP Fiori launchpad, go to the Machine Learning Engine group and open the Health Indicator Data Set Configuration application.
2. To configure a data set, you can choose between the following options:
   - **Configure a new data set based on an existing configuration**: Select the base data set and choose Copy. The new data set contains all settings of the base data set.
   - **Configure a new data from scratch**: Choose . The New Data Set Configuration screen is displayed.
3. Fill in all required fields. For more information, see Fields for Configuring a Data Set [page 273].
4. Add features to the data set by choosing Add:

   A feature is a combination of a certain indicator group with indicators, an aggregation function, and an aggregation period. Each feature together with a specified range represents a new column in the data set.

   **Note**

   The maximum number of features that you can add to the data set is limited. This limit is determined by the way the features are calculated. For more information, see Calculation of Features [page 274].

   a. Select the indicators.

      Select the indicators that you want to include in the data set such as pressure, temperature, or humidity. Each indicator belongs to an indicator group.

      **Note**

      Consider the following:
      - Only indicators that have the data type Numeric or NumericFlexible are displayed for the selection.
      - If the same indicators and indicator groups are displayed multiple times, they belong to different model templates. For more information about model templates, see Templates [page 223].
      - The included indicator values are within the retention period. The retention period is maintained for the SAP Internet of Things store and can have a maximum range of 5 years. For more information, see Create Retention Period for Time Series Data Store.
b. Select the aggregation functions.

Select the aggregation functions that need to be executed on the indicators over the aggregation period. The aggregation functions are provided by SAP Internet of Things. You can choose from the following functions:

- **COUNT**
- **FIRST**
- **LAST**
- **MIN** (minimum)
- **MAX** (maximum)
- **SUM**
- **AVG** (average)
- **STDDEV** (standard deviation)

c. Define the aggregation period values:

- For the aggregation period, enter the time frame within which indicator data are aggregated. The aggregation period is a multiple of the step size.
- For the period offset, define how much the aggregation period is moved in the past from a certain timestamp.

**Example**

You set the aggregation period to **2 Days** and the period offset to **4 Days**. Your timestamp is October 22nd, 2017 at 1:30 p.m. This means that the aggregation of indicator data begins on the 16th of October at 1:30 p.m. and ends on the 18th of October at 1:30 p.m. (4 days before the timestamp and 2 days of aggregation).

If you want to use default values for the aggregation period and period offset, activate the **Use Default Values** checkbox. The default value of the aggregation period is the value of the step size. The default value of the period offset is **0**, which means that the aggregation period is not moved at all.

d. Specify a range.

With a range, you can exclude values for the aggregation by selecting a minimum and a maximum value. For all values outside this range, the selected **NULL** value strategy is applied.

If you want to aggregate all data, activate the **No Limits** checkbox.

e. Choose **OK**.

**i Note**

If you choose **Apply**, your features are added and the dialog box remains open so that you can select further features. Once you have selected further features and you choose **Apply**, the already added features are ignored and only the new features are added to the feature table.

5. **(Only relevant if you decided to include labels in your data set):** Configure the label for the data set:

a. Define the lead time.

With the lead time, you define a buffer before the prediction window to react to a failure that might occur during the prediction window.

b. Specify the prediction window.

With the prediction window, you define the length of the time frame within which a failure can occur in the future. The prediction window begins when the lead time ends and is a multiple of the step size.
Example

If you enter 1 Day with 0 as the lead time, the data of the next 24 hours will be looked at. During this time frame, you can expect a failure.

c. Add notifications or alerts to the data set by choosing Add.

○ For notifications, you can choose from all notifications that are related to your equipment. By default, all values are selected. If filter values exist, you can also filter the notifications by selecting a specific status, priority or the header level failure mode (failure mode ID) to which the notification is assigned.

i Note

Only notifications with a valid malfunction start date are later collected during the model training and scoring.

○ For alerts, you can choose from alert types that are defined in the Templates application. For more information, see Adding Alert Types [page 243].

i Note

To use an alert type in a data set, the alert type first needs to be added to an alert type group, and then the alert type group needs to be assigned to the respective equipment model that is used in the data set. For more information, see Adding Alert Type Groups and Assigning Alert Type Groups to a Model.

i Note

If you have used event as labels before the 2011 release and want to continue using the similar functionality with alert as labels, you need to update the labeling. For more information, see the Updating the Machine Learning Engine section in the Update Guide.

6. Save your configuration.

Results

Your data set is configured and added to the Data Set Configurations pane.

If you have configured multiple data sets and you want to get information about a specific data set, select the data set from the Data Set Configurations pane and use the URL of the selected data set to directly link to this data set.

Related Information

Managing Models for Equipment Health Indicators [page 276]
### 6.1.1 Fields for Configuring a Data Set

<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>x</td>
<td>Enter a name for the data set configuration.</td>
</tr>
<tr>
<td>Description</td>
<td></td>
<td>Enter a description for the data set configuration.</td>
</tr>
<tr>
<td>Equipment Model</td>
<td>x</td>
<td>Select the equipment model that you want to use as basis for the data set. You can choose from all available equipment models.</td>
</tr>
<tr>
<td>Step Size</td>
<td></td>
<td>Select the interval within which indicator data are aggregated for the training and the scoring. You can choose among step sizes from 2 Minutes to 1 Year.</td>
</tr>
<tr>
<td>Null Values Strategy</td>
<td></td>
<td>Define how to handle missing values in the data set. You can choose from the following options:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Ignore</strong>: Ignore NULL values and leave them as NULL values. You can use this option for the algorithms TEC, AFP, and IQR as those algorithms can handle NULL values.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Replace</strong>: Replace NULL values with different values. The default value is 0. You can use this option for all algorithms.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Remove</strong>: Remove rows with NULL values from the data set. You can use this option for all algorithms.</td>
</tr>
</tbody>
</table>

For more information about all algorithms, see [Algorithms for Equipment Health Indicators](#) [page 284].
### Field

<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labels</td>
<td>-</td>
<td>Define whether you want to include labels in your data set to predict upcoming failures. A label indicates a failure or no failure for each row in the data set. You can choose from the following options:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- None: No labels are included in the data set.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Alerts: Include alerts as failures in the data set.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Notifications: Include notifications as failures in the data set.</td>
</tr>
</tbody>
</table>

**iNote**

You need to use labeling for the following algorithms of the learner type **CLASSIFICATION**:

- Logistic Regression (LOR)
- Tree Ensemble Classifier (TEC)
- Automatic Failure Prediction (AFP)

For more information about these algorithms, see *Algorithms for Equipment Health Indicators* [page 284].

---

### 6.1.2 Calculation of Features

Depending on how many features you want to add to a data set, it is important to know how the maximum number of features is calculated. This topic provides you with an overview of how features are calculated including examples.

#### Calculation

The maximum number of features is based on the bucket size per added feature. The bucket size is calculated by the aggregation period divided by the step size. For the maximum number of features, all bucket sizes are aggregated over all added features. The allowed maximum sum is 2100.
Overall, the following calculation applies:

**Maximum number of features = (Sum of bucket sizes (aggregation period/step size) over all added features) \(<\) 2100**

This means, depending on the bucket size, you can add more or less features. If you have a bucket size of 1, you can add 2100 features to the data set. If you have a greater bucket size, you can add less features to the data set. A bucket size of 2100 only allows you to add one feature to the data set.

### Examples

The following examples show you some feature calculations based on different bucket sizes:

#### Bucket Size = 1

- **Example**

  You have added 200 features with a bucket size of 1 as follows:

<table>
<thead>
<tr>
<th>Aggregation Period</th>
<th>Step Size</th>
<th>Bucket Size</th>
<th>Added Features</th>
<th>Feature Calculation</th>
<th>Allowed / Not Allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Minutes</td>
<td>2 Minutes</td>
<td>(2/2) = 1</td>
<td>200</td>
<td>(1x200) = 200</td>
<td>Allowed</td>
</tr>
</tbody>
</table>

- **Example**

  You have added 500 features with a bucket size of 1 as follows:

<table>
<thead>
<tr>
<th>Aggregation Period</th>
<th>Step Size</th>
<th>Bucket Size</th>
<th>Added Features</th>
<th>Feature Calculation</th>
<th>Allowed / Not Allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Day</td>
<td>1 Day</td>
<td>(1/1) = 1</td>
<td>500</td>
<td>(1x500) = 500</td>
<td>Allowed</td>
</tr>
</tbody>
</table>

#### Bucket Size = 1 and > 1

- **Example**

  You have added 650 features with a bucket size of 1 and greater than 1 as follows:

<table>
<thead>
<tr>
<th>Aggregation Period</th>
<th>Step Size</th>
<th>Bucket Size</th>
<th>Added Features</th>
<th>Feature Calculation</th>
<th>Allowed / Not Allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 Hours</td>
<td>1 Hour</td>
<td>(18/1) = 18</td>
<td>25</td>
<td>(18x25+1x200) = 650</td>
<td>Allowed</td>
</tr>
<tr>
<td>1 Hour</td>
<td>1 Hour</td>
<td>(1/1) = 1</td>
<td>200</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Bucket Size > 1

- **Example**

  You have added 800 features with a bucket size greater than 1 as follows:
<table>
<thead>
<tr>
<th>Aggregation Period</th>
<th>Step Size</th>
<th>Bucket Size</th>
<th>Added Features</th>
<th>Feature Calculation</th>
<th>Allowed / Not Allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Hours</td>
<td>1 Hour</td>
<td>(4/1) = 4</td>
<td>200</td>
<td>(4x200) = 800</td>
<td>Allowed</td>
</tr>
<tr>
<td>200 Hours</td>
<td>1 Hour</td>
<td>(200/1) = 200</td>
<td>10</td>
<td>(4x200+200x10)</td>
<td>Not allowed</td>
</tr>
</tbody>
</table>

**Example**

You have added 200 features with a bucket size greater than 1 as follows:

<table>
<thead>
<tr>
<th>Aggregation Period</th>
<th>Step Size</th>
<th>Bucket Size</th>
<th>Added Features</th>
<th>Feature Calculation</th>
<th>Allowed / Not Allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Hours</td>
<td>1 Hour</td>
<td>(4/1) = 4</td>
<td>200</td>
<td>(4x200+200x10)</td>
<td>Not allowed</td>
</tr>
</tbody>
</table>

### 6.2 Managing Models for Equipment Health Indicators

This topic describes how to manage models for equipment health indicators.

#### Prerequisites

The role `DataScienceUser` or the two roles `DataScienceUser` and `DataScienceRead` are assigned to your user.

**Note**

If the required role or roles are not assigned to your user, you cannot see the application on the launchpad. Contact your Identity Management Administrator if the role or roles have not been assigned to your user yet.

#### Context

To calculate the health status and predict failures for your equipment, you need to configure, train, and score models in the `Health Indicator Model Management` application.

#### Procedure

1. To train and score a model, you first need to configure a model. For more information, see Configuring a Model [page 277].
2. Once you have configured a model, you can train it. For more information, see Training a Model [page 323].
3. Once you have trained a model, you can use the latest trained model to score data. For more information, see Scoring a Model [page 329].

6.2.1 Configuring a Model

This topic describes how to configure models for equipment health indicators.

Prerequisites

At least one data set has been configured in the Health Indicator Data Set Configuration application.

Context

To train and score a model, you first need to configure a model.

Procedure

1. On the SAP Fiori launchpad, go to the Machine Learning Engine group and open the Health Indicator Model Management application.
2. To configure a model, you can choose between the following options:
   ○ Configure a new model based on an existing model: Select the base model and choose Copy. The new model contains all settings of the base model.
   ○ Configure a new model from scratch: Choose .
     The New Model screen is displayed.
3. Fill in all required fields in the General Information and Algorithm sections. For more information, see Fields for Configuring a Model [page 278].
4. Save your model.

Results

Your model is configured and added to the Models pane.

If you have configured multiple models and you want to get information about a specific model, select the model from the Models pane and use the URL of the selected model to directly link to this model.
### 6.2.1.1 Fields for Configuring a Model

**General Information**

<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Name</td>
<td>x</td>
<td>Enter a name for the model.</td>
</tr>
<tr>
<td>Description</td>
<td></td>
<td>Enter a description for the model.</td>
</tr>
<tr>
<td>Tags</td>
<td></td>
<td>Add tags to the model that you can later use to filter and organize your models. To add a tag, enter a value for the tag and press <code>ENTER</code>.</td>
</tr>
</tbody>
</table>

**i Note**

You can use the following characters:
- Uppercase or lowercase letters from a to z
- Numbers
- Hyphens
- Underscores
<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training Input</td>
<td>x</td>
<td>Select the data set that you want to use to train the model. You can choose from all configured data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To view details about the selected data set, choose ![image]. The data set with its details is then displayed in the Health Indicator Data Set Configuration application in a new tab.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Below the selected data set, the equipment model for the data set including all related equipment is displayed. You can filter the equipment by choosing ![image]. To delete filters, you can delete each filter individually or delete all filters together by choosing ![image].</td>
</tr>
<tr>
<td>Scoring Input</td>
<td>x</td>
<td>Select the data set that you want to use to score the model. You can use the pre-selected data set from the training input or select a different data set and choose from all configured data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>i Note</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The data set is only preselected when you configure a new model, not when you edit or copy a model.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To view details about the selected data set, choose ![image]. The data set with its details is then displayed in the Health Indicator Data Set Configuration application in a new tab.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Below the selected data set, the equipment model for the data set including all related equipment is displayed. You can filter the equipment by choosing ![image]. To delete filters, you can delete each filter individually or delete all filters together by choosing ![image].</td>
</tr>
<tr>
<td>Field</td>
<td>Mandatory</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Independent Variables</strong></td>
<td>x</td>
<td>Select the variables that you want to use as the column names for the model input. The independent variables are derived from the selected indicators and aggregation functions of the configured data set. You can select each independent variable individually or select all available independent variables together by choosing () (). To clear the selection, choose ().</td>
</tr>
</tbody>
</table>
## Algorithm

<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algorithm Name</td>
<td>x</td>
<td>Select the algorithm that you want to use to train and score the model. You can choose from the following predefined algorithms:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Earth Mover’s Distance (EMD)</strong> Distance-based failure analysis using Earth Mover’s Distance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Logistic Regression (LOR)</strong> Logistic Regression for Failure Prediction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>One Class Support Vector Machine (SVM)</strong> One-Class Support Vector Machine for anomaly detection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Multivariate Autoregression (MAR)</strong> Anomaly detection using Multivariate Autoregression</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Principal Component Analysis (PCA)</strong> Anomaly detection with Principal Component Analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Tree Ensemble Classifier (TEC)</strong> Failure prediction using Tree Ensemble Classifier</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Interquartile Range (IQR)</strong> Anomaly detection using Interquartile Range</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Automatic Failure Prediction (AFP)</strong> Failure prediction using Automatic Failure Prediction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Automatic Anomaly Detection (AAD)</strong> Anomaly detection using Automatic Anomaly Detection</td>
</tr>
</tbody>
</table>

For more information about the algorithms, see Algorithms for Equipment Health Indicators [page 284].

<p>| Namespace      | x         | Displays the namespace of the selected algorithm in which the model is created. The namespace for all predefined algorithms is <code>com.sap.iot.mle</code>. |</p>
<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learner Type</td>
<td>x</td>
<td>Displays the type of the selected algorithm. Depending on the algorithm you have selected, one of the following learner types is displayed:</td>
</tr>
</tbody>
</table>
|           |           | - **CLASSIFICATION**  
|           |           |   This learner type is used to predict a category, for example, to classify between good and defective.  
|           |           |   Dependent variable: Mandatory |
|           |           | - **REGRESSION**  
|           |           |   This learner type is used to predict a value, for example, a health score.  
|           |           |   Dependent variable: Mandatory |
|           |           | - **SURVIVAL**  
|           |           |   This learner type is used to predict the expected length of time until a certain event, such as the breakdown of a piece of equipment, will happen.  
|           |           |   Dependent variable: Mandatory |
|           |           | - **RULES**  
|           |           |   This learner type is used to include rules in the machine learning process.  
|           |           |   Dependent variable: Not allowed |
|           |           | - **UNSUPERVISED**  
|           |           |   This learner type is used to organize data or to describe its structure.  
|           |           |   Dependent variable: Not allowed |
|           |           | - **OTHER**  
|           |           |   Dependent variable: Optional |

Application Help for SAP Predictive Asset Insights

Machine Learning Engine
<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable</td>
<td>-</td>
<td>Select the variable or attribute that you want to train and score on. The dependent variables are derived from the selected indicators and aggregation functions of the configured data set.</td>
</tr>
<tr>
<td><strong>i Note</strong></td>
<td></td>
<td>Depending on the algorithm that you have selected, this field is displayed or hidden.</td>
</tr>
<tr>
<td><strong>i Note</strong></td>
<td></td>
<td>The dependent variable must differ from the independent variables.</td>
</tr>
<tr>
<td>&lt;Algorithm&gt; Parameters</td>
<td>-</td>
<td>Displays the parameters of the selected algorithm with their default values. For more information about the parameters of each algorithm, see Algorithm-Specific Parameters [page 303]. You can use the predefined values of the parameters or overwrite the values. To define a new value, enter the value and press <strong>ENTER</strong>.</td>
</tr>
<tr>
<td><strong>i Note</strong></td>
<td></td>
<td>If you have selected the algorithms <strong>Automatic Failure Prediction (AFP)</strong> or <strong>Automatic Anomaly Detection (AAD)</strong>, no parameters are displayed. These algorithms find the most suitable parameters and values for the provided data set in the background.</td>
</tr>
</tbody>
</table>
### Field: Output Mappings

Mandatory: x

Description: Displays the outputs of the selected algorithm. For more information about the outputs of each algorithm, see Algorithm-Specific Outputs [page 319].

Select an indicator for an output. Each indicator belongs to an indicator group.

**i Note**

Consider the following:
- You need to select an indicator for at least one output.
- Only indicators that meet all the following requirements are displayed for the selection:
  - The indicators have the data type Numeric or NumericFlexible.
  - The indicator and the output have the same dimension or the output has the dimension ANY.

---

### 6.2.1.2 Algorithms for Equipment Health Indicators

**Anomaly Detection with Principal Component Analysis**

**Use Case**

Before you explore the details of anomaly detection with principal component analysis (PCA), you should first know when to use this algorithm. A typical use case would be the following:

**Example**

A railway operator uses sensors in locomotives. Four motors each have four temperature sensors. If the motors are working correctly, all 16 sensors send data about a synchronous increase or decrease of temperature. PCA notes when this behavior changes. You would use this algorithm to monitor this behavior and to detect if sensors send temperature data that differ from other sensors, which might indicate that a motor is damaged and needs to be maintained.

For more information, see Anomaly Detection with Principal Component Analysis (PCA) [page 288].
Distance-Based Failure Analysis Using Earth Mover’s Distance

Use Case

Before you explore the details of distance-based failure analysis using earth mover’s distance (EMD) as known in computer science (also known as the Wasserstein metric in mathematics), you should first know when to use this algorithm. A typical use case would be the following:

Example

An airplane contains electric devices that have batteries inside. These electric devices are equipped with at least two sensors that send data. Sensor A sends data about measurements of electric current, sensor B sends data about voltage measurements. An electric device could also have a sensor C that sends data about temperature measurements. The data sent by the three sensors not only depends on the electric device itself, but also on other factors that affect the electric device and its batteries. These factors could be the weather conditions at heights of several kilometers, how often the device is used in the cockpit, under which conditions the pilot uses the device, and so on. It is therefore normal that data sent from the three sensors might vary around a certain mean score. The data from each sensor can be visualized in a one-dimensional histogram. For multidimensional visualizations, scatterplots are used. This visualization is like a fingerprint of each battery in the airplane. To compare the sensor data of different batteries without looking at and comparing each visualization, a distance measure for probability distributions is needed. One of these measures is the Wasserstein metric, or EMD. It can be used to measure deviation from a known good reference fingerprint of a battery, or to measure differences between several batteries of the same type, for example.

For more information, see Distance-Based Failure Analysis Using Earth Mover’s Distance (EMD) [page 290].

Anomaly Detection Using Multivariate Autoregression

Use Case

The algorithm for multivariate autoregression (MAR) can detect dependencies between different kinds of sensors even if the influence of one sensor by another one is delayed over time.

Example

An example might be the changes in the outflow temperature of a system, which after a while is also reflected in the inflow temperature of a downstream system. MAR can handle different kinds of sensor values, and autonomously ranks their influence on each other. The algorithm can therefore handle noisy or random signals.

MAR produces good results if abnormal behavior is detected for systems with various different kinds of sensors that (partly) depend on and influence each other.

For more information, see Anomaly Detection Using Multivariate Autoregression (MAR) [page 292].
**Failure Prediction Using Tree Ensemble Classifier**

**Use Case**
The TEC algorithm can be used whenever the following applies:

- The goal is to predict failure of a system under investigation.
- Historical sensor data or feature records for the system or a similarly behaving system are available.
- Feature records include labels for each record whether or not the record corresponds to a failing system.

**Example**
For a rotating engine, sensors measure vibrations at different positions of the housing. A frequency analysis of these vibrations has been performed and, as a result, an SAP HANA fusion view (only valid for on-premise edition) has been created. This fusion view contains several calculated columns per sensor that express the strength of certain characteristic frequencies of the equipment within the vibrations. From an algorithm point of view, these columns represent the features. In this setting, the TEC algorithm can be used to learn to distinguish unhealthy from healthy vibration patterns from historical labeled data. That is data that includes one additional column specifying whether the system was healthy or not at the time in the past when the vibrations were observed. The model created by TEC can then be applied to detect engine problems early on.

For more information, see *Failure Prediction Using Tree Ensemble Classifier (TEC)* [page 294].

**One Class Support Vector Machine (SVM) for Anomaly Detection**

**Use Case**
Before you explore the details of SVM, you should first know when to use this algorithm. A typical use case would be the following:

**Example**
In an aircraft, the turbines’ condition is monitored using sensors measuring values such as temperature and air flow. Sensor records from flights where the aircraft’s turbines are known to have worked correctly are used to train One-Class-SVM models for different operating modes such as take-off, landing, or constant cruise. Using these models, it can be told whether an aircraft turbine of the former type is running properly, needs repair, or maybe even needs to be replaced.

For more information, see *One Class Support Vector Machine (SVM) for Anomaly Detection* [page 296].

**Logistic Regression for Failure Prediction**

**Use Case**
Logistic regression (LOR) for failure prediction can be used whenever the following applies:

- The goal is to predict failure of a system under investigation.
Historical sensor data or feature records for the system or a similarly behaving system are available.
Feature records include labels for each record whether or not the record corresponds to a failing system.

Example

The job of an ATS box is to capture and burn off (regenerate) the particulate matter (soot) in the engine’s exhaust gas. When an ATS box is replaced, a primary failed part is identified which may either be the ATS box itself or an upstream component. In this case, the logistic regression can be used to predict if the process is still okay or near to failing, and what the main influencers are, that is if the ATS box or some upstream component is the problem.

For more information, see Logistic Regression (LOR) for Failure Prediction [page 298].

Anomaly Detection Using Interquartile Range

Use Case

Before you explore the details of anomaly detection using interquartile range (IQR), you should first know when to use this algorithm. A typical use case would be the following:

Example

You want to monitor a motor using a sensor measuring its temperature. If the motor is too cold, it is not operating efficiently and an overheating of the motor should also be avoided. The algorithm automatically determines thresholds for the normal range of the sensor and can identify issues based on the sensor being out of range.

For more information, see Anomaly Detection Using Interquartile Range (IQR) [page 299].

Failure Prediction Using Automatic Failure Prediction

Use Case

Failure prediction using automatic failure prediction (AFP) can be used whenever the following applies:

- The goal is to predict failure of a system under investigation.
- Historical sensor data or feature records for the system or a similarly behaving system are available.
- Feature records include labels for each record whether or not the record corresponds to a failing system.

Example

You monitor a pump within a production process by the use of multiple sensors such as pressure, voltage, and temperature. By using automatic failure prediction, you create a model that uses data from the different sensors to predict breakdowns of the pump.

For more information, see Failure Prediction Using Automatic Failure Prediction (AFP) [page 300].
Anomaly Detection Using Automatic Anomaly Detection

Use Case

Before you explore the details of anomaly detection using automatic anomaly detection (AAD), you should first know when to use this algorithm. A typical use case would be the following:

Example

You want to monitor a welding robot using multiple sensors measuring its current, voltage, and resistance. By using the algorithm, an anomaly detection model is created from the sensors. By monitoring the behavior of the sensors, anomalies are detected that can indicate a potential failure.

For more information, see Anomaly Detection Using Automatic Anomaly Detection (AAD) [page 301].

6.2.1.2.1 Anomaly Detection with Principal Component Analysis (PCA)

The principal component analysis (PCA) can be used to detect anomalies in multivariate sensor data.

What Does the Algorithm Do?

The algorithm basically transforms data readings from an existing coordinate system into a new coordinate system. This concept is depicted in the following sequence of graphics:
3. The closer data readings are to the center of the new coordinate system, the closer these readings are to an optimum value.

**Model Configuration**

To configure a model for anomaly detection with PCA, use the *Health Indicator Model Management* application. For more information, see *Managing Models for Equipment Health Indicators* [page 276].

**Data Preparation for Model Training and Scoring**

Do not use all observations for model training. Rather, use observations from known equipment with normal behavior for the model training instead of random observations where possible. A small amount of abnormal data normally has no effect on the model performance.

This algorithm cannot handle missing values in a data set. If your data set contains such NULL values, you cannot train and score your model. To train and score your model, you need to remove or replace existing NULL values by using the NULL value strategy. For more information, see *Fields for Configuring a Data Set* [page 273].

**Model Training**

Model training for PCA means calculating the eigenvectors and eigenvalues of the covariance matrix of the training data.

**i Note**

The model size depends only on the number of dimensions (that is, the sensors) that go into the model, not on the number of training examples.
Depending on the individual use case, PCA can be applied to any kind of reading, be it one-second-interval readings of sensors or aggregated sensor readings.

To train a model for anomaly detection with PCA, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

After a training, a model summary of the trained model is displayed in the Trainings table. For more information, see Model Summary [page 327].

Model Scoring

Anomaly Score
The anomaly score is calculated using the Mahalanobis distance between a sensor reading and the mean of all readings, which is the center of the transformed coordinate system.

Smoothing
In some cases, anomaly scores can be high but only for a few seconds. This phenomenon is not usually critical, and can represent normal behavior (if a machine is started, for example). Smoothing algorithms added to the anomaly score prevent anomaly alerts caused by sporadic anomalies. The smoothing of algorithms is done using the running median.

To score a model for anomaly detection with PCA, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

6.2.1.2.2 Distance-Based Failure Analysis Using Earth Mover’s Distance (EMD)

What Does the Algorithm Do?

To explain what the algorithm does, we can use a figurative example: The algorithm solves a linear optimization problem, in this case a transportation problem. Suppose you want to transform a sandcastle A into a sandcastle B. Both sandcastles consist of the same amount of sand. EMD measures how much sand you have to transport across which distance. The algorithm compares the locations of both sandcastles: Are they located close to each other, or does the sand have to be transported a long way from sandcastle A to sandcastle B? The algorithm also compares how the two sandcastles are shaped, for example. If they have a similar shape, no or little rebuilding work needs to be done. If their shapes differ significantly, considerable effort is required to rebuild sandcastle A so that it looks like sandcastle B. The conclusion is that the closer and more similar the sandcastles are, the lower the work effort and transport costs are.

Similar to the example, the histogram of a battery A, for example, is compared to the histogram of a well functioning battery B. The lower the score calculated with EMD, the more similar the histograms are (battery A is working like battery B). The higher the score, the more different the histograms are.
Model Configuration

To configure a model for distance-based failure analysis using earth mover's distance, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

Data Preparation for Model Training and Scoring

Before training and scoring, data scientists need to configure a model. In the configuration, they need to specify the names of one or more columns that contain values by which the data need to be grouped. These grouping columns are used for scoring. You can define as many grouping columns as required for your business case. The grouping columns are included in scoring only. In training, the grouping columns are used to exclude these columns from training.

This algorithm cannot handle missing values in a data set. If your data set contains such NULL values, you cannot train and score your model. To train and score your model, you need to remove or replace existing NULL values by using the NULL value strategy. For more information, see Fields for Configuring a Data Set [page 273].

Model Training

To train a model for distance-based failure analysis using earth mover's distance, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

After a training, a model summary of the trained model is displayed in the Trainings table. For more information, see Model Summary [page 327].

Model Scoring

To score a model for distance-based failure analysis using earth mover's distance, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].
6.2.1.2.3 Anomaly Detection Using Multivariate Autoregression (MAR)

A multivariate autoregressive model can be used to detect anomalies in a univariate or multivariate series of sensor data records varying over time.

What Does the Algorithm Do?

Based on the training data, which in this case is a time series of data records, the algorithm trains a model. If trained on regular data (data without anomalies present), the model is capable of learning the regular behavior of a system. Based on a window of recently observed data records, the model can then predict the data record for one time step into the future. Once the actual values for this point in time are available, the model prediction can be compared to the actual observations. An anomaly score is then assigned based on the distance between the prediction and the observation. If large deviations appear, this can indicate abnormal behavior of the underlying system.

The following graphic illustrates the predictive model for one input variable:

---

**i Note**

The implemented algorithm computes one multivariate predictive model per input variable, and aggregates the deviations for the equipment from each model.
**Model Configuration**

To configure a model for multivariate autoregression, use the *Health Indicator Model Management* application. For more information, see *Managing Models for Equipment Health Indicators* [page 276].

**Data Preparation for Model Training and Scoring**

This algorithm cannot handle missing values in a data set. If your data set contains such NULL values, you cannot train and score your model. To train and score your model, you need to remove or replace existing NULL values by using the NULL value strategy. For more information, see *Fields for Configuring a Data Set* [page 273].

For a correct training and scoring, the number of records in the provided data time series used for training needs to be at least $window.size + 1$ per group (typically per piece of equipment).

> **Tip**

For more robust models and, thus, more reliable anomaly scores, we recommend using a training data size at least one or two orders of magnitude larger than the window size.

> **Tip**

We generally recommend creating one distinct model per group of input variables for which a tight, time-varying dependency can be assumed, rather than modeling a joint model of all input variables.

> **Example**

An example of a tightly coupled group of input variables could be battery voltage and charging current for the system of a rechargeable battery.

> **Tip**

If it is clear from the system context that the sensor dependency is directed (the battery voltage is influenced by the charging current, but the charging current is typically not directly influenced by battery voltage), we recommend specifying prediction targets (battery voltage in this example) manually using the corresponding model-specific parameters.

**Model Training**

To train an MAR model, the provided data is used to fit one autoregressive multivariate linear model for each target variable. By default, each provided input variable is also a target variable, but the model-specific parameter `target.columns` can be used to select only specific input variables as target variables.

To train a model for multivariate autoregression, use the *Health Indicator Model Management* application. For more information, see *Managing Models for Equipment Health Indicators* [page 276].
After a training, a model summary of the trained model is displayed in the *Trainings* table. For more information, see Model Summary [page 327].

**Model Scoring**

Scoring is applied to a series of `window.size + 1` consecutive records referring to the order of their timestamps. The first `n` of these records are used as input for the linear models established during training to produce predictions for each target of the record number `window.size + 1`.

Each prediction is compared to the actual values of the first `window.size + 1` record. An anomaly score is derived based on the distance between predictions and observations, and on other influencing factors such as model uncertainty.

To score a model for multivariate autoregression, use the *Health Indicator Model Management* application. For more information, see Managing Models for Equipment Health Indicators [page 276].

### 6.2.1.2.4 Failure Prediction Using Tree Ensemble Classifier (TEC)

Based on records of sensor data, a tree ensemble model can learn to predict future system failures from past failures.

**What Does the Algorithm Do?**

The algorithm trains a boosted decision tree model, which is a series of decision trees, that encodes characteristics of data records with regards to failure. Based on the values of features of a given data record, the model is trained in such a way that each tree can decide which set of record groups the given record belongs to. An appropriate weight is then assigned to each record, indicating evidence for or against the record belonging to a failing system. The model aggregates the evidence weights of all trees and outputs a probability of failure. Thus, the model reflects the certainty that the given data record is an indication of a failing system.
The following graphic illustrates the tree ensemble model created by the algorithm:

### Model Configuration

To configure a model for the tree ensemble classifier, use the *Health Indicator Model Management* application. For more information, see *Managing Models for Equipment Health Indicators* [page 276].

### Data Preparation for Model Training and Scoring

This algorithm is a supervised learning method. This means that it requires training data records featuring a column that indicates for each record whether a record belongs to a regular or a failing system.

### Model Training

Model training for TEC means using the provided historical training data to learn the following:

- A series of decision trees, including decision thresholds
- Evidence weights
- An appropriate mapping of weights to probabilities of failure that represents the training data well

Together, these make up the model as referred to in the context of this algorithm.

The aim is to find a model that well represents the data set used for training. Internally, this algorithm splits the data into a train and test set, using 90% of the data for the training. After a training, quality metrics calculated
on the test set are displayed in a model summary in the *Trainings* table. For more information, see *Model Summary* [page 327].

The contribution of each feature (independent variable) of a trained model, i.e. the feature importance, can be found in the *Log Summary* in the *Trainings* table.

To train a model for the tree ensemble classifier, use the *Health Indicator Model Management* application. For more information, see *Managing Models for Equipment Health Indicators* [page 276].

### Model Scoring

To score a record, the TEC model determines for each decision tree the group that the record belongs to based on the feature values of this record. Next, the assigned evidence weights of each tree are aggregated for this record.

#### Example

Referring to the graphic above, these weights could be -41.83 (taken from group 1.4 of tree 1), and -99.04 (taken from group 2.2 of tree 2). Which weights of a tree are aggregated depends on the decision result of a tree.

To score a model for the tree ensemble classifier, use the *Health Indicator Model Management* application. For more information, see *Managing Models for Equipment Health Indicators* [page 276].

### 6.2.1.2.5 One Class Support Vector Machine (SVM) for Anomaly Detection

#### What Does the Algorithm Do?

In order to identify anomalous behaviour of equipment, the current sensor values of this particular piece of equipment are compared with sensor values of a period when the equipment is working correctly. This is done by training a model using sensor data from when the equipment was working correctly, which is then used to classify the current sensor values as normal or anomalous accordingly.

An n-dimensional set of data points, considered as normal by the user, is supplied to the algorithm. The algorithm classifies the data by spatially separating the region containing the set from the rest of the n-dimensional space. This, in most of the cases, is done by finding a hyperplane in a higher dimensional space, which is enclosing the data when projecting back to the initial n dimensions. The hyperplane is characterized by so-called support vectors, lying at the edge of enclosed region of as normal classified data. If a new data point needs to be classified, the distance between the data point and any of the support vectors is computed. From this, it can uniquely be told whether the data point lies within the region of normal data, so is a member of the learned ‘normal’ class, or is anomalous.
Model Configuration

To configure a model for this type of anomaly detection, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

Data Preparation for Model Training and Scoring

This algorithm cannot handle missing values in a data set. If your data set contains such NULL values, you cannot train and score your model. To train and score your model, you need to remove or replace existing NULL values by using the NULL value strategy. For more information, see Fields for Configuring a Data Set [page 273].

Model Training

To train a model for this type of anomaly detection, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

Important Note

The Support Vector Machine algorithm is sensitive to the number of rows in training data. The run time of the training methods exponentially grows with the number of rows of input data. While for a data set with ten columns and 10k rows training takes about 15 sec, training on a table with ten columns and 100k rows already takes more than half an hour. On the other hand, SVM has performance advantage in case of increased number of features, which is columns.

After a training, a model summary of the trained model is displayed in the Trainings table. For more information, see Model Summary [page 327].

Model Scoring

To score a model for this type of anomaly detection, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].
6.2.1.2.6 Logistic Regression (LOR) for Failure Prediction

What Does the Algorithm Do?

This algorithm uses logistic regression to perform supervised binary classification, meaning the algorithm is able to predict either 0 or 1 corresponding to a healthy or unhealthy state. Logistic regression, similar to Tree Ensemble Classification, can be used to either predict the likeliness of an failure, or the need for maintenance, based on historic sensor data as well as information indicating if there was a maintenance or failure, or not.

The algorithm fits a multi-dimensional logistic function to the input data. For this, a label column, specified as dependent, is required containing only the values 0 and 1. The logistic function gets fitted to these values, using the predictor values as arguments. In scoring, the value of the fitted function obtained during training is computed. This value is interpreted as failure probability. Each data with a score larger than the cutoff is classified as 1, otherwise 0.

Model Configuration

To configure a model using LOR, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

Data Preparation for Model Training and Scoring

This algorithm cannot handle missing values in a data set. If your data set contains such NULL values, you cannot train and score your model. To train and score your model, you need to remove or replace existing NULL values by using the NULL value strategy. For more information, see Fields for Configuring a Data Set [page 273].

Model Training

Internally, this algorithm splits the data into a train and test set, using 90% of the data for the training. After a training, quality metrics calculated on the test set are displayed in a model summary in the Trainings table. For more information, see Model Summary [page 327].

To train a model using LOR, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].
Model Scoring

To score a model using LOR, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

6.2.1.2.7 Anomaly Detection Using Interquartile Range (IQR)

What Does the Algorithm Do?

This algorithm uses the interquartile range test for determining anomalies on univariate timeseries. During the training, the normal range is determined for each piece of equipment by using the interquartile range (upper quartile − lower quartile). The interval between lower quartile − n * inter-quartile range and upper quartile + n * interquartile range is considered as the normal range. All data points in this range receive scores between 0 and 1. All data points outside that range receive scores greater than 1.

Model Configuration

To configure a model for anomaly detection using IQR, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

Data Preparation for Model Training and Scoring

Only one independent variable may be used in this algorithm.

Model Training

To train a model for anomaly detection using IQR, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

After a training, a model summary of the trained model is displayed in the Trainings table. For more information, see Model Summary [page 327].
Model Scoring

To score a model for anomaly detection using IQR, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

*i Note
If the trained model is based on a constant value, a deviating value from this constant receives an infinite value in scoring. In this case, the value is set to MAX_FLOAT.

6.2.1.2.8 Failure Prediction Using Automatic Failure Prediction (AFP)

Based on records of sensor data, a tree ensemble model can learn to predict future system failures from past failures.

What Does the Algorithm Do?

This algorithm uses a black box approach to learn a classification model for failure prediction.

Model Configuration

To configure a model for failure prediction using AFP, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

Data Preparation for Model Training and Scoring

This algorithm is a supervised learning method. This means that it requires training data records featuring a column that indicates whether each record belongs to a regular or a failing system.

Model Training

Model training for AFP means using the provided historical training data to learn a classification model for failure prediction.

The aim is to find a model that well represents the data set used for training. Internally, this algorithm splits the data into a train and test set, using 90% of the data for the training. After a training, quality metrics calculated
on the test set are displayed in a model summary in the *Trainings* table. The algorithm may also generate additional features (independent variables) internally based on the training data. After the training, these may also appear in the model summary. For more information about the model summary, see *Model Summary* [page 327].

To train a model for failure prediction using AFP, use the *Health Indicator Model Management* application. For more information, see *Managing Models for Equipment Health Indicators* [page 276].

**Model Scoring**

To score a record, the model found in the training is applied to the scoring data.

The result contains information on whether the equipment is likely to fail and the probability of failure.

This algorithm may also generate additional features (independent variables) internally based on the scoring data. After the scoring, these may appear in the log summary.

To score a model for failure prediction using AFP, use the *Health Indicator Model Management* application. For more information, see *Managing Models for Equipment Health Indicators* [page 276].

### 6.2.1.2.9 Anomaly Detection Using Automatic Anomaly Detection (AAD)

**What Does the Algorithm Do?**

This algorithm trains and scores multiple anomaly detection models and compares their score distribution to find the most appropriate unsupervised anomaly detection model. The model that best separates anomalies from normal behavior is considered the most appropriate unsupervised anomaly detection model.

The following graphic illustrates the difference between an inappropriate and appropriate anomaly detection model. In the diagram of the inappropriate anomaly detection model, the scores are overlapped and a
separation of anomalies from normal scores is not possible. In the diagram of the appropriate anomaly detection model, the scores are split and anomalies can be separated from normal data:

Model Configuration

To configure a model for anomaly detection using AAD, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

Data Preparation for Model Training and Scoring

For the model training, use training data that includes normal data and anomalies. The percentage of the included anomalies is assumed to be a maximum of 10%.

This algorithm cannot handle missing values in a data set. If your data set contains such NULL values, you cannot train and score your model. To train and score your model, you need to remove or replace existing NULL values by using the NULL value strategy. For more information, see Fields for Configuring a Data Set [page 273].

Model Training

To train a model for anomaly detection using AAD, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

After a training, a model summary of the trained model is displayed in the Trainings table. For more information, see Model Summary [page 327].
Model Scoring

To score a model for anomaly detection using AAD, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 276].

6.2.1.3 Algorithm-Specific Parameters

Depending on the algorithm that you have selected, different parameters are displayed. The following sections provide you with an overview of the parameters with their descriptions and default values, sorted by the algorithms:

**Note**

If you have selected the algorithms **Automatic Failure Prediction (AFP)** or **Automatic Anomaly Detection (AAD)**, no parameters are displayed. These algorithms find the most suitable parameters and values for the provided data set in the background.
# Earth Mover’s Distance (EMD)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| number.of.cores   | Number of cores to use during scoring. Choosing a number higher than 1 to utilize multi-threaded implementation is recommended only if you have large enough data and the performance of your runtime or memory is critical for your use case:  
  - Multi-threaded implementation pays off with respect to training runtime, for example, for data sets of 10,000 rows and 25 columns, or for data sets of 100,000 rows and 10 columns. Therefore, multi-threaded implementation can make sense only for similarly sized or larger training data sets.  
  - However, while the training runtime decreases significantly, the parallel implementation causes slightly increased scoring runtimes. For this reason, parallel implementation is recommended only if you consider the performance of training jobs, which are asynchronous tasks, to be performance-critical for your use case, depending also on how often performance of your runtime or memory is not considered critical, the single-threaded implementation is recommended (number.of.cores = 1).  
  The default value is 1. |
| bins              | The number of bins to use in each dimension to generate the histogram. By default, bins are created such that the minimum and maximum reading of each sensor come to lie at the center of the lowest or highest bin respectively, and linearly equi-spaced bins are created in each dimension.  
  Positive integer for discretization that is not zero. The default value is 20. |
| group.by          | Column name of data to be excluded in contingency table computation. It contains the name(s) of the column(s) used for grouping data. This parameter is mandatory.  
  The default value is Equipment. |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| normalizer.type     | The type of normalizer that should be applied to the scores calculated by the algorithm. The default value is **quantile**. Allowed values are:  
  - Quantile (default)  
    Internally calculates an effective threshold value based on the training data. Raw scores and normalized scores are generated.  
  - Threshold  
    Uses the given value. Raw scores and normalized scores are generated.  
  - None  
    Does not do any normalization of the values. Only raw scores are generated.  
  
  **Note**  
  For more information about the normalization of scores, see Normalization of Scores [page 316].                                                                                                                                                                                                                                       |
| normalizer.value    | The value used for the normalization. For quantile, a value between 0 and 1 is valid; for threshold, a value larger than 0. The default value is **0.99**.                                                                                                                                                                               |
| alignment.interval  | The parameter is used by the algorithm to bucket given timestamps into intervals that are then treated as one group of data. The value is given in minutes where -0 (default) means that no alignment is done, and the timestamps are treated as they are. A value of 1 means, that all timestamps are bucketed into 1-minute intervals, meaning timestamps of the same minutes are grouped together. After that, based on the updated timestamps, the distribution of each timestamp group is calculated and compared with the distribution of a normal state of the equipment.  
  The default value is **0**.  
  
  **Note**  
  To use this parameter, enter **Timestamp** as a value in the **group.by** parameter in addition to a value in the **alignment.interval** parameter. Otherwise, the scores are not calculated by the **alignment.interval** parameter.                                                                                                                                                        |
### Logistic Regression (LOR)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cutoff</td>
<td>Cutoff for the binary classes. Data with score below is classified 0, above is classified 1. The default value is 0.5.</td>
</tr>
</tbody>
</table>

### One Class Support Vector Machine (SVM)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>nu</td>
<td>This parameter is an upper bound on the fraction of margin errors and a lower bound of the fraction of support vectors relative to the total number of training samples. Nu specifies the fraction of training data to be misclassified during training. Therefore, you should choose nu equal to the fraction of data you assume to be anomalous. The default value is 0.01.</td>
</tr>
</tbody>
</table>

**i Note**

As nu specifies the fraction of training samples which you assume to be outliers and, for normalizer.type, normalizer.value specifies the fraction of training samples which you assume to be normal, these two values should always add up to one. If you set nu to 0.01, you are advised to set the normalizer.value to 0.99 if you use the normalizer.type quantile.

<p>| gamma     | This parameter controls the influence of individual training samples, which effects the smoothness of the model. A low value improves the smoothness and generalizability of the model. A high value reduces it, but makes the model tighter-fitted to the training data. The default value is 0.1. |</p>
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>number.of.cores</td>
<td>Number of cores to use during scoring</td>
</tr>
<tr>
<td></td>
<td>Choosing a number higher than 1 to utilize multi-threaded implementation is recommended only if you have large enough data and the performance of your runtime or memory is critical for your use case:</td>
</tr>
<tr>
<td></td>
<td>• Multi-threaded implementation pays off with respect to training runtime, for example, for data sets of 10,000 rows and 25 columns, or for data sets of 100,000 rows and 10 columns. Therefore, multi-threaded implementation can make sense only for similarly sized or larger training data sets.</td>
</tr>
<tr>
<td></td>
<td>• However, while the training runtime decreases significantly, the parallel implementation causes slightly increased scoring runtimes. For this reason, parallel implementation is recommended only if you consider the performance of training jobs, which are asynchronous tasks, to be performance-critical for your use case, depending also on how often performance of your runtime or memory is not considered critical, the single-threaded implementation is recommended (number.of.cores = 1).</td>
</tr>
<tr>
<td></td>
<td>The default value is 1.</td>
</tr>
<tr>
<td>normalizer.type</td>
<td>The type of normalizer that should be applied to the scores calculated by the algorithm. The default value is quantile. Allowed values are:</td>
</tr>
<tr>
<td></td>
<td>• Quantile (default) Internally calculates an effective threshold value based on the training data. Raw scores and normalized scores are generated.</td>
</tr>
<tr>
<td></td>
<td>• Threshold Uses the given value. Raw scores and normalized scores are generated.</td>
</tr>
<tr>
<td></td>
<td>• None Does not do any normalization of the values. Only raw scores are generated.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>For more information about the normalization of scores, see Normalization of Scores [page 316].</td>
</tr>
</tbody>
</table>
### normalizer.value

The value used for the normalization. For quantile, a value between 0 and 1 is valid; for threshold, a value larger than 0. The default value is **0.99**.

**Note**

As `nu` specifies the fraction of training samples which you assume to be outliers and, for `normalizer.type`, `normalizer.value` specifies the fraction of training samples which you assume to be normal, these two values should always add up to one. If you set `nu` to **0.01**, you are advised to set the `normalizer.value` to **0.99** if you use the `normalizer.type` quantile.

---

### Multivariate Autoregression (MAR)

#### Parameter: target.columns

Contains the columns for which a linear regression should be fitted (default: NULL/empty). Depending on the input data, it is necessary to specify at least one target column if the `window.size` parameter is 0.

**Note**

You need to enter the exact name of the columns because this field is case-sensitive.

#### Parameter: window.size

Contains the number of former observations that are taken into account to fit a regression. Windowing is only necessary if each row contains only the observations from one particular time.

**Note**

If windowing is applied, the algorithm uses the data of the `window.size` parameter former rows (based on the timestamp). In order to ensure a proper functionality, an equidistance is recommended.

The default value is **10**.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>weight.by.uncertainty</td>
<td>If set to TRUE, the deviation between prediction and observation is discounted by the quality of the underlying model for this particular target variable. The underlying idea is to incorporate the predictive power of the trained regressions. If a model for one particular target variable does not produce reliable predictions, the influence of this particular deviation should be less than the deviation produced by a more accurate regression. The default value is TRUE.</td>
</tr>
<tr>
<td>smoothing.window.size</td>
<td>Determines how to smooth raw scores calculated by the algorithm. The permitted value range is odd numbers greater than 0.</td>
</tr>
<tr>
<td></td>
<td>The default value is 1.</td>
</tr>
<tr>
<td></td>
<td>If you enter a number greater than 1, the scores are smoothed using a running median with a window size given by the parameter.</td>
</tr>
<tr>
<td>normalizer.type</td>
<td>The type of normalizer that should be applied to the scores calculated by the algorithm. The default value is quantile. Alowed values are:</td>
</tr>
<tr>
<td></td>
<td>• Quantile (default) Internally calculates an effective threshold value based on the training data</td>
</tr>
<tr>
<td></td>
<td>• Threshold Internally calculates an effective threshold value based on the training data. Raw scores and normalized scores are generated.</td>
</tr>
<tr>
<td></td>
<td>• None Does not do any normalization of the values. Only raw scores are generated.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong> For more information about the normalization of scores, see Normalization of Scores [page 316].</td>
</tr>
<tr>
<td>normalizer.value</td>
<td>The value that is used for the normalization. For quantile, a value between 0 and 1 is valid; for threshold, a value larger than 0.</td>
</tr>
<tr>
<td></td>
<td>The default value is 0.99.</td>
</tr>
</tbody>
</table>
# Principal Component Analysis (PCA)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>group.by</strong></td>
<td>Name(s) of the column(s) used for grouping data rows. <strong>This parameter is mandatory.</strong>&lt;br&gt;The default value is <em>Equipment</em>.*</td>
</tr>
<tr>
<td><strong>sort.by</strong></td>
<td>Name(s) of the column(s) used for sorting data rows. <strong>This parameter is mandatory.</strong>&lt;br&gt;The default value is <em>Timestamp</em>.*</td>
</tr>
<tr>
<td><strong>smoothing.window.size</strong></td>
<td>Integer specifying the width of the running median window. <strong>i Note</strong>&lt;br&gt;This value must be an odd number.&lt;br&gt;Use smoothing.window = 3 for minimal robust smoothing so that isolated outliers are eliminated.&lt;br&gt;The default value is 1.*</td>
</tr>
<tr>
<td><strong>window.size</strong></td>
<td>Contains the number of former observations that are taken into account to fit a regression. Windowing is only necessary if each row contains only the observations from one particular time. <strong>i Note</strong>&lt;br&gt;If windowing is applied, the algorithm uses the data of the window.size parameter former rows (based on the timestamp). In order to ensure a proper functionality, an equidistance is recommended.&lt;br&gt;The default value is 0.*</td>
</tr>
</tbody>
</table>
### Parameter Description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>normalizer.type</td>
<td>The type of normalizer that should be applied to the scores calculated by the algorithm. The default value is <code>quantile</code>. Allowed values are:</td>
</tr>
</tbody>
</table>
|                      |   - Quantile (default)  
|                      |     Internally calculates an effective threshold value based on the training data. Raw scores and normalized scores are generated.                |
|                      |   - Threshold           
|                      |     Uses the given value. Raw scores and normalized scores are generated.                                                                      |
|                      |   - None                
|                      |     Does not do any normalization of the values. Only raw scores are generated.                                                               |
| normalizer.value     | The value that is used for the normalization. For quantile, a value between 0 and 1 is valid; for threshold, a value larger than 0. 
|                      | The default value is 0.99.                                                                                                                     |

**Note**

For more information about the normalization of scores, see [Normalization of Scores](#) [page 316].

---

### Tree Ensemble Classifier (TEC)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| number.of.trees | Specifies the number of trees in the ensemble model. Increasing the number of trees in the model can yield higher prediction accuracy, but requires higher computational effort, and there is the risk that the model will be adjusted too much to the non-characteristic noise of the specific training data set (known as overfitting). Permitted value range is integer numbers greater than or equal to 1. 
<p>|                 | The default value is 20.                                                                                                                     |</p>
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>max.tree.depth</td>
<td>Controls the maximum depth of each tree in the ensemble model. Increasing the maximum tree depth allows you to build more complex trees that are capable of capturing more complex relations in the data. On the downside, increasing the maximum tree depth also increases the risk of building models that are heavily tuned to the particularities of the given training data set, including those that are not characteristic of the underlying real-world process. It is generally recommended to increase the amount of training data when increasing the maximum tree depth (where possible). Permitted value range is <strong>integer numbers greater than or equal to 1</strong>. The default value is 2.</td>
</tr>
<tr>
<td>records.subsampling.ratio</td>
<td>Defines the share of records (that is, rows of the training data) to be used to train each tree of the ensemble model. The number of records corresponding to the specified share is chosen randomly (without replacement) from the training data set. Specifying a value strictly smaller than 1 for this parameter can increase the robustness of the model (that is, it is less likely to overfit) if .number.of.trees is set to a sufficiently large value (problem-dependent) at the same time. On the downside, a smaller value for this parameter may lead to lower overall model accuracy and confidence, and may (indirectly) require higher computational effort due to a need for larger values for .number.of.trees. Also, a relatively large training data set may be required for subsampling to be successful. Permitted value range is numbers greater than 0 and less than or equal to 1. Note that a value of 1 effectively means that no subsampling is performed. The default value is 1.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>features.subsampling.ratio</td>
<td>Defines the share of features (that is, columns of the training data) to be used to train each tree of the ensemble model. The number of columns corresponding to the specified share is chosen at random (without replacement) from the given training data set. Similarly to .records.subsampling.ratio, specifying a value strictly smaller than 1 can be used to increase the robustness of the model, but may come at the price: lower accuracy and model confidence, and choosing a smaller value for .features.subsampling.ratio may reduce the ability to capture complex relationships in the data successfully. It can be helpful, however, to tune this parameter if the given data set contains highly correlated features (for example, variants obtained through feature engineering). The permitted value range is numbers greater than 0 and less than or equal to 1. Note that a value of 1 effectively means that no subsampling is performed. The default value is 1.</td>
</tr>
<tr>
<td>max.weight.contrib.per.leaf</td>
<td>Defines how much weight each leaf of a tree may contribute maximally to the ensemble model. Within the algorithm, this parameter is used as a threshold to cap xgboost’s gradient step in norm (that is, in absolute length). Choosing a smaller value for this parameter may help deal with unbalanced data sets (i.e. data sets where the occurrence of one class is only a fraction of the occurrence of the other class) by preventing “highly confident” leaves dominating “less confident” leaves as a result of sheer sample majority. The permitted value range is numbers greater than or equal to 0. Note that 0 means that no limit is specified on the maximum weight contribution of each leaf, while every strictly positive number specifies a weight threshold. The default value is 0.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>learning.rate</td>
<td>Defines the step size of the updates calculated through each tree on the ensemble learning objective function. In this specific algorithm, this parameter can be interpreted as the level of trust the ensemble model gives to each tree before calculating the next tree on the score residuals of the previously calculated trees. Choosing a smaller value will mean that objective functions of subsequently computed trees will look more alike and, as a consequence, the ensemble model tends to feature more trees per problem facade (at the cost of covering fewer facades if the overall number of trees is not increased). It is generally recommended to increase number.of.trees when decreasing learning.rate. Reducing this parameter can be used to increase number.of.trees when decreasing learning.rate. Reducing this parameter can be used to prevent overfitting, but it comes at the price of typically requiring a higher number.of.trees to achieve comparable model accuracy and confidence. The permitted value range is numbers greater than 0 and less than or equal to 1. The default value is 0.3.</td>
</tr>
<tr>
<td>initial.guess.bias</td>
<td>Allows you to introduce a bias into the classifier. This parameter serves as the initial guess (score) to which the tree models are iteratively added. Assuming that result scores (of the ensemble model) smaller than 0.5 are interpreted as predicting class ‘0’ and scores greater than or equal to 0.5 are a prediction of class ‘1’, code.initial.guess.bias can be used to require more tree weight to predict one class compared to the other, and thus naturally favor one class. Tuning this parameter may help to find a desirable tradeoff between so-called “false positives” and “false negatives” among incorrectly classified records. Permitted value range is numbers greater than or equal to 0 and less than or equal to 1. A value of 0.5 means no bias in either direction. The default value is 0.5.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>evaluation.metric</td>
<td>Controls the evaluation metric for validation. The default value is error. Allowed values are:</td>
</tr>
<tr>
<td>• error (default)</td>
<td>The error rate for the binary classification that is calculated as $(\text{wrong cases})/(\text{all cases})$. For the predictions, the evaluation regards the instances with prediction value larger than 0.5 as positive instances, and the others as negative instances.</td>
</tr>
<tr>
<td>• error@t</td>
<td>A different than 0.5 binary classification threshold value could be specified by providing a numerical value through &quot;t&quot;, where t is a decimal between 0 and 1. A possible example is &quot;error@0.7&quot;.</td>
</tr>
<tr>
<td>• auc</td>
<td>Area under the ROC curve.</td>
</tr>
<tr>
<td>Note</td>
<td>For more information about the parameter evaluation.metric and the ROC curve, see XGBoost Parameters and ROC curve.</td>
</tr>
<tr>
<td>scale.pos.weight</td>
<td>Controls the balance of positive and negative weights, for instance if it is desired to weight the positive cases more than negative ones. This scenario is useful for unbalanced classes that are typical in predictive maintenance. Any positive real number can be entered by the user.</td>
</tr>
<tr>
<td></td>
<td>The default value is 0. For this value, the ratio of number of negative instances to the number of positive instances i.e. $(\text{negative cases}) / (\text{positive cases})$ will be used implicitly.</td>
</tr>
<tr>
<td>Note</td>
<td>If it is not desired to weight classes differently, the value 1 should be used.</td>
</tr>
</tbody>
</table>
Interquartile Range (IQR)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>interquartile.multiplier</td>
<td>Factor by which the interquartile range will be multiplied when determining the normal interval. The default value is 2.</td>
</tr>
<tr>
<td>normalizer.type</td>
<td>The type of normalizer that should be applied to the scores calculated by the algorithm. The default value is <em>quantile</em>. Allowed values are:</td>
</tr>
<tr>
<td></td>
<td>- Quantile (default) Internally calculates an effective threshold value based on the training data</td>
</tr>
<tr>
<td></td>
<td>- Threshold Internally calculates an effective threshold value based on the training data. Raw scores and normalized scores are generated.</td>
</tr>
<tr>
<td></td>
<td>- None Does not do any normalization of the values. Only raw scores are generated.</td>
</tr>
<tr>
<td>normalizer.value</td>
<td>The value that is used for the normalization. For quantile, a value between 0 and 1 is valid; for threshold, a value larger than 0. The default value is 0.99.</td>
</tr>
</tbody>
</table>

6.2.1.3.1 Normalization of Scores

Normalizing scores enables you to compare scores computed for different equipment using different anomaly detection algorithms.

Normalization Type: Threshold

You can use the normalization type *threshold* to score a model if you know the threshold for your data set that distinguishes normal data from abnormal data.
You can compare scores that were computed using different algorithms. The following table provides you with an example of how normalized scores are calculated:

<table>
<thead>
<tr>
<th>Algorithm 1</th>
<th>Algorithm 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Raw Score</strong></td>
<td><strong>Normalized Score</strong></td>
</tr>
<tr>
<td>100</td>
<td>[\frac{100}{80} \times 100 = 125]</td>
</tr>
<tr>
<td>90</td>
<td>[\frac{90}{80} \times 100 = 112.5]</td>
</tr>
<tr>
<td>4</td>
<td>[\frac{4}{80} \times 100 = 5]</td>
</tr>
<tr>
<td>32</td>
<td>[\frac{32}{80} \times 100 = 40]</td>
</tr>
</tbody>
</table>

Without normalizing the raw scores of the algorithms 1 and 2, a comparison of the scores of these two algorithms would hardly be possible. Using the threshold, which represents a percentage of 100, the normalized scores are set in relation to this percentage and can therefore be compared across different anomaly detection algorithms.

**Normalization Type: Quantile**

You can use the normalization type **quantile** to train a model if you do not know the threshold for your data set. However, you know the data set itself very well, and you know that a certain percentage of your raw scores are outliers.

**Example**

You do not have a training set of normal data that is below a certain threshold. You cannot therefore train your model against a training data set. However, you know that 90% of your raw scores are normal and 10% of your raw scores are abnormal. You also know which scores represent normal values and which values represent abnormal values. What you need to do before you can score your model is to get to a threshold that distinguishes normal from abnormal scores. Without normalizing the raw scores of the algorithms 1 and 2, a comparison of the scores of these two algorithms would hardly be possible. Using the threshold, which represents a percentage of 100, the normalized scores are set in relation to this percentage and can therefore be compared across different anomaly detection algorithms.
Outliers = 10 %, which means quantile = 0.9

<table>
<thead>
<tr>
<th>Raw Score Training</th>
<th>Effective Threshold After Training Using Statistic Function to Calculate the Empirical Quantile: 0.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal score 0.04</td>
<td></td>
</tr>
<tr>
<td>Normal score 0.07</td>
<td></td>
</tr>
<tr>
<td>Normal score 0.07</td>
<td></td>
</tr>
<tr>
<td>Normal score 0.15</td>
<td></td>
</tr>
<tr>
<td>Normal score 0.23</td>
<td></td>
</tr>
<tr>
<td>Normal score 0.35</td>
<td></td>
</tr>
<tr>
<td>Normal score 0.35</td>
<td></td>
</tr>
<tr>
<td>Normal score 0.71</td>
<td></td>
</tr>
<tr>
<td>Normal score 0.89</td>
<td></td>
</tr>
<tr>
<td>abnormal score 0.95</td>
<td></td>
</tr>
</tbody>
</table>

After your model has been trained with the empirical quantile process, the calculated effective threshold is used to score your model. The scoring process is then executed as described in the section **Normalization Type: Threshold**:  

**Effective Threshold = 0.9**

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>Normalized Score</th>
<th>Score Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4</td>
<td>(0.4/0.9)*100 = 44.44</td>
<td>55.56 % below the threshold = normal</td>
</tr>
<tr>
<td>1.1</td>
<td>(1.1/0.9)*100 = 122.22</td>
<td>22.22 % above the threshold = abnormal</td>
</tr>
<tr>
<td>0.23</td>
<td>(0.23/0.9)*100 = 25.56</td>
<td>74.44 % below the threshold = normal</td>
</tr>
<tr>
<td>0.91</td>
<td>(0.91/0.9)*100 = 101.11</td>
<td>1.11 % above the threshold = abnormal</td>
</tr>
</tbody>
</table>
6.2.1.4 Algorithm-Specific Outputs

Depending on the algorithm that you have selected, different outputs are displayed. The following sections provide you with an overview of the outputs with their descriptions, data type and dimension, sorted by the algorithms:

### Earth Mover's Distance (EMD)

<table>
<thead>
<tr>
<th>Output</th>
<th>Description</th>
<th>Data Type</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normalized Score</td>
<td>Displays the percentage of the score divided by the effective threshold that is selected in the model specific parameter (Score/Effective threshold*100)</td>
<td>Numeric</td>
<td>None</td>
</tr>
<tr>
<td>Score</td>
<td>Displays the anomaly of a data point</td>
<td>Numeric</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>With an increasing value, the anomaly of the data point increases too.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading Count</td>
<td>The number of readings contributing to score</td>
<td>Numeric</td>
<td>None</td>
</tr>
</tbody>
</table>

### Logistic Regression (LOR)

<table>
<thead>
<tr>
<th>Output</th>
<th>Description</th>
<th>Data Type</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted Class</td>
<td>For this output, the values 0 or 1 are possible. If the probability of failure is greater than the cut-off value, the data points receive the value 1. Otherwise the data points receive the value 0.</td>
<td>Numeric</td>
<td>None</td>
</tr>
<tr>
<td>Score</td>
<td>Displays the probability of failure</td>
<td>Numeric</td>
<td>None</td>
</tr>
</tbody>
</table>
### One Class Support Vector Machine (SVM)

<table>
<thead>
<tr>
<th>Output</th>
<th>Description</th>
<th>Data Type</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normalized Score</td>
<td>Displays the percentage of the score divided by the effective threshold that is selected in the model specific parameter (Score/Effective threshold*100)</td>
<td>Numeric</td>
<td>None</td>
</tr>
<tr>
<td>Score</td>
<td>Displays the anomaly of a data point</td>
<td>Numeric</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>With an increasing value, the anomaly of the data point increases too.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Multivariate Autoregression (MAR)

<table>
<thead>
<tr>
<th>Output</th>
<th>Description</th>
<th>Data Type</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normalized Score</td>
<td>Displays the percentage of the score divided by the effective threshold that is selected in the model specific parameter (Score/Effective threshold*100)</td>
<td>Numeric</td>
<td>None</td>
</tr>
<tr>
<td>Score</td>
<td>Measures the difference between a data point and a predicted value</td>
<td>Numeric</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>A greater values indicates a bigger abnormality.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Principal Component Analysis (PCA)

<table>
<thead>
<tr>
<th>Output</th>
<th>Description</th>
<th>Data Type</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normalized Score</strong></td>
<td>Displays the percentage of the score divided by the effective threshold that is selected in the model specific parameter (Score/Effective threshold*100).</td>
<td>Numeric</td>
<td>None</td>
</tr>
<tr>
<td><strong>Score</strong></td>
<td>Displays the anomaly of a data point</td>
<td>Numeric</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>With an increasing value, the anomaly of the data point increases too.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Tree Ensemble Classifier (TEC)

<table>
<thead>
<tr>
<th>Output</th>
<th>Description</th>
<th>Data Type</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Predicted Class</strong></td>
<td>Displays the predicted class of the record</td>
<td>Numeric</td>
<td>None</td>
</tr>
<tr>
<td><strong>Score</strong></td>
<td>Displays the probability of the corresponding record belonging to the class that is encoded as the predicted class</td>
<td>Numeric</td>
<td>None</td>
</tr>
</tbody>
</table>

### Interquartile Range (IQR)

<table>
<thead>
<tr>
<th>Output</th>
<th>Description</th>
<th>Data Type</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normalized Score</strong></td>
<td>Displays the percentage of the score divided by the effective threshold that is selected in the model specific parameter (Score/Effective threshold*100)</td>
<td>Numeric</td>
<td>None</td>
</tr>
</tbody>
</table>
### Score
- **Description**: Displays the anomaly of a data point
- With an increasing value, the anomaly of the data point increases too. The scores are based on the distance to the median and the quartiles.
- **Data Type**: Numeric
- **Dimension**: None

### Automatic Failure Prediction (AFP)

<table>
<thead>
<tr>
<th>Output</th>
<th>Description</th>
<th>Data Type</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted Class</td>
<td>Displays the predicted class of the record</td>
<td>Numeric</td>
<td>None</td>
</tr>
<tr>
<td>Score</td>
<td>Displays the probability of a data point belonging to the predicted class</td>
<td>Numeric</td>
<td>None</td>
</tr>
</tbody>
</table>

### Automatic Anomaly Detection (AAD)

<table>
<thead>
<tr>
<th>Output</th>
<th>Description</th>
<th>Data Type</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normalized Score</td>
<td>Displays the percentage of the score divided by the effective threshold that is calculated in the model training (Score/Effective threshold*100)</td>
<td>Numeric</td>
<td>None</td>
</tr>
</tbody>
</table>
6.2.2 Training a Model

This topic describes how to train models for equipment health indicators.

Prerequisites

- At least one model has been configured.
- To download data sets, the role DataScienceDataExporter is assigned to your user.

Context

Once you have configured a model, you can train it.

**Note**

After the first successful training of a model, you can only edit the name, description, and tags of the model.

Procedure

1. On the SAP Fiori launchpad, go to the Machine Learning Engine group and open the Health Indicator Model Management application.
2. To train a model, you can choose between the following options:
   - Set up a regular training for the model. For more information, see Scheduling Regular Training of a Model [page 324].
   - Set up a manual training for the model. For manual training, proceed as described in the following steps:
3. From the Models pane, select the model you want to train.
4. Define the time frame of the data that is used for training. You can choose between the following options:
   - Select a date and time in the New Training From and To fields by choosing 🕒.
   - Select a time frame by using the training data preview. For more information, see Selecting Training Data Using Training Data Preview [page 325].
5. Choose Start Training.

The training run starts, showing the status in the Trainings table. The status refreshes every 5 seconds.

Once the training run is completed, you can see detailed information and the training job ID by clicking on the log entries in the Log Summary column. You can also view a model summary with multiple metrics by choosing 📊. For more information about the model summary and the metrics, see Model Summary [page 327].
**i Note**

If the role `DataScienceDataExporter` is assigned to your user, you can download your configured data set for the latest successful training of your model by choosing **Download Input Data**. The downloaded file includes the independent variables you selected as input for your model within the defined time frame for the training. The file is available for 30 days after the training and is only for information purposes.

**Results**

Your model is trained.

**Related Information**

- Scoring a Model [page 329]

### 6.2.2.1 Scheduling Regular Training of a Model

This topic describes how to schedule a regular training of models used for equipment health indicators.

**Prerequisites**

At least one model has been configured.

**Context**

In the **Health Indicator Model Management** application, you can configure a schedule, update an existing schedule, and activate or deactivate a schedule for the periodical execution of training.

**Procedure**

1. On the SAP Fiori Launchpad, go to the **Machine Learning Engine** group and open the **Health Indicator Model Management** application.
2. From the **Models** pane, select the model you want to train.
3. To configure the training schedule, choose **Set Schedule**.

   The **Set Training Schedule** dialog box is displayed.

4. Fill in the following fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>Activate or deactivate the training schedule for the model.</td>
</tr>
<tr>
<td>Start</td>
<td>Select the start date and time of the training schedule.</td>
</tr>
<tr>
<td>Recurrence Pattern</td>
<td>Define whether the training job should run once or frequently at certain intervals.</td>
</tr>
<tr>
<td>Data Range</td>
<td>Define a limited data set coming in during a certain time period before the training.</td>
</tr>
<tr>
<td>Range of Recurrence</td>
<td>Define whether the training schedule should finish at a certain date and time.</td>
</tr>
</tbody>
</table>

5. Choose **OK**.

**Results**

The training schedule is configured.

You can later edit or also deactivate the training schedule if required.

**Related Information**

Training a Model [page 323]

**6.2.2.2 Selecting Training Data Using Training Data Preview**

This topic describes how to select training data using the training data preview.

**Context**

In the **Health Indicator Model Management** application, you have different options to select a time frame for training models. One option is to select the time frame by using the training data preview. This preview displays the available training data for a certain period of time.
**Procedure**

1. In the **Health Indicator Model Management** application, select the model that you want to train from the **Models** pane.

   The training data preview including a data preview histogram and a data preview slider is displayed under **Training Data Preview**.

   If the model is already trained, the data preview histogram and the data preview slider is visible by choosing **Show Data Preview and Training Runs**.

   **Note**
   
   The data preview histogram shows an estimated number of all aggregated data of the training input. The actual available data may differ from the displayed number of data in the chart depending, for example, on the null strategy you have chosen or which independent variables you have selected.

2. Select a time frame. You can choose between the following options:
   - Click on the data preview slider.
   - Drag the frame to any point on the data preview slider.
   - Pull the left or right side of the frame to any point on the data preview slider.

   **Note**
   
   Only data within the past year is displayed in the data preview slider. If you want to select a time frame with an earlier start date, select the time frame by using the **New Training From** and **To** fields.

**Results**

The selected training data is displayed in the data preview histogram in an enlarged view and the **New Training From** and **To** fields are filled.

**Related Information**

Training a Model [page 323]
6.2.2.3 Model Summary

After each training of a model, you can view a model summary. This model summary contains multiple metrics, which help you to understand the trained model better and evaluate and compare the quality of different trained models.

Background Information

When you train a model, metrics containing multiple numeric measurements and diagrams are calculated automatically. These numeric measurements and diagrams are calculated in different ways:

- Based on all training data. This is typical for the numeric measurements and diagrams for anomaly detection, such as score distribution.
- Based on dedicated test data. In this case, a test set, representing 10% of the training data is automatically split from the data, and is excluded from the training. The numeric measurements and diagrams are calculated by using the test set to compare the model predictions with the actual outcomes of the test data after the training. This is typical for the numeric measurements and diagrams for failure prediction, such as accuracy.
- Based on the learned model. This is typical for the feature importance for failure prediction.

The Metrics of the Model Summary

Depending on the algorithm that you have selected for the model training, a different combination of numeric measurements and/or diagrams is displayed. The following tables provide you with an overview of the metrics with their descriptions, and show the algorithms to which they apply:

### Numeric Measurements

<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</th>
<th>Algorithm</th>
</tr>
</thead>
</table>
| **Accuracy** | This metric displays the overall fraction of the correctly classified data. For this metric, values between 0 and 1 are possible. The value 1 refers to a perfect model. | • Logistic Regression (LOR)  
• Automatic Failure Prediction (AFP)  
• Tree Ensemble Classifier (TEC) |

**i Note**

This metric can be misleading for highly imbalanced data sets.
<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</th>
<th>Algorithm</th>
</tr>
</thead>
</table>
| **Kappa**                   | This metric adjusts the accuracy based on the expected accuracy provided by the class distribution. For this metric, values between -1 and 1 are possible. The value 1 refers to a perfect model. | • Logistic Regression (LOR)  
• Automatic Failure Prediction (AFP)  
• Tree Ensemble Classifier (TEC) |
| **Matthews Correlation Coefficient (MCC)** | This metric takes class imbalance into account. For this metric, values between -1 and 1 are possible. The value 0 refers to a random prediction. The value 1 refers to a perfect prediction. | • Logistic Regression (LOR)  
• Automatic Failure Prediction (AFP)  
• Tree Ensemble Classifier (TEC) |
| **Sensitivity**             | This metric displays the fraction of correctly classified positive cases. For this metric, values between 0 and 1 are possible. The value 1 refers to a perfect classification of all positive cases. | • Logistic Regression (LOR)  
• Automatic Failure Prediction (AFP)  
• Tree Ensemble Classifier (TEC) |
| **Specificity**             | This metric displays the fraction of correctly classified negative cases. For this metric, values between 0 and 1 are possible. The value 1 refers to a perfect classification of all negative cases. | • Logistic Regression (LOR)  
• Automatic Failure Prediction (AFP)  
• Tree Ensemble Classifier (TEC) |
| **Test set size**           | This metric displays the amount of data that was used to calculate the metrics. | • Logistic Regression (LOR)  
• Automatic Failure Prediction (AFP)  
• Tree Ensemble Classifier (TEC) |
| **Estimated Anomaly Fraction** | This metric displays the fraction of abnormal training data. The abnormal training data are classified by the Automatic Anomaly Detection (AAD) algorithm. | Automatic Anomaly Detection (AAD) |

**Diagrams**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</th>
<th>Algorithm</th>
</tr>
</thead>
</table>
| **Confusion Matrix** | This diagram displays the number of correctly and incorrectly classified positive and negative cases in the test set as separate tiles. Large numbers on the green tiles on the diagonal indicate a good classification. Large numbers on the red tiles on the off-diagonal indicate a bad classification. | • Logistic Regression (LOR)  
• Automatic Failure Prediction (AFP)  
• Tree Ensemble Classifier (TEC) |
### 6.2.3 Scoring a Model

This topic describes how to score models for equipment health indicators.

**Prerequisites**

Your model has been trained successfully at least once.

**Context**

Once you have trained a model, you can score the latest trained model to score data.

**i Note**

The latest version of a trained model is used for scoring.

**i Note**

If you have used trained models for scoring before the 2011 release, due to a technical change, you need to retrain the models in order to use these models for the scoring again. Besides the retraining, we also offer a...
manual migration if a retraining is not possible. For more information, see the *Updating the Machine Learning Engine* section in the *Update Guide*.

**Procedure**

1. On the SAP Fiori launchpad, go to the *Machine Learning Engine* group and open the *Health Indicator Model Management* application.

2. To score a model, you can choose between the following options:
   - Set up a regular scoring for the model. For more information, see *Scheduling Regular Scoring of a Model* [page 331].
   - Set up a manual scoring for the model. For manual scoring, proceed as described in the following steps:

3. From the *Models* pane, select the model you want to score.

4. To define the time frame of data that is used for scoring, select a date and time in the *Score Data From* and *To* fields by choosing.

5. Choose *Start Scoring*.

   The scoring run starts, showing the status in the *Scorings* table. The status refreshes every 5 seconds.

   Once the scoring run is completed, you can see detailed information and the scoring job ID by clicking on the log entries in the *Log Summary* column.

**Results**

Your model is scored.

**Next Steps**

You can now check the scores in the indicator chart by choosing in the *Scorings* table. From the equipment list, select a piece of equipment to display the algorithm scores over the scoring time for this piece of equipment. This provides you with insights about the health and performance of your equipment.

**Example**

You have scored a model using the Multivariate Autoregression (MAR) algorithm. From the scores in the indicator chart, you see that the MAR scores for your pump increased in the last week within the scoring time frame. This means that the algorithm has detected a probable anomaly and you can expect a failure.

**Note**

The following restrictions apply:
The icon for the indicator chart is only displayed when the scoring run was completed successfully. The scores in the indicator chart are only displayed when data for the equipment was collected during the scoring run. You can view this information in the log entries of the scoring run.

Related Information

Indicator Chart [page 20]
Anomaly Detection Using Multivariate Autoregression (MAR) [page 292]
Managing Models for Equipment Health Indicators [page 276]

6.2.3.1 Scheduling Regular Scoring of a Model

This topic describes how to schedule a regular scoring of models used for equipment health indicators.

Prerequisites

Your model has been trained successfully at least once.

Context

In the Health Indicator Model Management application, you can configure a schedule, update an existing schedule, and activate or deactivate a schedule for the periodical execution of scoring.

Procedure

1. On the SAP Fiori launchpad, go to the Machine Learning Engine group and open the Health Indicator Model Management application.
2. From the Models pane, select the model you want to score.
3. To configure the scoring schedule, choose Set Schedule.
   The Set Scoring Schedule dialog box is displayed.
4. Fill in the following fields:


Active

Activate or deactivate the scoring schedule for the model.
<table>
<thead>
<tr>
<th><strong>Start</strong></th>
<th>Select the start date and time of the scoring schedule.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recurrence Pattern</strong></td>
<td>Define whether the scoring job should run once or frequently at certain intervals.</td>
</tr>
<tr>
<td><strong>Data Range</strong></td>
<td>Define whether the scoring should run on all data coming in since the last execution (scoring run), or on a limited data set coming in during a certain time period before the scoring.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>When you select the option to include all data since the last execution, consider that only the data since the last successful execution is taken into account.</td>
</tr>
<tr>
<td><strong>Range of Recurrence</strong></td>
<td>Define whether the scoring schedule should finish at a certain date and time.</td>
</tr>
</tbody>
</table>

5. Choose **OK**.

**Results**

The scoring schedule is configured.

You can later edit or also deactivate the scoring schedule if required.

**Related Information**

Scoring a Model [page 329]

### 6.3 Managing Models for Failure Mode Analytics

This topic describes how to manage models for failure mode analytics.

**Prerequisites**

- You have performed the configuration steps before configuring, training, and scoring a failure mode analytics model. For more information, see Configuring Failure Mode Analytics [page 412].
The role FMA_MODEL_MANAGER is assigned to your user.

**i Note**

If the required role is not assigned to your user, you cannot see the application on the launchpad. Contact your Identity Management Administrator if the role has not been assigned to your user yet.

**Context**

To get insights and analytics about the patterns of failures for your equipment and equipment models, your notifications need to be analyzed by configuring, training, and scoring models in the *Failure Mode Analytics Model Management* application.

In this process, you first configure and train an unsupervised model and then configure, train, and score a supervised model. The unsupervised model is the basis for the supervised model. The unsupervised model identifies the characteristics of notification texts and maps the notification texts to the characteristics found in standard failure modes. After the training, it suggests the most appropriate failure mode for each notification.

**Tip**

You can perform validation tasks to validate and improve the suggestion. For more information, see [Validating Failure Mode Analytics](#).

The supervised model learns from this suggestion by performing text classification. This means, it learns the characteristics of individual failure modes from the mapped notification texts for upcoming notifications during the training. After the scoring, it maps the most appropriate failure modes to upcoming notifications.

**Procedure**

1. To train an unsupervised model, you first need to configure it. For more information, see [Configuring a Model](#).
2. Once you have configured the unsupervised model, you can train it. For more information, see [Training a Model](#).
3. Once you have trained the unsupervised model, you can configure the supervised model. For more information, see [Configuring a Model](#).
4. Once you have configured the supervised model, you can train it. For more information, see [Training a Model](#).
5. Once you have trained the supervised model, you can use the latest trained model to score data. For more information, see [Scoring a Model](#).
6.3.1 Configuring a Model

This topic describes how to configure models for failure mode analytics.

Context

To train and score a model, you first need to configure a model.

Note

You start with first configuring a model of unsupervised learner type, and then a model of supervised learner type.

Procedure

1. On the SAP Fiori launchpad, go to the Machine Learning Engine group and open the Failure Mode Analytics Model Management application.
2. To configure a model, you can choose between the following options:
   ○ Configure a new model based on an existing model: Select the base model and choose Copy. The new model contains all settings of the base model.
   ○ Configure a new model from scratch: Choose .
     The New Model screen is displayed.
3. Fill in all required fields in the General Information and Algorithm sections. For more information, see Fields for Configuring a Model [page 335].
   a. To configure an unsupervised model, select the LDA algorithm and select an equipment model.
   b. To configure a supervised model, select the TextClassEnsemble algorithm and select the created unsupervised model as a basis for the supervised model.
4. Save your model.

Results

Your model is configured and added to the Models pane.

Related Information

Training a Model [page 343]
### 6.3.1.1 Fields for Configuring a Model

#### General Information

<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>x</td>
<td>Enter a name for the model.</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td></td>
<td>Enter a description for the model.</td>
</tr>
</tbody>
</table>

**Note**

The model name must not contain whitespaces.

#### Algorithm

<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Algorithm Name</strong></td>
<td>x</td>
<td>Select the algorithm that you want to use to train and score the model. You can choose from the following algorithms:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>LDA</strong> Unsupervised topic modeling using Latent Dirichlet Allocation for failure mode assignment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>TextClassEnsemble</strong> Failure mode analytics with supervised TextClassEnsemble</td>
</tr>
</tbody>
</table>

For more information about the algorithms, see *Algorithms for Failure Mode Analytics* [page 337].
<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learner Type</strong></td>
<td>x</td>
<td>Displays the type of the selected algorithm. Depending on the algorithm you have selected, one of the following learner types is displayed:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>UNSUPERVISED</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>This learner type is displayed if you have selected the algorithm name <strong>LDA</strong>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>SUPERVISED</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>This learner type is displayed if you have selected the algorithm name <strong>TextClassEnsemble</strong>.</td>
</tr>
<tr>
<td><strong>Equipment Model</strong></td>
<td>x</td>
<td>Select the equipment model that you want to use as basis for the model. You can choose from all equipment models that were created in the <strong>Models</strong> application.</td>
</tr>
<tr>
<td><strong>Unsupervised Model</strong></td>
<td>x</td>
<td>Select the unsupervised model that you want to use as basis for the supervised model.</td>
</tr>
<tr>
<td><strong>Parameters</strong></td>
<td></td>
<td>Displays the parameters of the selected algorithm with their default values. For more information about the parameters of each algorithm, see <strong>Algorithm-Specific Parameters</strong> [page 340]. You can use the predefined parameters or adjust the parameters by deleting parameters, adding own parameters, or overwriting the values of the predefined parameters. To define a new value for a parameter, enter the value and press <strong>ENTER</strong>.</td>
</tr>
</tbody>
</table>
6.3.1.2  Algorithms for Failure Mode Analytics

Unsupervised Topic Modeling Using Latent Dirichlet Allocation for Failure Mode Assignment

Use Case
Before you explore the details of this algorithm, you should first know when to use this algorithm. Unsupervised Topic Modeling applies for the following scenarios:

- The goal is to auto-assign labels to documents, given known behavior of the labels in the form of text.
- A text corpus related to the document that needs label assignment is available.
- A text corpus related to the labels whose underlying topic needs to be inferred needs to be available, thereby allowing for-auto assignment of the label to the notification based on the mutual topic assignment.

Example
An example use case is notifications that have rich text data, but are missing failure modes. In this case, unsupervised topic modeling can be applied to learn latent topics in the notifications. Scoring is then used on the text corpus related to standard failure modes to infer underlying topics, thereby giving the ability to assign standard failure mode labels to the topics learned.

For more information, see Unsupervised Topic Modeling Using Latent Dirichlet Allocation for Failure Mode Assignment [page 338].

Supervised Text Classification Using Ensemble Techniques

Use Case
Before you explore the details of this algorithm, you should first know when to use this algorithm. Supervised Text Classification applies for the following scenarios:

- The goal is to predict labels/class to text data.
- Text records must include labels.
- Text data representing similar entities/issues must be available.

Example
An example use case would be auto-assigning failure modes to new notifications on the basis of text classification model learned on historical data. If notifications that have rich text data, have been assigned failure modes either using automated techniques using NLP or manually via hand labeling, a text classification model can be learned. New notifications are auto-assigned failure modes based on the text classification models learned.

For more information, see Failure Mode Analytics with Supervised TextClassEnsemble [page 339].
### Unsupervised Topic Modeling Using Latent Dirichlet Allocation for Failure Mode Assignment

#### What Does the Algorithm Do?

This algorithm uses Latent Dirichlet Allocation, which is a generative probabilistic method for modeling a corpus. Corpus here could be text from notifications. Latent Dirichlet Allocation assigns topics to documents and generates topic distributions over words given a collection of texts, thus providing a way of automatically discovering topics those documents contain.

The LDA model is a Bayesian mixture model for discrete data where topics are assumed to be uncorrelated. LDA assumes that each document can be represented as a probabilistic distribution over latent topics, and that topic distribution in all documents share a common Dirichlet prior. Each latent topic in the LDA model is also represented as a probabilistic distribution over words and the word distributions of topics share a common Dirichlet prior as well.

The algorithm fits a topic model to the input text data. For this, text data that makes up the corpus is specified. Training a model extracts the latent topics given a set of documents (notification texts).

Likewise, scoring would essentially be to infer underlying topics that explain a specific document based on the generative process which was used to train the model; basically infer the conditional distribution (posterior) of the hidden variables given the observed variables.

#### Model Configuration

To configure a model for failure mode analytics, use the *Failure Mode Analytics Model Management* application. For more information, see Managing Models for Failure Mode Analytics [page 332].

#### Data Preparation for Model Training and Scoring

The algorithm takes text data as an input. Thus, each row of text must belong to a homogenous set, which might have several latent categories.

<table>
<thead>
<tr>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>All failure notification texts that belong to a single equipment model.</td>
</tr>
</tbody>
</table>
Model Training

Model training for LDA means using the provided historical training text data to learn a topic model for failure mode assignment.

The aim is to find a model that well represents the data set used for training. Internally, this algorithm splits the data into a train and test set, using 90% of the data for the training. After a training, a quality metric calculated on the test set is displayed in the Log Summary in the Trainings table. For more information, see Model Summary [page 345].

To train a model for failure mode analytics, use the Failure Mode Analytics Model Management application. For more information, see Managing Models for Failure Mode Analytics [page 332].

Model Scoring

To score a model for failure mode analytics, use the Failure Mode Analytics Model Management application. For more information, see Managing Models for Failure Mode Analytics [page 332].

6.3.1.2.2 Failure Mode Analytics with Supervised TextClassEnsemble

What Does the Algorithm Do?

This algorithm conducts automatic supervised classification on text data using ensemble agreement between multiple classification algorithms that makes a prediction concerning the label/class given a document. The train function uses an ensemble of three algorithms: random forest, cart, and knn to generate a consensus on assigning categories to documents.

Scoring makes predictions from the fitted ensemble model to predict the class (label) of new documents.

Model Configuration

To configure a model for failure mode analytics, use the Failure Mode Analytics Model Management application. For more information, see Managing Models for Failure Mode Analytics [page 332].
Data Preparation for Model Training and Scoring

The algorithm takes text records that are classified as an input. Thus, each row is expected to have text data represented as a document that must have a class or label associated with it.

Model Training

To train a model for failure mode analytics, use the Failure Mode Analytics Model Management application. For more information, see Managing Models for Failure Mode Analytics [page 332].

Model Scoring

To score a model for failure mode analytics, use the Failure Mode Analytics Model Management application. For more information, see Managing Models for Failure Mode Analytics [page 332].

6.3.1.3 Algorithm-Specific Parameters

Depending on the algorithm that you have selected, different parameters are displayed. The following sections provide you with an overview of the parameters with their descriptions and default values, sorted by the algorithms:
## LDA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>stopwords</strong></td>
<td>Collection of stopwords that is excluded from the failure mode analysis, for example, a model name or user name. This parameter already includes a list of default stopwords, which are automatically excluded from the analysis. These stopwords are not visible as default values on the UI. The stopwords are language-specific, currently standard English stopwords are used. You can find multiple English stopwords lists on the internet. In addition to the automatically excluded stopwords, you can also add your own stopwords.</td>
</tr>
<tr>
<td><strong>alpha</strong></td>
<td>Parameter of the Dirichlet distribution for topics across documents The default value is 0.001.</td>
</tr>
<tr>
<td><strong>beta</strong></td>
<td>Logarithmized parameter of the word distribution for each topic The default value is 0.001.</td>
</tr>
<tr>
<td><strong>num.top.terms</strong></td>
<td>Number of top terms per topic that need to be extracted The default value is 20.</td>
</tr>
<tr>
<td><strong>num.topics</strong></td>
<td>Number of topics The default value is 5.</td>
</tr>
<tr>
<td><strong>burnin</strong></td>
<td>Number of omitted Gibbs iterations at beginning The default value is 4000.</td>
</tr>
<tr>
<td><strong>iter</strong></td>
<td>Number of Gibbs iterations The default value is 2000.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>thin</td>
<td>Number of omitted in-between Gibbs iterations. The default value is <strong>500</strong>.</td>
</tr>
<tr>
<td>best</td>
<td>If <strong>TRUE</strong>, only the model with the maximum (posterior) likelihood is returned. The default value is <strong>TRUE</strong>.</td>
</tr>
<tr>
<td>ngram</td>
<td>This parameter allows you to focus your analysis based on a certain number of words using a Document Term Matrix. You enter a value as the considered number of words. Based on this entered value, only notifications that contain this number of words in this sequence are analyzed during the training and scoring and are later displayed in the failure mode analytics results. You can enter values from 1 to 6. The default value is <strong>1</strong>.</td>
</tr>
</tbody>
</table>

**Example**

You enter the value **2**. The Document Term Matrix then contains two word phrases as its entries for terms. During the training and scoring, only notifications that contain two word phrases, for example, *bearing overheating* are analyzed. After the scoring, only results based on these notifications and the belonging top words are displayed in the failure mode analytics results.
### TextClassEnsemble

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ngram</td>
<td>This parameter allows you to focus your analysis based on a certain number of words using a Document Term Matrix. You enter a value as the considered number of words. Based on this entered value, only notifications that contain this number of words in this sequence are analyzed during the training and scoring and are later displayed in the failure mode analytics results. You can enter values from 1 to 6. The default value is 1.</td>
</tr>
</tbody>
</table>

**Example**

You enter the value 2. The Document Term Matrix then contains two word phrases as its entries for terms. During the training and scoring, only notifications that contain two word phrases, for example, bearing overheating are analyzed. After the scoring, only results based on these notifications and the belonging top words are displayed in the failure mode analytics results.

---

### 6.3.2 Training a Model

This topic describes how to train models for failure mode analytics.

**Prerequisites**

- At least one failure mode analytics model has been configured.
- The notifications for your equipment meet all of the following requirements:
  - The breakdown attribute of the notification is set to True or the notificationTypeDescription attribute is set to Breakdown.
  - The notification has a valid malfunction start and end date.
  - The notification has a long description.

If these requirements are not met, the notifications are not collected during the training. For more information about all these attributes and how to view and create a notification, see Viewing and Creating Equipment Notifications [page 104] and Notifications.

- The notifications that are later included in the selected training time frame meet the following requirements:
  - At least two different failure modes are included among all notifications.
  - For optimal results, for each failure mode that is included also at least 10 notifications should exist in the training time frame.
Context

Once you have configured a model, you can train it.

Note
You start with first training a model of unsupervised learner type, and then a model of supervised learner type.

Note
After the first successful training of a model, you cannot edit your model configuration any longer or delete your model. You can only copy the model and adjust the copied model.

Procedure

1. On the SAP Fiori launchpad, go to the Machine Learning Engine group and open the Failure Mode Analytics Model Management application.
2. From the Models pane, select the model you want to train.
3. To define the time frame of data that is used for training, select a date and time in the New Training From and To fields by choosing .

Note
For training a supervised model, in addition to the aspects above, select a time frame that is a subset of the time frame used in the unsupervised model that is referred to in the created supervised model.


The training run starts, showing the status in the Trainings table.

5. To refresh the status, choose next to the table.

Once the training run is completed, you can see detailed information, a model summary with multiple metrics, and the training job ID by clicking on the log entries in the Log Summary column. For more information about the model summary and the metrics, see Model Summary [page 345].

Results

Your model is trained.

Related Information

Configuring a Model [page 334]
6.3.2.1 Model Summary

After each training of a model, you can view a model summary. This model summary contains multiple metrics, which help you to understand the trained model better and evaluate and compare the quality of different trained models.

Background Information

When you train a model, metrics containing multiple numeric measurements are calculated. These metrics are calculated based on dedicated test data. This means, a test set, representing 10% of the training data is automatically split from the data, and is excluded from the training. The numeric measurements are calculated by using the test set to compare the model predictions with the actual outcomes of the test data after the training.

The Metrics of the Model Summary

Depending on the algorithm that you have selected for the model training, different numeric measurements are displayed. The following tables provide you with an overview of the metrics with their descriptions, and show the algorithm to which they apply:

<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</th>
<th>Algorithm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accuracy</strong></td>
<td>This metric displays the overall fraction of the correctly classified data. For this metric, values between 0 and 1 are possible. The value 1 refers to a perfect model.</td>
<td>Supervised Text Classification Using Ensemble Techniques</td>
</tr>
</tbody>
</table>

**i Note**

This metric can be misleading for highly imbalanced data sets.

<p>| <strong>Kappa</strong> | This metric adjusts the accuracy based on the expected accuracy provided by the class distribution. For this metric, values between -1 and 1 are possible. The value 1 refers to a perfect model. | Supervised Text Classification Using Ensemble Techniques |</p>
<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</th>
<th>Algorithm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recall</td>
<td>This metric displays the fraction of correctly classified positive cases.</td>
<td>Supervised Text Classification Using Ensemble Techniques</td>
</tr>
<tr>
<td></td>
<td>For this metric, values between 0 and 1 are possible. The value 1 refers to a perfect classification of all positive cases.</td>
<td></td>
</tr>
<tr>
<td>Precision</td>
<td>This metric displays the fraction of correctly classified negative cases.</td>
<td>Supervised Text Classification Using Ensemble Techniques</td>
</tr>
<tr>
<td></td>
<td>For this metric, values between 0 and 1 are possible. The value 1 refers to a perfect classification of all negative cases.</td>
<td></td>
</tr>
<tr>
<td>F1 Score</td>
<td>This metric is a measure that combines precision and recall and is the harmonic mean between precision and recall. The value 1 refers to a perfect combination of precision and recall. The value 0 refers to a bad combination.</td>
<td>Supervised Text Classification Using Ensemble Techniques</td>
</tr>
<tr>
<td>Perplexity</td>
<td>This metric indicates how well a probability model predicts a sample and is used by the convention in language modeling. A low perplexity indicates that the probability distribution is good at predicting the sample. The lower the perplexity score, the better the generalization performance.</td>
<td>Unsupervised Topic Modeling Using Latent Dirichlet Allocation</td>
</tr>
</tbody>
</table>

### 6.3.3 Scoring a Model

This topic describes how to score models for failure mode analytics.

**Prerequisites**

Your supervised model has been trained successfully at least once.
Context

Once you have trained a supervised model, you can score the latest trained model to score data.

**Note**
The latest version of a model is used for scoring.

Procedure

1. On the SAP Fiori launchpad, go to the *Machine Learning Engine* group and open the *Failure Mode Analytics Model Management* application.
2. To score a model, you can choose between the following options:
   - Set up a regular scoring for the model. For more information, see *Scheduling Regular Scoring of a Model* [page 348].
   - Set up a manual scoring for the model. For manual scoring, proceed as described in the following steps:
3. From the *Models* pane, select the model you want to score.
4. To define the time frame of data that is used for scoring, select a date and time in the *Score Data From* and *To* fields by choosing .
5. Choose *Start Scoring*.
   - The scoring run starts, showing the status in the *Scorings* table.
6. To refresh the status, choose next to the table.
   - Once the scoring run is completed, you can see detailed information and the scoring job ID by clicking on the log entries in the *Log Summary* column.

Results

Your supervised model is scored.

Next Steps

You can now check the scoring results for failure mode analytics as follows:

- On the equipment or model pages. For more information, see *Using Failure Mode Analytics on the Equipment or Model Pages* [page 51].
- In the *Failure Modes* or *Failure Mode Analytics* applications. For more information, see *Using Failure Mode Analytics in the Failure Modes Application* [page 57] and *Using the Failure Mode Analytics Application* [page 58].
6.3.3.1 Scheduling Regular Scoring of a Model

This topic describes how to schedule a regular scoring of models used for failure mode analytics.

Prerequisites

Your supervised model has been trained successfully at least once.

Context

In the Failure Mode Analytics Model Management application, you can configure a schedule, update an existing schedule, and activate or deactivate a schedule for the periodical execution of scoring.

Procedure

1. On the SAP Fiori launchpad, go to the Machine Learning Engine group and open the Failure Mode Analytics Model Management application.
2. From the Models pane, select the model you want to score.
3. To configure the scoring schedule, choose Set Schedule.
   The Set Scoring Schedule dialog box is displayed.
4. Fill in the following fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active</strong></td>
<td>Activate or deactivate the scoring schedule for the model.</td>
</tr>
<tr>
<td><strong>Start</strong></td>
<td>Select the start date and time of the scoring schedule.</td>
</tr>
<tr>
<td><strong>Recurrence Pattern</strong></td>
<td>Define whether the scoring job should run once or frequently at certain intervals.</td>
</tr>
</tbody>
</table>
Data Range

Define whether the scoring should run on all data coming in since the last scoring run, or on a limited data set coming in during a certain time period before the scoring.

Range of Recurrence

Define whether the scoring schedule should finish at a certain date and time.

5. Choose OK.

Results

The scoring schedule is configured.
You can later edit or also deactivate the scoring schedule if required.

Related Information

Scoring a Model [page 346]

6.4 Validating Failure Mode Analytics

This topic describes how to validate failure mode analytics.

Prerequisites

- Your unsupervised model has been trained successfully once at least. For more information, see Managing Models for Failure Mode Analytics [page 332].
- The role FMA_VALIDATION_EXPERT is assigned to your user.

Note

If the required role or roles are not assigned to your user, you cannot see the application on the launchpad. Contact your Identity Management Administrator if the role or roles have not been assigned to your user yet.
**Context**

To improve the accuracy of the text analysis that maps topics with top words from notification texts to the most appropriate failure modes, we recommend you perform validation tasks.

Validation tasks are generated based on a trained unsupervised model and are displayed on the *Failure Mode Analytics Validation* application. For each trained unsupervised model, one validation task is generated. The validation is assumed to be a one-time activity for each training run.

Once you have performed a validation task, you can apply your validation to the next supervised model training and scoring run in the *Failure Mode Analytics Model Management* application and check the validation results for failure mode analytics.

**Procedure**

1. On the SAP Fiori launchpad, go to the *Machine Learning Engine* group and open the *Failure Mode Analytics Validation* application.
   
The *Validation Tasks* table is displayed. The table lists all available tasks.

2. To begin a validation task, choose *Start*.
   
The *Topics and Failure Mode Assignments* table is displayed. The table lists all topics with the most relevant top words for each failure mode.

3. In the table, check if each topic is assigned to the most relevant failure mode based on the top words of the topic and your own experience. You can see the top words by clicking on a topic.

   **i Note**

   Consider the following:
   - The topics are pre-assigned to the most relevant failure modes during the initial training. When a topic has an equal relevance split between several failure modes, it is assigned to the first mode ID alphabetically.
   - Each topic is represented by a number. If no relevant failure mode is found for the top words of the topic during the training, the topic, for example, topic number 2 is not displayed in the list.

4. *(Relevant only if there is a more relevant failure mode):* Reassign the topic to a different failure mode by using the failure mode selection dialog.

   **i Note**

   If you change the failure mode, the relevance score changes to reflect the new relevance of the topic to the failure mode.

5. To continue the task, choose *Save and Next*.
   
The *Notifications* table is displayed. The table lists notifications for each failure mode. It displays a maximum of 10 notifications per failure mode.

6. In the table, check if each notification is assigned to the most relevant failure mode. You can view details of a notification by clicking the notification link.

7. *(Relevant only if there is a more relevant failure mode):* Reassign the notification to a different failure mode by using the failure mode selection dialog.
If you change the failure mode, the relevance score is replaced with N/A and a new training is required to generate a new score.

8. To confirm the task, choose Save and Confirm.
9. To complete the task, choose Activate.

i Note
To rework the task, choose Start.

The task is completed and removed from the Validation Tasks table and the Failure Mode Analytics Validation application.

A new validated model is displayed on the Failure Mode Analytics Model Management application.

10. To apply the validation, go to the Machine Learning Engine group and open the Failure Mode Analytics Model Management application.
11. Configure a supervised model based on the unsupervised model that you validated, train, and score it. For more information, see Managing Models for Failure Mode Analytics [page 332].

Results

For the chosen equipment model, the validation results are applied.

Next Steps

You can now check the validation results for failure mode analytics as follows:

- On the equipment or model pages. For more information, see Using Failure Mode Analytics on the Equipment or Model Pages [page 51].
- In the Failure Modes or Failure Mode Analytics applications. For more information, see Using Failure Mode Analytics in the Failure Modes Application [page 57] and Using the Failure Mode Analytics Application [page 58].

Related Information

Failure Mode Analytics [page 49]
6.5 Managing Models for Leading Indicators

This topic describes how to manage models for leading indicators.

Prerequisites

The role `DataScienceUser` or the roles `DataScienceRead` and `DataScienceWrite` are assigned to your user.

**Note**

If the required role or roles are not assigned to your user, you cannot see the application on the launchpad. Contact your Identity Management Administrator if the role or roles have not been assigned to your user yet.

Context

To view and analyze the leading indicators that have the highest influence on failures for your equipment and equipment models, you need to determine the leading indicators by configuring and training models in the `Leading Indicators Model Management` application.

In this process, you configure a model based on the equipment model and optionally failure mode for which you later want to view and analyze the leading indicators. You can do this either for a one piece of equipment or all equipment of the equipment model. You then train the model.

Procedure

1. To train a model, you first need to configure a model. For more information, see Configuring a Model [page 353].
2. Once you have configured a model, you can train it. For more information, see Training a Model [page 356].
6.5.1 Configuring a Model

This topic describes how to configure models for leading indicators.

Context

To train a model, you first need to configure a model.

i Note

Once you have configured a model, you can only edit the name and the description of the model. If you delete a configured model, the used data set of the model is deleted if the data set is not used in other models.

Procedure

1. On the SAP Fiori launchpad, go to the Machine Learning Engine group and open the Leading Indicators Model Management application.
2. To configure a model, you can choose between the following options:
   - **Configure a new model based on an existing model**: Select the base configuration and choose Copy. The new configuration contains all settings of the copied configuration.
   - **Create a new model from scratch**: Choose . The New Model screen is displayed.
3. Fill in all required fields in the General Information section. For more information, see Fields for Configuring a Model [page 354].
4. Save your model.

Results

Your model is configured and added to the Models pane.

Related Information

Training a Model [page 356]
### 6.5.1.1 Fields for Configuring a Model

<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>x</td>
<td>Enter a name for the model.</td>
</tr>
<tr>
<td>Description</td>
<td>-</td>
<td>Enter a description for the model.</td>
</tr>
</tbody>
</table>
| Data Set       | -         | Select the data set that you want to use to train the model. You can choose between the following options:  
|                |           | - Generate a data set for the training input  
|                |           | Select this option when you haven’t configured a data set yet as a training input.  
|                |           | - Select an existing data set for the training input  
|                |           | Select this option when you have already configured a data set as training input.  |

**i Note**  
The included indicator values are within the retention period. The retention period is maintained for the SAP Internet of Things store and can have a maximum range of 5 years. For more information, see Create Retention Period for Time Series Data Store.
<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment Model</td>
<td>x</td>
<td>Select the equipment model that you want to use as a basis for the data set. You can choose from all equipment models that were created in the Models application.</td>
</tr>
<tr>
<td>Note</td>
<td></td>
<td>This field is visible only when you have selected the option to generate a data set.</td>
</tr>
<tr>
<td>Note</td>
<td></td>
<td>If you want to include a specific failure mode, select a failure mode in the field below. If you don't want to select a specific failure mode and determine the leading indicators for all failures that occurred in the past, choose Generate Data Set to generate the data set. The generated data set is then displayed in the Training Input field.</td>
</tr>
<tr>
<td>Failure Mode</td>
<td></td>
<td>Select the failure mode that you want to use as a basis for the data set. You can choose from all failure modes that are assigned to the selected equipment model.</td>
</tr>
<tr>
<td>Note</td>
<td></td>
<td>This field is visible only when you have selected the option to generate a data set.</td>
</tr>
<tr>
<td>Note</td>
<td></td>
<td>Once you have selected a failure mode, choose Generate Data Set to generate the data set. The generated data set is then displayed in the Training Input field.</td>
</tr>
</tbody>
</table>
### Training Input

- **Mandatory**: X
- **Description**: Depending on the option that you have chosen for the Data Set field, either the training input is displayed or you select the training data set:
  - When you have selected the option to generate a data set, the data set is displayed in this field. You can review the generated data set by clicking the training input link.
  - When you have selected the option to select a data set, you select here the data set that you want to use to train the model. You can choose from all configured data sets in the Health Indicator Data Set Configuration application. To view details about the selected data set, choose . The data set with its details is then displayed in the Health Indicator Data Set Configuration application in a new tab.

### 6.5.2 Training a Model

This topic describes how to train models for leading indicators.

**Prerequisites**

At least one model has been configured.

**Context**

Once you have configured a model, you can train it.

For more information about the algorithm that is used for the model training, see Decision Tree.

**Note**

Once you have trained a model and you delete the trained model, the used data set of the model is deleted in case the data set is not used in other models and the leading indicators with their conditions on the
models and equipment page are deleted. If you have created a rule for one condition, this rule is not deleted, and you need to delete it manually.

## Procedure

1. On the SAP Fiori launchpad, go to the *Machine Learning Engine* group and open the *Leading Indicators Model Management* application.
2. From the *Models* pane, select the model that you want to train.
3. To define the time frame of data that is used for training, select a date and time in the *New Training From* and *To* fields by choosing .
4. Choose *Start Training*.
   
   The training run starts, showing the status in the *Trainings* table.
5. To refresh the status, choose next to the table.
   
   Once the training run is completed, you can see detailed information and the training job ID by clicking on the log entries in the *Log Summary* column.

## Results

Your model is trained.

## Next Steps

You can now view and analyze the leading indicators as follows:

- On the equipment page for one piece of the equipment of the equipment model. For more information, see Viewing and Analyzing Leading Indicators for Equipment [page 109].
- On the models page for all your equipment of the equipment model. For more information, see Viewing and Analyzing Leading Indicators for a Model [page 126].

## Related Information

Managing Models for Leading Indicators [page 352]
6.6 Failure Curve Analytics Model Configuration Management

Overview of Failure Curve Analytics

Failure curve analytics lets you view the age at which your equipment may fail within an age range and the likeliness of the failure by using a failure curve with different insights. This helps you detect potential failure risks early and plan actions to prevent failures.

The failure curve with the different insights is calculated per failure mode for a group of equipment (fleet group) with similar operating conditions. The failure curve is displayed on the equipment page. On the failure curve, the following insights are displayed:

- The current age of the piece of equipment in calendar days
- The probability of failure (POF) or conditional probability of failure for the current age. The probability of failure is the chance that the equipment will fail based on the failures that occurred in the past. The conditional probability of failure is the chance the equipment will fail by a specific future age given that it is not failed until the current age.
- The upper and lower confidence interval for the POF
- The predicted failure date for the piece of equipment
- The time to failure in days (remaining useful live) for the piece of equipment based on the predicted failure date

The insights can be displayed for any age within the age range.

Example

Rose, a reliability engineer, spots a problematic piece of equipment, pump-0054. She lets the system calculate the failure curve and reviews the failure curve for the failure mode OHE (Overheating). On the failure curve, she sees that the piece of equipment has a current age of 43 days and that the probability of failure for this age is 80%. She also views the further insights and sees that the predicted time to failure is less than 15 days. To prevent the failure from occurring, she creates a maintenance request to get the pump repaired.

Failure Curve Analytics and Machine Learning

For calculating the failure curve and the insights, machine learning is used. In that process, model configurations are trained and scored using a Weibull distribution algorithm. The model configuration contains different input data that is used by the algorithm to produce outputs (results). You can have multiple model configurations with similar or different input data.
Input Data for Model Configuration Training and Scoring

The input data is separated into configuration parameters and data sets.

Configuration Parameters

First, you enter the configuration parameters of the model configuration. Besides the ID and the description of the model configuration, you select the following parameters:

- **Fleet Group**: The fleet group defines the group of equipment. You can either use an existing fleet group or create a new group and select the equipment using the fleet builder. The fleet builder includes searching and filtering. Besides basic filters, for example, the model, you can also add and define additional attributes as filter. The additional attributes include, for example, the data type.

- **Age for the Conditional Probability of Failure**: This age is used for calculating the conditional probability of failure. For example, you enter 100 days as the age and your equipment has a current age of 50 days, then the conditional probability of failure is calculated for the age of 100 days given that the equipment has not failed until the age of 50 days. If you leave the field empty, then the probability of failure is calculated.

- **Whether the Installation Date is Maintained and Reliable**: If your installation dates are maintained and reliable, they are used to calculate the age of the equipment at its first failure. If your installation dates are not maintained or reliable, the first malfunction end date is used to calculate the age of the equipment at its next failure. For equipment that has failed or been replaced, the date of the replacement is used as the installation date and the age is set to 0.

- **Whether the Equipment is Repairable**: If your equipment is repairable, it is restored to a "like-new" condition and set to the age of 0 once it has been repaired. This age is then used to calculate the age of the equipment at its next failure. If your equipment is not repairable, the installation dates are used to calculate the age of the equipment at its failure.

Data Sets

Based on the selection, the system collects the notifications and failure modes for the fleet group that you can adapt according to your needs:

- **Notification Date Range**: The notification date range is suggested by the system. The start date is either the equipment installation date or the malfunction start date of the oldest created notification if the installation date is not maintained. The end date is always the current date. The range includes all breakdown notifications of the equipment. You can keep the suggested date range or edit it. You can also add additional ranges or delete added date ranges. If you define additional ranges, the breakdown notifications of all ranges are used.

  **Note**
  
  If a breakdown notification has no failure mode assigned, the notification will only be used by the algorithm to calculate the time the equipment was down and is otherwise not taken into account.

- **Failure Modes**: The failure modes are collected from the equipment or the equipment models they belong to. For each failure mode, the number of breakdown notifications is displayed. You can keep the failure modes or remove failure modes and add them back. With the failure modes, you can filter the breakdown notifications so that the results are only calculated for certain failure modes. To get meaningful results, you should select at least one failure mode.

  **Note**
  
  The algorithm will only use the failure modes for which breakdown notifications exist.
**Equipment**: The equipment is used from the selected fleet group or a new fleet group. You can keep the selection of equipment or add equipment using the fleet builder and remove equipment.

## Model Configuration Training and Scoring

The training and scoring happen successively in one go.

During the training of the model configuration, the Weibull distribution algorithm uses the breakdown notifications and failure modes together with the information of the first installation date and equipment repairability to calculate the uptime and downtime of the fleet group. For more information about what is an uptime and downtime, see the related information link below. The uptimes and downtimes are then used to produce a Weibull model. The Weibull model includes the shape and scale of the failure curve for the fleet group.

During the scoring of the model configuration, the algorithm uses the output of the training to calculate the probability of failure and the other insights, for example, the predicted failure date. With this, the calculation of the final curve and the insights is complete for the fleet group and the failure modes.

The following graphic illustrates how the input data is used during the training and scoring and what outputs are produced:

For a successful calculation, the training and scoring need to be completed successfully. The training and scoring can be repeated at any time. The failure curve always shows the insights for the latest successful training and scoring. For each training and scoring, the training happens once, and the scoring is repeated every day by default to produce the latest insights. You can also edit the scoring date range and the recurrence or turn the recurrence off.

**Note**

If you edit the recurrence or turn it off, the insights on the failure curve are not updated by default anymore on a daily basis.

You can also edit the input data of the model configuration after the training and scoring again. In this case, you need to repeat the training and scoring of the model configuration so that the failure curve and the insights are updated.
Model Configuration Statuses

A model configuration can be in any of the following main statuses:

- **Inactive**: The model configuration has been created, but not yet trained and scored.
- **Review**: The model configuration has been created and trained successfully at least once, but not yet scored.
- **Active**: The model configuration has been trained and scored successfully at least once.

Besides the main statuses, a model configuration can also be in any of the following statuses:

- **Collecting Data**: The model configuration has been created and the system is collecting the equipment together with the failure modes and notifications of the equipment.
- **Collection Failed**: The collection of the failure modes failed because of a technical error. In this case, you should delete the model configuration and create a new one again. If the issue persists, you need to create a support ticket.
- **Pending**: A training or scoring run for the model configuration is in progress.

Model Configuration Deletion

You can delete a model configuration as long as no training has been started for the model configuration or the model configuration has not been trained successfully. After the first successful training, you can only copy the model configuration.

Related Tasks

Managing Model Configurations [page 362]

Related Information

Calculation of Mean Time KPIs [page 52]
6.6.1 Managing Model Configurations

This topic provides you with an overview of all steps for managing model configurations for failure curve analytics.

Prerequisites

The role FailureCurveAnalyticsUser or the two roles FailureCurveAnalyticsTrainAndScore and FailureCurveAnalyticsDelete are assigned to your user.

Procedure

1. Create a model configuration. For more information, see Creating a Model Configuration [page 363].

   → Remember
   
   If you need to delete the model configuration, consider that you can only delete the model configuration as long as no training has been started for the model configuration or the model configuration has not been trained successfully. For more information, see Deleting a Model Configuration [page 369].

2. Train and score the model configuration. For more information, see Training and Scoring a Model Configuration [page 366].

Results

The workflow has been completed and the results for failure curve analytics are calculated.

You can always repeat the training and scoring to produce latest results. You can also edit the model configuration after the scoring again and retrain and rescore the model configuration. For more information about editing a model configuration, see Editing a Model Configuration [page 368].

Next Steps

You can now view the failure curve with the different insights for your equipment. For more information, see Viewing a Failure Curve for Equipment [page 111].
Related Information

Failure Curve Analytics Model Configuration Management [page 358]

6.6.1.1 Creating a Model Configuration

This topic explains how to create a model configuration.

Prerequisites

- You have created failure modes and assigned the failure modes to the relevant equipment or equipment models that you want to use for failure curve analytics. For more information, see Creating a Failure Mode [page 143] and Assigning Failure Modes to Business Objects [page 149].
- The notifications for your equipment meet all of the following requirements:
  - The breakdown attribute of the notification is set to True or the notificationTypeDescription attribute is set to Breakdown.
  - The notification has a valid malfunction start and end date.
  - The notifications have a failure mode assigned.
  For more information about all these attributes and how to view and create a notification, see Viewing and Creating Equipment Notifications [page 104] and Notifications.

Procedure

1. On the SAP Fiori launchpad, open the Failure Curve Analytics Model Configuration Management application.
   The Configurations screen is displayed. The screen lists all created model configurations with further information, for example, the status.
2. To create a model configuration, choose between the following options:
   - Create a new configuration based on an existing configuration: Select an existing configuration and choose Copy. The new model configuration contains all settings of the base configuration.
   - Create a new configuration from scratch: Choose New.
   The New Configuration or Copy Configuration dialog box is displayed.
3. In the dialog box, fill in the following fields:
   - **Model Configuration ID**: Enter the ID for the model configuration.
   - **Note**: You can use the following characters:
Description

Enter a description for the model configuration. You can enter a description with a maximum number of 256 characters.

Fleet Group

Select the group of equipment (fleet group). You can choose from the following options:

- Select an existing fleet group by choosing 🔄. You can choose from all fleet groups that have been created in the Groups application.
- Create a new fleet group by choosing New and then select the equipment of the group using the fleet builder. The new group is then also stored in the Groups application.

**i Note**

Consider the following:

- When you create a new group, do not include equipment that was sold or shared before the 2011 release. Otherwise, the creation of the group may not work.
- We recommend to only include equipment used in similar operating conditions.

Age for Conditional Probability of Failure

Enter an age for the conditional probability or leave the field empty.

**i Note**

If you enter an age, ensure that the age is higher than the current age of the equipment.

Installation Date is Maintained and Reliable

Select whether the installation date for the group of equipment is maintained or not.

Equipment is Repairable

Select whether the group of equipment is repairable or not.

**i Note**

If you have non-repairable equipment and a piece of equipment has been replaced by a new one, ensure that you add the new piece of equipment to the fleet group.

4. Choose Save.
The model configuration is created and you are forwarded to the details screen of the configuration where you can refine the data sets to complete the model configuration.

5. On the details screen, choose \(\textbf{Input Data Sets} \Rightarrow \textbf{Notification Data Ranges}\) to view the notification date ranges:
   a. To edit the suggested date range, select the range and choose \textit{Edit}.
   b. To define an additional date range, choose \textit{Add}, select the date and time and save it.
   c. To remove a date range, select the range and choose \textit{Delete}.

6. To view the failure modes, choose \(\textbf{Input Data Sets} \Rightarrow \textbf{Failure Modes}\):
   All failure modes of the equipment or equipment models are displayed in the list. That means you can only add a failure mode after you have excluded that failure mode.

   \[\textbf{i Note}\]
   It can take a short while to collect all failure modes. During this time, the failure modes table will be empty and the respective status for the collection is displayed. Once all failure modes are collected, the status changes again and the failure modes are displayed in the table. For more information about the statuses, see \textit{Failure Curve Analytics Model Configuration Management} [page 358].

   a. To exclude failure modes from the analysis, select the failure mode or modes and choose \textit{Remove}.
   b. To include additional failure modes in the analysis, choose \textit{Add} and select the desired failure mode or modes.

7. To view the equipment of the fleet group, choose \(\textbf{Input Data Sets} \Rightarrow \textbf{Equipment}\):

   \[\textbf{i Note}\]
   Consider the following:
   ○ You can only edit the equipment of the fleet group if the group is in \textit{Revision} mode.
   ○ If you edit the equipment of the fleet group, the failure mode list is not updated immediately. The list is updated once you start the training and scoring for the model configuration.
   ○ If you edit the equipment of the fleet group, the equipment count on the \textit{Model Configurations} screen will be updated after 15 minutes.

   a. To include additional equipment in the analysis, choose \textit{Add} and select the desired equipment. You can choose any equipment.
   b. To exclude equipment from the analysis, select the equipment and choose \textit{Remove}.

\[\textbf{Results}\]

The creation of the model configuration is complete.

\[\textbf{Related Information}\]

Training and Scoring a Model Configuration [page 366]
6.6.1.2 Training and Scoring a Model Configuration

This topic explains how to train and score a model configuration.

Prerequisites

You have created or edited a model configuration.

Procedure

1. **(Only relevant if the details screen of the model configuration is not displayed yet):** Navigate to the details screen:
   a. On the SAP Fiori launchpad, open the Failure Curve Analytics Model Configuration Management application.
   b. Select the model configuration that you want to train and score.

   The details screen is displayed.

2. On the details screen, choose **Train and Score**.

   The training run starts showing the status **In Progress** and the logs for the training run are being created.

3. To view the training status and the logs, select the model configuration and choose **Trainings** on the details screen.

   The training run and the status is displayed in the **Training Runs** table. The logs for the training run are displayed in the **Last Training Run Logs** table.

4. To refresh the status and the logs, choose **next to the Training Runs table**.

   Once the training run has finished, the status changes to **Completed** or **Failed**.

   If the training run has failed, you need to analyze the logs and then start the training and scoring again. For more information about the logs, see **Logs** [page 367].

   If the training run has been completed, the scoring run automatically starts showing the status **In Progress** and the logs for the scoring run are being created.

5. To view the scoring status and the logs, choose **Scorings**.

   The scoring run and the status is displayed in the **Scoring Runs** table. The logs for the scoring run are displayed in the **Last Scoring Run Logs** table.

6. To refresh the status and the logs, choose **next to the Scoring Runs table**.

   Once the scoring run has finished, the status changes to **Completed** or **Failed**.

   If the scoring run has failed, you need to analyze the logs and then start the training and scoring again. For more information about the logs, see **Logs** [page 367].
Results

The model configuration is trained and scored. The scoring repeats based on the recurrence.

You can later edit the scoring date range or the recurrence by choosing Scorings and then Edit under Scoring Date Range. To apply the edits, train and score the model configuration again. To turn the recurrence off, set the value of the recurrence to 0. In this case, you do not need to train and score the model configuration again.

If you have multiple training and scoring runs for your model configuration and you want to view the logs or details about a specific training run, choose the respective run in the Training Run or Scoring Run tables.

Related Information

Managing Model Configurations [page 362]

6.6.1.2.1 Logs

During a training or scoring run, different log entries are created. The log entries are always displayed for the currently running training or scoring run or the last training or scoring run.

Log Entry

A log entry provides you with information about the steps that are executed during a training and scoring run and whether a step has been completed successfully or not.

Types of Log Entries

Depending on whether a step has been completed successfully or not, different types are displayed:

- **Information**
  This type is displayed if a step has been completed successfully, for example, all data has been collected and processed successfully.

- **Warning**
  This type is displayed if a step has been completed with an exception, for example, if some data has been excluded or if the conditional probability could not be calculated for all equipment.

- **Error**
  This type is displayed if a step has failed, for example, if the data could not be collected. If an error is displayed, the training or scoring run fails.
Corellation ID For Support

The correlation ID is displayed for any type and can be used to create a support ticket, for example, for errors where further clarification is required.

6.6.1.3 Editing a Model Configuration

This topic explains how to edit a model configuration.

Prerequisites

You have created a model configuration or trained and scored the model configuration.

Procedure

1. (Only relevant if the application is not open yet): On the SAP Fiori launchpad, open the Failure Curve Analytics Model Configuration Management application.

   The Configurations screen is displayed.

2. On the Configurations screen, select the model configuration that you want to edit.

   The details screen of the model configuration is displayed.

3. To edit the configuration parameters, choose Edit Header:

   a. In the Edit Configuration dialog box, edit the fields.
   b. Choose Save.

4. To edit the notification date range, choose Input Data Sets Notification Data Ranges:

   a. To edit the suggested date range, select the range and choose Edit.
   b. To define an additional date range, choose Add, select the date and time and save it.
   c. To remove a date range, select the range and choose Delete.

5. To edit the failure modes, choose Input Data Sets Failure Modes:

   All failure modes of the equipment or equipment models are displayed in the list. That means you can only add a failure mode after you have excluded that failure mode.

   i Note

   It can take a short while to collect all failure modes. During this time, the failure modes table will be empty and the respective status for the collection is displayed. Once all failure modes are collected, the status changes again and the failure modes are displayed in the table. For more information about the statuses, see Failure Curve Analytics Model Configuration Management [page 358].
a. To exclude failure modes from the analysis, select the failure mode or modes and choose Remove.
b. To include additional failure modes in the analysis, choose Add and select the desired failure mode or modes.

6. To edit the equipment of the fleet group, choose \textit{Input Data Sets} \textit{Equipment}.

\textbf{i Note}

Consider the following:
- You can only edit the equipment of the fleet group if the group is in \textit{Revision} mode.
- If you edit the equipment of the fleet group, the failure mode list is not updated immediately. The list is updated once you start the training and scoring for the model configuration.
- If you edit the equipment of the fleet group, the equipment count on the \textit{Model Configurations} screen will be updated after 15 minutes.

a. To include additional equipment in the analysis, choose Add and select the desired equipment. You can choose any equipment.
b. To exclude equipment from the analysis, select the equipment and choose Remove.

\textbf{Results}

The model configuration is edited.

\textbf{Related Information}

\textit{Training and Scoring a Model Configuration} [page 366]

\textbf{6.6.1.4 Deleting a Model Configuration}

This topic explains how to delete a model configuration.

\textbf{Prerequisites}

You have created a model configuration.

\textbf{→ Remember}

You can only delete the model configuration as long as no training has been started for the model configuration or the model configuration has not been trained successfully.
Procedure

1. To delete a model configuration, you can choose between the following options:
   - **Delete a single model configuration directly on the details screen**: Choose *Delete* and confirm the displayed dialog box.
   - **Delete a single or multiple model configurations on the Model Configurations screen**: Proceed as described in the steps below:

2. **(Only relevant if the application is not open yet)**: On the SAP Fiori launchpad, open the *Failure Curve Analytics Model Configuration Management* application.
   The *Configurations* screen is displayed.

3. On the *Configurations* screen, select the model configuration or multiple configurations that you want to delete.

4. Choose *Delete* and confirm the displayed dialog box.

Results

The model configuration or multiple model configurations are deleted.

Related Information

*Managing Model Configurations [page 362]*
7 Administration

The tiles under Administration on the SAP Fiori launchpad give you access to the various administration functions.

Overview of Administration Functions

<table>
<thead>
<tr>
<th>Title</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Profile [page 371]</td>
<td>Create/display a company profile. You can add locations of your organization, subsidiaries and specify industry IDs.</td>
</tr>
<tr>
<td>Application Settings [page 382]</td>
<td>Execute configuration tasks for roles and users and configure the Explorer and analysis tools.</td>
</tr>
<tr>
<td>User Authorizations [page 390]</td>
<td>Define a more granular user authorizations to access SAP Predictive Asset Insights.</td>
</tr>
<tr>
<td>Data Protection and Privacy (DPP) [page 398]</td>
<td>View details regarding your personal data like e-mail address, first name, last name, and user ID and the objects that you have created or modified.</td>
</tr>
</tbody>
</table>

7.1 Managing Company Profile

As an organization administrator, you can edit your organization’s company profile, add locations of your organization, add subsidiaries and maintain Industry IDs of your organization in SAP Predictive Asset Insights. You can search for organizations using the industry member names. You can also create locations, contact persons and industry ID’s for a subsidiary.

Prerequisites

Your organization and the users of your organization are successfully registered with SAP Predictive Asset Insights and you have received the necessary information to logon to the SAP Predictive Asset Insights and use the applications of SAP Predictive Asset Insights.

Context

You use the Company Profile application to work with the company profile of your organization.
7.1.1 Adding Location Details of your Organization

Prerequisites

Your user ID has the role `COMPANYPROFILE_DELETE, COMPANYPROFILE_EDIT` assigned.

Procedure

1. Open the Company Profile application.
2. Choose Locations.
3. Choose New Location.
4. In the New Location popup, enter the Location Details and Contact Person Details.
   1. For Location Details, enter the values for the fields as described in the table below:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location Name (*)</td>
<td>Enter the name of your location.</td>
</tr>
<tr>
<td>Street/Number</td>
<td>Enter the street and house number information for your location.</td>
</tr>
<tr>
<td>Postal Code/City</td>
<td>Enter the postal code and city information for your location.</td>
</tr>
<tr>
<td>Country</td>
<td>Enter the country information for your location.</td>
</tr>
<tr>
<td>Phone Number</td>
<td>Enter the phone number for your location.</td>
</tr>
</tbody>
</table>

2. For Contact Person Details, enter the values for the fields as described in the table below:

   i Note
   If you want to use the primary contact person details of your base location, select the checkbox `Reuse Primary Contact Person Details`.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Enter the title of your contact person</td>
</tr>
<tr>
<td>First Name</td>
<td>Enter the first name of your contact person</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>Last Name</td>
<td>Enter the last name of your contact person</td>
</tr>
<tr>
<td>Phone Number</td>
<td>Enter the phone number of your contact person</td>
</tr>
<tr>
<td>Email Address</td>
<td>Enter the Email address of your contact person</td>
</tr>
</tbody>
</table>

**i Note**

The information you enter for your contact person will be visible for other companies when they are viewing your company profile.

Therefore, make sure that your contact person is aware of this system behavior, and you only enter a contact person whose tasks include to represent your company location to external business partners.

If you change a contact person, the previously entered contact person data gets overwritten with the new contact person information and cannot be restored.

5. Choose Save.

### 7.1.2 Updating Location Details of your Organization

**Prerequisites**

- You have at least one location of your organization in SAP Predictive Asset Insights.
- Your user ID has the roles `COMPANYPROFILE_DELETE,COMPANYPROFILE_EDIT` assigned.
  For more information, see Roles.

**Procedure**

1. Open the Company Profile application.
2. Choose Locations and select the location you want to edit.
3. Choose Edit.
4. In the Edit Location pop-up, update the Location Details and Contact Person Details.
5. Choose Save.
7.1.3 Deleting Location Details of your Organization

Prerequisites

- You have at least one location of your organization in SAP Predictive Asset Insights.
- Your user ID has the role `COMPANYPROFILE_DELETE` assigned.
  
  For more information, see Roles.

Procedure

1. Open the Company Profile application.
2. Choose Locations and select the location you want to delete.
3. Choose Delete.
   
   To delete multiple locations, perform these steps:
   1. Choose the List View icon.
   2. Select all the locations you wish to delete.
   3. Choose Delete.
4. Choose OK on the warning message.

7.1.4 Creating Subsidiary Details

You perform this procedure to add your subsidiary company details to the network.

Prerequisites

Your user ID has the roles `COMPANYPROFILE_DELETE`, `COMPANYPROFILE_EDIT` and `DOCUMENT_EDIT` or `DOCUMENT_DELETE` assigned.

Procedure

1. Open the Company Profile application.
2. Choose Subsidiaries.
3. Choose New.
4. In the **New Subsidiary** popup, add the following details:

1. For Subsidiary Details enter the values for the fields as described in the table below:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Name(*)</td>
<td>Name of the subsidiary company</td>
</tr>
<tr>
<td>Subsidiary Logo</td>
<td>Browse the subsidiary logo and upload</td>
</tr>
<tr>
<td>Company Short Name</td>
<td>Enter a short name for the subsidiary</td>
</tr>
<tr>
<td>Roles (*)</td>
<td>Choose the roles from the dropdown</td>
</tr>
<tr>
<td></td>
<td>Th following roles are available:</td>
</tr>
<tr>
<td></td>
<td>○ Bill-To Party</td>
</tr>
<tr>
<td></td>
<td>○ Insurer</td>
</tr>
<tr>
<td></td>
<td>○ Manufacturer</td>
</tr>
<tr>
<td></td>
<td>○ Operator</td>
</tr>
<tr>
<td></td>
<td>○ Regulator/Authority</td>
</tr>
<tr>
<td></td>
<td>○ Retailer</td>
</tr>
<tr>
<td></td>
<td>○ Service Provider</td>
</tr>
<tr>
<td></td>
<td>○ Ship-To Party</td>
</tr>
<tr>
<td></td>
<td>○ Software Partner/Content Partner</td>
</tr>
<tr>
<td></td>
<td>○ Sold-To Party</td>
</tr>
<tr>
<td></td>
<td>○ Supplier / Dealer</td>
</tr>
<tr>
<td>Mnemonics</td>
<td>Enter informal names (for example, obsolete company names, abbreviations or</td>
</tr>
<tr>
<td></td>
<td>potential wrong spellings) of the subsidiary company that may be used for</td>
</tr>
<tr>
<td></td>
<td>search.</td>
</tr>
<tr>
<td>Street/Number</td>
<td>Enter the street and house number information for the subsidiary</td>
</tr>
<tr>
<td>Postal Code</td>
<td>Enter the postal code information for the subsidiary</td>
</tr>
<tr>
<td>City</td>
<td>Enter the city information for the subsidiary</td>
</tr>
<tr>
<td>Country</td>
<td>Enter the country information for the subsidiary</td>
</tr>
<tr>
<td>Phone Number</td>
<td>Enter the phone number of the subsidiary</td>
</tr>
<tr>
<td>Web Site (*)</td>
<td>Enter the URL of the subsidiary Web site</td>
</tr>
<tr>
<td>Acquired Subsidiary</td>
<td>Specify if your organization has acquired the subsidiary.</td>
</tr>
</tbody>
</table>

**i Note**

Yes/No is a toggle button. If Yes, specify the date you acquired the subsidiary company.
2. For Contact Person Details enter the values for the fields as described in the table below:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Enter the title of the subsidiary contact person</td>
</tr>
<tr>
<td>First Name</td>
<td>Enter the first name of the subsidiary contact person</td>
</tr>
<tr>
<td>Last Name</td>
<td>Enter the last name of the subsidiary contact person</td>
</tr>
<tr>
<td>Phone Number</td>
<td>Enter the phone number of the subsidiary contact person</td>
</tr>
<tr>
<td>Email Address</td>
<td>Enter the Email address of the subsidiary contact person</td>
</tr>
</tbody>
</table>

**i Note**

The information you enter for subsidiary contact person will be visible for other companies when they are viewing the subsidiary information in your company profile.

Therefore, make sure that your subsidiary organization is aware of this, and you only enter a subsidiary contact person whose tasks include to represent the subsidiary externally.

If you change a subsidiary contact person, the previously entered subsidiary contact person data gets overwritten with the new subsidiary contact person information and cannot be restored.

5. Choose Save.

**Results**

The subsidiary company, as a separate entity, cannot create or access business objects in the network.

**i Note**

You can also create locations and industry IDs for subsidiaries. To do so, open the subsidiary and choose **Locations or Industry IDs** to maintain the respective information.
7.1.5 Viewing Company Profile

Prerequisites

Your user ID has the roles COMPANYPROFILE_DELETE, COMPANYPROFILE_READ, or COMPANYPROFILE_EDIT assigned.

For more information, see Roles.

Procedure

1. Open the Company Profile application.
2. Choose Locations to view the locations of an organization.
3. Choose Subsidiaries to view the list of all the subsidiary companies or acquired companies of an organization.

   Choose Industry IDs to view or search for member IDs or member name as SAP Asset Intelligence Network account has in a specific industry group.

7.1.6 Recording Industry ID Information

You perform this activity to maintain the unique reference number (for example, a vendor ID, a manufacturer ID) your company has with a standard organization that issues such unique IDs.

Prerequisites

Your user ID has the role COMPANYPROFILE_DELETE, COMPANYPROFILE_EDIT assigned.

For more information, see Roles.

Procedure

1. Open the Company Profile application.
2. Choose the Industry IDs tab.
3. Choose New.
4. In the New window, under the Industry ID Detail, fill in Industry Group, Member ID and Member Name.
5. Choose .

### 7.1.7 Maintaining External Organizations

This procedure allows you to maintain the external organizations along with external IDs.

#### Prerequisites

Your user ID has the role `COMPANYPROFILE_DELETE, COMPANYPROFILE_EDIT` assigned.

#### Procedure

1. Open the *Company Profile* application.
2. Choose *External Organizations*.
3. Choose *New*.
   - Enter the external organization details like company name, logo, address, roles, country, phone number, website, and so on.
4. Choose *Save*.

#### Results

You can maintain the external IDs for each of these external organizations by selecting the organization and choosing *External IDs*. You can add, edit, or delete external IDs here.

---

**i Note**

- Only you can view your external organizations. No other organizations can see *External Organizations* tab when they visit my company profile.
- Premium as well as invitee accounts can now create external organizations within their account. These external organizations are only visible to the account holder.
- On business object lists and business object details, you can view the name of external organizations that do not belong to your organization, but you cannot navigate to the details of such a foreign external organization.
- You can now create more than one external organizations with the same name for a given premium or invitee in SAP Asset Intelligence Network.
7.1.8 Editing Company Profile

Prerequisites

Your user ID has the role COMPANYPROFILE_DELETE, COMPANYPROFILE_EDIT assigned.

Procedure

1. Open the Company Profile application.
2. Choose Edit to edit your Company Details and your Primary Contact Person Details
   a. In the Edit Company Profile > Company Details dialog box, enter the values for the fields as described in the table below:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Name (*)</td>
<td>Enter your company name.</td>
</tr>
<tr>
<td>Web Site (*)</td>
<td>Enter the URL of your company Web site</td>
</tr>
<tr>
<td>Company Logo</td>
<td>Browse for and upload the logo of your company.</td>
</tr>
<tr>
<td><strong>i Note</strong></td>
<td>The logo will be displayed on the Company Profile, on the Company Details, as well as on list views/grid views that show company information.</td>
</tr>
<tr>
<td>Background Image</td>
<td>Upload a background image for your company.</td>
</tr>
<tr>
<td>Company Short Name</td>
<td>Enter your company short name</td>
</tr>
<tr>
<td><strong>i Note</strong></td>
<td>This short name will be displayed in list/grid views (for example, in Business Partner app), and value helps (for example, Manufacturer/Operator/Service Provider value helps) if it is maintained.</td>
</tr>
</tbody>
</table>

Application Help for SAP Predictive Asset Insights Administration
In the **Edit Company Profile > Primary Contact Person Details** dialog box, enter the values for the fields as described in the table below:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roles (*)</td>
<td>Select additional roles for your company from the drop-down.</td>
</tr>
<tr>
<td>Mnemonics</td>
<td>Enter informal names (e.g. obsolete company names, abbreviations or potential wrong spellings) for your company that other business partners may search for. <strong>Example:</strong> In Company Profile you entered SAP SE as company name. Some of your business partner may still know your company as SAP AG. If you enter SAP AG in the mnemonic field, business partners in SAP Predictive Asset Insights who still search by SAP AG will find you under the official company name SAP SE.</td>
</tr>
<tr>
<td>Street/Number</td>
<td>Enter the street and house number information for your company.</td>
</tr>
<tr>
<td>Postal Code/City</td>
<td>Enter the postal code and city information for your company</td>
</tr>
<tr>
<td>Country</td>
<td>Enter the country information for your company</td>
</tr>
<tr>
<td>State/Region</td>
<td>Enter the state and region information for your company</td>
</tr>
<tr>
<td>Phone Number</td>
<td>Enter the phone number for your company</td>
</tr>
</tbody>
</table>

**i Note**

The information you enter for your primary contact person will be visible for other companies when they are viewing your company profile.

Therefore, make sure that your primary contact person is aware of this system behavior, and you only enter a primary contact person whose tasks include to represent your company to external business partners.
If you change a contact person, the previously entered contact person data gets overwritten with the new contact person information and cannot be restored.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Enter the title of your primary contact person</td>
</tr>
<tr>
<td>First Name</td>
<td>Enter the first name of your primary contact person</td>
</tr>
<tr>
<td>Last Name</td>
<td>Enter the last name of your primary contact person</td>
</tr>
<tr>
<td>Phone Number</td>
<td>Enter the phone number of your primary contact person</td>
</tr>
<tr>
<td>Email Address</td>
<td>Enter the Email address of your primary contact person</td>
</tr>
</tbody>
</table>

3. Choose Save.

### 7.2 Configuring the Document Category

To ensure complete documentation for assets such as models, or equipment, an SAP administrator configures the significance of a document category at the subclass level. As an organization admin, you can set the preference of the document category at the subclass level.

**Prerequisites**

- Your user ID has the roles `TEMPLATE_DELETE` or `TEMPLATE_EDIT` assigned. For more information, see Roles.
- You have identified the subclass for which you want to configure the documents.

**Context**

The preference set by the organization administrator overrides the preference set by the SAP administrator for the document category.

**Procedure**

1. Open the Templates application.
2. Search for a subclass template.
3. Select a subclass template from the search results.
4. In the Template screen, select the DOCUMENT CATEGORIES tab.
5. In the DOCUMENT CATEGORIES section, choose Edit and update the category configuration for model and category configuration for equipment as appropriate.
6. Choose Save.

### 7.3 Application Settings

You must be an organization administrator to perform the activities using Application Settings.

You can perform the following tasks with this application:

- **Users**
  - Create user information (see Creating User Details [page 384]).
  - Update user information (see Updating User Details [page 386]).
  - Delete user information (see Deleting User Details [page 387]).
  - Granting Access to Invitee Users in

- **External Systems**

- **Object Types**
  - The object types are used for external systems integration.
  - To support external object ID mapping, you are provided with a capability to add custom object type, in case a relevant object type is missing in the standard list using Application Settings → Object type → Add.
  - You can use it later for corresponding External ID mapping in Company Profile app.
  - You can add new object types using the Add button.

**Note**

You will not be able to add a new object type, if the name of object type that you create is the same as an existing SAP delivered object type. Before you create your own object, please use the External ID API to check the SAP delivered object types.

- **General Application Settings**
  - Configure document size limit: Use this functionality to set the maximum document size limit. This setting determines the allowed maximum upload size of your documents from the Documents application. For more information, see Configuring Document Upload Size [page 388].
  - Configure Prefix: Configuring the Prefix for the Object ID of your Organization [page 388].
    - Objects created in the will have IDs generated for them. You have to define the prefix in the Application Settings app. For example, for instruction the ID can be I. ABCD.1, where <ABCD> is the prefix defined by you. Another example for ID for a document can be D.ABCD.1.

**Note**

Only premium account holders can maintain prefix. The prefix is valid for its invitees as well. Prefix maintenance section is made noneditable for the invitee administrators.
○ Maintain Email domains for **Automatic User Creation**. Premium accounts can maintain one or more Email domains for their organization.

○ Maintain customer-specific list of object types. In the reusable dialog to maintain external IDs, you can optionally select the previously maintained object types to create multiple **External IDs for a system**.

○ In the section **Organizational Configurations** you can:
  ○ Enable **User Authorization**, and **Spare Parts Obsolescence**.
  ○ Define the Retention Period for the deleted users after which the users will be permanently deleted from the system.
    For more details also refer to **Deletion of Personal Data** in the Security Information for SAP Asset Intelligence Network.
  ○ Define retention period for off-boarding objects.
    As a Premium account, you can set a retention period for your business objects. This retention period will be applied after the off-boarding of an organization to all not shared business objects, which may still be available in the offboarded organization’s account.

<table>
<thead>
<tr>
<th>i Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retention period for business objects is set by the Premium account only, that is, the maintained period is also applied to the Premium’s Invitees’ business objects.</td>
</tr>
</tbody>
</table>

○ Define the Default Scope (in case your organization is working with multiple scopes).

○ Define the automatic email domains for user under **General Application Settings** **Automatic User Creation**.
  As a premium organization administrator, you have to maintain allowed email domains, relevant for premium organization users, if there are one or more invitee organizations on-boarded using **Company Profile** app.

<table>
<thead>
<tr>
<th>i Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is to avoid any invitee user from getting on-boarded as premium organization user automatically and hence be able to access premium organization data, which is inappropriate from a security perspective.</td>
</tr>
</tbody>
</table>

○ Under **General Application Settings** **Bar Code Configurations**, you can define the **<Prefix>** and **<Suffix>**. You can then use the RFID feature in the **Lookup** application in devices that support RFID reader.

○ You can define **Personal Dashboard** app as the entry point for your invitee accounts by enabling **Personal Dashboard as Landing Page** under **General Application Settings** **Invitee Configuration**.

  ● **Object Page Configurations**
  ○ You can maintain the default configuration settings for the equipment, model, and system object page under **Object Page Configurations**. Choose **Edit** to change the default settings.

  ● **Extensions**

  ● **Header Status**
  ○ You can maintain 2 default indicator names in the header information of all the equipment in your organization using the **Header Status** section.

  ● **Explorer and Analysis Tools Configuration**
  ○ Configure the Explorer and analysis tools (see **Explorer and Analysis Tools Configuration [page 457]**).
7.3.1 Configuration Tasks

As an organization admin, you perform several configuration tasks.

The following list provides the list of tasks that an administrator performs:

- Assign roles to the users of your organization.
- Configure the Application Settings (see Application Settings [page 382]).
- Configure documents at subclass level (see Configuring the Document Category [page 381]).
- User Management
  - Creating User Details [page 384]
  - Updating User Details [page 386]
  - Deleting User Details [page 387]

7.3.1.1 Creating User Details

As an administrator you can add the details of the users of your organization to SAP Predictive Asset Insights.

Prerequisites

- Preliminary steps in other applications:
  - In SAP Cloud Platform Identity Authentication Service Administration Console, the user groups required for your SAP Intelligent Asset Management scenario have already been created. Users have been created and assigned to one or more user groups.
  - In SAP Cloud Platform Cockpit, the role collections for your SAP Intelligent Asset Management scenario have already been created. The role collections you created before have been mapped to the user groups you created before.

  Note

  By mapping the role collections with the user groups, you ensure that the users you assign to a user group have the respective set of role templates assigned that allow them to perform their intended actions in SAP Intelligent Asset Management.

  For more information on the trust configuration, refer to the process steps described in Configuring Trust Configuration.

  Your user ID has the role CONFIGURATION_DELETE, CONFIGURATION_EDIT assigned. For more information, see Roles and Role Collections.

Procedure

1. Log on to SAP Predictive Asset Insights.
2. Open the Application Settings application.

3. Navigate to Users Add.
   a. Choose Add Single User to add a single user only.
      Enter the user ID, first and last name, email address and organization name.
      
      The user IDs you assign depends on the SAP Identity Authorization Service (IAS) configuration within your subaccount. The NameID format used for SAML authorization decides whether the user ID has to be the email address or the user ID available in SAP IAS.
      
      b. Choose Mass Upload Users to add at multiple users.
         a. Download the CSV template.
         b. Enter the user ID, first and last name, email address and organization name in the template.
         
         Email address is optional.
         
         The user IDs you assign depends on the Identity Provider configuration within your subaccount. The NameID format used for SAML authorization decides whether the user ID has to be the email address or the user ID available in SAP IAS.
      c. Upload the CSV template with the user information.

4. Choose Save.

Example

You want to add a new user - Jane Doe - as Administrator with additional DPP tasks for your own organization My Org.

- Preliminary steps in other applications:
  - In SAP Cloud Platform Identity Authentication Service Administration Console
    - (Under Users & Authorizations User Groups)
      You’ve created a user group MY_ORG_ADMIN_DPP.
  - In SAP Cloud Platform Cockpit
    - (Under Security Role Collections).
      You’ve created a role collection MY_ORG_ADMIN_DPP. This role collection contains the following role templates: AC_ORG_DATA_EXPERT; AIN_ORG_DATA_EXPERT; DPP_AUTH.
      
      You can flexibly define your role collections based on the delivered role templates for your subscribed applications.

      - (Under Security Trust Configuration <your default identity provider> Role Collection Mappings). You’ve mapped your role collection with your user group:
○ Role Collection: MY_ORG_ADMINS_DPP
○ Attribute: Groups
○ Operator: equals
○ Value: MY_ORG_ADMINS_DPP

○ In SAP Cloud Platform Identity Authentication Service Administration Console
  ○ (Under Users & Authorizations > Users)

    You’ve created a user for Jane Doe (for example, jane.doe@myorg.com).
    You’ve assigned the user group = MY_ORG_ADMINS_DPP to Jane Doe’s user.

● In SAP Intelligent Asset Management
  ○ Choose Application Settings > Users > Add > Add Single User.

    Enter the relevant information for Jane Doe:
    ○ First Name: Jane
    ○ Last Name: Doe
    ○ Organization Name: <select your own organization> (for example, My Org)
    ○ User ID: <select the User ID in the format expected by your identity provider configuration> (for example, JANE.DOE@MYORG.COM)
    ○ Email Address: jane.doe@myorg.com

    Result: Jane Doe can access the SAP IAM applications for her company (= My Org) and do her tasks based on the role collection assigned to her user.

Related Information


7.3.1.2 Updating User Details

If your organization possesses a premium account, as an administrator you can update the details of the users of your organization and your supplier organization in SAP Predictive Asset Insights.

Prerequisites

● Your user ID has the roles CONFIGURATION_DELETE or CONFIGURATION_EDIT assigned.
● The users that you create have been assigned predefined roles to access and perform appropriate actions using applications.
**Procedure**

1. Open the *Application Settings* application.
2. Choose *Users*.
3. Choose *More* on a user tile, and choose *Edit*.
4. In the *Edit User* pop-up, update the user details.
5. Choose *Save*.

### 7.3.1.3 Deleting User Details

You perform this procedure to remove the user from SAP Predictive Asset Insights.

**Prerequisites**

Your user ID has the role `CONFIGURATION_DELETE` assigned.

For more information, see *Roles*.

**Procedure**

1. Open the *Application Settings* application.
2. Choose *Users > My Users* > *Users*.
3. Select the user you want to delete.
4. Choose *Delete*.
5. Choose *OK* on the warning message.
6. Open your *SAP Cloud Platform* account.
7. Navigate to the *Security > Authorizations* tab.
8. Choose the respective role and unassign the user ID from the role.
7.3.1.4 Configuring the Prefix for the Object ID of your Organization

You perform this activity to configure the Instruction ID, Document ID and Announcement ID for your organization. Setting a prefix from the Application Settings app determines the object ID while you are creating an instruction, document, and announcement from the respective applications for your organization.

Prerequisites

Your user ID is configured to the group ORG_ADMIN or ORG_DATA_EXPERT.

Procedure

1. Launch the Application Settings application.
2. Choose the General Application Settings tab.
3. In the Prefix for Objects created field, input a prefix of 4 characters.
4. Click Save.

Note

- This is a one-time activity and you cannot modify or delete the prefix at a later point in time.
- Only premium account holders can maintain prefix. The prefix is valid for its invitees as well. Prefix maintenance section is made non-editable for the invitee administrators.

7.3.1.5 Configuring Document Upload Size

You perform this activity using the Application Settings application to set the document size limit for upload. This setting determines the document upload size in Documents application.

Prerequisites

Your user ID has role CONFIGURATION_DELETE or CONFIGURATION_EDIT assigned.
Procedure

1. Launch the Application Settings application.
2. Choose the General Application Settings tab.
3. Choose Edit.
4. Enter the upload size of your choice.
5. Choose OK.

7.3.1.6 Configuring Default Indicators in the Header Status

You perform this activity to display default indicators in the header status of a piece of equipment. You can maintain 2 default indicator names in the header information of all the equipment in your organization.

Prerequisites

Your user ID has role CONFIGURATION_EDIT assigned.

Context

You can have exceptions for the default header status based on the subclass used by a piece of equipment. You can define a different set of indicators to be displayed for a listed subclass instead of the default using the Class Configurations.

Procedure

1. Launch the Application Settings application.
2. Choose the Equipment under Header Status tab.
3. Choose Edit.
4. Configure the 2 default status by selecting from the dropdown menu.
5. As an optional step, you can maintain the statuses to be displayed for different subclass under Class Configurations.
   You can add, edit, or remove the entries.
6. Choose Save.

i Note

The indicators are visible in the header information of a piece of equipment only if the indicators are assigned to the equipment and values are defined for the indicators.
7.4 User Authorizations

For SAP Cloud Platform - Cloud Foundry Environment

You use this feature to define a more granular access to SAP Predictive Asset Insights business objects for users within your organization.

You can use the User Authorization app to:

- Create an organizational hierarchy.
- Assign the following to a node in the organizational hierarchy:
  - Role Collections
  - Business Objects
  - Groups
- Edit the organization hierarchy and its assigned objects.
- Delete a node from the organizational hierarchy.

Role collections get assigned to one or more nodes in the organization hierarchy. Users who are part of a user group that is mapped to a role collection (which is assigned to a node in the organizational hierarchy) have access to:

- The business objects and groups assigned to the relevant node in the hierarchy.
- The business objects and groups assigned to the sub-nodes of a relevant parent node in the organizational hierarchy.

**i Note**

- The administrator of your organization must be assigned to the root node or parent organizational level in your organizational hierarchy to have access to all the business objects in your organization.
- The level of authorization for each user is defined under `<Privilege>`.
- If a role collection is assigned to multiple nodes in the organizational hierarchy, then the privilege maintained on the highest level is by default inherited to the sub-nodes. If required you can also edit an inherited privilege on a sub-node.

**Prerequisites**

The following objects and object relationships have been configured in SAP Cloud Platform Identity and SAP Cloud Platform Cockpit:

- In SAP Cloud Platform Identity:
  - User groups created
  - Users assigned to user groups

  **i Note**
  
  Users can also be added to user groups at a later point in time.

- In SAP Cloud Platform Cockpit:
Role Collections created
Mapping of User groups to Role Collections done

Note
All these set-up steps are not specific to User Authorization but should already have been done during the setting up of roles and onboarding of users to your account.
For more details on these steps, refer to https://help.sap.com/ under Security Guide > User Onboarding > Setting up Roles and Onboarding Users.

Process Overview

- Enable User authorization in Application Settings > General Application Settings > Organizational Configurations.
- Create an organizational hierarchy for your organization in User Authorization app.

Note
Currently, you can have only one organizational hierarchy for your organization.

- Assign role collections to the nodes in your organizational hierarchy in User Authorization app.
- Assign business objects to the nodes in your organizational hierarchy in User Authorization app. You can directly assign business objects to the nodes in your organizational hierarchy in User Authorization app. Create a group in Groups app and assign business objects to this group, and then assign the group to a node in your organizational hierarchy in User Authorization app.

Example

Company B wants to provide a more granular access to business objects for their internal users, so that their users can only access business objects that are assigned to their area of responsibility. In the example:

- Equipment 2 is to be visible for users assigned to Germany
- Equipment 3 is to be visible for users assigned to Germany - North
- Equipment 3 and 4 are to be visible for users assigned to Germany - South
- Equipment 5 is to be visible for users assigned to Switzerland
- Equipment 6 are to be visible for users assigned to Switzerland - North
- Equipment 7 are to be visible for users assigned to Switzerland - South
- Equipment 1 is to be visible for all areas

Note
The following example is based on a simple country or region structure, but you can flexibly model other structural elements as well according to your needs.

1. Authorized user at Company B enables user authorization in Application Settings > General Application Settings > Organizational Configurations.
2. Authorized user at Company B creates an organizational hierarchy in User Authorization app:
   1. Create root node Company B.
   2. Create child node Company B > Germany.
   3. Create 2 child nodes Company B > Germany > Germany North and Company B > Germany > Germany South.
4. Create a second child node under the root node `Company B > Switzerland`.

5. Create 2 child nodes `Company B > Switzerland > Switzerland North` and `Company B > Switzerland > Switzerland South`.

3. Authorized user at `Company B` assigns role collections to the respective nodes in the organizational hierarchy:

1. Assign an admin role collection (= role collection to which your admin user group is assigned) to the root node `Company B` and provide respective privileges, which the user is to have on the business objects
   Users assigned to the user group which is mapped to the role collection that is assigned to the root node can access all of the business objects assigned to the child nodes with the maintained privilege.

   **i Note**
   It is recommended to add at least one admin user as well as substitutes to the admin user group assigned to the root node to ensure that there is always at least one user in the organization who has full access to all objects.

2. Assign other role collections to the respective nodes in the organizational structure and provide respective privileges the users in the associated user group are to have on the business objects.
   Role collections can be assigned to one or more nodes in the organizational structure. If a role collection is assigned to a node, which has further child nodes, the users in the associated user group can access the business objects assigned to the current node as well as all of the child nodes with the maintained privilege.

**Result:** Authorized user of `Company B` created their organizational hierarchy and assigned role collections.

```
User Authorization (= organization-internal)

Company B
  └── Company B Germany
      ├── Company B – Germany North
      │     └── (Role collection) COMPANY_B_ADMIN (DELETE)
      │     └── (Role collection) COMPANY_B_ADMIN (DELETE) – inherited from parent node
      │     └── (Role collection) COMPANY_B_DE (READ)
      │     └── (Role collection) COMPANY_B_DE (READ) – inherited from parent node
      │     └── (Role collection) COMPANY_B_DE_N (WRITE)
      │     └── Company B – Germany South
      │     └── (Role collection) COMPANY_B_ADMIN (DELETE)
      │     └── (Role collection) COMPANY_B_ADMIN (DELETE) – inherited from parent node
      │     └── (Role collection) COMPANY_B_DE (READ)
      │     └── (Role collection) COMPANY_B_DE (READ) – inherited from parent node
      │     └── (Role collection) COMPANY_B_DE_S (WRITE)
      └── Company B Switzerland
          └── (Role collection) COMPANY_B_ADMIN (DELETE)
          └── (Role collection) COMPANY_B_ADMIN (DELETE) – inherited from parent node
          └── (Role collection) COMPANY_B_CH (READ)
          └── Company B – North
          └── (Role collection) COMPANY_B_ADMIN (DELETE)
          └── (Role collection) COMPANY_B_ADMIN (DELETE) – inherited from parent node
          └── (Role collection) COMPANY_B_CH (READ)
          └── (Role collection) COMPANY_B_CH (READ) – inherited from parent node
          └── (Role collection) COMPANY_B_CH_N (WRITE)
          └── Company B – South
          └── (Role collection) COMPANY_B_ADMIN (DELETE)
          └── (Role collection) COMPANY_B_ADMIN (DELETE) – inherited from parent node
          └── (Role collection) COMPANY_B_CH (READ)
          └── (Role collection) COMPANY_B_CH (READ) – inherited from parent node
          └── (Role collection) COMPANY_B_CH_S (WRITE)
```
4. Authorized user at Company B assigns equipment to the relevant nodes in the organizational hierarchy in User Authorization app.

1. Assign Equipment 1, 2, 5, and 8 to node Company B Germany.
2. Assign Equipment 6 and 7 to node Company B Germany South.
3. Assign Equipment 3, 4, and 8 to node Company B Switzerland.

Result:
Authorized user of Company B assigned all relevant business objects to the relevant nodes in the organizational hierarchy.

---

**User Authorization (organization-internal)**

<table>
<thead>
<tr>
<th>Role Collection</th>
<th>Company B</th>
<th>Company B Germany</th>
<th>Company B Germany North</th>
<th>Company B Germany South</th>
<th>Company B Switzerland</th>
<th>Company B Switzerland North</th>
<th>Company B Switzerland South</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPANY_B_ADMIN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Business Object Assignment (example for assignment of Equipment)**

- Equipment 1, Equipment 2
- Equipment 1, Equipment 3
- Equipment 1, Equipment 4
- Equipment 1, Equipment 5
- Equipment 1, Equipment 6
- Equipment 1, Equipment 7

---

**i Note**

Once a business object was assigned to a node in the organizational hierarchy, this business object is only visible to the users assigned to the user groups which are mapped to one or more role collections that are assigned to the respective node in the organizational hierarchy.

Business objects that are not assigned to the organizational hierarchy, are still accessible to everyone in the organization.

**Example:** Equipment 2 was assigned to hierarchy node Company B Germany, so only users who belong to a user group that is mapped to the role collections assigned to hierarchy node Company B Germany and have either EQUIPMENT_READ or EQUIPMENT_EDIT or EQUIPMENT_DELETE privileges can now view, edit, or delete this equipment.

Equipment 10 was not/neither directly assigned to a node in the authorization hierarchy nor belongs to any group which is assigned to a node in the authorization hierarchy, so all users of Company B with EQUIPMENT_READ or EQUIPMENT_EDIT or EQUIPMENT_DELETE privileges can view, edit, or delete this equipment.
7.4.1 Creating Organizational Hierarchy

You perform this activity to define a new organizational hierarchy for your organization.

Prerequisites

Your user ID has the roles USER_AUTH_DELETE, or USER_AUTH_EDIT assigned.

For more information, see Roles.

Procedure

Creating Single Organizational Unit

1. Open the User Authorization app.
2. Choose New Single Organizational Unit.
3. In the New Organizational Unit dialog box, provide the appropriate organizational unit name, short and long descriptions.
4. Choose OK.

Creating Multiple Organizational Units

5. Open the User Authorization app.
6. Choose New Multiple Organizational Units.
7. In the Multiple Organizational Units dialog box, download the CSV template.
8. Enter the organizational unit name, short and long descriptions, row ID and parent row ID name in the template.

- **Note**
  - Root organization is an organization that does not have any parent organization unit. It is mandatory for every organization to have parent organization except for root organizations.
  - You can have only one root organization.
  - You cannot maintain duplicate organization entries

9. Upload the CSV template with the organizational information.

- **Note**
  - Upload CSV can only be used if there is no organizational units created or maintained in the organization structure.

Results

System creates a node or multiple nodes in the organizational hierarchy to which you can add users, business objects, and groups.

7.4.2 Assigning Business Objects

Context

You perform this activity to assign the relevant business objects to the selected node in the organizational hierarchy.

Procedure

1. Open the User Authorizations app.
2. Select a node in the organizational hierarchy.
3. Select the relevant business object like model, locations in the Business Objects section in the object page of the selected node. For example, you have selected Models.
4. Choose Assign in the Models section.
5. Select the relevant models in the Select Models window. Choose Select.

Select the dependent objects that you want to assign. You can share the following business objects:

- Models
- Equipment
- Announcements
- Templates
- Documents
- Instructions
- Locations
- Spare Parts
- Systems
- Failure Modes
  - You can only assign published failure modes to the selected node in the organizational hierarchy.
- Attributes
- Attribute Groups
- Indicators
- Indicator Groups
- Alert Types
6. Choose Assign to save the changes.

7.4.3 Assigning Groups

You perform this activity to assign the relevant groups to the selected node in the organizational hierarchy.

**Prerequisites**

You have created one or more groups in the Groups app. You have assigned the business objects that you want to use for user authorization to these groups.

**Procedure**

1. Open the User Authorizations app.
2. Select a node in the organizational hierarchy.
3. Choose Assign in the Groups tab in the object page of the selected node.
4. Select the relevant groups in the Select Groups window. Choose Select.
   
   Select the dependent objects that you want to assign.

   **i Note**
   
   By default, all the dependents are selected.

5. Choose Assign to save the changes.

7.4.4 Deleting an Organizational Unit

**Context**

You perform this activity to delete an existing node from the organizational hierarchy.
**Procedure**

1. Open the User Authorizations app.
2. Select the node from the organizational hierarchy that you want to delete.
3. Choose Delete in the object page of the selected node.
4. Choose OK on the confirmation message dialog box.

**7.4.5 Assigning Role Collections**

**Context**

**i Note**

This topic is only relevant for SAP Cloud Platform - Cloud Foundry Environment.

You perform this activity to add role collections to the selected node in the organizational hierarchy.

**i Note**

All the assigned role collections have authorizations to access all the business objects and groups associated with the node in the organizational hierarchy at this level and all the subnodes of this level.

**Procedure**

1. Open the User Authorization app.
2. Select a node in the organizational hierarchy.
3. Select Edit in the Role Collections section of the organizational hierarchy object page.
4. Choose Assign.
5. Select the relevant role collections in the Select Role Collections window.
6. Choose Add.
7. Define the level of authorization for each role collections in the Privilege field.
   - By default, the role collections have read access.
8. Choose Save.
7.5 **Data Protection and Privacy (DPP)**

Data protection is associated with numerous legal requirements and privacy concerns. In addition to compliance with general data privacy regulation, it is necessary to consider compliance with industry-specific legislation in different countries. SAP provides specific features and functions to support compliance with regards to relevant legal requirements, including data protection.

SAP does not give any advice on whether these features and functions are the best method to support company, industry, regional, or country-specific requirements. Furthermore, this information does not give any advice or recommendation in regards to additional features that would be required in particular IT environments; decisions related to data protection must be made on a case-by-case basis, under consideration of the given system landscape and the applicable legal requirements.

**Introduction**

The Data Protection and Privacy (DPP) application can be used by data subjects and data admins. As a data subject, you can view your own personal data stored in SAP Predictive Asset Insights. A data admin can view and delete one’s own personal data and personal data of any other data subject.

**Related Information**

- Information Report [page 398]

7.5.1 **Information Report**

The DPP application supports you to be compliant with the *Information Report* section of Data Privacy and Protection.

You can view details regarding your personal data like e-mail address, first name, last name, and user ID and the objects that you have created or modified.

If you have an admin role, then you can view the list of users, their personal data, and the list of objects that each user has created or modified. If the user is a functional location or company profile contact person, then you can view their personal data as well as relevant address details.

In SAP Predictive Asset Insights, a user can view the personal data whereas a user with the admin role can delete or remove own personal data or personal data of any other data subject.

**Related Information**

- Data Protection and Privacy (DPP) [page 398]
7.6 **Mass API Dashboard**

You can view a list of jobs triggered for the mass API. The details of the successful and failed request is also displayed.

You can view a list of successful and failed status for a request.

You can further view the request and response for successful status. For failed status an error is displayed and you can view the request and error response.

7.7 **Equipment Technical Sync Dashboard**

You can use this feature to check the current or intermediate status of all equipment that is in the process of being synchronized with SAP Internet of Things.

By default, the logs display the synchronization status of a piece of equipment for the last one hour. The various synchronization statuses are as below:

- **SYNC IN PROGRESS**: This status appears when the events are being processed.
- **SYNC FAILURE**: This status appears for a failed synchronization.
- **SYNC COMPLETED**: This status appears after the synchronization completes successfully.

7.8 **Manage Workflows**

*SAP Cloud Platform Workflow* lets you build, run, and manage workflows, from simple approvals to end-to-end processes that span across organizations and apps. With an inbox app and custom-built UIs, you involve end users into business processes for decision making and data entry. The service comes with web-based tools for workflow modeling, APIs for consumption in custom apps, monitoring tools, and Fiori-based apps for end-user access. You can use JavaScript to embed custom business logic.

The asset central foundation app only provides event-based integration with workflows that are modeled using the SAP Cloud Platform Workflow service.

**Integration of Workflows with Asset Central Foundation**

Based on the action that has to be performed in asset central foundation, the relevant events are triggered. For example, upon publishing a piece of equipment, a workflow can be created for further actions or assessments. We can configure SAP Cloud Platform Workflow in asset central foundation based on the following events:

- Create
Configuring a Workflow

Prerequisite:
You must have a separate subscription to SAP Cloud Platform Workflow to model workflows and use the asset central foundation workflow application. Refer to SAP Cloud Platform Workflow.

You can configure the SAP Cloud Platform Workflow for the asset central foundation by following the steps explained in this topic:

1. Customer workflow subscription
   Go to customer account space and service market place and subscribe to workflow. For more information, see Prepare to Create Workflows in SAP Cloud Platform.

2. Create workflow instance
   You can create workflow instance by going inside workflow service and new instance. Once you create an instance, you get client id and secret by which can be used in a destination creation that communicates to asset central foundation.

i Note
The workflow instance used to create the destination must include the WORKFLOW_DEFINITION_GET and WORKFLOW_INSTANCE_START roles. See sample code:

```
Sample Code
{"authorities": ["WORKFLOW_DEFINITION_GET","WORKFLOW_INSTANCE_START"]}
```
The workflow_rest_url, clientid, clientsecret, and url are used to configure the destination.

3. Create workflow destination
   - Go to subaccount and create new destination with `<name>_workflow`.
   - It is of basic authentication and user, password is client id secret we got in previous step.
   - An additional property `content-endpoint` also needs to be added. The value for the field would be `workflow_rest_url` (from step 2)

These are the only configurations required for asset central foundation to access the workflow service.

**Configuring Workflow Applications for SAP Intelligent Asset Management Fiori launchpad**

Optionally, you can configure the Monitor Workflow apps in the SAP Fiori launchpad. For more information, see Create Workflow and My Inbox Tiles on SAP Fiori Launchpad.

**Creating Custom Fiori Launchpad**

1. Download the relevant FLP content. Refer to the ‘Upgrade Custom FLP Content’ in the Update Guide.
2. You can use Create Workflow and My Inbox Tiles on SAP Fiori Launchpad to integrate the workflow applications in the relevant asset central foundation fiori launchpad that you have downloaded.
3. You have to add a configuration code for workflows apps in `CommonDataModel.json` under the `portal` `portal-site` file of the relevant product content that you have downloaded.
Here is a sample code for configuring workflow apps:

```json
{
"id": "1eccfbd1-057f-4aa6-8ba4-ec63deba7ae1",
"source": "com.sap.dsc.ac.equipment",
"specversion": "1.0-rc1",
"type": "header.update",
"datacontenttype": "application/json",
"time": "1576125244",
"objectid": "C030AA04F27446E2A8710D399A614534",
"objectownerid": "D1080120A941602F16006F0265F15AD4",
"correlationid": "2a6dab34-58d5-48d7-8345-58421d9fa75a",
}
```

### How to Use Workflow in Asset Central Foundation

**Use**

To automate the process of triggering a workflow (directly from asset central foundation), you can configure asset central events like publish, delete to initiate the workflow. The workflow is initiated when the event is performed. The workflow can be modeled to meet various business scenarios.

1. Go to **Manage Workflows** application.
2. Select **New**.
3. In the **New Workflow Mapping**, select the `<Event Type>`. Select the `<Workflow>` for the event type.

**Note**

Only the workflows that are available in the subaccount where you have configured the destination will be displayed here.

4. Choose **Save**.

### Context Data For a Workflow

You receive a JSON object as a context data to be used in a workflow. The format is similar to the sample code:

```json
{
  "id": "1eccfbd1-057f-4aa6-8ba4-ec63deba7ae1",
  "source": "com.sap.dsc.ac.equipment",
  "specversion": "1.0-rc1",
  "type": "header.update",
  "datacontenttype": "application/json",
  "time": "1576125244",
  "objectid": "C030AA04F27446E2A8710D399A614534",
  "objectownerid": "D1080120A941602F16006F0265F15AD4",
  "correlationid": "2a6dab34-58d5-48d7-8345-58421d9fa75a",
}
```


<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>unique id for the message</td>
</tr>
<tr>
<td>source</td>
<td>the relevant business object that the workflow is initiated for like, equipment, model, and so on.</td>
</tr>
<tr>
<td>specversion</td>
<td>Event cloud version</td>
</tr>
<tr>
<td>type</td>
<td>specifies the event type</td>
</tr>
<tr>
<td>datacontenttype</td>
<td>json</td>
</tr>
<tr>
<td>time</td>
<td>time at which the event is created</td>
</tr>
<tr>
<td>objectid</td>
<td>specifies the id of the object for which the workflow is initiated</td>
</tr>
<tr>
<td>objectownerid</td>
<td>the business partner id to which the object belongs</td>
</tr>
<tr>
<td>correlationid</td>
<td>used for asset central foundation log</td>
</tr>
<tr>
<td>triggeredorgid</td>
<td>the business partner who is performing the action</td>
</tr>
</tbody>
</table>

- id:
- source

**Result**

Wherever the event is performed, the relevant workflow is triggered.

**Related Information**

https://developers.sap.com/group.cp-workflow-cf.html
https://help.sap.com/viewer/e157c391253b4ecd93647bf232d18a83/Cloud/en-US/60ae81179050478caa4212f42d4ba50f2.html
7.8.1 Creating Sample App and Trigger from Asset Central Foundation

This topic describes the steps to create a sample app and trigger from asset central foundation.

Sample Scenario:

1. Create a workflow application using SAP Web IDE Full-Stack. For more information, see Enable the Workflow Editor in SAP Web IDE.

   ![Workflow Editor in SAP Web IDE](image)

2. When a piece of equipment is published, a review workflow is initiated to a configured user.
3. The reviewer can add their comment and Accept or Reject the workflow.
4. If the reviewer accepts the workflow, it ends the workflow. If they reject it, then a follow-up task is issued for the user who last changed the published equipment.
5. To access the public APIs in asset central foundation, a destination has to be created. For example, GetToken is the destination created.
Destination is of type OAuth2 and client id and secret is from asset-central broker token.

2. Add event to asset central foundation.
Open asset central foundation SAP Fiori launchpad and go to Administration. Select and add workflow against the event.

Once the mapping is complete, the event action triggers the workflow, that user can see in its workflow SAP Fiori launchpad bound to application. The URL of workflow SAP Fiori launchpad is basically the endpoint of app router URL, which is used while developing workflow app.

3. Launch workflow SAP Fiori launchpad.
   You can go to the cockpit or cloud foundry app to view SAP Fiori launchpad app router URL.

4. Publish equipment.
   As per the previous configurations, any publish of equipment triggers asset workflow. Based on the API call, it fetches the data and displays in the inbox to be approved or rejected based on data.
   Based on your requirement, you can add any custom logic to the workflow.
   Optionally, you can configure the Monitor Workflow apps in the SAP Fiori launchpad. For more information, see Create Workflow and My Inbox Tiles on SAP Fiori Launchpad.
8 Configuring SAP Predictive Asset Insights

Context

To configure SAP Predictive Asset Insights, it is recommended to follow the configuration order described in this chapter.

Procedure

1. Configure the application settings. For more information, see Application Settings [page 382].
2. Configure equipment modeling capabilities. For more information, see Equipment Modelling.
3. Create and publish your required equipment. For more information, see Creating a Piece of Equipment [page 80] and Important Information When Creating Equipment in SAP Predictive Asset Insights.
4. Create alert types for alerts. For more information, see Adding Alert Types [page 243].
5. For the alert type created using step 4, the alerts can be created.
6. Configure data sets and manage models for equipment health indicators.. For more information, see Configuring Data Sets for Equipment Health Indicators [page 269] and Managing Models for Equipment Health Indicators [page 276].
7. Configure failure mode analytics. For more information, see Configuring Failure Mode Analytics [page 412].
8. Manage model configurations for failure curve analytics. For more information, see Failure Curve Analytics Model Configuration Management [page 358].
9. Manage models for leading indicators. For more information, see Managing Models for Leading Indicators [page 352].
10. Configure the Explorer and analysis tool variants. For more information, see Explorer and Analysis Tools Configuration [page 457].
11. Configure SAP Analytics Cloud and analytics dashboards. For more information, see Analytics Dashboards Configuration [page 419].

8.1 Equipment Modelling

The procedure to model equipment is as follows:

1. Create indicator groups and indicators (Optional)
2. Create attribute groups and attributes (Optional)
3. Create alert types and Create alert type groups
4. Create model template
   ○ Assign attribute groups to model template
   ○ Assign indicator groups to model template
5. Create model from model template
6. Assign alert type group to model (Optional)
7. Create a piece of equipment

**Note**

- While creating an equipment, the IoT sync button should be set to Yes, by default.
- Once the equipment is published, one external ID is created. The external ID is only created if you are using SAP-managed data persistence and streaming.

**Related Information**

**Configuring External Systems**

### 8.1.1 SAP Internet of Things Synchronization

Once a piece of equipment is created and published in SAP Predictive Asset Insights, it is synchronized and objects are created in SAP Internet of Things.

In order that the synchronization works, you need to set up SAP Internet of Things as an external system. For more information, see *Configuring External Systems*. If you are an existing customers with an SAP Internet of Things license, you need to perform additional steps prior to the configuration of the external system. For more information, see *Setting Up SAP Cloud Platform Internet of Things*. 
The following graphic displays the synchronization flow:

- **Important Information for the Synchronization**

While the publishing to SAP Internet of Things, the following points need to be considered:

- Only equipment with model in asset central foundation is synchronized with SAP Internet of Things. This means that lean equipment will not be synchronized with SAP Internet of Things.

- The equipment create API should have the following properties for the scenarios given below:
  - Both IoT services 4.0 and PdMS sync enabled
    - objectsSync: [{externalSys: "HCP IoT 4.0", status: true}, {externalSys: "PdMS", status: true}]
    - gateWayID: "2"
  - Both IoT services 4.0 and PdMS sync disabled
    - objectsSync: [{externalSys: "HCP IoT 4.0", status: false}, {externalSys: "PdMS", status: false}]
    - gateWayID: "2"
  - Only IoT services 4.0 sync is enabled
    - objectsSync: [{externalSys: "HCP IoT 4.0", status: true}]
    - gateWayID: "2"
  - Only PdMS sync is enabled
    - objectsSync: [{externalSys: "HCP IoT 4.0", status: false}, {externalSys: "PdMS", status: true}]
    - gateWayID: null

- For every equipment a device is created. The device will be associated with capabilities corresponding to indicator groups, the indicators coming from both model templates and equipment templates in SAP Predictive Asset Insights.

- When you have created a piece of equipment based on a template in SAP Predictive Asset Insights, for every template a sensor type is created.

- To support update of capabilities with the new properties from asset central foundation, default capabilities, for example, IG_EDGE_CONFIG and MachineAlarmPST are created inside a sensor type. The
sensor types’ default name is DEFFAULT_CAPABILITY_TEMPLATE_DEFAULT. The capabilities and the sensor type should not be removed.

- For a successful synchronization, each indicator group can have only one indicator of type Date.

**Note**

If umlauts or special characters are used in indicators or indicator groups, the indicators and indicator groups are still considered while the synchronization to SAP Internet of Things, but with the object IDs as the names. The object IDs have the prefix I_ for indicators and the prefix IG_ for indicator groups.

The following graphic displays the mapping between objects and the corresponding naming conventions for SAP Predictive Asset Insights:

---

### 8.2 Creating Equipment

On the SAP Fiori launchpad under *Master Data* you can find all the functions you need to create equipment and its associated data.

To create equipment, you use a model template to create a model and assign the model to the equipment. These prerequisites are described below. For information about creating equipment, see *Creating a Piece of Equipment*.

For more general information about equipment, see *Managing Equipment*.

**Note**

Once you have created your equipment do not forget to publish it.
Prerequisites

- Create a model template. A model template is used to define metadata for a model. It inherits a subclass template or other model template and has additional attribute groups and attributes. For information about creating a model template, see Creating a Model Template [page 249]. For more general information about templates, see Managing Templates [page 225].
- Create a model. A model is an abstract representation from the manufacturer that defines all maintenance and specification information related to a new or existing product. A physical equipment is an instance of a model. A model is based on a model template and allows users to add values to the definitions used in the underlying template. For information about creating a model see Creating a Model [page 115]. To add model components, refer to Adding Model Components [page 122]. For more general information, see Managing Models [page 114].

Related Information

Configuring SAP Predictive Asset Insights [page 407]

8.3 Machine Alarms

Alerts can also be created by alarms raised by machine. The configuration for the machine alarms mapping details allow the machine to send alerts. In a scenario where validation is required with alarms to raise an alert, a trigger based rule must be defined.

Procedure

1. Define alert type for error codes: Navigate to Templates → Alert Types → New. The origin should be Machine. You can also define the deduplication configuration to reduce the duplication of similar alerts. For more information, refer Adding Alert Types [page 243]
2. Define alert type groups for the alert type created. For more information, refer Adding Alert Type Groups [page 247]
3. Assign the alert type group to the model, which in turn will assign all alert types to the model and available for equipment derived from model. For more information, refer Assigning Alert Type Groups to a Model [page 125]
4. Create configuration file for the equipment, that have configured required to setup a specific connector instance.
5. You can also define a rule if any other condition need to be checked during alert generation from the equipment alarm. In such a scenario, you can define a trigger based alarm using the Rules creation page. Add a condition that will be validated before creating the alert. For more information, refer Creating Rules [page 262]
8.4 Configuring Failure Mode Analytics

This topic describes how to configure failure mode analytics.

Prerequisites

- You have created an equipment model with equipment and assigned the equipment model to the equipment. For more information, see Creating Equipment [page 410].
- You have created failure modes and assigned the failure modes to the equipment model or the piece of equipment for which you want to analyze the patterns of failures. For more information, see Creating a Failure Mode [page 143] and Assigning Failure Modes to Business Objects [page 149].

**Note**

Make sure that the failure modes are in the same language as the language that you configure in step 2.

Context

In order to use failure mode analytics, multiple steps are required.

Procedure

1. **(Optional):** Configure the periodical calculation for the mean time global indicators and define the included failures. By default, the periodical calculation is enabled for critical failures. For more information, see Mean Time Indicators Configuration [page 413].
2. Configure the language in which the notifications are later displayed in the failure mode analytics results. You can choose between different options. For more information, see Notification Language Configuration [page 415].
3. Configure, train, and score a failure mode analytics model. For more information, see Managing Models for Failure Mode Analytics [page 332].
Tip
To improve the accuracy of the text analysis that maps topics with top words from notification texts to the most appropriate failure modes, we recommend you perform validation tasks. For more information, see Validating Failure Mode Analytics [page 349].

Related Information

Failure Mode Analytics [page 49]

8.4.1 Mean Time Indicators Configuration

The configuration for the mean time indicators is useful for making better maintenance planning decisions. With the mean time indicators configuration, the global indicators Mean Time To Repair (MTTR), Mean Time To Failure (MTTF), and Mean Time Between Failures (MTBF) are calculated every month based on historical data for your equipment model. In addition, you can also define for which failure mode types the mean time global indicators are calculated. By default, the periodical calculation is enabled for all critical failures. For more information about the global indicators, see Global Indicators [page 241].

i Note
The mean time indicators configuration is only valid for the global indicators of the equipment model. It is independent from the mean time KPIs calculation for the failure modes. For more information about the calculation for the failure modes, see Calculation of Mean Time KPIs [page 52].

For the calculation, all your notifications are collected, extracted, and the failure modes are assigned based on your machine learning inputs. For each failure mode, the indicator value is then calculated. For the global indicators values for the equipment model, the calculated indicator values are then aggregated and determined as follows:

- For MTTF and MTBR, the indicator values are aggregated for the failure modes and the minimum value is taken as the global indicator value.
- For MTTR, the indicator values are aggregated for the failure modes and the maximum value is taken as the global indicator value.

If you have defined that you only include certain failure mode types, then only the indicator values for all the selected types are aggregated.

Once the calculation is complete, you can view the indicator values on the INDICATOR tab on the model object page. The values are updated after each scoring of your failure mode analytics model. For more information about the scoring, see step 3 in the topic Configuring Failure Mode Analytics.

For more information about configuring the mean time global indicators, see Configuring the Mean Time Indicators [page 414].
8.4.1.1 Configuring the Mean Time Indicators

This topic describes how to configure the mean time indicators for failure mode analytics.

Prerequisites

- You have created and assigned the relevant business objects. For more information, see Configuring Failure Mode Analytics [page 412] and check the prerequisites.
- You have added and instantiated the global indicators for the desired equipment model or piece of equipment. For more information, see Adding Indicator Groups and Indicators [page 234].
- The role ConfigUser is assigned to your user.

Procedure

1. On the SAP Fiori launchpad, go to the Administration group and open the Application Settings application.
2. To configure the mean time global indicators, choose (Failure Mode Analytics). The Failure Mode Analytics configuration screen is displayed.
3. To change the settings for the configuration, choose Edit next to the Mean Time KPI Calculation section.
4. In the section, fill in the following fields:

   - **Enable Calculation**
     - By default, the slider is moved to Yes.

   - **Failure Mode Types**
     - Select the failure mode types for which the mean time KPIs are calculated. You can choose from the following types:
       - Type 1 - Design function is not obtained
       - Type 2 - Specified function lost or outside acceptable limit

   - **Remember**
     - If you no longer need the periodical calculation, you can later disable it. The calculation is then disabled and the latest indicator values on the model object page are not updated.
5. Save your configuration.

Results

Your mean time indicators calculation is configured. You can later edit your configuration. Once you have edited the configuration, you need to repeat the scoring of your failure mode analytics model as mentioned in step 3 in the topic Configuring Failure Mode Analytics to apply your changes.

Related Information

Mean Time Indicators Configuration [page 413]
Configuring Failure Mode Analytics [page 412]

8.4.2 Notification Language Configuration

By default, when you run a failure mode analysis, only English is supported for all your notifications and the notifications are not translated in the failure mode analytics results. With the notification language configuration, you can define the language in which the notifications are later displayed in the results by doing the following, regardless of your current system language:

- Select the target language.
- Translate all your notifications to the target language.

**Note**

We currently support German as an additional language.

Language Selection

The language selection is useful if all your notifications are in English or all your notifications are in German. With the language selection, all your notifications for the selected language are collected and extracted based on your machine learning inputs during the failure mode analysis. Once the analysis is complete, the extracted notifications are then displayed as the top words and related notifications in the selected language in the failure mode analytics results.
Language Translation

The language translation is useful if your notifications are in multiple languages or are in the same language, which is not however English or German, for example, Italian. With the language translation, all your notifications are collected and translated into the configured language. The translation is performed using your own key from the Google Cloud translation service. The translated notifications are then extracted during the failure mode analysis based on your machine learning inputs. Once the analysis is complete, the extracted notifications are displayed as the top words and related notifications in the translated language in the results.

⚠️ Caution

Consider the following if you are using the language translation:

The translation feature for failure mode analytics is an optional feature and is based on Bring Your Own Account (BYOA). That means that you must have a private account with Google for translation services, and you must have your own Google API key. You alone are responsible for all required contracts with Google, including important aspects such as privacy data (especially customer data transferred to Google servers or other third party servers), costs for translation services, and so on.

SAP is under no obligation to provide this feature now or in the future. The feature may be enhanced or discontinued at any time, without notice.

For more information about configuring the language translation, see Configuring a Notification Language Translation [page 417].

Related Information

Configuring Failure Mode Analytics [page 412]

8.4.2.1 Selecting a Notification Language

This topic describes how to select the notification language for failure mode analytics.

Prerequisites

- You have created and assigned the relevant business objects. For more information, see Configuring Failure Mode Analytics [page 412] and check the prerequisites.
- (Optional): You have configured the mean time indicators configuration. For more information, see Configuring the Mean Time Indicators [page 414].
The role ConfigUser is assigned to your user.

**Procedure**

1. On the SAP Fiori launchpad, go to the Administration group and open the Application Settings application.
2. To configure the target language, choose (Failure Mode Analytics).
   The Failure Mode Analytics configuration screen is displayed.
3. To change the settings for the configuration, choose Edit next to the Language Selection section.
4. In the section, select the language in which the notifications are displayed.
5. Save your selection.

**Results**

Your language is selected.

You can later also select a different language. Once you have selected a different language, you need to repeat step 3 in the topic Configuring Failure Mode Analytics to apply your changes.

**Related Information**

Notification Language Configuration [page 415]
Configuring Failure Mode Analytics [page 412]

8.4.2.2 Configuring a Notification Language Translation

This topic describes how to configure the notification language for failure mode analytics.

**Prerequisites**

- You have created and assigned the relevant business objects. For more information, see Configuring Failure Mode Analytics [page 412] and check the prerequisites.
- (Optional): You have configured the mean time indicators configuration. For more information, see Configuring the Mean Time Indicators [page 414].
- The role ConfigUser is assigned to your user.
- You have performed the following steps related to Google:
You have a Google account.
You have created a Google API key. For more information, see the relevant google page.

⚠️ Caution
Consider the following if you are using the language translation:
The translation feature for failure mode analytics is an optional feature and is based on Bring Your Own Account (BYOA)
SAP is under no obligation to provide this feature now or in the future. The feature may be enhanced or discontinued at any time, without notice. That means that you must have a private account with Google for translation services, and you must have your own Google API key. You alone are responsible for all required contracts with Google, including important aspects such as privacy data (especially customer data transferred to Google servers or other third party servers), costs for translation services, and so on.

Procedure

1. On the SAP Fiori launchpad, go to the Administration group and open the Application Settings application.
2. To configure the target language, choose Failure Mode Analytics.
The Failure Mode Analytics configuration screen is displayed.
3. To change the settings for the configuration, choose Edit next to the Language Translation section.
4. In the section, fill in the following fields:
   - Enable Translation: Move the slider to Yes to enable the language translation.
   - Remember: If you no longer need the translation, you can later disable it. However, if you want the translation to take place, do not disable the language translation before you have performed all of the steps in the topic Configuring Failure Mode Analytics. Otherwise, you receive an error when you manage your failure mode analytics model in step 3 and your translation is not applied.
   - Google Cloud API Key: Paste the string from your created Google Cloud API key.
   - Language: Select the language in which the notifications are translated.
   - Note: The selection is displayed under Language Selection.
5. Save your configuration.
Results

Your language translation is configured.

You can later edit your configuration. Once you have edited the configuration, you need to repeat step 3 in the topic Configuring Failure Mode Analytics to apply your changes.

Related Information

Notification Language Configuration [page 415]
Configuring Failure Mode Analytics [page 412]

8.5 Analytics Dashboards Configuration

As an administrator, you can configure analytics dashboards for different applications in SAP Predictive Asset Insights using different options:

- You can configure analytics dashboards using OData services APIs with an import data connection.
- You can configure analytics dashboards using your own SAP HANA database with a live data connection.

Configuration Using OData Services APIs with Import Data Connection

With this option, you can configure an import data connection between SAP Predictive Asset Insights and SAP Analytics Cloud. This allows you to copy data from the SAP Predictive Asset Insights into a model and respective story in SAP Analytics Cloud. You then configure this story as an analytics dashboard in multiple applications of SAP Predictive Asset Insights.

To copy the data, the import data connection uses OData services as the data source when you create a model in SAP Analytics Cloud. The related APIs of the OData services fetch the data. The data that you can copy includes header data or last indicator values from multiple business objects. For an overview of the business object data that you can import, see OData Services for SAP Analytics Cloud.

For creating models and stories in SAP Analytics Cloud, you can choose whether you create your own model and story or import a package with business content. This package is called SAP Intelligent Asset Management and contains a sample OData connection, seven sample models, and two sample stories. One story is for the Analytics Dashboards application and one story is for the equipment object page. As data for the models and the stories, the package contains sample data, which you also overwrite. You can also combine the options, which means that you can use a sample model and a sample story or use a sample model and create your own story.

Any changes that are done in SAP Predictive Asset Insights after the data is copied do not affect the data of the story and respective analytics dashboard, but you can schedule an hourly data replication job. For more information about import data connection, see Import Data Connection.
Configuration Using Own SAP HANA Database with Live Data Connection

**Note**

This feature is only available with Amazon Web Services (AWS).

With this option, you can configure a live data connection between your own SAP HANA database and SAP Analytics Cloud. This allows you to use the data of your own SAP HANA database “live” in a model and respective story in SAP Analytics Cloud. You then configure this story as an analytics dashboard in multiple applications of SAP Predictive Asset Insights.

In your own SAP HANA database, you can combine data from the analytics database and other databases. The analytics database is a separate database from SAP Predictive Asset Insights and contains master data and time series data. For the data to initially load into the analytics database, the piece of equipment whose data should be loaded needs to be published in SAP Predictive Asset Insights. If you want to use time series data, you need to request the usage via a support ticket before the publishing. For more information about the analytics database and the data, see Analytics Database [page 446].

**Caution**

The connection to the analytics database is only allowed to be used for displaying data in SAP Analytics Cloud as described in this guide. Any other usage is beyond the scope of this feature and not allowed nor supported by SAP.

To access the data of the analytics database, you need specific credentials and a remote connection (remote data source) from the analytics database to your own SAP HANA database. To use the data of the analytics
database, you need virtual tables in your own SAP HANA database. The virtual tables refer to the source tables of the analytics database. You only need virtual tables for the source tables that are required for your use case. In your own SAP HANA database, you can also perform different calculations, for example, join the virtual tables with other virtual tables or your own data tables if you have any in your own SAP HANA database. Depending on the data that you want to display in the story and the analytics dashboard, you need to create cube calculation views based on the virtual tables and your own data tables. The live data connection uses these calculation views as the data source when you create a model in SAP Analytics Cloud. The calculation views fetch the data of the virtual tables and your own tables, which refer to the source tables.

Any changes that are done in the analytics database or in any of the other used databases are reflected in the story in SAP Analytics Cloud once you refresh the story manually or by configuring an auto refresh. After the refresh, the changes are also reflecting in the respective analytics dashboard in SAP Predictive Asset Insights. For more information about live data connection, see Live Data Connection.

The following graphic illustrates the concept using your own SAP HANA database with a live data connection:

**Comparison Between the Import Data Connection and Live Data Connection**

The following table summarizes again the main aspects of the options:

<table>
<thead>
<tr>
<th>Aspect</th>
<th>OData APIs with Import Connection</th>
<th>Own SAP HANA Database with Live Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of data that can be used</td>
<td>• Header data of multiple business objects with no custom attributes</td>
<td>• Master data with custom attributes</td>
</tr>
<tr>
<td></td>
<td>• Last indicator values</td>
<td>• Time series data</td>
</tr>
</tbody>
</table>

Application Help for SAP Predictive Asset Insights
Configuring SAP Predictive Asset Insights
<table>
<thead>
<tr>
<th>Aspect</th>
<th>OData APIs with Import Connection</th>
<th>Own SAP HANA Database with Live Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place where data is stored</td>
<td>In SAP Analytics Cloud with a copy of the data from SAP Predictive Asset Insights</td>
<td>In your own SAP HANA database with a reference to the analytics database</td>
</tr>
<tr>
<td>Possibility to use data “live”</td>
<td>No, the data gets copied to SAP Analytics Cloud, but you can schedule an hourly data replication job.</td>
<td>Yes</td>
</tr>
<tr>
<td>Need of having a SAP Analytics Cloud license</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Need of having own SAP HANA database</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Possibility to augment data in SAP Analytics Cloud</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Need of creating models in SAP Analytics</td>
<td>Yes with the option to import business content</td>
<td>Yes</td>
</tr>
<tr>
<td>Need of creating stories in SAP Analytics Cloud</td>
<td>Yes with the option to import business content</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Related Tasks**

- Configuring Analytics Dashboards Using Import Data Connection [page 423]
- Configuring Analytics Dashboards Using Live Data Connection [page 443]

**Related Information**

- Analytics Dashboards [page 60]
8.5.1 Configuring Analytics Dashboards Using Import Data Connection

This topic explains how to configure analytics dashboards using OData services APIs with an import data connection.

Prerequisites

You have a license for SAP Analytics Cloud and an activate account. For more information about SAP Analytics Cloud, see [SAP Analytics Cloud](#).

Procedure

Steps related to SAP Analytics Cloud:

1. Enable your custom identity provider from SAP Predictive Asset Insights in SAP Analytics Cloud to achieve single sign-on. For more information, see [Enabling a Custom SAML Identity Provider](#).

   **Note**

   Consider the following when you perform this step:
   - For a correct configuration, you also need to configure the trusted origins. To do this, choose [System > Administration > App Integration](#) in the main menu. In the Trusted Origins section, choose between the following options:
     - Activate the Allow all origins checkbox.
     - Deactivate the Allow all origins checkbox and add specific trusted origins.
     - If you are using Chrome, ensure that the third-party cookies are enabled in the cookie settings.

2. Define a model in SAP Analytics Cloud. You can choose between the following options:
   - Import the SAP Intelligent Asset Management package with the sample models and the sample data. For more information, see [Importing Business Content and Overwriting Sample Data in SAP Analytics Cloud](#).
   - Create your own model. To create your own model, proceed as follows:
     - Configure a data connection to use data from SAP Predictive Asset Insights. For more information about configuring a data connection, see [Configuring a Data Connection in SAP Analytics Cloud](#).
     - Create a model and import the data. For more information, see [Creating a Model in SAP Analytics Cloud](#).

3. Set up a data replication schedule in SAP Analytics Cloud to regularly refresh the data. For more information, see [Updating and Scheduling Models](#).

4. Define a story in SAP Analytics Cloud based on the model. You can choose between the following options:
   - Use one of the sample stories of the SAP Intelligent Asset Management package. To open a sample story, navigate to the Files screen and open the [SAP_Content > SAP_IAM_Intelligent_Asset_Management](#) folders.
Remember
To use a sample story, you need to have imported the package in step 3 and used one of the sample models.

○ Create your own story. For more information, see Creating Your First Story and Creating a New Story.

5. Assign the BI Content Viewer role with read privileges to the users from SAP Analytics Cloud who want to view analytics dashboards. For more information, see Assigning Roles to Users.

Tip
The users are already created automatically.

6. Share the story with the users. For more information, see Sharing Stories or Bookmarks.

Tip
To easily share a story with multiple users, we recommend to create teams and share stories with teams including different users. For more information about creating teams, see Creating Teams.

Steps related to SAP Predictive Asset Insights:
7. Configure SAP Analytics Cloud as an external system in SAP Predictive Asset Insights. For more information, see Configuring SAP Analytics Cloud in SAP Predictive Asset Insights [page 437].
8. Configure analytics dashboards in SAP Predictive Asset Insights. For more information, see Configuring Analytics Dashboards [page 438].
9. (Only relevant if you have configured an analytics dashboard for the equipment or model object pages): Configure the object pages. For more information, see Configuring Object Pages [page 442].

Related Information

Analytics Dashboards Configuration [page 419]

8.5.1.1 Configuring a Data Connection in SAP Analytics Cloud

This topic describes how to configure a data connection in SAP Analytics Cloud.

Prerequisites

You have enabled your custom identity provider from SAP Predictive Asset Insights in SAP Analytics Cloud. For more information, see Enabling a Custom SAML Identity Provider.
Context

Procedure

1. Open SAP Analytics Cloud.
2. Choose (Main Menu) ➤ Connection. The Connections screen is displayed.
3. To add a new connection, choose + (Add Connection). The Select a Datasource dialog box is displayed.
4. Choose Acquire Data ➤ OData Services. The New OData Services Connection dialog box is displayed.
5. Fill in the following fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection Name</td>
<td>Enter a name for the connection.</td>
</tr>
<tr>
<td>Description</td>
<td>Enter a description for the connection.</td>
</tr>
<tr>
<td>Connect to an SAP OData service</td>
<td>Activate this checkbox.</td>
</tr>
<tr>
<td>Data Service URL</td>
<td>Enter the following URL: <a href="https://ac.cfapps.eu10.hana.ondemand.com/ain/ac.odata.svc/api/v1">https://ac.cfapps.eu10.hana.ondemand.com/ain/ac.odata.svc/api/v1</a></td>
</tr>
<tr>
<td>Authentication Type</td>
<td>Select OAuth 2.0 Client Credentials.</td>
</tr>
<tr>
<td>OAuth Client ID</td>
<td>Enter the client ID that you received during the subscription to the asset central foundation.</td>
</tr>
<tr>
<td>Secret</td>
<td>Enter the client secret that you received during the subscription to the asset central foundation.</td>
</tr>
<tr>
<td>Token URL</td>
<td>Enter the following URL with your tenant-subdomain: https://&lt;tenant-subdomain&gt;.authentication.eu10.hana.ondemand.com/oauth/token/</td>
</tr>
</tbody>
</table>

6. Choose Create.

Results

The data connection is configured.
8.5.1.2 Creating a Model in SAP Analytics Cloud

This topic describes how to create a model in SAP Analytics Cloud.

Prerequisites

You have configured a data connection in SAP Analytics Cloud. For more information, see Configuring a Data Connection in SAP Analytics Cloud [page 424].

Context

For general information about creating models, Building Your First Model and Creating a New Model.

**Note**

Consider the following when you create a model using the following OData APIs:

- **Work order, notification, equipment, or model APIs:**
  In SAP Asset Intelligent Management, you can store a maximum of 5000 characters in the LongDescription field. In SAP Analytics Cloud, you can only store a maximum of 256 characters. This can cause an error during the data import of the APIs in SAP Analytics Cloud. To avoid this error, do the following when you create a model in SAP Analytics Cloud:
  1. Create a new calculated column and add the following formula to it:

     ```
     SUBSTRING ([longDescription],0 ,256)
     ```
  2. Delete the original column.
  Your data is then transformed and stored in the new column, which you can then use in your analytics dashboard.

- **Indicator API:**
  The data of the Value field can have different equipment indicator data types (Numeric, NumericFlexible, String, Boolean, and Date). If the field contains non-numeric data, you cannot use the data in charts because SAP Analytics Cloud prevents you from turning this field into a measure. To turn the field and use the data in charts, do the following when you create a model in SAP Analytics Cloud:
  1. Change type of the Value source column to generic, not a measure.
  2. Create a new calculated column called Null and add two double quotes ("\"\") as the formula.
  3. Create a new calculated column called Numeric Values and add the following formula to it:

     ```
     IF([dataType]="numeric" OR [dataType]="numericflexible", [value], "\"")
     ```
This step copies all numeric values into the new field and you can use it in charts.

4. Make the new Numeric Values column the measure.
5. Ensure that the original Value field is a dimension, not a measure.
6. (Optional) create another new calculated column called Non Numeric Values and add the following formula to it:

   ```
   IF([dataType]="numeric" OR [dataType]="numericflexible", [value], [Null])
   ```

- **Equipment API:**
  The longitude and latitude values for the geo coordinates are provided together in the coordinates source column separated by a comma. In order that SAP Analytics Cloud can use it, you need to split the values into two columns:

  1. Switch to the grid view to open the source data table by choosing 📊.
  2. (Optional) duplicate the column to preserve the original column.
  3. Select the duplicated column and split the column by creating a transformation. The following graphic shows an example in the transform bar format:
  4. Rename the two splitted columns to Longitude and Latitude.
  5. Create a geo source column by using the Geo Enrichment function.

For more information about creating calculated columns, performing column actions, transformations, and data types, see Video: Create Calculated Columns and the Improving data quality section in Preparing Data.

---

**Procedure**

1. Open SAP Analytics Cloud.
2. Choose ☉️ (Main Menu) ➔ Create ➔ Model.
   The options for bringing data into a model are displayed.
   On the right side, a pane is displayed.
4. In the Acquire data section of the pane, select OData Services.
   The Create Model from OData Services dialog box is displayed.
5. Select the name of the configured data connection.
6. Choose Next.
   SAP Analytics Cloud retrieves data from the OData Service. Once the data is received, the New Query for OData Services dialog box is displayed.
7. In the dialog box, select the business object that you want to add and choose Next.
   The available attributes for the selected business object are displayed.
8. From the **Available Data** area, drag and drop the attributes that you want to use to the **Selected Data** area.

9. Choose **Create**.

   On the top bar of the application, the query for the business object is displayed and loaded.

10. Once the query is loaded, choose the query.

   The **New Model** screen is displayed, where you can modify the model before creating it.

11. Choose **Create**.

### Results

The model is created.

### Related Information

**Updating and Scheduling Models**

#### 8.5.1.3 Importing Business Content and Overwriting Sample Data in SAP Analytics Cloud

This topic describes how to import business content and overwrite the sample data in SAP Analytics Cloud.

### Prerequisites

You have enabled your custom identity provider from SAP Predictive Asset Insights in SAP Analytics Cloud. For more information, see [Enabling a Custom SAML Identity Provider](#).

### Context

When you use the **SAP Intelligent Asset Management** package, you have the option to only import the business content with the included sample data and view this data in a story and analytics dashboard or you can overwrite the imported sample data with your own data.

#### i Note

Consider that the usage of the sample data only fully works for the analytics dashboard in the **Analytics Dashboards** application. For the analytics dashboard in the equipment object page, it shows the dashboard but without data because the data is filtered by the equipment of the page.
Procedure

1. Open SAP Analytics Cloud.
2. Import the SAP Intelligent Asset Management package into SAP Analytics Cloud using SAP Business Content as the type of content. For more information, see Importing from the Content Network.

   The sample models and stories are imported together with the sample OData connection and the sample data. If you would only like to use the sample data, you can skip the remaining steps of the procedure. If you would like to overwrite the data with your own data, proceed with step 3.
3. Navigate to the Connection screen, select the sample OData connection and update or fill in the required fields that point to the connection of your data source. For more information about the fields, see Configuring a Data Connection in SAP Analytics Cloud [page 424].
4. Choose (Main Menu) > Browse > Files > Public > Models and open the model that you want to use.
5. Switch to the Data Management screen and check how many import jobs are displayed under Import Jobs:
   ○ If there is one import job displayed, refresh it by choosing . If the refresh is successful and all of the rows have been imported, you can skip the remaining steps of the procedure. If the refresh is not successful, proceed with step 6.
   ○ If there are multiple or no import jobs displayed, proceed with step 6.

   For more information about the Data Management screen, see Introduction to the Modeler.
6. Create a new query for the data import. For more information, see Importing OData Services Data to a New or Existing Model.

   i Note
   Consider the following when you are using the link above:
   ○ In step 1, start with substep d.
   ○ In step 2, select the OData connection that you have just updated.
   ○ In step 3, choose the option to create new query.
   ○ In step 5, choose the option to build a query.
   ○ In step 6, choose the created query in the Draft Sources sources list.

7. In the card view, adjust the mapping of the imported data and the fields of the model. The adjustments differ depending on which model you are using. The following table lists the related procedures:

<table>
<thead>
<tr>
<th>Model</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model for equipment data</td>
<td>Mapping Equipment [page 430]</td>
</tr>
<tr>
<td>Model for equipment data with geo coordinates</td>
<td>Mapping Equipment with Geo Coordinates [page 431]</td>
</tr>
<tr>
<td>Model for indicator data</td>
<td>Mapping Indicators [page 433]</td>
</tr>
<tr>
<td>Model for locations data</td>
<td>Mapping Locations [page 433]</td>
</tr>
<tr>
<td>Model for equipment models data</td>
<td>Mapping Models [page 434]</td>
</tr>
<tr>
<td>Model for notification data</td>
<td>Mapping Notifications [page 435]</td>
</tr>
<tr>
<td>Model for spare parts data</td>
<td>Mapping Spare Parts [page 436]</td>
</tr>
</tbody>
</table>
Model for work orders data

Mapping Work Orders [page 436]

For general information about viewing and mapping data imported to an existing model, see Preparing Data.

8. In the right pane, choose and select Clean and replace selected version data under Import Method.

Results

The business content is imported and your data is loaded.

Related Information

Updating and Scheduling Models

8.5.1.3.1 Mapping Equipment

This topic describes how to map a model for equipment data.

Procedure

1. Map the id source column to the Technical ID card.
2. Unmap the source column for the Longitude card.
3. Map the coordinates source column to the GeoLocation card.
4. Create the source columns for the longitude and latitude and adjust the mapping for the longitude and latitude. The longitude and latitude values are provided together in the coordinates source column separated by a comma. In order that SAP Analytics Cloud can use it, you need to split the values into two columns:
   a. Switch to the grid view to open the source data table by choosing .
   b. Navigate to the coordinates column.
   c. (Optional) duplicate the column to preserve the original column by using the Quick Actions option. For more information about this option, see the Improving data quality section in Preparing Data.
   d. Select the duplicated column and split the column by creating a transformation. For more information about transformations, see the Improving data quality section in Preparing Data. The following graphic shows an example in the transform bar format:
e. Name the first splitted column Longitude and the second splitted column Latitude.
f. Switch back to the card view.
g. Map the Longitude column to the Longitude card.
h. Map the Latitude column to the Latitude card.

5. Create a measure source column and adjust the mapping for the Measure attribute card:
   a. Create a calculated column and add a fixed value as the formula, for example, 1. For more information about creating calculated columns, see Video: Create Calculated Columns.
   b. Double-click the Measure card.
   c. Map the calculated column to the attribute card.

6. (Only relevant if the source column for the long description has more than 256 characters) limit the long description to the first 255 characters:
   a. Create a calculated column called Long Description Truncated and add the formula SUBSTRING ([longDescription], 0, 256) to it.
   b. Unmap the source column for the Long Description card.
   c. Map the new calculated column to the Long Description card.

Results

The mapping is adjusted.

Related Information

Importing Business Content and Overwriting Sample Data in SAP Analytics Cloud [page 428]

8.5.1.3.2 Mapping Equipment with Geo Coordinates

This topic describes how to map a model for equipment data with geo coordinates.

Procedure

1. Create the source columns for the longitude and latitude. The longitude and latitude values are provided together in the coordinates source column separated by a column. In order that SAP Analytics Cloud can use it, you need to split the values into two columns:
   a. Switch to the grid view to open the source data table by choosing coordinates column.
   b. Navigate to the coordinates column.
c. **(Optional)** duplicate the column to preserve the original column by using the *Quick Actions* option. For more information about this option, see the *Improving data quality* section in *Preparing Data*.

d. Select the duplicated column and split the column by creating a transformation. For more information about transformations, see the *Improving data quality* section in *Preparing Data*. The following graphic shows an example in the transform bar format:

e. Name the first splitted column *Longitude* and the second splitted column *Latitude*.

2. Use the created longitude and latitude source columns and adjust the mapping for the geo coordinates:
   a. Double-click the *ID* card.
   b. Unmap the source column for the *Dimension ID* attribute card.
   c. Map the *internalId* source column to the *Dimension ID* attribute card.
   d. Select the *GeoLocation* attribute card and choose *Map locations*.
      
      The *Map Latitude/Longitude* dialog box is displayed.
   e. In the dialog box, select the created latitude and longitude fields and choose *OK*.

3. Adjust the mapping for the *Technical ID* card:
   a. Double-click the *Technical ID* card.
   b. Unmap the source column for the *Dimension ID* attribute card.
   c. Map the *id* source column to the *Technical ID* card.

4. Adjust the mapping for the *Model ID* card:
   a. Double-click the *Model ID* card.
   b. Unmap the source columns for the *Dimension ID* and *Description* attribute cards.
   c. Map the *modelId* source column to the *Dimension ID* attribute card.
   d. Map the *modelName* source column to the *Description* attribute card.

5. Adjust the mapping for the *Measures* card:
   a. Double-click the *Measures* card.
   b. Unmap the source columns for the *Longitude* and *Latitude* attribute cards.

6. Create a measure source column and adjust the mapping for the *Measure* attribute card:
   a. Create a calculated column and add a fixed value as the formula, for example, 1. For more information about creating calculated columns, see *Video: Create Calculated Columns*.
   b. Double-click the *Measure* card.
   c. Map the calculated column to one of the attribute card, for example, the *Latitude* attribute card.

## Results

The mapping is adjusted.

## Related Information

*Importing Business Content and Overwriting Sample Data in SAP Analytics Cloud* [page 428]
8.5.1.3.3 Mapping Indicators

This topic describes how to map a model for indicator data.

**Procedure**

1. Create calculated columns for numeric values and non-numeric values called Null, Numeric Values and Non-Numeric Values as described in the Indicator API note section in Creating a Model in SAP Analytics Cloud [page 426].
   
   For more information about creating calculated columns, see Video: Create Calculated Columns.
2. Double-click the Measure card.
3. Map the numeric source column to the Value Numeric attribute card.
4. Map the Null source column to the Null card.
5. Map the non-numeric source column to the Value Non-Numeric card.

**Results**

The mapping is adjusted.

**Related Information**

Importing Business Content and Overwriting Sample Data in SAP Analytics Cloud [page 428]

8.5.1.3.4 Mapping Locations

This topic describes how to map a model for locations data.

**Procedure**

1. Map the id source column to the Technical ID card.
2. Create a measure source column and adjust the mapping for the Measure attribute card:
   a. Create a calculated column and add a fixed value as the formula, for example, 1. For more information about creating calculated columns, see Video: Create Calculated Columns.
   b. Double-click the Measure card.
c. Map the calculated column to the attribute card.

Results

The mapping is adjusted.

Related Information

Importing Business Content and Overwriting Sample Data in SAP Analytics Cloud [page 428]

8.5.1.3.5 Mapping Models

This topic describes how to map a model for models data.

Procedure

1. Map the id source column to the Technical ID card.
2. Create a measure source column and adjust the mapping for the Measure attribute card:
   a. Create a calculated column and add a fixed value as the formula, for example, 1. For more information about creating calculated columns, see Video: Create Calculated Columns.
   b. Double-click the Measure card.
   c. Map the calculated column to the attribute card.
3. Unmap the source column for the Category card.
4. (Only relevant if the source column for the long description has more than 256 characters) limit the long description to the first 255 characters:
   a. Create a calculated column called Long Description Truncated and add the formula SUBSTRING ([longDescription], 0, 256) to it.
   b. Unmap the source column for the Long Description card.
   c. Map the new calculated column to the Long Description card.

Results

The mapping is adjusted.
8.5.1.3.6 Mapping Notifications

This topic describes how to map a model for notification data.

Procedure

1. **(Only relevant if the source column for the long description has more than 256 characters)** limit the long description to the first 255 characters:
   a. Create a calculated column called Long Description Truncated and add the formula `SUBSTRING ([longDescription], 0, 256)` to it. For more information about creating calculated columns, see Video: Create Calculated Columns.
   b. Unmap the source column for the Long Description card.
   c. Map the new calculated column to the Long Description card.

2. Create a measure source column and adjust the mapping for the Measure attribute card:
   a. Create a calculated column and add a fixed value as the formula, for example, 1.
   b. Double-click the Measure card.
   c. Map the calculated column to the attribute card.

Results

The mapping is adjusted.

Related Information

Importing Business Content and Overwriting Sample Data in SAP Analytics Cloud [page 428]
8.5.1.3.7    Mapping Spare Parts

This topic describes how to map a model for spare parts data.

Procedure

1. Map the \(id\) source column to the \(Technical\ ID\) card.
2. Create a measure source column and adjust the mapping for the \(Measure\) attribute card:
   a. Create a calculated column and add a fixed value as the formula, for example, 1. For more information about creating calculated columns, see Video: Create Calculated Columns.
   b. Double-click the \(Measure\) card.
   c. Map the calculated column to the attribute card.
3. Adjust the mapping for the \(ID\) card:
   a. Unmap the source column for the \(ID\) card.
   b. Double-click the \(Spare\ Part\ Search\ Terms\) card.
   c. Unmap the source column for the \(Description\) attribute card.
   d. Map the \(sparepartName\) source column to the \(ID\) card.

Results

The mapping is adjusted.

Related Information

Importing Business Content and Overwriting Sample Data in SAP Analytics Cloud [page 428]

8.5.1.3.8    Mapping Work Orders

This topic describes how to map a model for work orders data.

Procedure

Create a measure source column and adjust the mapping for the \(Measure\) attribute card:

a. Create a calculated column and add a fixed value as the formula, for example, 1. For more information about creating calculated columns, see Video: Create Calculated Columns.
b. Double-click the Measure card.
c. Map the calculated column to the attribute card.

Results

The mapping is adjusted.

Related Information

Importing Business Content and Overwriting Sample Data in SAP Analytics Cloud [page 428]

8.5.1.4 Configuring SAP Analytics Cloud in SAP Predictive Asset Insights

This topic describes how to configure SAP Analytics Cloud in SAP Predictive Asset Insights.

Prerequisites

- You have shared the story with the users. For more information, see Sharing Stories or Bookmarks.
- One of the following roles is assigned to your user:
  - CONFIGURATION_EDIT
  - CONFIGURATION_DELETE

Procedure

1. On the SAP Fiori launchpad, go to the Administration group and open the Application Settings application.
2. Choose External Systems.
3. Choose Add Other External System.
   The Add System dialog box is displayed.
4. In the dialog box, fill in the following fields:

   | System Name | Enter the following name: SAC System. |
5. Choose OK.

**Results**

SAP Analytics Cloud is configured in SAP Predictive Asset Insights.

**Related Information**

Configuring Analytics Dashboards [page 438]

### 8.5.1.5 Configuring Analytics Dashboards

This topic describes how to configure analytics dashboards in SAP Predictive Asset Insights.

**Prerequisites**

- You have configured SAP Analytics Cloud as an external system in SAP Predictive Asset Insights. For more information, see Configuring SAP Analytics Cloud in SAP Predictive Asset Insights [page 437].
- One of the following roles is assigned to your user:
  - CONFIGURATION_EDIT
  - CONFIGURATION_DELETE

**Procedure**

1. On the SAP Fiori launchpad, go to the *Administration* group and open the *Application Settings* application.
2. To configure analytics dashboards, choose (Analytics Dashboards).
   
   The *Analytics Dashboards* configuration screen is displayed.
3. Choose between the following options:
   - Configure an analytics dashboard for the *Analytics Dashboards* application. For more information, see Configuring an Analytics Dashboard for the Application [page 439].
   - Configure an analytics dashboard for an object page. For more information, see Configuring an Analytics Dashboard for an Object Page [page 440].
4. To edit a configured dashboard, select it and choose **Edit**.

5. To delete or clear a configured dashboard, you can choose between the following options:
   - For the application, select the dashboard and choose **Delete**.
   - For the object page dashboard, select the dashboard and choose **Clear**.
   Once you have deleted a dashboard or cleared the configuration, the dashboard is no longer available for the business user.

**Results**

The analytics dashboard are configured.

**Next Steps**

Depending on your configuration, the business user can now view the dashboard as follows:

- In the **Analytics Dashboards** application. For more information, see Viewing Analytics Dashboards in the Application [page 62].
- On the spare part and location object pages. For more information, see Viewing Analytics Dashboards on Object Pages [page 63].

**Note**

For the equipment and model object pages, you also need to configure the object pages so that the dashboard is displayed. For more information, see Configuring Object Pages [page 442].

### 8.5.1.5.1 Configuring an Analytics Dashboard for the Application

This topic describes how to configure an analytics dashboard for the **Analytics Dashboards** application in SAP Predictive Asset Insights.

**Procedure**

1. In the **Analytics Dashboards** configuration screen, choose **Add** under **Analytics Dashboards Application**.
   - The **Add Analytics Dashboard** dialog box is displayed.
2. Fill in the following fields:
3. Choose OK.

Results

The dashboard for the application is configured.

Related Information

Configuring Analytics Dashboards [page 438]

8.5.1.5.2 Configuring an Analytics Dashboard for an Object Page

This topic describes how to configure an analytics dashboard for an object page in SAP Predictive Asset Insights.

Procedure

1. In the Analytics Dashboards configuration screen, select the business object for which you want to configure an analytics dashboard under Object Pages.
2. Choose Edit.
   
   The Edit Analytics Dashboard dialog box for the business object is displayed.
3. Fill in the following fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Enter a name for the dashboard. This name is later displayed in the Analytics Dashboards application.</td>
</tr>
<tr>
<td>Story URL</td>
<td>Paste the URL of your story from SAP Analytics Cloud. To paste the URL, open the story in SAP Analytics Cloud (SAC) and add the parameter ;mode=embed at the end of the URL.</td>
</tr>
</tbody>
</table>

Example

https://<domain>/sap/fpa/ui/app.html#;view_id=story;storyId=<story ID>;mode=embed
Story URL

Paste the URL of your story from SAP Analytics Cloud.

To paste the URL, open the story in SAP Analytics Cloud (SAC) and add the parameter `;mode=embed` at the end of the URL.

**Example**

```
https://<domain>/sap/fpa/ui/app.html#;view_id=story;storyId=<story ID>;mode=embed
```

Data Model ID

Paste the model ID of your story from SAP Analytics Cloud. The model ID filters the story data by a specific business object, for example, a piece of equipment.

To paste the model ID, open SAP Analytics Cloud and add the string `/api/v1/stories?include=models` to the domain of the URL.

**Example**

```
https://<domain>/api/v1/stories?include=models
```

A list with all stories and model information is then displayed. For the model ID, go to the desired story. The attribute `id` is the model ID.

Dimension

Enter the dimension of your business object. The dimension is the ID of your business object and filters the story data by that ID, for example, for the specific piece of equipment.

You can enter the following dimensions:

- `internalId` for equipment, models, and locations
- `sparepartinternalID` for spare parts

4. Choose OK.

Results

The dashboard for the business object is configured.

Related Information

Configuring Analytics Dashboards [page 438]
8.5.1.6 Configuring Object Pages

This topic describes how to configure object pages for analytics dashboards in SAP Predictive Asset Insights.

Prerequisites

- You have configured a dashboard for the equipment or model object pages. For more information, see Configuring Analytics Dashboards [page 438].
- One of the following roles is assigned to your user:
  - CONFIGURATION_EDIT
  - CONFIGURATION_DELETE

Context

By default, the tabs and subsections in which the analytics dashboards are displayed are not activated for the equipment and model object pages. To enable the configured dashboards to be displayed, you need to configure the settings and activate the tabs and subsections for the object pages.

Procedure

1. On the SAP Fiori launchpad, go to the Administration group and open the Application Settings application.
2. To configure the equipment and model page, choose (Object Page Configurations).
   The Object Page Configurations configuration screen is displayed.
3. Expand the sections below Equipment and Model.
4. Activate the checkboxes for Analytics and Analytics Dashboards.

Results

The object pages are configured.

Next Steps

The business user can now view the dashboard on the equipment and model object pages. For more information, see Viewing Analytics Dashboards on Object Pages [page 63].
8.5.2 Configuring Analytics Dashboards Using Live Data Connection

This topic explains how to configure analytics dashboards using your own SAP HANA database with a live data connection.

Prerequisites

- You have a license for SAP Analytics Cloud and an activate account. For more information about SAP Analytics Cloud, see SAP Analytics Cloud.
- You have your own SAP HANA database with version 2.0 SPS 04 or higher with the ability to create a remote data source.

i Note

If you want to use time series data, you also need to create a support ticket and receive a response before you can start with the procedure. The information that you need to provide for creating the ticket are:

- component: IOT-PDM-OPS
- title: Custom Analytics
- tenant ID
- subdomain

Procedure

Step related to SAP Predictive Asset Insights:
1. Publish the piece of equipment in SAP Predictive Asset Insights so that the related data is initially loaded into the analytics database. For more information, see Publishing Multiple Equipment [page 100].

Steps related to your own SAP HANA database:
2. Create credentials for the remote connection (remote data source) in SAP Cloud Platform Cockpit. For more information, see Creating Credentials for the Remote Source [page 445].
3. In your own SAP HANA database, create the remote connection (remote data source) to access and use the data of the analytics database using the created credentials. For more information, see Create an SAP HANA Remote Source.
For the Extra Adapter Properties field, you need to paste the string `encrypt=TRUE;sslTrustStore=` in front of the certificate and put the certificate in quotation marks. The field looks then as follows:

```
encrypt=TRUE;sslTrustStore="certificate text".
```

4. In your own SAP HANA database, create virtual tables based on the tables of the analytics database and save them in the schema of choice. For more information about the analytics database, see Analytics Database [page 446].

For the Extra Adapter Properties field, you need to paste the string `encrypt=TRUE;sslTrustStore=` in front of the certificate and put the certificate in quotation marks. The field looks then as follows:

```
encrypt=TRUE;sslTrustStore="certificate text".
```

5. In SAP HANA Studio or SAP Web IDE, create cube calculations views based on the virtual tables. For more information, see Create Graphical Calculation Views.

6. **(Only relevant if you want to create geo maps in SAP Analytics Cloud):** In SAP HANA Studio, create location dimension views in the `SAP_BOC_SPATIAL` package. For more information, see Creating Geo model from Live HANA Calculation View.

**Steps related to SAP Analytics Cloud:**

7. Create a live data connection in SAP Analytics Cloud to your own SAP HANA database. For more information, see Live Data Connection to SAP HANA Using a Direct Connection with Password Authentication.

8. Create a model in SAP Analytics Cloud based on the live data connection. For more information, see Creating a Model from a Live Data Connection.

9. Create a story in SAP Analytics Cloud based on the model. For more information, see Creating Your First Story and Creating a New Story.

10. Assign the BI Content Viewer role with read privileges to the users from SAP Analytics Cloud who want to view analytics dashboards. For more information, see Assigning Roles to Users.

    
    The users are already created automatically.

11. Share the story with the users. For more information, see Sharing Stories or Bookmarks.

    
    To easily share a story with multiple users, we recommend to create teams and share stories with teams including different users. For more information about creating teams, see Creating Teams.

**Steps related to SAP Predictive Asset Insights:**

12. Configure SAP Analytics Cloud as an external system in SAP Predictive Asset Insights. For more information, see Configuring SAP Analytics Cloud in SAP Predictive Asset Insights [page 451].

13. Configure analytics dashboards in SAP Predictive Asset Insights. For more information, see Configuring Analytics Dashboards [page 452].

14. **(Only relevant if you have configured an analytics dashboard for the equipment or model object pages):** Configure the object pages. For more information, see Configuring Object Pages [page 456].
8.5.2.1 Creating Credentials for the Remote Source

This topic explains how to create credentials for the remote source.

Prerequisites

You have published the equipment. For more information, see Publishing Multiple Equipment [page 100].

Procedure

2. Navigate to your subaccount.
3. In the Spaces table, choose your space.
4. In the right pane, choose Services Service Instances.
   The Service Instances screen is displayed.
5. On the screen, choose Create Instance.
6. A new dialog box with New Instance as a first screen is displayed.
7. Fill in the following fields:

<table>
<thead>
<tr>
<th>Service</th>
<th>Select SAP Intelligent Asset Management Analytics.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Plan</td>
<td>Select standard.</td>
</tr>
<tr>
<td>Instance Name</td>
<td>Enter an instance name, for example, Analytics.</td>
</tr>
</tbody>
</table>

8. Choose Create Instance.
9. The new instance is added to the Service Instances table.
10. Choose the new instance.
   A pane with the service keys is displayed on the right.
11. Choose Actions Create Service Key.
   The New Service Key dialog box is displayed.
12. In the dialog box, enter a service key name, for example, Analytics Service Key.
13. Choose Create.
The service key is created and added to the Service Keys table.

14. In the Service Keys table, select the service and key and choose Actions > View.

A new dialog box with the service key JSON file is displayed. In the 'hana' section of the JSON file, the following information for the remote source are displayed:
- Username
- Password
- Certificate (for the extra adapter properties)
- Host
- Port

**Results**

The credentials for the remote source are created.

**Related Information**

Create an SAP HANA Remote Source

### 8.5.2.2 Analytics Database

The analytics database stores master data and time series data from SAP Predictive Asset Insights. Depending on the type of data, the data is stored in different tables.

**Note**

When you are using the data of the analytics database, you need to consider multiple aspects. For more information, see Important Information When Using the Analytics Database [page 449].

**Master Data and Time Series Data**

The master data in the analytics database contains, for example, equipment, models, locations, alerts, and so on, and custom attributes for equipment and models.

The time series data in the analytics database contains numeric indicators and non-numeric indicators. Numeric indicators are indicators of the type Numeric, Numeric Flexible, and Boolean where true is set to 1 and false is set to 0. Non-numeric indicators are indicators of the data type String. The numeric indicators are stored as aggregated values and the non-numeric indicators are stored as raw data.
The aggregated values are calculated in an hourly interval based on indicator data collected from SAP Predictive Asset Insights. The aggregated values include the following:

- The highest value of the indicator within an hour (MAX)
- The lowest value of the indicator within an hour (MIN)
- The average value of the indicator within an hour (AVG)
- The total count of values aggregated within an hour (COUNT)
- The sum of values aggregated within an hour (SUM)

**Static and Dynamic Tables**

The master data and time series data is stored in static and dynamic tables.

The master data is stored in static tables. The time series data and the custom attributes are stored in dynamic tables. Static tables are included in the analytics database by default. Dynamic tables are only created in the analytics database if you have indicators, indicator groups, attributes or attribute groups for equipment and models.

The tables have different naming conventions. For an overview of the tables and their naming conventions, see the Overview of Tables and Data section below.

**Load of Data into the Tables**

Initially, the analytics database is empty and only contains the static tables without any data. For the data to initially load into the analytics database, the piece of equipment whose data should be loaded needs to be published in SAP Predictive Asset Insights. If you want to use time series data, you need to request the usage via a support ticket before the publishing. With the publishing, the related data gets loaded into the static tables and the dynamic tables are created.

**Note**

For alerts and notifications, the data is loaded independently of publishing equipment. The data is loaded into the static tables once an alert or notification is created in SAP Predictive Asset Insights.

After the initial load of the data, the data gets updated in the following ways:

- The aggregated indicator values of the numeric indicators are generally updated within every hour after each calculation. If indicator data arrives later in SAP Predictive Asset Insights than the usual calculation window, for example, because of connection issues, then the data from SAP Predictive Asset Insights is included in the next calculation and the aggregated values will be added to the respective time range to which they belong to in the analytics database.
- The raw data of the non-numeric indicators is updated every couple of minutes.
- The master data except for alerts and notifications, and the custom attributes are updated every time a related piece of equipment is published.
- Alerts and notifications are updated every time a new alert or notifications is created.

Depending on the data that is loaded into the database, the static and dynamic tables are updated in different ways. For the master data, either the existing row of the respective static table is updated, or a new row is
added. For example, if you assign a location to a published piece of equipment and publish it again, then a new row is added in the location static table. For the time series data and the custom attributes, either the rows of the dynamic tables are updated, or new dynamic tables are created. For example, if you create a new attribute group for a piece of equipment and publish it again, then a new dynamic table for this attribute group is created.

**Overview of Tables and Data**

The following table provides you with a summary of the static and dynamic tables that exist in the database with the included data and how this data is stored in the tables:

<table>
<thead>
<tr>
<th>Table with Naming Convention</th>
<th>Table Type</th>
<th>Data</th>
<th>Load of Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>com.sap.iam.analytics:AGGREGATES_&lt;INDICATOR_GROUP_ID&gt;</td>
<td>Dynamic</td>
<td>Numeric indicators as aggregated values, grouped by the indicator group ID. Each indicator name column has the same data type as the indicator that has been created in SAP Predictive Asset Insights. Each aggregated value (MAX, MIN, AVG, COUNT, SUM) of an indicator is stored in a separate column.</td>
<td>Initial creation of the tables with publishing of equipment, then the data is generally loaded and updated after the calculation every hour.</td>
</tr>
<tr>
<td>com.sap.iam.analytics:RAW_&lt;INDICATOR_GROUP_ID&gt;</td>
<td>Dynamic</td>
<td>Non-numeric indicators as raw data, grouped by the indicator group ID. Each indicator name column has the same data type as the indicator that has been created in SAP Predictive Asset Insights.</td>
<td>Initial load with publishing of equipment, then the data is updated every couple of minutes.</td>
</tr>
<tr>
<td>com.sap.iam.analytics:ATTRIBUTES_&lt;ATTRIBUTE_GROUP_ID&gt;</td>
<td>Dynamic</td>
<td>Attributes, grouped by the attribute group ID. Each attribute name column has the same data type as the attribute that has been</td>
<td>Initial load with publishing of equipment, then the data is updated once a piece of equipment is published.</td>
</tr>
<tr>
<td>Table Name</td>
<td>Type</td>
<td>Data</td>
<td>Load of Data</td>
</tr>
<tr>
<td>------------</td>
<td>--------</td>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>com.sap.iam.analytics: :ALERT</td>
<td>Static</td>
<td>Master data</td>
<td>Data is loaded and updated once an alert is created.</td>
</tr>
<tr>
<td>com.sap.iam.analytics: :EQUIPMENT</td>
<td>Static</td>
<td>Master data</td>
<td>Initial load with publishing of equipment, then the data is updated once a piece of equipment is published.</td>
</tr>
<tr>
<td>com.sap.iam.analytics: :INDICATOR</td>
<td>Static</td>
<td>Master data</td>
<td>Initial load with publishing of equipment, then the data is updated once a piece of equipment is published.</td>
</tr>
<tr>
<td>com.sap.iam.analytics: :INSTALLATION_LOCATION</td>
<td>Static</td>
<td>Master data</td>
<td>Initial load with publishing of equipment, then the data is updated once a piece of equipment is published.</td>
</tr>
<tr>
<td>com.sap.iamanalytics: :LOCATION</td>
<td>Static</td>
<td>Master data</td>
<td>Initial load with publishing of equipment, then the data is updated once a piece of equipment is published.</td>
</tr>
<tr>
<td>com.sap.iamanalytics: :MODEL</td>
<td>Static</td>
<td>Master data</td>
<td>Initial load with publishing of equipment, then the data is updated once a piece of equipment is published.</td>
</tr>
<tr>
<td>com.sap.iamanalytics: :NOTIFICATION</td>
<td>Static</td>
<td>Master data</td>
<td>Data is loaded and updated once a notification is created.</td>
</tr>
</tbody>
</table>

### 8.5.2.2.1 Important Information When Using the Analytics Database

When you are using the data of the analytics database in your own SAP HANA database, you need to consider several aspects.

⚠ **Caution**

The connection to the analytics database is only allowed to be used for displaying data in SAP Analytics Cloud as described in this guide. Any other usage is beyond the scope of this feature and not allowed nor supported by SAP.
General

- Currently, instance-based authorization capabilities are not supported. That means that every user within your organization who is authorized to access your company’s dashboards can also view the master data and time series data for the respective equipment.
- You can only store data up to 10 GB in the database, which is sufficient in most use cases.

Time Series Data

- You can only use time series data that is created after the confirmation of the support ticket. That means you cannot include time series data from the past in the database.
- We only store the last 180 days of time series data.
- You can only use indicator groups with a maximum number of 249 indicators for SAP Analytics Cloud.
- Since the aggregated values for the numeric indicators are calculated every hour, there is a slight delay when the aggregated values are available in the database. In general, the aggregated values are available in the hour after the individual time series reading have been ingested. The aggregated values are calculated shortly after the hour based on all indicator data that was ingested in the previous hour or since the last aggregation. In certain cases, it can take up to 2 hours for some indicator data to be included in the calculation. This can, for example, happen when indicator data has been ingested closely before the calculation happens or if the indicator data is late arriving data.
- Since the non-numeric indicators are stored as raw data, we recommend to isolate the non-numeric indicators in separate indicator groups and limit the ingestion of readings. Otherwise, it can happen that if you ingest a high volume of non-numeric indicators, the analysis in the analytics dashboards slows down.

Master Data

- You can only use master data for analytics that is published after the onboarding. That means after you are onboarded as an analytics user, you need to publish your equipment again to include master data for the equipment created before the onboarding. This does not apply to notifications and alerts, for this kind of master data, you cannot include data created before the onboarding.
- Models and locations only get sent to the analytics database if they are related to a piece of equipment and that piece of equipment is published.
- In the asset central foundation, you can translate certain texts into different languages, for example, the short description of a piece of equipment. In the analytics database, if you have texts in English and another language, only English is supported. If you have texts only in a language other than English, then that language will show. This is independent of the language settings.
8.5.2.3 Configuring SAP Analytics Cloud in SAP Predictive Asset Insights

This topic describes how to configure SAP Analytics Cloud in SAP Predictive Asset Insights.

Prerequisites

- You have shared the story with the users. For more information, see Sharing Stories or Bookmarks.
- One of the following roles is assigned to your user:
  - CONFIGURATION_EDIT
  - CONFIGURATION_DELETE

Procedure

1. On the SAP Fiori launchpad, go to the Administration group and open the Application Settings application.
2. Choose External Systems.
3. Choose Add Other External System.
   - The Add System dialog box is displayed.
4. In the dialog box, fill in the following fields:
   - **System Name**: Enter the following name: SAC System
   - **System Status**: Select Active.
5. Choose OK.

Results

SAP Analytics Cloud is configured in SAP Predictive Asset Insights.

Related Information

Configuring Analytics Dashboards [page 452]
8.5.2.4 Configuring Analytics Dashboards

This topic describes how to configure analytics dashboards in SAP Predictive Asset Insights.

Prerequisites

- You have configured SAP Analytics Cloud as an external system in SAP Predictive Asset Insights. For more information, see Configuring SAP Analytics Cloud in SAP Predictive Asset Insights [page 451].
- One of the following roles is assigned to your user:
  - CONFIGURATION_EDIT
  - CONFIGURATION_DELETE

Procedure

1. On the SAP Fiori launchpad, go to the Administration group and open the Application Settings application.

2. To configure analytics dashboards, choose (Analytics Dashboards). The Analytics Dashboards configuration screen is displayed.

3. Choose between the following options:
   - Configure an analytics dashboard for the Analytics Dashboards application. For more information, see Configuring an Analytics Dashboard for the Application [page 453].
   - Configure an analytics dashboard for an object page. For more information, see Configuring an Analytics Dashboard for an Object Page [page 454].

4. To edit a configured dashboard, select it and choose Edit.

5. To delete or clear a configured dashboards, you can choose between the following options:
   - For the application, select the dashboard and choose Delete.
   - For the object page dashboard, select the dashboard and choose Clear.

Once you have deleted a dashboard or cleared the configuration, the dashboard is no longer available for the business user.

Results

The analytics dashboard are configured.

Next Steps

Depending on your configuration, the business user can now view the dashboard as follows:
- In the Analytics Dashboards application. For more information, see Viewing Analytics Dashboards in the Application [page 62].
- On the spare part and location object pages. For more information, see Viewing Analytics Dashboards on Object Pages [page 63].

**i Note**

For the equipment and model object pages, you also need to configure the object pages so that the dashboard is displayed. For more information, see Configuring Object Pages [page 456].

### 8.5.2.4.1 Configuring an Analytics Dashboard for the Application

This topic describes how to configure an analytics dashboard for the Analytics Dashboards application in SAP Predictive Asset Insights.

**Procedure**

1. In the Analytics Dashboards configuration screen, choose Add under Analytics Dashboards Application.

   The Add Analytics Dashboard dialog box is displayed.

2. Fill in the following fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title</strong></td>
<td>Enter a name for the dashboard. This name is later displayed in the Analytics Dashboards application.</td>
</tr>
<tr>
<td><strong>Story URL</strong></td>
<td>Paste the URL of your story from SAP Analytics Cloud. To paste the URL, open the story in SAP Analytics Cloud (SAC) and add the parameter ;mode=embed at the end of the URL.</td>
</tr>
</tbody>
</table>

   **Example**

   ```
   https://<domain>/sap/fpa/ui/app.html#;view_id=story;storyId=<story ID>;mode=embed
   ```

3. Choose OK.

**Results**

The dashboard for the application is configured.
Related Information

Configuring Analytics Dashboards [page 452]

8.5.2.4.2 Configuring an Analytics Dashboard for an Object Page

This topic describes how to configure an analytics dashboard for an object page in SAP Predictive Asset Insights.

Procedure

1. In the Analytics Dashboards configuration screen, select the business object for which you want to configure an analytics dashboard under Object Pages.
2. Choose Edit.
   The Edit Analytics Dashboard dialog box for the business object is displayed.
3. Fill in the following fields:
   
   **Story URL**
   Paste the URL of your story from SAP Analytics Cloud.
   To paste the URL, open the story in SAP Analytics Cloud (SAC) and add the parameter ;mode=embed at the end of the URL.

   **Example**
   https://<domain>/sap/fpa/ui/app.html#;view_id=story;storyId=<story ID>;mode=embed
**Data Model ID**

Paste the model ID of your story from SAP Analytics Cloud. The model ID filters the story data by a specific business object, for example, a piece of equipment.

To paste the model ID, open SAP Analytics Cloud and add the string `/api/v1/stories?include=models` to the domain of the URL.

**Example**

https://<domain>/api/v1/stories?include=models

A list with all stories and model information is then displayed. For the model ID, go to the desired story. The attribute `id` is the model ID.

**Dimension**

Enter the dimension of your business object. The dimension is the ID of your business object and filters the story data by that ID, for example, for the specific piece of equipment.

You can enter the following dimensions:

- `internalId` for equipment, models, and locations
- `sparepartinternalID` for spare parts

4. Choose **OK**.

**Results**

The dashboard for the business object is configured.

**Related Information**

Configuring Analytics Dashboards [page 452]
8.5.2.5  Configuring Object Pages

This topic describes how to configure object pages for analytics dashboards in SAP Predictive Asset Insights.

Prerequisites

- You have configured a dashboard for the equipment or model object pages. For more information, see Configuring Analytics Dashboards [page 452].
- One of the following roles is assigned to your user:
  - CONFIGURATION_EDIT
  - CONFIGURATION_DELETE

Context

By default, the tabs and subsections in which the analytics dashboards are displayed are not activated for the equipment and model object pages. To enable the configured dashboards to be displayed, you need to configure the settings and activate the tabs and subsections for the object pages.

Procedure

1. On the SAP Fiori launchpad, go to the Administration group and open the Application Settings application.
2. To configure the equipment and model page, choose (Object Page Configurations).
   - The Object Page Configurations configuration screen is displayed.
3. Expand the sections below Equipment and Model.
4. Activate the checkboxes for Analytics and Analytics Dashboards.

Results

The object pages are configured.

Next Steps

The business user can now view the dashboard on the equipment and model object pages. For more information, see Viewing Analytics Dashboards on Object Pages [page 63]
8.6 Explorer and Analysis Tools Configuration

Configuration options for analysis tool variants and the Explorer can be found in a dropdown within Application Settings.

Prerequisites

The role collection PDMS_CONFIG is assigned to your user.

Accessing the Configuration Dropdown

Go to the SAP Fiori launchpad under Administration > Application Settings > Explorer and Analysis Tools Configuration.

Preconfigured Variants

In addition to variants that you configure, we also deliver preconfigured variants. For more information, see Preconfigured Variants [page 459].

Overview of Functions in the Configuration Dropdown

<table>
<thead>
<tr>
<th>Configuration Entry</th>
<th>More Information</th>
<th>Type of Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alerts</td>
<td>Fields for Configuring Alerts [page 460]</td>
<td>Analysis tool with variants</td>
</tr>
<tr>
<td>Equipment Indicators</td>
<td>Fields for Configuring Equipment Indi-</td>
<td>Analysis tool with variants</td>
</tr>
<tr>
<td></td>
<td>cators [page 461]</td>
<td></td>
</tr>
<tr>
<td>Explorer</td>
<td>Fields for Configuring the Explorer</td>
<td>Application</td>
</tr>
<tr>
<td></td>
<td>[page 463]</td>
<td></td>
</tr>
</tbody>
</table>
## Overview of Functions in the Explorer and Analysis Tool Configuration Screens

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add</td>
<td>Configure a new variant.</td>
</tr>
<tr>
<td>Save</td>
<td>Save a configured variant.</td>
</tr>
<tr>
<td>Cancel</td>
<td>While configuring a variant, you can cancel the configuration.</td>
</tr>
<tr>
<td>Copy</td>
<td>Copy an existing variant and adjust the copied variant as you require.</td>
</tr>
<tr>
<td>Delete</td>
<td>Delete an existing variant.</td>
</tr>
<tr>
<td>Restore Default</td>
<td>Restore a preconfigured variant in case you deleted it.</td>
</tr>
</tbody>
</table>

### i Note

In the Explorer configuration, the following functions do not exist, as the Explorer has only one variant:

- **Add**
- **Copy**
- **Delete**
- **Restore Default**

### i Note

For information on the supported user interface (UI) languages, refer to [SAP Predictive Asset Insights](#) [page 6].
8.6.1 Preconfigured Variants

With every release, we deliver preconfigured variants in addition to the variants that you can configure. This allows a business user to immediately start working with the Explorer.

Overview of the Preconfigured Variants

We deliver the following preconfigured variants:

- A preconfigured variant for each analysis tool including a preconfigured model variant for the indicator chart
- A preconfigured variant for the Explorer global filter
- A preconfigured variant for the Explorer

The settings of the preconfigured variants can differ in every release.

Titles of the Preconfigured Variants

<table>
<thead>
<tr>
<th>Preconfigured Variant</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preconfigured variants for the analysis tools and the Explorer global filter</td>
<td><em>SAP Standard</em></td>
</tr>
<tr>
<td>Preconfigured model variant for the indicator chart</td>
<td><em>SAP Standard for a Model</em></td>
</tr>
<tr>
<td>Preconfigured variant for the Explorer</td>
<td>No title because the Explorer has only one variant</td>
</tr>
</tbody>
</table>

Working with the Preconfigured Variants

You can work with the preconfigured variants as follows:

Preconfigured Variant for Each Analysis Tool and for the Explorer Global Filter

- You can copy the preconfigured variants for the analysis tools and the preconfigured variants for the Explorer global filter and then edit the copy.
- If one of the preconfigured variants for the analysis tools or the preconfigured variant for Explorer global filter is not required, you can delete it. The deleted preconfigured variant is then not available for the business user in the Explorer.
If you have deleted one of the preconfigured variants and you need it again, you can restore it.

**Preconfigured Variant for the Explorer**

You can edit the preconfigured variant for the Explorer by changing the preconfigured settings.

**i Note**

If you edit the preconfigured variant for the Explorer, we recommend that you note down the preconfigured settings before changing them so that you can later bring them back if required. Also, if you edit the preconfigured variant, the edited variant persists in the upcoming release and is not overwritten by the new delivered preconfigured variant.

**Related Information**

Explorer and Analysis Tools Configuration [page 457]

**8.6.2 Fields for Configuring Alerts**

You can define variants of this analysis tool. These variants can then be selected by business users from the Explorer.

**Preconfigured Variant**

SAP also delivers a preconfigured variant. For more information about preconfigured variants, see Preconfigured Variants [page 459].

**Columns**

In this section you define which columns business users see by default when they choose this variant of the *Alerts* analysis tool to add it to the Explorer. You can choose from a predefined list of columns.

**Filters**

In this section you define the default filter values that are displayed in the list of alerts for the variant.
**Sorting**

In this section you define which columns are displayed under Sort in the View Settings of the Alerts analysis tool and whether the column should be sorted in ascending or desending order. The first entry in this list is the default in the alert list.

**Labels and Translations**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>Select the language in which you want to maintain text values.</td>
</tr>
<tr>
<td>Variant Name</td>
<td>Enter a name for the variant. The name is visible when you select a variant for the analysis tool in the Explorer.</td>
</tr>
<tr>
<td>Variant Description</td>
<td>Enter a description to provide more details about the variant. The description is visible in the Variants pane in the configuration screen.</td>
</tr>
</tbody>
</table>

**Related Information**

Explorer and Analysis Tools Configuration [page 457]
Alerts [page 20]

**8.6.3 Fields for Configuring Equipment Indicators**

You can define variants of this analysis tool. These variants can then be selected by business users from the Explorer.

**Preconfigured Variant**

SAP also delivers a preconfigured variant. For more information about preconfigured variants, see Preconfigured Variants [page 459].

**Column Selection**

In this section, you define which columns/fields business users see by default when they choose this variant of the Equipment Indicators analysis tool in the Explorer. You can choose from a predefined list of columns.
**Note**
The column *Equipment* is mandatory. You can navigate to the details page only by clicking the Equipment.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column</td>
<td>Name of column. Select master data, attribute, attribute group, indicator, and indicator group</td>
</tr>
<tr>
<td>Column Width</td>
<td>Width defined here will be the default column width in the <em>Equipment Indicators</em> analysis tool. By default, the width is 200 pixels.</td>
</tr>
<tr>
<td>Default</td>
<td>By default, on selecting this checkbox results in the respective column displaying in the analysis tool.</td>
</tr>
</tbody>
</table>

**Filters**
In this section, you define the default filter for the columns. The analysis tool display the contents according to these filters. The values are

- Contains
- Equal

**Sorting**
In this section, you define the default sorting of the columns. You can sort the columns in the ascending or descending order.

**Labels and Translations**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>Select the language in which you want to maintain text values</td>
</tr>
<tr>
<td>Variant Name</td>
<td>Enter a name for the variant. The name is visible when you select a variant for the analysis tool in the Explorer.</td>
</tr>
<tr>
<td>Variant Description</td>
<td>Enter a description to provide more details about the variant. The description is visible in the <em>Variants</em> pane in the configuration screen.</td>
</tr>
</tbody>
</table>

**Related Information**

Explorer and Analysis Tools Configuration [page 457]
Equipment Indicators [page 29]
8.6.4 Fields for Configuring the Explorer

Here you configure what your business users will see in the Explorer when they log on for the first time. After the very first logon, SAP Predictive Asset Insights preserves the order of analysis tools made by business users in the Explorer.

Preconfigured Variant

The preconfigured variant for the Explorer contains a predefined order of all analysis tools with their preconfigured variants.

For more information about preconfigured variants, see Preconfigured Variants [page 459].

Content

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis Tool</td>
<td>Select the analysis tool that is displayed by default, for example, Alerts.</td>
</tr>
<tr>
<td>Variant</td>
<td>Select the variant of the analysis tool that is displayed by default, for example, Work Orders - Pump Variant.</td>
</tr>
</tbody>
</table>

Labels and Translations

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>Select the language in which you want to maintain text values.</td>
</tr>
<tr>
<td>Variant Name</td>
<td>Enter, for example, a role suitable for this Explorer variant if required.</td>
</tr>
<tr>
<td>Variant Description</td>
<td>Enter a description to provide more details about, for example, the role that uses this Explorer variant if required.</td>
</tr>
</tbody>
</table>
8.6.5 Fields for Configuring the Explorer Global Filter

You can define variants including various filters. These variants can then be selected by business users in the Explorer.

Preconfigured Variant

The preconfigured variant for the Explorer global filter contains no filters so that the analysis tools show data for all top equipment.

For more information about preconfigured variants, see Preconfigured Variants [page 459].

Filters

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>Select the underlying class template used while creating the model/piece of equipment. The characteristics of a piece of equipment are defined by the underlying class and subclass template.</td>
</tr>
<tr>
<td>Subclass</td>
<td>Select the underlying subclass of a model or a piece of equipment. The characteristics of a piece of equipment are defined by the underlying class and subclass template.</td>
</tr>
<tr>
<td>Model</td>
<td>Select the abstract representation of an equipment that holds the specifications defined for that equipment.</td>
</tr>
<tr>
<td>Location</td>
<td>Select the location where your equipment is installed.</td>
</tr>
<tr>
<td>Phase</td>
<td>Select the phase to which the equipment relates, for example, planned or sold.</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Select the relevant manufacturer linked to the selected model ID. If a model ID is selected when creating equipment data, the relevant manufacturer is linked to the equipment.</td>
</tr>
<tr>
<td>Operator</td>
<td>Select the operator who maintains additional information specific to a piece of equipment.</td>
</tr>
</tbody>
</table>
### Labels and Translations

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Language</strong></td>
<td>Select the language in which you want to maintain text values.</td>
</tr>
<tr>
<td><strong>Variant Name</strong></td>
<td>Enter a name for the variant. The name is visible when you select a variant for the Explorer global filter in the Explorer.</td>
</tr>
<tr>
<td><strong>Variant Description</strong></td>
<td>Enter a description to provide more details about the variant. The description is visible in the Variants pane in the configuration screen.</td>
</tr>
</tbody>
</table>

### 8.6.6 Fields for Configuring the Indicator Chart

When navigating to the Indicator Chart from Alerts, the indicator chart displays the first variant defined in the Indicator Chart configuration.

### Data Points

In this section, you can define the number of data points per indicators that you want to be displayed in the chart.

**i Note**

A maximum of 600 data points in total can be displayed in the indicator chart. This is entered in the Data Points for Each Indicator on the Chart column. The default number of data points is 240 and can range between 30 and 600. The more the number of data points, the more the accuracy of chart. But, the response time may be affected.

### Preconfigured Variants

SAP delivers two preconfigured variants. They appear in the variant selection dialog in the indicator chart. They are:

- **SAP Standard**: This variant stores default settings for an indicator chart. As an end user of the application, you can select indicators as favorites in the indicator list. On choosing this variant, the indicators thus selected appear as default indicators.

- **SAP Standard for a Model**: This variant stores default settings for an indicator chart. As an administrator with the required role, you can select indicators as default for a model in the indicator list. On choosing this variant, the indicators thus selected appear as default indicators.
i Note

The default indicator for a model is set in indicator list for a model and default indicator for equipment template is set in indicator list for equipment.

For all variants, except SAP Standard for a Model, the user selected favourite indicators are loaded by default. For more information about preconfigured variants, see Preconfigured Variants [page 459].

Time Filters

Only five time filters can be added for a variant

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text Key</td>
<td>Key of the time interval</td>
</tr>
<tr>
<td>Text</td>
<td>Label of the time interval that is displayed on the UI of the indicator chart</td>
</tr>
<tr>
<td></td>
<td>Example</td>
</tr>
<tr>
<td></td>
<td>48 Hours, Today</td>
</tr>
<tr>
<td>Value</td>
<td>Value of the time interval</td>
</tr>
<tr>
<td></td>
<td>Example</td>
</tr>
<tr>
<td></td>
<td>48 for a time interval of 48 hours</td>
</tr>
<tr>
<td>Unit</td>
<td>Unit of the time interval</td>
</tr>
<tr>
<td></td>
<td>Example</td>
</tr>
<tr>
<td></td>
<td>hour for a time interval of 48 hours</td>
</tr>
</tbody>
</table>

You can choose among the following values:

- hour
- day
- week
- month
- year
### Labels and Translations

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lang</strong></td>
<td>Select the language in which you want to maintain text values.</td>
</tr>
<tr>
<td><strong>Key / Text</strong></td>
<td>Choose the key of the text. Enter the time filter text you would like to be displayed on the UI.</td>
</tr>
<tr>
<td><strong>Variant Name</strong></td>
<td>Enter a name for the variant. The name is visible when you select a variant for the analysis tool in the Explorer.</td>
</tr>
<tr>
<td><strong>Variant Description</strong></td>
<td>Enter a description to provide more details about the variant. This description is visible in the Variants pane in the configuration screen.</td>
</tr>
</tbody>
</table>

### Related Information

- Explorer and Analysis Tools Configuration [page 457]
- Features in Indicator Chart [page 41]

### 8.6.7 Fields for Configuring the Map

You can define variants of this analysis tool. These variants can then be selected by business users in the Explorer.

#### Preconfigured Variant

The preconfigured variant for the map includes a sample base map so that business users can immediately start working with the map. It does not include preconfigured settings related to equipment (for which models to show equipment on the map). These settings are customer-specific and therefore cannot be added to the preconfigured variant.

For more information about preconfigured variants, see Preconfigured Variants [page 459].

#### Map Settings

In the map settings, you configure the initial position and displayed area for the map variant when you open it in the Explorer.
### Field Description

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Zoom Level</strong></td>
<td>Enter a value for the initial zoom level. The map variant is then displayed with this initial zoom level.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>Only enter integer as values.</td>
</tr>
<tr>
<td></td>
<td>The zoom level can be 0 or higher. Per default, 0 is entered. A zoom level of 0 is the outermost zoom level and most far away from the earth displaying, for example, the whole world. This zoom level is also referred to as the full map extent. With each higher zoom level, the map view is closer to the earth displaying, for example, only some continents or regions. The maximum zoom level depends on the map provider.</td>
</tr>
<tr>
<td></td>
<td>The following graphic shows a map example with a zoom level of 0 and 4:</td>
</tr>
<tr>
<td><strong>Latitude</strong></td>
<td>Enter a value for the initial latitude. The map variant is then displayed centered on this geographical coordinate.</td>
</tr>
<tr>
<td></td>
<td>The latitude defines the north-south position. You can enter a value from -90 to +90 where -90 is the south pole and +90 is the north pole. 0 reflects the line of the Equator.</td>
</tr>
<tr>
<td><strong>Longitude</strong></td>
<td>Enter a value for the initial longitude. The map variant is then displayed centered on this geographical coordinate.</td>
</tr>
<tr>
<td></td>
<td>The longitude defines the west-east position. You can enter a value from -180 to +180 where -180 is the most west position and + 180 is most east position. 0 reflects the prime meridian.</td>
</tr>
</tbody>
</table>

### Layers

In the layers settings, you configure the base layer and overlay layer settings for the map variant.

| Note | You can use any map provider of your choice. Fill in the fields below according to the map provider. |
# Base Layers

A base layer sets the background of the map variant displaying basic geographical information, for example, oceans and streets.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Layer Name</strong></td>
<td>Enter the name for the base layer. The name is later displayed in the overlay dropdown menu in the top right hand corner of the map variant.</td>
</tr>
<tr>
<td><strong>Layer Type</strong></td>
<td>Enter the type for the base layer. The type depends on the map provider that you want to use.</td>
</tr>
<tr>
<td></td>
<td>You can choose from the following types:</td>
</tr>
<tr>
<td></td>
<td>● <strong>xyz</strong></td>
</tr>
<tr>
<td></td>
<td>This type is used for many map providers. It defines the layer using an URL with the following format: /z/x/y.png. The png is the image for the tile of the map, z defines the zoom level, and x and y identity the tile.</td>
</tr>
<tr>
<td></td>
<td>If you choose this type, make sure you fill in the <strong>Layer URL</strong> field.</td>
</tr>
<tr>
<td></td>
<td>● <strong>esri</strong></td>
</tr>
<tr>
<td></td>
<td>One map provider uses a separate type to construct maps. If you choose this type, make sure you fill in the <strong>Layer Parameters</strong> field.</td>
</tr>
<tr>
<td><strong>Layer URL</strong></td>
<td>(Only relevant if you have entered <em>xyz</em> as the base layer type) Enter the URL of the map provider. The URL defines the style of the baser layer type.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>Activate the <strong>Mandatory</strong> checkbox if you have filled in this field.</td>
</tr>
<tr>
<td><strong>Layer Parameters</strong></td>
<td>(Only relevant if you have entered <em>esri</em> as the base layer type) Enter the base map value. The base map value defines the style of the base layer type. You can choose between different values, for example, satellite.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>Activate the <strong>Mandatory</strong> checkbox if you have filled in this field.</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Attribution</strong></td>
<td>Enter the attribution for the map variant. The attribution is a string that defines the copyright of the map provider, for example, © &lt;map provider&gt;. You can also include an HTML link that leads to the copyrights of the map provider.</td>
</tr>
<tr>
<td><strong>Application ID</strong> (Only relevant if your map provider provides an application ID)</td>
<td>Paste the application ID for the map provider.</td>
</tr>
<tr>
<td><strong>Application Code</strong> (Only relevant if your map provider provides an application code)</td>
<td>Paste the application code for the map provider.</td>
</tr>
<tr>
<td><strong>Subdomains</strong> (Only relevant if your map provider is using a subdomain)</td>
<td>Enter the subdomain for the map provider.</td>
</tr>
<tr>
<td><strong>Map ID</strong> (Only relevant if your map provider is using map versions)</td>
<td>Enter the map version that you want to use.</td>
</tr>
<tr>
<td><strong>Base</strong> (Only relevant if your map provider is using base map types)</td>
<td>Enter the base map type for the base layer, for example, traffic.</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Initial Base Layer | Select the option for the initial base layer. This field is useful if you create multiple layers. You can choose between True and False:  
bullet If you select True for one layer, this base layer is set as the default layer. This means it is later the first layer in the overlay dropdown menu in the top right hand corner of the map variant.  
bullet If you select True for all layers, they are displayed in the overlay dropdown menu according to the order in which you created them.  
bullet If you select False for all layers, they are also displayed in the overlay dropdown menu according to the order in which you created them. |
| Hide Logo        | Activate this checkbox if the logo of the map provider should not be visible on the map variant. |

**Overlay Layers**

The base layer can be overlaid by the overlay layers to define specific attributes, for example, how the equipment on the map is displayed.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
</table>
| Model ID | Select a model or multiple models for which you want to display the equipment on the map variant.  
The ID of the selected models is displayed later in the overlay dropdown menu in the top right hand corner of the map variant. |
**Field** | **Description**
---|---
**Clustering** | Select the clustering method for the map variant. You can choose from the following methods:
- **Marker**: If you select this method, each top equipment is displayed on the map individually.
- **Cluster**: If you select this method, the top equipment is clustered on the map according to the zoom level. The further you zoom out of a map, the wider the radius of a cluster.
  - If many equipment are too close to each other at maximum zoom level when the cluster is configured, a spider leg will appear to show all overlapping equipment after clicking the cluster.
  - Clustering is applied separately for all equipment of an equipment model. For example, separate clusters are build based on the geographic proximity of model A, and separate clusters are build based on the proximity of model B.

**i Note**
Consider the following:
- Select **Cluster** for larger sets of equipment. Otherwise, you encounter performance issues with the map when you have larger sets.
- Spider leg only works when you have selected **Cluster** as the method.
- Spider leg only works with clusters at the maximum zoom level. This means when you add a new model to the map variant, the initial value for **Remove Cluster at Zoom Level** is 0. To ensure that spider leg works, you need the same value as the maximum zoom level possible for your map provider.

**Remove Cluster at Zoom Level** (Only relevant when you have selected **Cluster** as the clustering option) | Define at which zoom level clusters are removed and the top equipment is displayed separately.

**i Note**
Enter a value that is one higher than the maximum zoom level possible for your map provider. Otherwise, spider leg does not work.
### Labels and Translations

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>Select the language in which you want to maintain text values.</td>
</tr>
<tr>
<td>Variant Name</td>
<td>Enter a name for the variant. The name is visible when you select a variant for the analysis tool in the Explorer.</td>
</tr>
<tr>
<td>Variant Description</td>
<td>Enter a description to provide more details about the variant. The description is visible in the Variants pane in the configuration screen.</td>
</tr>
</tbody>
</table>

### Related Information

Explorer and Analysis Tools Configuration [page 457]

### 8.6.8 Fields for Configuring Notifications

You can define variants of this analysis tool. These variants can then be selected by business users from the Explorer.

### Preconfigured Variants

SAP also delivers a preconfigured variant. For more information about preconfigured variants, see Preconfigured Variants [page 459].

### Columns

In this section, you define which columns/fields business users see by default when they choose this variant of the Notifications analysis tool in the Explorer. You can choose from a predefined list of columns.

### Filters

In this section, you define the filter field values for the notifications variant.
Sorting

In this section, you define which columns are displayed under Sort in the View Settings of the Notifications analysis tool and whether the column should be sorted in ascending or descending order.

Table Details

In this section, you configure the Notifications analysis tool for more information about a particular notification. When you click a notification, you navigate in-place to more information about that notification.

You define the tabs containing this further information and enter an ID for the tab under Tab Title (you later map a label to this ID under Labels and Translations). Each of these tabs can have up to 3 columns and you can define which fields are displayed in each column.

Labels and Translations

<table>
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</table>

Related Information

Explorer and Analysis Tools Configuration [page 457]
Work Orders [page 37]
8.6.9 Fields for Configuring Work Orders

You can define variants of this analysis tool. These variants can then be selected by business users from the Explorer.

Preconfigured Variant

SAP also delivers a preconfigured variant. For more information about preconfigured variants, see Preconfigured Variants [page 459].

Columns

In this section you define which columns/fields business users see by default when they choose this variant of the Work Orders analysis tool in the Explorer. You can choose from a predefined list of columns.

Filters

In this section you define the filter field values for the work orders variant.

Sorting

In this section you define which columns are displayed under Sort in the View Settings of the Work Orders analysis tool and whether the column should be sorted in ascending or descending order. The first entry in this list is the default in the alert list.

Table Details

In this section you configure the Work Orders analysis tool for more information about a particular work order. When you click on a work order you navigate in-place to more information about that work order.

You define the tabs containing this further information and enter an ID for the tab under Tab Title (you later map a label to this ID under Labels and Translations). Each of these tabs can have up to 3 columns and you can define which fields are displayed in each column.
Labels and Translations

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<tbody>
<tr>
<td>Language</td>
<td>Select the language in which you want to maintain text values.</td>
</tr>
<tr>
<td>Variant Name</td>
<td>Enter a name for the variant. The name is visible when you select a variant for the analysis tool in the Explorer.</td>
</tr>
<tr>
<td>Variant Description</td>
<td>The variant description you enter here is visible in the analysis tool catalog after you have selected the variant by its name.</td>
</tr>
</tbody>
</table>

Related Information

Explorer and Analysis Tools Configuration [page 457]
Work Orders [page 37]
Important Disclaimers and Legal Information

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