Application Help for SAP Predictive Maintenance and Service, cloud edition
# Content

1. **SAP Predictive Maintenance and Service, cloud edition 1906.** ....................................................... 6  
   1.1 Accessing Applications and Functions .................................................................................. 7  
   1.2 Terminology ......................................................................................................................... 8  
2. **SAP Fiori Launchpad with SAP Predictive Maintenance and Service, cloud edition.** ........... 9  
3. **Analytics.** ................................................................................................................................. 12  
   3.1 Explorer ................................................................................................................................. 12  
   3.2 Features in Indicator Chart .................................................................................................. 38  
   3.3 Equipment Page .................................................................................................................... 45  
   3.4 Failure Mode Analytics ........................................................................................................ 46  
   3.5 Personal Dashboard ................................................................................................................ 55  
   3.6 Analytics Dashboards ............................................................................................................ 55  
   3.7 Emerging Issue Detection (EID). .......................................................................................... 59  
4. **Processes.** ................................................................................................................................. 60  
   4.1 Performance Improvement .................................................................................................... 60  
   4.2 Obsolescence Management .................................................................................................... 67  
   4.3 Lookup .................................................................................................................................... 68  
   4.4 Smart Matcher ....................................................................................................................... 70  
5. **Master Data.** ............................................................................................................................. 71  
   5.1 Equipment .............................................................................................................................. 72
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating Rules</td>
<td>245</td>
</tr>
<tr>
<td>Rule Management</td>
<td>247</td>
</tr>
<tr>
<td>5.15 State Transitions</td>
<td>249</td>
</tr>
<tr>
<td>5.16 Creating Revisions and Switching Between Revisions and Published State</td>
<td>249</td>
</tr>
<tr>
<td>5.17 Export to Excel</td>
<td>250</td>
</tr>
<tr>
<td>6 Machine Learning Engine</td>
<td>251</td>
</tr>
<tr>
<td>6.1 Configuring Data Sets for Equipment Health Indicators</td>
<td>251</td>
</tr>
<tr>
<td>Entries to Configure a Data Set</td>
<td>254</td>
</tr>
<tr>
<td>Calculation of Features</td>
<td>256</td>
</tr>
<tr>
<td>6.2 Managing Models for Equipment Health Indicators</td>
<td>257</td>
</tr>
<tr>
<td>Configuring a Model</td>
<td>258</td>
</tr>
<tr>
<td>Training a Model</td>
<td>303</td>
</tr>
<tr>
<td>Scoring a Model</td>
<td>309</td>
</tr>
<tr>
<td>6.3 Managing Models for Failure Mode Analytics</td>
<td>312</td>
</tr>
<tr>
<td>Configuring a Model</td>
<td>314</td>
</tr>
<tr>
<td>Training a Model</td>
<td>322</td>
</tr>
<tr>
<td>Scoring a Model</td>
<td>326</td>
</tr>
<tr>
<td>6.4 Validating Failure Mode Analytics</td>
<td>328</td>
</tr>
<tr>
<td>6.5 Managing Models for Leading Indicators</td>
<td>330</td>
</tr>
<tr>
<td>Configuring a Model</td>
<td>331</td>
</tr>
<tr>
<td>Training a Model</td>
<td>335</td>
</tr>
<tr>
<td>7 Administration</td>
<td>338</td>
</tr>
<tr>
<td>7.1 Managing Company Profile</td>
<td>338</td>
</tr>
<tr>
<td>Adding Location Details of your Organization</td>
<td>339</td>
</tr>
<tr>
<td>Updating Location Details of your Organization</td>
<td>340</td>
</tr>
<tr>
<td>Deleting Location Details of your Organization</td>
<td>341</td>
</tr>
<tr>
<td>Creating Subsidiary Details</td>
<td>341</td>
</tr>
<tr>
<td>Viewing Company Profile</td>
<td>344</td>
</tr>
<tr>
<td>Recording Industry ID Information</td>
<td>344</td>
</tr>
<tr>
<td>Editing Company Profile</td>
<td>345</td>
</tr>
<tr>
<td>7.2 Configuring the Document Category</td>
<td>347</td>
</tr>
<tr>
<td>7.3 Application Settings</td>
<td>348</td>
</tr>
<tr>
<td>Configuration Tasks</td>
<td>349</td>
</tr>
<tr>
<td>7.4 User Authorizations</td>
<td>359</td>
</tr>
<tr>
<td>Tasks in SAP Leonardo IoT</td>
<td>363</td>
</tr>
<tr>
<td>Creating Organizational Hierarchy</td>
<td>365</td>
</tr>
<tr>
<td>Assigning Business Objects</td>
<td>366</td>
</tr>
<tr>
<td>Assigning Groups</td>
<td>367</td>
</tr>
<tr>
<td>Deleting an Organizational Unit</td>
<td>368</td>
</tr>
<tr>
<td>Assigning Role Collections</td>
<td>368</td>
</tr>
</tbody>
</table>
8 Configuring SAP Predictive Maintenance and Service, cloud edition. 371
8.1 Accessing Applications and Functions 371
8.2 Equipment Modelling 372
8.3 Creating Equipment 373
8.4 Equipment Alarms 373
8.5 Creating Alerts 374
8.6 Configuring SAP Analytics Cloud and Analytics Dashboards 378
  Creating a Destination for SAP Analytics Cloud 380
  Configuring Analytics Dashboard Types 382
8.7 Explorer and Analysis Tools Configuration 386
  Preconfigured Variants 388
  Entries to Configure Alerts 389
  Entries to Configure Equipment Indicators 391
  Entries to Configure the Explorer 392
  Entries to Configure the Explorer Global Filter 393
  Entries to Configure the Indicator Chart 394
  Entries to Configure the Map 396
  Entries to Configure Notifications 402
  Entries to Configure Work Orders 403
  Entries to Configure Equipment Scores (Obsolete) 405
SAP Predictive Maintenance and Service, cloud edition 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 organised in the following categories:

- Processes [page 60]
- Master Data [page 71]
- Administration [page 338]
- Machine Learning Engine [page 251]
- Analytics [page 12]

Supported UI Languages

The following UI 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 (pt-BR)

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 Maintenance and Service, cloud edition 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 Maintenance and Service, cloud edition

Access URLs

You can access the SAP Fiori launchpad URLs by choosing Go to Application on the subscription applications in SAP Cloud Platform Cockpit. For more information, see Setting up Account.

The SAP Fiori launchpad URLs give you access to all the available applications. There are two types of SAP Fiori launchpad available. The individual SAP Fiori launchpad for SAP Predictive Maintenance and Service, cloud edition and the SAP Intelligent Asset Management Fiori launchpad that includes the applications from the SAP Intelligent Asset Management relevant products on a single SAP Fiori launchpad based on your subscriptions.

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 Predictive Maintenance and Service Fiori launchpad for a</td>
<td>https://&lt;subaccount&gt;.pdms-sap.cfapps.eu10.hana.ondemand.com</td>
</tr>
<tr>
<td>standard license</td>
<td></td>
</tr>
<tr>
<td>SAP Predictive Maintenance and Service Fiori launchpad for a</td>
<td>https://&lt;subaccount&gt;.pdms-sap-pr.cfapps.eu10.hana.ondemand.com</td>
</tr>
<tr>
<td>test and demo license</td>
<td></td>
</tr>
<tr>
<td>SAP Intelligent Asset Management Fiori launchpad for a</td>
<td>https://&lt;subaccount&gt;.iam.cfapps.eu10.hana.ondemand.com</td>
</tr>
<tr>
<td>standard license</td>
<td></td>
</tr>
<tr>
<td>SAP Intelligent Asset Management Fiori launchpad for a test</td>
<td>https://&lt;subaccount&gt;.iam-pr.cfapps.eu10.hana.ondemand.com</td>
</tr>
<tr>
<td>and demo license</td>
<td></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.
## 1.2 Terminology

Here we describe the meanings of some fundamental terms in SAP Predictive Maintenance and Service, cloud edition.

<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 turns physical energy into work.</td>
</tr>
</tbody>
</table>

### 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
You access SAP Predictive Maintenance and Service, cloud edition using the SAP Fiori launchpad. 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.

There are two types of SAP Fiori launchpad available. The individual SAP Fiori launchpad for SAP Predictive Maintenance and Service, cloud edition and the SAP Intelligent Asset Management Fiori launchpad that includes the applications from the SAP Intelligent Asset Management relevant products on a single SAP Fiori launchpad based on your subscriptions.

**Supported Features**

The launchpad supports the following SAP Fiori launchpad features:

- Anchor navigation
- Search
- Me area
  - App Finder
  - Settings - including changing the appearance of the launchpad, specifying a unit of measure, and selecting an automatic data refresh interval
  - Edit Home Page - contains changing the visibility and placement of groups and applications
# Groups

The applications are organized into the following groups:

<table>
<thead>
<tr>
<th>Group</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analytics</strong></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>
<tr>
<td><strong>Processes</strong></td>
<td>Find the important business processes for SAP Predictive Maintenance and Service.</td>
</tr>
<tr>
<td><strong>Master Data</strong></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>
<tr>
<td><strong>Machine Learning Engine</strong></td>
<td>Find tools for your data science tasks: Data scientists can use the algorithms of the machine learning engine for health indicators to calculate the health status and predict failures for their equipment. In that process, they define data sets, configure, train, and score models. For failure mode analytics, they can use the algorithms of the machine learning engine to analyze the notifications and failure modes for their equipment in order to get insights about the last occurring failures. 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 this process, they configure and train models.</td>
</tr>
<tr>
<td><strong>Administration</strong></td>
<td>Access applications for user management and configuration of the Explorer and its analysis tools</td>
</tr>
</tbody>
</table>
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 Roles section in the Security Information for SAP Predictive Maintenance and Service, cloud edition.
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 46]</td>
<td>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 your equipment and models with the last occurring failures.</td>
</tr>
<tr>
<td>Personal Dashboard [page 55]</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>
</tbody>
</table>

3.1 Explorer

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

**i 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 \( \text{(Filter)} \).
- Filtering across all analysis tools in the Explorer.

> **i 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 35].

**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 on all analysis tools in the Explorer by choosing *Refresh*.
- Automatically refreshing data on 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**

> **i Note**
> If you have saved a tile in the last release, the tile is not carried over to this release and you need to save the tile again.

You can save a current set of analysis tools with their selected variants in the Explorer as a new tile by choosing \( \text{(Save as Tile)} \). 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 Me area 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 45].

### 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 and can be adjusted by the business user to work with the Explorer according to the personal business scenario. For more information about the configuration, see Explorer and Analysis Tools Configuration [page 386].

**i Note**

In addition to the variants configured by an administrator, we also deliver preconfigured variants titled <analysis tool>- SAP Default. 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].

**i Note**

In addition to the available analysis tools, you can also create your own analysis tools with analysis tool variants. For more information, see SAP Help Portal→ Development → SAP Predictive Maintenance and Service, SDK for 1906.
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>
<tr>
<td>Indicator Chart [page 20]</td>
<td>Provides data visualization across one or more measurements.</td>
</tr>
<tr>
<td>i Note</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 34]</td>
<td>Provides a list of current work orders and their details.</td>
</tr>
<tr>
<td>Notifications [page 32]</td>
<td>Provides a list of notifications and their details</td>
</tr>
<tr>
<td>Equipment Indicators [page 27]</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 28]</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>
<tr>
<td>Equipment Scores (Obsolete) [page 35]</td>
<td>Provides a list of equipment with their scores.</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 (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 (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 (Filter), select the filters, enter the values and choose 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)

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 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 (Reset Global Filter).

Besides applying filters to all analysis tools by using the 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 35].

Navigation and Editing (Relevant for all analysis tools)

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

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 Add Evidence in the analysis tools, Indicator Chart, Alerts, and Notifications.

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

In the SAP Fiori launchpad, you can define if the unit of measure system for the application is metric (default) or imperial. You do this in the Settings under 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 the automatic data refresh and define the refresh interval, go to the Settings of the SAP Fiori launchpad and choose 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 95] and Viewing Alerts of an Equipment [page 94].

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 95] and Viewing Alerts of an Equipment [page 94].

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. If the value is aggregated from different applications, it also shows the used aggregation concept.

You can display the health score information by clicking on an indicator value link in the Equipment Indicator analysis tool.
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. For more information about the configuration, see Explorer and Analysis Tools Configuration [page 386].

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).

**Note**
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.
3.1.1.3 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 page. 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.

Note
- Alerts, notifications, and work orders are not displayed in the indicator chart in Explorer
- Legends display equipment name in Explorer

For more information on features within the indicator chart, refer Features in Indicator Chart [page 38]

3.1.1.4 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.
# Working with the Alert Analysis Tool

<table>
<thead>
<tr>
<th>Action</th>
<th>Further Information</th>
</tr>
</thead>
</table>
| Display list of alerts | You can display the alert list in one of the following ways:  
  - From the *Explorer*, by choosing/adding an analysis tool variant for alerts. For more information, see *Adding Analysis Tools to the Explorer* [page 18].  
  - From the *equipment page*, by choosing Monitoring → Alerts. |
| Display *Alert Page* with additional alert information | Click an alert in the alert list to navigate to the *Alert Page* [page 24]. |
| View related top equipment/equipment | 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 *Equipment* page.  
  For more information, see *Equipment Page* [page 45] and *Equipment* [page 72]. |
| Information on alert occurrence | The following alert occurrence information is available in the alert list:  
  - Column *Created On*: When did the alert occur for the first time?  
  - Column *Last Updated On*: For reoccurring alerts: When did the alert last occur? |
| | **Note**  
  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 23]. |
| Sort and filter alerts | 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. |
| 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. |
**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).

---

**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.

<table>
<thead>
<tr>
<th>Button</th>
<th>Contents</th>
</tr>
</thead>
</table>
| 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 62) and [Emerging Issue Detection (EID)](page 59). |
| Set in Process   | Change alert status to in process or completed using the respective buttons. |
| Set to Completed | When you set an alert to in process, you are automatically assigned as the processor.  
                  | The status sequence is New → In Process → Completed or New to Completed. The changes to the alert status do not change already assigned processors. |
|                  | **i Note**  
                  | If you select more than 10 alerts at one time, the Set in Process and Set to Completed buttons will be disabled. |
| Set Processor    | Use the Set Processor button to change the alert processor. |
|                  | **i Note**  
                  | If you select more than 10 alerts at one time, then the Set Processor button will be disabled. |
Create Notification

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 Notification link to view more details about the notification.

**i Note**

You can create notifications for multiple alerts, only if the alerts belong to the same equipment. If not, the Create Notification button will be disabled.

---

**i Note**

- *Timestamp* changed to *Created Timestamp* on the user interface
- *Business Timestamp* changed to *Last Updated On* on the user interface
- *New Timestamp* changed to *Created Timestamp* in the database and *Entered in System* on the user interface

---

**Related Information**

- Entries to Configure Alerts [page 389]
- Entries to Configure the Indicator Chart [page 394]
- Features in Indicator Chart [page 38]
- Adding Alert Types [page 227]

---

**3.1.1.4.1 Alert Deduplication**

Deduplication option allows the user not to create duplicate alerts for an existing alert type and equipment ID. New alerts can be generated once the deduplication period is over or the status of existing alert of that particular alert type 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 227]
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 113]
3. Create alerts - Create alerts for the alert types. For more information, refer Creating Alerts [page 374]
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 94] and Alerts [page 20]
3.1.4.2 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 23].</td>
</tr>
</tbody>
</table>
| Indicator Values | The indicator chart helps you visualize the alert in a time-based line chart, together with contributing indicators. 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.

- The **Recommended Actions** column shows the number of instructions assigned to a failure mode.
- Click a row to navigate to details about the failure mode and to display the instructions.

The data displayed is analyzed using *Failure Mode Analytics* and every piece of equipment, all alert types, the model for the selected alert and indicators mentioned in related notifications are observed here.

Which failure modes are displayed? All overlapping failure modes for the previous year are displayed:

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

### Example

You display the alert page with detailed information about an alert. In this example the highlighted failure mode (failure mode 1) is displayed.

The following failure modes have been assigned to the related piece of equipment (asset), model or alert type:

**Piece of equipment (asset) and model:**
- Failure Mode 1
- Failure mode 3
- Failure mode 4
- Failure mode 6 (older than one year, based on the timestamp created for the alert)

**Alert type assigned to the alert:**
- Failure Mode 1
- Failure mode 2
- Failure mode 5
- Failure mode 6 (older than one year, based on the timestamp created for the alert)
## 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 227]
- Indicator Chart [page 20]
- Failure Modes [page 128]
- Failure Mode Analytics [page 46]
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 five 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

**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

**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 220]

Related Information

Entries to Configure Equipment Indicators [page 391]
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.

i Note

Consider the following:
- The map only shows top equipment.
- Only a maximum number of 10,000 top equipment can be displayed on the map at the same time.

Markers

When you hover over a marker on the map, the following information represented by that marker is displayed:
● Equipment ID
● Equipment description
● Model description

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

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.

**Map Views**

You can switch between different map views by choosing 📍. By choosing 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. The following list shows some sample map views that can be configured:

● **Open Street Maps**

![Open Street Maps](image)

● **Satellite**
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.

Features

Zoom In and Zoom Out

Depending on which area you want to focus, you can zoom in and zoom out by:
You can select specific top equipment by drawing one or more geofences around them, as follows:

- Choose \(\text{Draw Polygon}\) to activate the drawing cursor.
- To draw the geofence, use single mouse clicks to set points that form the polygon rather than drawing by dragging the mouse.
- To close the geofence, either double-click at the area on the map where you want the last point to be or single-click on the first point. You can draw several polygons.
- To cancel the geofence, choose \(\text{Clear All}\).
- After selecting top equipment on the map in this way, you can choose \textit{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.

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.

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.

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]

### 3.1.1.7 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 Maintenance and Service 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 Notifications of Equipment [page 96]
• 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 basis 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 62] and Emerging Issue Detection (EID) [page 59]
• 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
• 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

Entries to Configure Notifications [page 402]
Equipment [page 72]
Analysis Tools [page 14]

3.1.1.7.1 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 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
The notifications are saved in SAP Predictive Maintenance and Service (PdMS). They can be pushed to the back end system using the integration possibilities.

Related Information

Notifications [page 32]

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 Maintenance and Service, cloud edition 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 98] and Equipment Page [page 45].
- 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 59] and Creating an Improvement Request [page 62].
- 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.
- 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]
3.1.1.9 Equipment Scores (Obsolete)

This analysis tool provides a sortable list of equipment and components (with their score(s)).

From the Equipment Scores analysis tool in the Explorer, you can navigate to the Equipment page by clicking the equipment name or description.

In the Equipment Scores configuration you define which score or scores are displayed. The scores are calculated using the provided algorithms.

- **Example**
  
The pieces of equipment are scored from 1-100, 100 indicating a very healthy piece of equipment. You sort the list by ascending score so the equipment with the lowest scores are displayed first. These are the equipment that most urgently need attention.

In the configuration you can determine further equipment attributes to sort and filter by, for example, manufacturer or maintenance plant.

- **Example**
  
  You sort the list by maintenance plant and you can compare the performance of all the equipment within this maintenance plant by checking the equipment scores.

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.

- **Note**
  
  The Explorer global filter filters based on top equipment.

The Explorer global filter is displayed at the top of the Explorer. The following graphic shows an example of the Explorer global filter with all available filters:
Using the Explorer Global Filter

You can use the Explorer global filter in the following ways:

- By using configured variants with defined filters. For more information, see Using the Explorer Global Filter with Variants [page 36].
- By using a combination of filters from scratch. For more information, see Using the Explorer Global Filter with Filters [page 37].

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. For more information about the configuration, see Explorer and Analysis Tools Configuration [page 386].

Note

In addition to the variants configured by an administrator, we also deliver a preconfigured variant titled Explorer Global Filter - SAP Default. If your administrator has deleted this preconfigured variant, it is not available to you. For more information about the settings for the preconfigured variant, contact your administrator.
**Procedure**

1. On the SAP Fiori launchpad, go to the *Analytics* group and open the *Explorer* application. The Explorer global filter with the first configured variant is displayed.

2. To select a different variant, expand the variant dropdown list next to the title of the Explorer global filter variant.

3. From the *My Views* dropdown list, select the desired Explorer global filter variant. You can choose from all configured variants.

   **i Note**
   
   You can change the filter variant by selecting additional filters or deselecting filters. To do so, choose *Adapt Filters*. These changes are only temporary and will not be adapted to the configured variant.

4. Choose *Go*.

**Results**

The selection is applied to all analysis tools in the Explorer.

You can collapse the filters by choosing above the Explorer global filter. You can later also reset the applied filters in the analysis tools by choosing **(Reset Global Filter)**.

**Related Information**

*Using the Explorer Global Filter with Filters* [page 37]
*Explorer Global Filter* [page 35]

**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].
**Procedure**

1. On the SAP Fiori launchpad, go to the Analytics group and open the Explorer application.
2. At the top of the Explorer, select the filters and the values for the filters.
3. Choose Go.

**Results**

The selection is applied to all analysis tools in the Explorer.

You can collapse the filters by choosing below the Explorer global filter. You can later also reset the applied filters in the analysis tools by choosing (Reset Global Filter) in the action bar at the top of the Explorer.

**Related Information**

Using the Explorer Global Filter with Variants [page 36]
Explorer Global Filter [page 35]

### 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. For more information, see Entries to Configure the Indicator Chart [page 394]

**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 Custom Data option

**Note**

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 59] and Creating an Improvement Request [page 62]

### 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.

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

**Note**

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**

Only numeric indicators are supported.

- **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 boundry. 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 displays within the indicator chart.
**Prerequisite:** You should configure forecasting for the indicator in the Models application. For more information, refer Configuring Indicator Forecasting for a Model [page 117]

**Note**

This feature is available only within the Indicator chart in the Equipment page.

---

### 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 displays in the indicator chart. On adding the indicators, the alerts linked to the selected indicator also displays 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.

i Note

Thresholds are only displayed for the indicator category, Flow and Level.

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.

i Note

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.

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, 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]

---

**Related Information**

Indicator Chart [page 20]
Explorer [page 12]
Adding Analysis Tools to the Explorer [page 18]
Entries to Configure the Indicator Chart [page 394]
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 in 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>
<tr>
<td>Documentation</td>
<td>• Highlights</td>
</tr>
<tr>
<td></td>
<td>• Documents</td>
</tr>
<tr>
<td></td>
<td>• Instructions</td>
</tr>
<tr>
<td></td>
<td>• Failure Modes</td>
</tr>
<tr>
<td></td>
<td>• Alert Types</td>
</tr>
<tr>
<td></td>
<td>• Announcements</td>
</tr>
<tr>
<td></td>
<td>• Improvement Requests</td>
</tr>
<tr>
<td></td>
<td>• Fingerprints</td>
</tr>
<tr>
<td>Monitoring</td>
<td>• Alerts [page 20]</td>
</tr>
<tr>
<td></td>
<td>• Indicators</td>
</tr>
<tr>
<td></td>
<td>• Component Indicators</td>
</tr>
<tr>
<td></td>
<td>• Indicator Chart [page 95]</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 your equipment and models with the last occurring failures.

### Background Information

- Failure mode analytics uses unsupervised and supervised machine learning to extract topics with top words from notification texts that are assigned to standard failure modes and equipment models.
- The system uses various metrics and visualizations to provide you with insights and analytics about your equipment and models with the last occurring failures.
- On the **Equipment** and **Model** pages, the failure mode cards show how often the failure modes appeared in notifications for the 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, you can find the top words found within the notifications for the chosen failure mode and equipment model by relevancy in a bar graph and a list of all related notifications.

#### 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.

**Using Failure Mode Analytics**

You can access and use the failure mode analytics functions from different access points. For more information, see Using Failure Mode Analytics [page 47].

**Validating Failure Mode Analytics**

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 328].

**Related Information**

Failure Modes [page 128]
Managing Models for Failure Mode Analytics [page 312]

**3.4.1 Using Failure Mode Analytics**

How to access and use failure mode analytics functions for SAP Predictive Maintenance and Service, cloud edition.

**Prerequisites**

To appear as failure mode cards, the equipment and failure modes must be assigned to a model. Otherwise, they are hidden.
3.4.1.1 Using Failure Mode Analytics from Equipment or Model

This topic describes how to use failure mode analytics from the Equipment or Model pages.

Procedure

1. On the SAP Fiori launchpad, choose between the following options:
   ○ Go to the Analytics group and open the Explorer application.
   ○ Go to the Master Data group and open the Equipment or Models application.
2. Choose the piece of equipment or model that you want to analyze.
3. Choose ANALYTICS > Failure Mode Analytics.
   The top 5 failure modes for the equipment model within the last 365 days are displayed in cards.

   You can also select a different time range and choose the Go button to apply your selection. If you select the time period from January 8 to January 9, this is a 48 hour time span, not 24 hours.

The failure modes are ranked by the number of occurrences, depending on how often specific words related to the failure mode occurred in notifications for this piece of equipment. The cards show KPIs, including:

1. The number of times this failure mode was identified in notifications created during the time range.
2. To what extent this figure compares against all notifications analyzed for the equipment model.
3. The MTTR (Mean Time To Repair), MTTF (Mean Time to Failure), and MTBF (Mean Time Between Failure = The sum of MTTR + MTTF) at the equipment level for each failure mode. For more information about the calculation of these KPIs, see Calculation of Mean Time KPIs [page 49].
4. The top bad actors at the model level for each failure mode.
5. To view detailed information about a failure mode, choose the failure mode description on the failure mode card.
6. To display all the failure modes assigned to the model of your selected equipment, choose All Failure Modes.
6. To navigate to the **Failure Mode Analytics** application, choose **View Analytics** on a failure mode card.

   The analysis shows the top words of the chosen failure mode and equipment model ranked by relevance score.

7. In the **Top Notifications** table, you can view the related notifications that are ranked by relevance and likelihood of belonging to the failure mode. You can view details of a notification by clicking the notification link.

   **Note**

   The notification ranking by relevance scores contains values from 1 as the highest ranked to 0 as the lowest ranked. 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

8. Under **Related Order** in the **Top Notifications** table, you find the work orders for the notifications, from which you can derive the actions taken for other equipment of the same equipment model. You can view details of a work order by clicking the work order link.

### 3.4.1.1.1 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 Notifications of Equipment](#page 96). For more information about viewing the `breakdown` attribute, see [SAP Help Portal → Configuration → API Tutorial → Equipment → Viewing 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:
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.

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 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).

3.4.1.2 Using Failure Mode Analytics from Failure Modes

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

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 a failure mode.
3. Choose the ANALYTICS tab.
4. Select an equipment model.
5. Choose Go.

The analysis shows a bar graph with the top words of the chosen failure mode and equipment model ranked by relevance score.

6. In the Top Notifications table, you can view the related notifications that are ranked by relevance and likelihood of belonging to the failure mode. You can view details of a notification by clicking the notification link.

Note

The notification ranking by relevance scores contains values from 1 as the highest ranked to 0 as the lowest ranked. The colors for the ranking are provided in three groups:
3.4.1.3 Using the Failure Mode Analytics Application

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

**Procedure**

1. On the SAP Fiori launchpad, go to the *Analytics* group and open the *Failure Mode Analytics* application.
2. Select an equipment model.
3. Select a failure mode.
4. Choose *Go*.

   The analysis shows a bar graph with the top words of the chosen failure mode and equipment model ranked by relevance score.

   ❇️ **Example**
   
   You select the equipment model of a faulty piece of equipment and a failure mode that describes the equipment’s problem. The failure mode analysis has been run and one of the top words found in the notifications related to this equipment model is “high temperature”. Since “high temperature” is a top word, you further investigate the notification texts that are related to this failure mode and feature this top word.

5. In the *Top Notifications* table, you can view the related notifications that are ranked by relevance and likelihood of belonging to the failure mode. You can view details of a notification by clicking the notification link.

   🔴 **Note**
   
   The notification ranking by relevance scores contains values from 1 as the highest ranked to 0 as the lowest ranked. 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

6. Under *Related Order* in the *Top Notifications* table, you find the work orders for the notifications, from which you can derive the actions taken for other equipment of the same equipment model. You can view details of a work order by clicking the work order link.
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, Templates and Instructions.
- **Applications**: Allows you to navigate directly to applications from this section.
- **Frequently Viewed**: Displays your frequently viewed items of equipment as thumbnails. You can navigate to an item of equipment through these thumbnails.
- **My Favorites**: Shows up to 20 items of equipment that you have marked as favorites on the Equipment 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 in order to display these stories in SAP Predictive Maintenance and Service, cloud edition.

For more information about stories in SAP Analytics Cloud, see Stories.

**Analytics Dashboard Types**

Your administrator can configure different types of analytics dashboards for you:

- **Analytics dashboards for the Analytics Dashboards application**
  These dashboards are displayed in the application itself. With this type of dashboard, you can run analytics on any data coming from the story, for example, for all equipment or models with their related data like work orders.

- **Analytics dashboards for object pages**
  These dashboards are displayed on certain object pages. With this type of dashboard, you can run analytics on data coming from the story 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

For more information about the configuration, see Configuring SAP Analytics Cloud and Analytics Dashboards [page 378].

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.

Adding Thresholds

To quickly get insights into which areas are doing well and which areas may need improvements, you can create thresholds, for example, for charts.

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 for stories in SAP Analytics Cloud, see SAP Analytics Cloud Help.

Viewing Analytics Dashboards

For more information about viewing analytics dashboards, see Viewing Analytics Dashboards in the Application [page 57] and Viewing Analytics Dashboards on Object Pages [page 58].

Related Information

SAP Analytics Cloud
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 Configuring SAP Analytics Cloud and Analytics Dashboards [page 378] and Configuring Analytics Dashboard Types [page 382].
- The following role is assigned to your user:
  - For SAP Predictive Maintenance and Service Fiori launchpad: <pdms_AssetCoreReader>
  - For SAP Intelligent Asset Management Fiori launchpad: <AC_ORG_DATA_READ>

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.

Related Information

Analytics Dashboards [page 55]
3.6.2 Viewing Analytics Dashboards on Object Pages

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

Prerequisites

- A dashboard for one of the business objects has been configured by an administrator. For more information, see Configuring SAP Analytics Cloud and Analytics Dashboards [page 378] and Configuring Analytics Dashboard Types [page 382].
- The following role is assigned to your user:
  - For SAP Predictive Maintenance and Service Fiori launchpad: <pdms_AssetCoreReader>
  - For SAP Intelligent Asset Management Fiori launchpad: <AC_ORG_DATA_READ>

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. Display the analytics dashboard for the business object. Choose between the following options:
   - On the equipment and models page, choose ANALYTICS ➤ Analytics Dashboard ➤.
   - On the locations and spare parts page, choose ANALYTICS DASHBOARD.

Results

The dashboard for the business object is displayed and you can view the data.
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 62], 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:

- Features in Indicator Chart [page 38]
- Alerts [page 20]
- Notifications [page 32]
- Work Orders [page 34]
4 Processes

The tiles under Processes on the SAP Fiori launchpad give you access to the various business processes offered by SAP Predictive Maintenance and Service, cloud edition.

Overview of Processes

<table>
<thead>
<tr>
<th>Tile</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Improvement</td>
<td>Get suggestions or a solution for an equipment issue by creating an improvement request.</td>
</tr>
<tr>
<td>Obsolescence Management</td>
<td>A report that graphically illustrates deadlines for manufacturer support for a model or a piece of equipment.</td>
</tr>
<tr>
<td>Lookup</td>
<td>Search for error codes and look up related information for an equipment or a model.</td>
</tr>
<tr>
<td>Smart Matcher</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.

**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 62]
  Reviewing an Improvement Request [page 63]
- Complete or reject an improvement request
  Completing an Improvement Request [page 64]
• Resubmit an improvement request
  Resubmitting an Improvement Request [page 64]
• Confirm an improvement request
  Confirming an Improvement Request [page 65]
• Reopen a confirmed improvement request
  Reopening a Confirmed Improvement Request [page 65]

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; OR 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:

![Improvement Request 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
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 Instructions dropdown.
   b. Select one or more instructions from the Select Instructions popup.
   c. Choose Assign.

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 60].

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 either belongs to the group **AIN ORG ADMIN** or **AIN ORG DATA EXPERT**, or has the roles **IMPROVEMENT_DELETE** assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
**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**

A report 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 67].

**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.

Choose the manufacturer.
Choose the relevant expiry date.
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 69].

In devices that support RFID, in addition to scanning of QR/barcodes you can also scan NFC tags to identify equipment (SAP 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.
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 Maintenance and Service, cloud edition. With this, operator owns a significant amount of equipment from SAP PM in SAP Predictive Maintenance and Service, cloud edition. 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 70].

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.

Overview of Master Data

<table>
<thead>
<tr>
<th>Tile</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment [page 72]</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 103]</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 119]</td>
<td>Create/display a location is a virtual record of the location where an equipment is installed.</td>
</tr>
<tr>
<td>Functions [page 127]</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 128]</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 137]</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 141]</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 151]</td>
<td>Create/display groups. You can group together different business objects for multiple purposes.</td>
</tr>
<tr>
<td>Systems [page 158]</td>
<td>Define systems based on a system model and assign system template to it.</td>
</tr>
<tr>
<td>Documents [page 167]</td>
<td>Create/assign/download/display documents for your equipment.</td>
</tr>
<tr>
<td>Announcements [page 191]</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>
<tr>
<td>Instructions [page 198]</td>
<td>Create/display instructions. An instruction is a set of steps that help the user to carry out a specific task, for example, maintenance of a specific piece of equipment</td>
</tr>
<tr>
<td>Templates [page 209]</td>
<td>Create/display templates. A template is a format created by the manufacturer to maintain metadata related to a model, piece of equipment or a location.</td>
</tr>
<tr>
<td>Rules [page 244]</td>
<td>Create and manage rules and associated actions.</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 249].

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 86].</td>
</tr>
<tr>
<td>Add and remove equipment components.</td>
<td></td>
</tr>
<tr>
<td>View details of an existing equipment and update an existing equipment.</td>
<td>For more information, see Viewing and Updating a Piece of Equipment [page 88].</td>
</tr>
</tbody>
</table>
Features | More Information
---|---
Delete a piece of equipment. | For more information, see Deleting a Piece of Equipment [page 92].

**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.

- View work orders for a piece of equipment
- View notifications for a piece of equipment
- View and edit indicators
- View and analyze leading indicators for a piece of equipment
- View an analytics dashboard for a piece 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 Maintenance and Service, cloud edition.
- Your user ID either belongs to the group *ORG_ADMIN* or *ORG_DATA_EXPERT*, or has the roles *EQUIPMENT_DELETE* or *EQUIPMENT_EDIT* assigned.
  For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

**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 <strong>Equipment</strong> application.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Choose <strong>New</strong>.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>In the <strong>New Equipment</strong> dialog box:</td>
<td>For more information, see <a href="https://help.sap.com/viewer/067e3d8253654398996ec49271b7441a/latest/en-US/ac5129f13f6c43eb99025ebdd079f83b.html">https://help.sap.com/viewer/067e3d8253654398996ec49271b7441a/latest/en-US/ac5129f13f6c43eb99025ebdd079f83b.html</a>.</td>
</tr>
<tr>
<td></td>
<td>1. You can optionally assign a model template for the equipment. Select the model template in the <strong>Model ID</strong>. In the <strong>Model ID</strong> dropdown, select an existing model from which you want to inherit the properties for the item of the equipment. If SAP Predictive Maintenance and Service is available, once the model template is selected the <strong>&lt;IoT Sync&gt;</strong> field is enabled. This field enables you to replicate the selected object in SAP Cloud Platform Internet of Things for the Cloud Foundry Environment and SAP IoT Application Enablement and maintain connection between these systems. You can choose a <strong>&lt;Yes&gt;</strong> or <strong>&lt;No&gt;</strong>. By default, the sync is always set to <strong>&lt;Yes&gt;</strong>.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. In the <strong>Equipment ID</strong> field, enter a unique name for an item of equipment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. In the <strong>Short Description</strong> field, enter a short description for an item of equipment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. In the <strong>Equipment Template</strong> 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 235].</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. In the <strong>Long Description</strong> field, enter a long description for an item of equipment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. In the <strong>Operator</strong> field, enter an operator for the equipment. Your company is selected as default value.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. In the <strong>Phase</strong>, select:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>○ <strong>Fully Operational</strong> or <strong>Partially Operational</strong> status if a piece of physical equipment exists.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>○ <strong>Planned</strong> if a piece of physical equipment does not exist, or you have chosen to update the physical equipment details later.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>○ <strong>Not Operational</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8. 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. Create Components creates the individual items of equipment, use <strong>Save</strong> to finalize the activity.</td>
<td>Component hierarchy is added to the equipment when a model is assigned to it.</td>
</tr>
<tr>
<td>Step #</td>
<td>Description</td>
<td>Additional Information</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</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 78]</td>
</tr>
<tr>
<td>5</td>
<td>Add structure components, spare parts or visual parts information</td>
<td>Adding Structure &amp; Parts [page 82]</td>
</tr>
<tr>
<td>6</td>
<td>Add equipment component</td>
<td>Adding Equipment Components [page 86]</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 83]</td>
</tr>
<tr>
<td>8</td>
<td>Configure indicator or component indicator</td>
<td>Adding Information in the Maintenance &amp; Service Section [page 87]</td>
</tr>
<tr>
<td>10</td>
<td>View changes made on the equipment data</td>
<td>Timeline [page 91]</td>
</tr>
<tr>
<td>11</td>
<td>To publish an item of equipment, choose Publish. Once equipment is published, it is synchronized with IoT Application Enablement and IoT Services. System publishes the item of the equipment and creates a first revision of the item of the equipment in</td>
<td>Publishing Multiple Equipment [page 92]</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 Creating Revisions and Switching Between Revisions and Published State [page 249].</td>
<td></td>
</tr>
</tbody>
</table>
5.1.1.2 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

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. 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.

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

4. Languages: You can view the languages supported.

5. 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.
5.1.1.3 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.
   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>Serial Number</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</td>
</tr>
<tr>
<td></td>
<td>added at a later lifecycle phase of the equipment.</td>
</tr>
<tr>
<td>Equipment Tag Number</td>
<td>Specify the tag number issued by your organization when the manufacturer has not specified any</td>
</tr>
<tr>
<td></td>
<td>serial number or batch number.</td>
</tr>
<tr>
<td>Batch Number</td>
<td>Specify the batch number issued by the manufacturer, if applicable.</td>
</tr>
<tr>
<td>Technical Identification Number</td>
<td>Enter the Technical Identification Number for the equipment</td>
</tr>
<tr>
<td>Operator Equipment ID</td>
<td>Enter an alternative key for stakeholder equipment identification.</td>
</tr>
<tr>
<td>Procurement Number</td>
<td>Enter Purchase Order Number to reference purchasing process or Order Code.</td>
</tr>
<tr>
<td>Long Description</td>
<td>Enter a description for the piece of equipment.</td>
</tr>
<tr>
<td>Manufacturer Part Number</td>
<td>Enter manufacturer part number.</td>
</tr>
<tr>
<td>Model ID</td>
<td>Enter a model ID.</td>
</tr>
<tr>
<td>Subclass</td>
<td>Select a subclass.</td>
</tr>
<tr>
<td>Build Date</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 an address at which the equipment is installed and any additional information.</td>
</tr>
<tr>
<td>Distribution Channel</td>
<td>Enter the contact person details for the location.</td>
</tr>
</tbody>
</table>
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.
5.1.1.4 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 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.
   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.
i 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 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.

5.1.1.5 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 work with documents relevant to a piece of equipment, select DOCUMENTATION and perform the following tasks:

   a. To add a document, choose Add New and perform the following tasks:
      1. In the Add Document dialog box, browse for a file or provide a link.
      2. Select a Category.
      3. Select a Phase.
      4. Select the type of data in Data Sensitivity.
      5. Select your Language.
      6. Enter a Description.
      7. Choose the Confidentiality of the document
      8. Choose Upload to upload a document without a duplicate check.

   i 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.

   b. To add an existing document, choose Add Assign and perform the following tasks:
      1. In the Select Documents dialog box, search for a document using the filters - Phase, Source, or Category.
2. Select a document from the search results.
3. Choose Assign.

c. To edit the properties of an assigned document, perform the following tasks:
   1. Select a document from the Documents section, and choose Edit.
   2. In the Edit Document popup, change the relevant fields - Phase, Category, or Description.
   3. Choose OK.

3. 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.

4. 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.

5. 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.

6. To view announcements assigned to the equipment, choose DOCUMENTATION > Announcements.

7. 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.

8. 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 137] app.
5.1.1.6 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 assigned to the equipment 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.

   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 login again the same filters and columns are displayed.

   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 93].

2. You can also view Alerts and Indicator Chart under Monitoring.
5.1.1.7 Adding Equipment Components

You perform this activity when you need to alter equipment components to suit your equipment needs.

Prerequisites

- You have already created an item of equipment in SAP Predictive Maintenance and Service, cloud edition.
- 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 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.
  - Choose Save.
5.1.1.8 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.

   **i Note**
   - 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.
4. **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.

   **i Note**
   - You need to have the BASELINE_EDIT role to view and create baselines, and BASELINE_READ role to view baselines.
5.1.1.9  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 either belongs to the group ORG_DATA_READ, or has the roles EQUIPMENT_READ assigned.
- To update an item of equipment, your user ID either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles EQUIPMENT_DELETE or EQUIPMENT_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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 IoT Services:
     - i Note

     Note: This option is available only if the equipment is in Published state, the <IoT Sync Flag> is set to Yes and IoT Services 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 is 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.

**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>` 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*.

   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>`.
   f. Choose *Save*.

9. To update attributes such as installation information, select tab `<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>`.

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>` 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>` tab and perform the following tasks:

   **Note**

   You must have instructions created.

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

   **Note**

   If you are unable to see the *Assign* button, change your browser zoom and retry.

   3. To remove an instruction, choose *Remove*. 
c. To view announcements assigned to the equipment, choose documenting 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 documenting 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.

<table>
<thead>
<tr>
<th>i Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>You can track addition and removal of component and parent equipment. Sharing activities are also tracked in the timeline.</td>
</tr>
</tbody>
</table>

15. Choose Publish to publish the updated equipment.

5.1.1.10 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>.

<table>
<thead>
<tr>
<th>i Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Help for SAP Predictive Maintenance and Service, cloud edition</td>
</tr>
<tr>
<td>Master Data</td>
</tr>
</tbody>
</table>
5.1.1.11 Publishing Multiple Equipment

When you have more items of Equipment created using public APIs provided by SAP Predictive Maintenance and Service, cloud edition, you can view these items of equipment using the Equipment application and perform a mass publish of such items of equipment.

Prerequisites

- Your user ID either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles EQUIPMENT_DELETE or EQUIPMENT_EDIT assigned. For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
- 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.

5.1.1.12 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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the role EQUIPMENT_DELETE assigned. For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
- 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. **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 Cloud Platform Internet of Things for the Cloud Foundry Environment or SAP Cloud Platform Internet of Things for the Neo Environment. 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 in question is already configured with SAP PdMS. For more information, see [https://help.sap.com/viewer/067e3d8253654398996ec49271b7441a/1906/en-US/697e20ce0af47d798ea3b76e637c893.html](https://help.sap.com/viewer/067e3d8253654398996ec49271b7441a/1906/en-US/697e20ce0af47d798ea3b76e637c893.html).
- Make sure that the **IoT Sync Flag** is set to "No".
- Your user ID either belongs to the group **ORG_ADMIN** or **ORG_DATA_EXPERT**, or 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 [page 73].
- 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 220].

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. For example: PdMS</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.

i Note

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

5.1.1.14 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: alert (identified by the correlation ID in the URL), status, status description, type, severity, severity description, code, code description, source, measured property, and description.

**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 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.

And, click the Alert Type link to view more details about the alert type.

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 247].

**Related Information**

Performance Improvement [page 60]

### 5.1.1.15 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.
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, and threshold 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.

For more information about indicator chart, refer to Features in Indicator Chart [page 38].

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.

5.1.1.16 Viewing and Creating Notifications of Equipment

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 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 notification ID to view more details of the same in the object page. A 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 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 95].

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

4. Choose **New**.

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>Priority (*)</td>
<td>Select the priority of the notification:</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>
</tbody>
</table>
### Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<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>

**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 60]**

### 5.1.1.17 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 belongs to the group `ORG_DATA_READ`, or it 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.

**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 95].
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.

### 5.1.1.18 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.

   **Note**
   
   **Component Indicators** are displayed only if any indicators are assigned to the equipment component and cannot be edited.

### 5.1.1.19 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](#).
- The following role is assigned to your user:
  
  - For SAP Predictive Maintenance and Service Fiori launchpad: `<pdms_AssetCoreExpert>`
  - For SAP Intelligent Asset Management Fiori launchpad: `<AC_ORG_DATA_EXPERT>`
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 on 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 on the strength link.
5. To create a new rule for one condition, select the condition and choose Create Rule. For more information about rules and how to create rules, see Rules [page 244].

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 115]

5.1.1.20 Viewing Alert Type Groups of Model Assigned to Equipment

You can view the alert type assigned to a model of an equipment.

Prerequisites

Your user ID either belongs to the role name AssetCoreReader or 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 244]
Adding Alert Types [page 227]
Adding Alert Type Groups [page 230]
Assigning Alert Type Groups to a Model [page 113]

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 249].

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 105]</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>
<tr>
<td>Add and remove model components.</td>
<td>Adding Model Components [page 111]</td>
</tr>
<tr>
<td>View details of an existing model and update an existing model.</td>
<td>Updating a Model [page 111]</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 113]</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 58]</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>
</tbody>
</table>
Create models relevant for systems.

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. For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
- 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 equipment or system.
   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.

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 will be 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.

<table>
<thead>
<tr>
<th>i Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>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 will be able to view the complete template hierarchy for your model.</td>
</tr>
</tbody>
</table>

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

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 will 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**.

<table>
<thead>
<tr>
<th>i Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is mandatory to have at least one parent object assigned, i.e. it is not possible to remove all assigned objects.</td>
</tr>
</tbody>
</table>
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.

   **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**.

   **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.
    a. From the Assign Spare Parts dialog box, select the spare part, and choose Provide Quantity.
    b. 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.
    c. 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:
    a. In the Documents section, from the Add menu, choose New to upload a new document, and perform the following steps.
    b. In the Add Document dialog box, browse for a file name or provide a link in the File text box.
    c. In the Phase field, select the phase in the life cycle of the model where the document is relevant for use.
    d. In the Category field, select the category relevant to a phase.
e. In the Language dropdown box, choose your language.
f. In the Data Sensitivity dropdown, choose if the document contains any sensitive or personal information for document security purpose such as Personal Data, Sensitive Personal Data, or No Sensitive Information.
g. In the Description field, enter a description for a document.
h. 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 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.

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.
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.

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.

   **Note**
   - 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 login again the same filters and columns are displayed.

20. To publish model, choose Publish.

   System publishes the model and creates a first revision of the model in SAP Predictive Maintenance and Service, cloud edition. 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 Maintenance and Service, cloud edition. For information about creating a model, see Creating a Model [page 105].
- 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. For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
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 105].
   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 105].
   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 Maintenance and Service, cloud edition, 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.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
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.
  For more information, see *Additional Roles for Master Data, Processes and Administration* [page 350].
- 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. For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

Context

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

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.

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 247].
- 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.
5.2.1.6 Viewing and Analyzing Leading Indicators for a Model

Use this procedure to view and analyze the leading indicators for a model.

Prerequisites

- You have trained a model in the Leading Indicators Model Management application. For more information, see Managing Models for Leading Indicators [page 330].
- The following role is assigned to your user:
  - For SAP Predictive Maintenance and Service Fiori launchpad: <pdms_AssetCoreExpert>
  - For SAP Intelligent Asset Management Fiori launchpad: <AC_ORG_DATA_EXPERT>

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 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 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 on 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 on the strength link.

   **Note**
   
   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 Create Rule. For more information about rules and how to create rules, see Rules [page 244].

Results

You have viewed and analyzed the leading indicators for your model.

Related Information

Viewing and Analyzing Leading Indicators for Equipment [page 100]
5.2.1.7 Configuring Indicator Forecasting for a Model

Use this procedure to configure indicator forecasting to forecast indicator values for your equipment of an equipment model.

Prerequisites

- The role <pdms_ConfigUser> is assigned to your user.
- Indicators are assigned to your equipment model. For more information, see Adding Indicator Groups and Indicators [page 220].
- The equipment model is published. For more information, see Publishing a Model [page 112].
- At least one piece of equipment is synchronized with SAP IoT Application Enablement Services. For more information, see Creating a Piece of Equipment [page 73].

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.

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 model for which you want to forecast indicators.
3. Choose *INDICATORS*.
   
   The list with all configured indicators for the model is displayed.
4. From the list, select the indicator for which you want to forecast indicator values.
5. Choose *Configure*.

   **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 111].

   The dialog box for the indicator is displayed.
6. In the dialog box, choose *Forecasting*.
7. Fill in the following entries:

   **Activate Indicator Forecasting**
   
   Activate this checkbox to forecast indicator values. You can later also deactivate already created configuration.

   **Data from within the last**

   Define the time range of the historical time series data that you want to use for forecasting.

   **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 Confirm.

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 38].

5.3 Locations

A location in SAP Predictive Maintenance and Service, cloud edition corresponds to a virtual record of the 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 249]

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 120].
- View details of an existing location and update an existing location. For more information, see Updating a Location [page 123].
- 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 124].
- 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 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 58].

### 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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT. For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
- You have already created a location template from the Templates application. For more information, see Creating a Location Template [page 237]

**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**
- 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></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>You can inherit subclass information from location template.</td>
</tr>
<tr>
<td>Subclass</td>
<td>Select a subclass. You can classify a location based on class or subclass. It enables you to perform location object classification through location template inheritance or manual assignment.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>You can change the subclass by using Manage Change Subclass.</td>
</tr>
<tr>
<td>Parent</td>
<td>Choose the organization name.</td>
</tr>
<tr>
<td>Street/Number</td>
<td>Provide the location details.</td>
</tr>
<tr>
<td>Postal Code/City</td>
<td>Enter the postal code or city.</td>
</tr>
<tr>
<td>Country</td>
<td>Enter country name.</td>
</tr>
<tr>
<td>State/Region</td>
<td>Specify state/region.</td>
</tr>
</tbody>
</table>

**i Note**
- The `<Address>` field autopopulates by inheriting the address from the functional unit or organization. You can retain the same address or modify as necessary.
- In the **Template** dropdown, choose the location template you have created. For more information, see Creating a Location Template [page 237].

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 autopopulates 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 a new document, choose DOCUMENTATION ➤ Documents ➤ Add ➤ New ➤ and perform the following tasks:
    1. In the Add Document dialog box, browse for a file or provide a link.
    2. Select a Category.
    3. Select a Phase.
    4. Select the type of data in Data Sensitivity.
    5. Select your Language.
    6. Enter a Description.
    7. Choose the Confidentiality of the document
    8. Choose Upload to upload a document without a duplicate check.

    **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.

11. 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.
12. 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**.

13. 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.

14. 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.

**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 either belongs to the group **ORG_ADMIN** or **ORG_DATA_EXPERT**.

For more information, see **Additional Roles for Master Data, Processes and Administration [page 350]**.
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 120].
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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT.
  For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
- You have created a location and the location is in any of the following states:
  - Unpublished
  - Published
  - In Revision

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 belongs to the group ORG_DATA_READ, or it 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.

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 95].

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.

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 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.

<table>
<thead>
<tr>
<th>i Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>In case of work orders that do not have an assigned equipment, then the indicator chart will not work.</td>
</tr>
</tbody>
</table>

For more information about indicator chart, refer Viewing Time Series Data (Indicator Chart) of an Equipment [page 95].

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.

**Context**

**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>Field</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------------------------------------------------------</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 130]
- Viewing and Publishing a Failure Mode [page 133]
- Updating a Failure Mode [page 134]
- Deleting a Failure Mode [page 135]
- Copying a Failure Mode [page 135]
- Assigning Failure Modes to Business Objects [page 136]
- View the causes associated with a failure mode

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
- Group assigned to the failure mode

#### i Note

A failure mode can be in any status when you assign a business object to it.
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.
For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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>
<tr>
<td>Type (*)</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>
**Detection Method**

Select a detection method to support detectability. You can select from the following list:
- Periodic maintenance
- Functional testing
- Inspection
- Periodic condition monitoring
- Continuous condition monitoring
- Production interference
- Casual observation
- Corrective maintenance
- On demand
- Other

---

**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**.

8. 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**.

**i Note**

You can only assign a maximum of 50 locations to a failure mode.

9. 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.

10. 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.

11. 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.

12. 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.

13. To add instructions, follow these steps:
   a. In the INSTRUCTIONSAssign.
      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.

14. To publish the failure mode, choose Publish.

15. 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 249].

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 belongs to the group `ORG_ADMIN` or `ORG_DATA_EXPERT`, or it has the roles `FAILURE_MODE_DELETE` or `FAILURE_MODE_EDIT` assigned to it.
- To view a failure mode, your user ID belongs to the group `ORG_DATA_READ`, or it has the role `FAILURE_MODE_READ` assigned to it.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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 103].
   b. Choose `Equipment` to view the pieces of equipment assigned to the failure mode.
      For more information about working with equipment, see Equipment [page 72].
   c. Choose `Locations` to view the locations assigned to the failure mode.
      For more information about working with locations, see Locations [page 119].
   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 141].
   e. Choose `Groups` to view the group assigned to the failure mode.
      For more information about working with groups, see Groups [page 151].
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 belongs to the group `ORG_ADMIN` or `ORG_DATA_EXPERT` or it has the roles `FAILURE_MODE_DELETE` or `FAILURE_MODE_EDIT` assigned to it.

  For more information, see *Additional Roles for Master Data, Processes and Administration [page 350]*

#### 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 130]*.
7. To add a new cause, select the *CAUSES* tab.

   For more information, see *Creating a Failure Mode [page 130]*.
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 belongs either to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the role FAILURE_MODE_DELETE assigned to it.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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 belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or it has the role FAILURE_MODE_DELETE and FAILURE_MODE_EDIT assigned to it.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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.

5.5.1.6 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 belongs to the group ORG_ADMIN or ORG_DATA_EXPERT.
  For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

**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 ▶.
   d. Choose New.
      Enter the <Fingerprint Name> and <Short Description> in the Create New Fingerprint dialog box.
   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.
      You can adjust the capture screen to select a specific period in the indicator chart.
   i. Choose OK and provide the snapshot description.
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 ▶ 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 Fingerprint
   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 Maintenance and Service, cloud edition, 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 Maintenance and Service, cloud edition, 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 142])
- Delete spare parts (see *Deleting Spare Parts* [page 144])

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 142]
- *Deleting Spare Parts* [page 144]
- 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 58].

**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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles PART_DELETE or PART_EDIT assigned.
  For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
- 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:
   b. From the Mass Upload of Spare Parts dialog box, download the template.
   c. Fill in the necessary details and upload the template.

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.

   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.

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 [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 Parts 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 ASSIGNMENTS 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

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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the role PART_DELETE assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
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 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/a46817d5f0874720bff566b9c7e68990.html](https://help.sap.com/viewer/67c291fba1bd10148bea8dce7b0caa3e/9.0.0.4/en-US/a46817d5f0874720bff566b9c7e68990.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**.

![Excel screenshot](image)

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 SAP Predictive Maintenance and Service, cloud edition specific data to the same VDS. Refer to [https://help.sap.com/viewer/67c291fba1bd10148bea8dce7b0caa3e/9.0.0.4/en-US/3569c3003f0f443da3f702a2c25268ee.html](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 in SAP Predictive Maintenance and Service, cloud edition can be any of the following types:

- **Fleet**
  - Allowed object types: Equipment
- **Training**
  - Allowed object types: Equipment, Models, Instructions, Locations, Spare Parts, Templates, Documents, Announcements
- **FMEA (Failure Mode Effect Analysis)**
  - Allowed object types: Equipment, Locations
- **Organization**
  - Allowed object types: Equipment, Locations
- **Variant**
  - Allowed object types: Models, Spare Parts
- **Handover and Commissioning**
  - Allowed object types: Equipment, Models, Instructions, Locations, Spare Parts, Templates, Documents, Announcements
- **Project**
  - Allowed object types: Equipment, Models, Instructions, Locations, Spare Parts, Templates, Documents, Announcements
- **Criticality Assessment**
  - Allowed object types: Equipment, Locations
- **Spare Parts Kit**
  - Allowed object types: Spare Parts

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:
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 153]
- Viewing and Publishing a Group [page 154]
- Updating a Group [page 155]
- Deleting a Group [page 156]
- Copying a Group [page 157]
- Assigning Business Objects to a Group [page 157]
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.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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 249].

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 belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles GROUP_DELETE or GROUP_EDIT assigned.
To view a group, your user ID belongs to the group ORG_DATA_READ, or has the role GROUP_READ assigned. For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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.
   To publish one or more unpublished groups, select the groups from the list and choose Publish.
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.

   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 belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles GROUP_DELETE or GROUP_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
**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 153].
7. To update business objects assigned to a group, select the OBJECT section.
   
   For more information, see Creating a Group [page 153].
8. To save the group, choose Save.
9. To publish the group, choose Publish.

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 belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the role GROUP_DELETE assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

**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 belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or it has the role GROUP_DELETE and GROUP_EDIT assigned to it.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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 Copy.

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 belongs either to the group ORG_ADMIN or ORG_DATA_EXPERT, or it has the role GROUP_DELETE and GROUP_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
Context

You can assign failure modes to different business objects.

**Note**

You can only assign a maximum of 50 items of each business object type to a group. The different business object type includes announcements, templates, instructions, and documents.

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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles SYSTEM_DELETE or SYSTEM_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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 240].
   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>Field</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------------------------------------------------------------</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.

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 249].
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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles SYSTEM_DELETE or SYSTEM_EDIT assigned. For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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
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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles SYSTEM_DELETE or SYSTEM_EDIT assigned. For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
- You have created systems in any of the following states:
  - Unpublished
  - Published
  - In Revision

#### 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 either belongs to the group `ORG_ADMIN` or `ORG_DATA_EXPERT`, or has the roles `SYSTEM_DELETE` or `SYSTEM_EDIT` assigned. For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
- 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.
- Drill down 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.

  **Note**
  To display the Topology tab, the system must have a model assigned which is based on a model template which inherits from subclass INDUSTRIAL_COMMUNICATION_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.

   **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)
   ○ You cannot assign a piece of equipment to 2 different industrial communication systems.

2. Go to the Systems app and open the system into which you loaded the topology data.
3. 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 SAP Predictive Maintenance and Service, cloud edition.
● 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 168] and Assigning Documents to Business Objects [page 176])

● Update a document centrally so that the changes apply to all associated business objects (see Updating a Document [page 173])

● Edit attributes of multiple documents centrally so that the changes apply to all associated business objects (see Editing Document Attributes [page 173])

● Delete documents that are not required on the network (see Deleting a Document [page 177])

● 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.

To view the list of document formats you can upload, see Uploading a Document [page 173].

**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 356].

### 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 357]

### 5.10.1 Uploading a Document

#### Prerequisites

- Your user ID either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles DOCUMENT_DELETE or DOCUMENT_EDIT assigned.
For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
• The document you want to upload is among the supported document formats and the configured file size. For more details see Documents [page 167]

Procedure

1. Open the Documents application.
2. Choose Add.
3. Choose New.
4. In the Add Document popup browse for a file or provide a URL link to the document along with a <Display Name>.

   **Note**

   You cannot upload private domains such as .corp as links.

5. Assign a Category to classify the document.
   You can also assign a Phase if required.
6. Select the type of sensitive data available in the document from the Data Sensitivity list.
7. Select the language from the dropdown that corresponds to the documents.
8. Enter a description.
9. Select the confidentiality of the document.
    You can also run a duplicate check and if no duplicates, only then upload a document using the Check and Upload button.

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<td>.tar</td>
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### 5.10.2 Maintaining Different Language Versions of a Document

**Prerequisites**

- Your user ID either belongs to the group **ORG_ADMIN** or **ORG_DATA_EXPERT**, or has the roles **DOCUMENT_DELETE** or **DOCUMENT_EDIT** assigned. For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
- The document you want to upload is among the supported document formats and the configured file size. For more details see Documents [page 167]

**Procedure**

1. Open the *Documents* application.
2. Select the desired document for which you want to maintain a different language version.
4. Choose *Add*.
5. In the *New Document* 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*. 
5.10.3 Editing Document Attributes

Prerequisites

Your user ID either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles DOCUMENT_DELETE or DOCUMENT_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles DOCUMENT_DELETE or DOCUMENT_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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.

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### 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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles DOCUMENT_DELETE or DOCUMENT_EDIT assigned.
  
  For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

#### Context

You can assign a document to the following objects:

- Models
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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the role DOCUMENT_DELETE assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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.

**i Note**
- When you choose to delete a document, the system deletes the document from the SAP Predictive Maintenance and Service, cloud edition permanently.
- When you choose to delete a document that is assigned to an improvement case, the document gets deleted from the improvement case without a warning.

### 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 belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles DOCUMENT_DELETE, or DOCUMENT_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

**Procedure**

1. Open the image.
   - System opens the file in the image viewer.

   **i Note**
   You can also select multiple images while editing. All the images you have selected queue up in the image viewer for editing.

2. Choose Manage 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. Continue to drag and drop 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 Maintain 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.

**Note**

If you want to unassign the image files that has the hotspots from the Document section of these objects, you must remove the hotspot attributes.

**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.

**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.

**i 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.

**i 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 the information that a manufacturer communicates to all his equipment owners or operators. For example: an existing instruction has been updated, or spare parts of an item of an equipment has been updated.

An announcement in SAP Predictive Maintenance and Service, cloud edition 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 from the manufacturer to communicate that an instruction has changed.
- **Service Bulletin**: An announcement from the manufacturer to communicate information when unanticipated problems occur with a model.
- **Recall**: An announcement 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 from the manufacturer to the operator to communicate the new policy of usage for certain models.
- **New Model**: An announcement from the manufacturer to the operator on the news of a new model.
- **Document Change**: An announcement from the manufacturer when the document related to a model has changed.
- **Spare Parts Change**: An announcement from the manufacturer to the operator when the spare parts have changed.
- **Model Information Change**: An announcement from the manufacturer to the operator when the information related to the model specification or maintenance has changed.
- **New Firmware**: An announcement from the manufacturer to the operator 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 249].
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 192])
- View and publish an announcement (see, Viewing and Publishing an Announcement [page 195])
- Update an announcement (see, Updating an Announcement [page 196])
- Delete an announcement (see, Deleting an Announcement [page 197])
- Assign business objects to an announcement (see, Assigning a Model to an Announcement [page 198])
- 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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles ANNOUNCEMENT_DELETE or ANNOUNCEMENT_EDIT assigned.
  For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
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>
<tr>
<td>Type</td>
<td>Select an announcement type. The following list provides the descriptions for each of the types of announcements:</td>
</tr>
<tr>
<td></td>
<td>○ Availability</td>
</tr>
<tr>
<td></td>
<td>○ Instruction Change</td>
</tr>
<tr>
<td></td>
<td>○ Service Bulletin</td>
</tr>
<tr>
<td></td>
<td>○ Recall</td>
</tr>
<tr>
<td></td>
<td>○ New Policy</td>
</tr>
<tr>
<td></td>
<td>○ New Firmware</td>
</tr>
<tr>
<td></td>
<td>○ New Model</td>
</tr>
<tr>
<td></td>
<td>○ Document Change</td>
</tr>
<tr>
<td></td>
<td>○ Spare Parts Change</td>
</tr>
<tr>
<td></td>
<td>○ Model Information Change</td>
</tr>
<tr>
<td>Priority</td>
<td>Select a priority of the announcement</td>
</tr>
<tr>
<td>Description</td>
<td>Enter a description for the announcement</td>
</tr>
</tbody>
</table>

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.

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**.

   **i 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 178].

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 revision 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 249].

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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles ANNOUNCEMENT_DELETE or ANNOUNCEMENT_EDIT assigned.
- To view an announcement, your user ID either belongs to the group AIN_ORG_DATA_READ, or has the role ANNOUNCEMENT_READ assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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 198].

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.

7. 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 103].

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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles ANNOUNCEMENT_DELETE, or ANNOUNCEMENT_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350]

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 192].
7. To update an instruction assigned to an announcement, select the INSTRUCTIONS section.
   For more information, see Creating an Announcement [page 192].
8. To add a new document, select DOCUMENTS section.
   For more information, see Creating an Announcement [page 192].
9. To update any models assigned to the announcement, select the ASSIGNMENTS section.
   For more information, see Creating an Announcement [page 192].
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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the role ANNOUNCEMENT_DELETE assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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 192].)
- You must have created a model that you want to assign to the announcement. (see Creating a Model [page 105])
- Your user ID either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles ANNOUNCEMENT_DELETE or ANNOUNCEMENT_EDIT assigned.
  For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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. In SAP Predictive Maintenance and Service, cloud edition, the manufacturer shares the instructions with the operator. The instructions help the operator to maintain the equipment better. SAP Predictive Maintenance and Service, cloud edition has the following instruction types:

- 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 249].

### 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 200]).
2. Create an instruction by reusing an existing instruction (see Creating an Instruction by Reusing an Existing Instruction [page 205]).
3. Update an existing instruction (see Updating and Publishing an Instruction [page 207]).
4. Viewing an instruction (see Viewing an Instruction [page 206])
5. Deleting an instruction (see Deleting an Instruction [page 208])
6. Assign models to an instruction (see Assigning a Model to an Instruction [page 209])

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. For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
- You have identified the subclass that you want to use for your instruction.

  **i 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 Maintenance and Service, cloud edition.

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 intrusion type.
   b. In the Subclass field, enter a subclass to which you want to assign an instruction. This is an optional field.
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>
<tr>
<td>Failure Mode Category(*)</td>
<td>For a breakdown instruction, select an appropriate value from the drop down. The list below describes what each failure mode means</td>
</tr>
<tr>
<td></td>
<td>○ Fail to function: equipment does not function.</td>
</tr>
<tr>
<td></td>
<td>○ Fail to open: equipment does not open.</td>
</tr>
<tr>
<td></td>
<td>○ Fail to close: equipment does not close.</td>
</tr>
<tr>
<td></td>
<td>○ Operation delay: equipment operation is delayed.</td>
</tr>
<tr>
<td></td>
<td>○ Output is high: output of the equipment is high.</td>
</tr>
<tr>
<td></td>
<td>○ Output is low: output of the equipment is low.</td>
</tr>
<tr>
<td>Long Description(*)</td>
<td>Enter a description for the instruction.</td>
</tr>
<tr>
<td>Frequency</td>
<td>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</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Primary Document</strong></td>
<td>An unstructured document that provides more information about the instruction. To add a new document, follow the steps below: 1. Choose <em>New</em>. 2. In the <em>Add Document</em> dialog box, browse for a file name. 3. In the <em>Phase</em> drop down, specify a phase. 4. In the <em>Category</em> drop down, choose a category that corresponds to a phase. 5. In the <em>Description</em> field, enter a description. 6. Choose <em>Upload</em>. To assign an existing document, follow the steps below: 1. In the <em>Assign Documents to Instruction</em> window, search for a document using the filters <em>Phase</em>, or <em>Category</em>. 2. Select a document from the search results list. 3. Choose <em>Assign</em>. To view the list of supported MIME types, see the Supported MIME Types table under the Documents documentation.</td>
</tr>
<tr>
<td><strong>3D Visual</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Relevant to Warranty</strong></td>
<td>Specify if the instruction is relevant for warranty.</td>
</tr>
</tbody>
</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*.  
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 249).

### 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 Maintenance and Service, cloud edition for a model, a piece of equipment, an instruction, or an announcement.
- Your user ID either belongs to the group **ORG_ADMIN** or **ORG_DATA_EXPERT**, or has the roles **INSTRUCTION_DELETE** or **INSTRUCTION_EDIT** assigned.
  For more information, see [Additional Roles for Master Data, Processes and Administration](page 350)
- You have created an instruction. For more details see [Creating an Instruction](page 200)
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 header section, enter the following details:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step Name</td>
<td>Enter a step name.</td>
</tr>
<tr>
<td>Step Description</td>
<td>Enter a step description.</td>
</tr>
<tr>
<td>3D Visual / Image</td>
<td>Upload either an image file, or a 3D visual.</td>
</tr>
</tbody>
</table>

   b. In the Information section, enter the following details:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>People Required</td>
<td>Enter the number of people required to completed the step.</td>
</tr>
<tr>
<td>Expected Work</td>
<td>Enter the total time required to complete the step.</td>
</tr>
<tr>
<td>Tools</td>
<td>Enter the list of tools required to execute the step.</td>
</tr>
<tr>
<td>i Note</td>
<td>You must press the enter button after you enter a tool.</td>
</tr>
<tr>
<td>Roles</td>
<td>Specify a role.</td>
</tr>
<tr>
<td>Risk Category</td>
<td>Specify the risk category</td>
</tr>
<tr>
<td>Risk Description</td>
<td>Enter a risk description.</td>
</tr>
</tbody>
</table>

   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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles INSTRUCTION_DELETE or INSTRUCTION_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350]

**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 200].
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**.

   For more information, see **Creating an Announcement** [page 192].

### 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 either belongs to the group **ORG_ADMIN** or **ORG_DATA_EXPERT**, or 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.

   For more information, see **Additional Roles for Master Data, Processes and Administration** [page 350].

**Context**

When you have more instructions created using public APIs provided by SAP Predictive Maintenance and Service, cloud edition, 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**.

   **i 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 the Groups tab to view the list of groups to which the instruction is assigned.

12. Choose the 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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles INSTRUCTION_DELETE or INSTRUCTION_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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.
4. If the instruction is already published, choose New Revision in the Planned Maintenance Instruction window.
5. To update any of the sections of an instruction, see Creating an Instruction [page 200]
6. Choose Save.
7. 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.

Note
For more information about creating a revision for an instruction and switching between a revision and a published version, see Creating Revisions and Switching Between Revisions and Published State [page 249]

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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles INSTRUCTION_DELETE assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles INSTRUCTION_DELETE or INSTRUCTION_EDIT assigned.
  For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
- You have identified the instruction to which you want to assign a model (see Creating an Instruction [page 200])
- 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 105]).

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 Instruction pop-up, search for a model using the search filters Class, or Manufacturer.
5. From the search results list, select a model using the check box and choose Assign.

5.13 Templates

A template is a format created by SAP Predictive Maintenance and Service, cloud edition 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.

**Note**
Classes and subclasses are provided by SAP Predictive Maintenance and Service, cloud edition. 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.

**Note**
You can create hierarchies of template from an existing template.

A template in SAP Predictive Maintenance and Service, cloud edition is identified by a unique name and comprises 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 Maintenance and Service, cloud edition, classification objects that can be created by customers, and type and instance information also created by customers relate.

1. The **class** level – delivered by SAP Predictive Maintenance and Service, cloud edition based on an industry standard – can be considered the top-node of the classification used in SAP Predictive Maintenance and Service, cloud edition.
   A class does not have a parent object, but can have multiple subclasses as child objects.

2. **Subclasses** – also delivered by SAP Predictive Maintenance and Service, cloud edition based on an industry standard – 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.

   **i 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 232].
• Create an equipment template to include equipment-specific attributes and attribute groups. For more information, see Creating an Equipment Template [page 235].
• Create a system template to include system-specific attributes and attribute groups. For more information, see Creating a System Template [page 240].
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>
<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 cannot change the ID of the code list once it has been created.</td>
</tr>
<tr>
<td>Description(*)</td>
<td>Enter an appropriate short description that describes the code list.</td>
</tr>
<tr>
<td>Long Description</td>
<td>Enter an appropriate long description that describes the code list.</td>
</tr>
</tbody>
</table>
### Field Description

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data Type (*)</strong></td>
<td>Select the data type from the list:</td>
</tr>
<tr>
<td>○ Date</td>
<td></td>
</tr>
<tr>
<td>○ String</td>
<td></td>
</tr>
<tr>
<td>○ Numeric</td>
<td></td>
</tr>
<tr>
<td>○ Numeric Flexible</td>
<td></td>
</tr>
</tbody>
</table>

| Values (*)             | Enter the values for the code list using +.                                 |

#### i Note

All the mandatory fields are marked as (*) in the 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** form 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 re-used:

- Global attribute groups & attributes are displayed in the attribute group/attribute lists with Source = SAP
- Global attribute groups & attributes can be re-used, 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 table below:

<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></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 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.

   **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.

4. To remove the attribute group, choose **Remove** in the *<Name of the Attribute Group>* section.

   **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 table below:

<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><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 attribute</td>
</tr>
<tr>
<td></td>
<td>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>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
</tbody>
</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 value list for the data type, then you can also maintain the attribute condition **Allow Additional Values** to allow additional texts 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.  
  ○ **numeric**: select numeric if you want the data type to support a numeric value. You can now also have numeric as relational operators. |
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 in the table below:

- **Dimension**: Select an appropriate dimension from the drop-down.
- **Threshold**: If the dimension has a suitable threshold which you want to use when entering attribute values, select an appropriate value from the drop-down.
- **Dependent Dimension**: 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**.

**i Note**

Numeric attributes can also be created without dimension and without an associated unit of measure.

- **Relational Operator**: Check this setting if you want to be able to maintain values with relational operators (for example, <, <=, >=, >). For example, Number of gears: <= 5.

- **enum**: select enum if you want the data type to support constant values.

**i Note**

Enter the values that you want the enum data type to support in the **Values** text box under the **Attribute Conditions** section. Also, if you want the user to select a single enum value, select the **Single Select** radio button and if you want the user to select multiple enum values, select the **Multi Select** radio button.
We now support multi-language enumerations. User has to enter enum value against one or more languages.

**Note**

Enum data type is deprecated and will not 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.

**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 in the table below:

- **Dimension**: Select an appropriate dimension from the drop-down.
- **Threshold**: If the dimension has a suitable threshold which you want to use when entering attribute values, select an appropriate value from the drop-down.
- **Dependent Dimension**: 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**.
- **Total Length of the Number**: Enter the total length of the number including decimals.
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>i Note</strong></td>
<td>Total length of the number should be greater than zero.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>○ Decimal Places Allowed: Enter the number of decimal places allowed for the number.</td>
</tr>
<tr>
<td><strong>i Note</strong></td>
<td>○ The allowed number of decimal places cannot be greater than the total length of the number.</td>
</tr>
<tr>
<td></td>
<td>○ Decimal places cannot be less than zero.</td>
</tr>
<tr>
<td><strong>i Note</strong></td>
<td>○ 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.</td>
</tr>
<tr>
<td></td>
<td>○ Data type <strong>Integer</strong> is covered by the newly introduced data type <strong>Numeric Flexible</strong> if the <strong>Decimal Places Allowed</strong> is equal to 0.</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 Maintenance and Service, cloud edition, 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 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>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>
</tbody>
</table>

i Note

All the mandatory fields are marked as (*) in the 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, the 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, the 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>i Note</strong></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>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><strong>Data Type(*)</strong></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>Note</strong>: For a date data type the <strong>Aggregation Concept</strong> is always set to <strong>Last Available Value</strong>.</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.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Note</strong>: For a boolean data type the <strong>Aggregation Concept</strong> is always set to <strong>Last Available Value</strong>.</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>Note</strong>: For a string data type the <strong>Aggregation Concept</strong> is always set to <strong>Last Available Value</strong>.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Code List</strong>: Assign code list for the indicator.</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>Note</strong>: <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>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>Field</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>Indicator Category</td>
<td>Define the indicator category: ○ Continuous ○ Level ○ Discrete</td>
</tr>
<tr>
<td>Aggregation Concept</td>
<td>Specify the aggregation concept of the new indicator. The following values can be assigned ○ Minimum ○ Maximum ○ Average ○ Sum ○ Last Available Value</td>
</tr>
<tr>
<td>Code List</td>
<td>Assign code list for the indicator.</td>
</tr>
<tr>
<td>Numeric Flexible</td>
<td>Select numeric flexible if you want the data type to support decimal value.</td>
</tr>
</tbody>
</table>

**iNote**

For a numeric flexible data type you can define additional properties.

○ Dimension: Select an appropriate dimension from the dropdown.

○ Expected Behaviour(*): Specify if the expected behaviour of the new indicator is Increasing, Decreasing, Unknown, or None.

○ Color: You can specify if you want a specific color for the indicator. You can select a color value from the palette.

○ Indicator Category: Define the indicator category: ○ Continuous ○ Level ○ Discrete

○ Total Length of the Number: Enter the total length of the number including decimals.
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>i Note</td>
<td><strong>Total length of the number should be greater than zero.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Decimal Places Allowed:</strong> Enter the number of decimal places allowed for the number.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>○ The allowed number of decimal places cannot be greater than the total length of the number.</td>
</tr>
<tr>
<td></td>
<td>○ Decimal places cannot be less than zero.</td>
</tr>
<tr>
<td></td>
<td><strong>Aggregation Concept:</strong> Specify the aggregation concept of the new indicator. The following values can be assigned</td>
</tr>
<tr>
<td></td>
<td>○ Minimum</td>
</tr>
<tr>
<td></td>
<td>○ Maximum</td>
</tr>
<tr>
<td></td>
<td>○ Average</td>
</tr>
<tr>
<td></td>
<td>○ Sum</td>
</tr>
<tr>
<td></td>
<td>○ Last Available Value</td>
</tr>
<tr>
<td></td>
<td><strong>Code List:</strong> Assign code list for the indicator.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>○ 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.</td>
</tr>
<tr>
<td></td>
<td>○ Data type <strong>Integer</strong> is covered by the newly introduced data type <strong>Numeric Flexible</strong> if the <strong>Decimal Places Allowed</strong> is equal to 0.</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Indicator Type</td>
<td>Define if the indicator is of type:</td>
</tr>
<tr>
<td></td>
<td>○ Measured</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>○ Calculated</td>
</tr>
<tr>
<td></td>
<td>Indicators derived using algorithms or some kind of calculation.</td>
</tr>
<tr>
<td></td>
<td>○ Assessed</td>
</tr>
<tr>
<td></td>
<td>Indicators that can be used in assessments.</td>
</tr>
</tbody>
</table>

**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:

![Threshold Colours and Colour Details](image-url)

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 codelists using the Codelist feature, see Adding, Updating, and Deleting Code Lists [page 212].

- **Color**: This color is used in the indicator chart (SAP Predictive Maintenance and Services 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 Maintenance and Services 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 Maintenance and Service, cloud edition, 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.*

**5.13.1.4 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 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>
</tbody>
</table>

   **i Note**
   1. No spaces allowed in the ID.
   2. Only the following characters are supported:
      - Uppercase and lowercase alphabets a through z and A through Z.
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>○ Numeric digits 0 through 9</td>
<td></td>
</tr>
<tr>
<td>○ Punctuation marks underscore (_), hyphen (-), colon (:), and full-stop (.)</td>
<td></td>
</tr>
<tr>
<td>○ Maximum number of characters allowed is 29</td>
<td></td>
</tr>
<tr>
<td>You cannot change the ID of the alert type once created.</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Select an alert category from the dropdown list:</td>
</tr>
<tr>
<td>○ Environment</td>
<td></td>
</tr>
<tr>
<td>○ Health</td>
<td></td>
</tr>
<tr>
<td>○ Equipment</td>
<td></td>
</tr>
<tr>
<td>○ Operation</td>
<td></td>
</tr>
<tr>
<td>○ Process</td>
<td></td>
</tr>
<tr>
<td>○ Safety</td>
<td></td>
</tr>
<tr>
<td>○ Other</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Enter an appropriate description that describes the alert type.</td>
</tr>
<tr>
<td>i Note</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>○ Information (1)</td>
<td></td>
</tr>
<tr>
<td>○ Warning (2)</td>
<td></td>
</tr>
<tr>
<td>○ Error (3)</td>
<td></td>
</tr>
<tr>
<td>Indicator</td>
<td>Assign indicator to the alert type by selecting from the list.</td>
</tr>
<tr>
<td>Origin</td>
<td>This allows you to differentiate between the alert type that is defined for the alert arising from an equipment or rule.</td>
</tr>
<tr>
<td>Select from the dropdown:</td>
<td></td>
</tr>
<tr>
<td>○ Equipment: On selecting, you can enter an error code (this is optional)</td>
<td></td>
</tr>
<tr>
<td>○ Rule: Value should be used for the alert type defined for rules.</td>
<td></td>
</tr>
<tr>
<td>Error Code</td>
<td>Enter an error code. This field is available only if you select Equipment as origin.</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>i Note</td>
<td>Maximum number of characters allowed is 32.</td>
</tr>
<tr>
<td>Failure Modes</td>
<td>Assign failure modes to the alert type by selecting from the list.</td>
</tr>
<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 the same alert type with the same ID.

If corresponding external ID is not populated, IoT Application Enablement replication of alert type has failed. In such a scenario, edit and save the alert type that will trigger the IoT replication.

**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 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.

- Alert type cannot be deleted if assigned to an alert type group. Unassign from alert type group to delete an 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 cannot assign shared alert types to an alert type group.
- Alert types are implicitly shared with the relevant model, but the failure modes associated with the shared alert types must be explicitly shared.

**Related Information**
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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT or 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><em>Note</em></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><em>Note</em></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><em>Note</em></td>
</tr>
<tr>
<td></td>
<td>The maximum number of characters allowed is 5,000.</td>
</tr>
</tbody>
</table>

2. Choose Save.

   *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.

<table>
<thead>
<tr>
<th>i Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>• You cannot delete alert type group if assigned to a model.</td>
</tr>
<tr>
<td>• You cannot assign shared alert types to an alert type group.</td>
</tr>
</tbody>
</table>

Related Information

Failure Modes [page 128]
Instructions [page 198]

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 Maintenance and Service, cloud edition, or a model template created within your organization or shared by a different organization, from which you can create the template.

<table>
<thead>
<tr>
<th>i Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

• Your user ID either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles TEMPLATE_DELETE or TEMPLATE_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
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:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Template ID(*)</td>
<td>Enter a unique ID for the model template.</td>
</tr>
<tr>
<td>i Note</td>
<td>There are no spaces allowed in the Template 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/Model Template</td>
<td>Select a subclass template, or another model template as parent template.</td>
</tr>
<tr>
<td>i Note</td>
<td>You can create a model template without a parent template.</td>
</tr>
<tr>
<td>Industry Standards</td>
<td>Add an industry standard.</td>
</tr>
<tr>
<td>i Note</td>
<td>This field is scope-specific.</td>
</tr>
<tr>
<td></td>
<td>Template objects can have only one industry standard assigned to them.</td>
</tr>
<tr>
<td></td>
<td>They can also have no industry standards assignments.</td>
</tr>
<tr>
<td></td>
<td>If an industry standard is assigned to a template object, you can change or delete it.</td>
</tr>
</tbody>
</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 213].

   **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 220].

   **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 > Add Industry Standard*.
   c. To add to a new attribute, choose *Add Attribute > New Attribute* and enter all attribute-relevant information.
   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*. 

---

Application Help for SAP Predictive Maintenance and Service, cloud edition

Master Data
Next Steps

- You can update the model template with new attribute groups and attributes. For more information, see Viewing and Updating a Template [page 242].
- You can create a model using the model template. For more information, see Creating a Model [page 105].
- You can add the template to a group using the Group button. For more information, see Groups [page 151].
- 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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT; or has the roles TEMPLATE_DELETE or TEMPLATE_EDIT assigned. For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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></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 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>Field</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Subclass/Equipment Template</td>
<td>Select a subclass template, or another equipment template as parent template.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>You can also create an equipment template without a parent template.</td>
</tr>
<tr>
<td>Industry Standards</td>
<td>Add an industry standard.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>○ This field is scope-specific.</td>
</tr>
<tr>
<td></td>
<td>○ Template objects can have only one industry standard assigned to them. They can also have no industry standards assignments.</td>
</tr>
<tr>
<td></td>
<td>○ If an industry standard is assigned to a template object, you can change or delete it.</td>
</tr>
</tbody>
</table>

**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 213].

**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 220].
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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT; or has the roles TEMPLATE_DELETE or TEMPLATE_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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><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 template once it has been created.</td>
<td></td>
</tr>
<tr>
<td>Short(*) and Long Description</td>
<td>Enter a template description.</td>
</tr>
</tbody>
</table>
## Field Description

### Parent Subclass/Location Template
Select a subclass template, or another location template as parent template.

**i Note**
- You can also create a location 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 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 213]*.

**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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT; or has the roles TEMPLATE_DELETE or TEMPLATE_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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>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 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>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>You can also create a spare part template without a parent template.</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------</td>
</tr>
<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 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 213]**

### 5.13.1.10 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 either belongs to the group **ORG_ADMIN** or **ORG_DATA_EXPERT**; or has the roles **TEMPLATE_DELETE** or **TEMPLATE_EDIT** assigned.

For more information, see **Additional Roles for Master Data, Processes and Administration [page 350]**.
Procedure

1. Launch the Templates application.

2. Choose [System Templates] ➤ [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>
<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</td>
</tr>
<tr>
<td></td>
<td>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/System Template</td>
<td>Select a subclass or another system template as the parent template.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>○ You can also create a system template without a parent template.</td>
</tr>
<tr>
<td>Industry Standards</td>
<td>Add an industry standard.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>○ This field is scope-specific.</td>
</tr>
<tr>
<td></td>
<td>○ Template objects can have only one industry standard assigned to them. They can also have no industry standards assignments.</td>
</tr>
<tr>
<td></td>
<td>○ If an industry standard is assigned to a template object, you can change or delete it.</td>
</tr>
</tbody>
</table>

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 either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT or has the roles 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 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.

   i 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.

   i 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** fields, 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 213]

   **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 213].

    **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.

   **Note**
   
   You can also define the deduplication configuration to reduce the duplication of similar alerts. For more information, refer Adding Alert Types [page 227].

2. Define alert type groups for an alert type created. For more information, refer Adding Alert Type Groups [page 230].

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 113].

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 245].

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 247].

6. You can also navigate to the Rules list page to view all the rules created against a model or equipment.

Related Information

Rule Management [page 247]
Adding Indicator Groups and Indicators [page 220]
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 are 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.

   i Note
   The rule will be 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.
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 required.
- 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 will 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 or select a threshold 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 220].
   - 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.
   - If you choose attribute, you can specify a constant value.

   Note
   - Constant value will be numeric.

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 348]
   - 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.

12. Select Status to activate or deactivate the rule.
13. Choose Save. The rule is added to the rule table.

> 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)

> Note
- 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.

> Note
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.

> Note
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.

### i Note

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 State Transitions

A business object such as a model, or an equipment undergoes state transitions during its creation and maintenance in SAP Predictive Maintenance and Service, cloud edition.

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.

5.16 Creating Revisions and Switching Between Revisions and Published State

You can create revisions of a business object such as a model, or an item of equipment. 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 Maintenance and Service, cloud edition allows you to switch between the last published state or the last revision of the business object or the business entity.

5.17 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

You can manage the machine learning engine of SAP Predictive Maintenance and Service, cloud edition by doing the following:

<table>
<thead>
<tr>
<th>Title</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Indicator Data Set Configuration [page 251]</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 257]</td>
<td>Configure models for equipment health indicators, and score, and train them.</td>
</tr>
<tr>
<td>Failure Mode Analytics Model Management [page 312]</td>
<td>Configure models for failure mode analytics, and score, and train them.</td>
</tr>
<tr>
<td>Failure Mode Analytics Validation [page 328]</td>
<td>Perform validation tasks to improve failure mode analytics.</td>
</tr>
<tr>
<td>Leading Indicators Model Management [page 330]</td>
<td>Configure models for leading indicators, and train 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 of SAP Predictive Maintenance and Service, cloud edition.

### Prerequisites

The following role or roles are assigned to your user:

- For SAP Predictive Maintenance and Service Fiori launchpad: `<pdms_DataScienceUser>`
- For SAP Intelligent Asset Management Fiori launchpad: `<DataScienceUser>` or the two roles `<DataScienceRead>` and `<DataScienceWrite>`

**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 set from scratch**: Choose +. The **New Data Set Configuration** screen is displayed.
3. Fill in all required fields. For more information about the entries to fill in, see Entries to Configure a Data Set [page 254].
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 256].

   a. Select the indicator groups with indicators.
      
      Select the indicator groups with indicators that you want to include in the data set such as pressure, temperature, or humidity.

   b. Select the aggregation functions.
      
      Select the aggregation functions that need to be executed on the indicators over the aggregation period, for example, the minimum or maximum value of a certain indicator over a certain aggregation period.

   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.
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.

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 event types 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.

○ For events, you can choose from all event types that were created using SAP IoT Application Enablement Services OData APIs. For more information about event types, see Event Type. This also includes the alert types that are defined in the Templates application. For more information, see Adding Alert Types [page 227].

Note

The following restrictions apply for event types:

○ If you have configured event types using SAP IoT Application Enablement Services REST APIs instead of SAP IoT Application Enablement Services OData APIs, you need to migrate
those event types in order to further use them. If you have questions about the migration, create a support ticket referring to component IOT-PDM.

○ Only use event types that are defined as alert types in the Templates application and that are assigned to the equipment model for which you create the data set. In the upcoming release, you will only be able to select those event types.

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 257]

6.1.1 Entries to Configure a Data Set

<table>
<thead>
<tr>
<th>Entry Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>x</td>
<td>The name of the data set configuration</td>
</tr>
<tr>
<td>Description</td>
<td>-</td>
<td>The description of the data set configuration</td>
</tr>
<tr>
<td>Equipment Model</td>
<td>x</td>
<td>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>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>Entry Field</td>
<td>Mandatory</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| **Null Values Strategy** | -         | Define how to handle missing values in the data set. You can choose from the following options:  
  - **Ignore**: 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.  
  - **Replace**: Replace NULL values with different values. The default value is 0. You can use this option for all algorithms.  
  - **Remove**: Remove rows with NULL values from the data set. You can use this option for all algorithms.  

  For more information about all algorithms, see [Algorithms for Equipment Health Indicators](page 265). |

| Labels             | -         | 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 labeling options:  
  - **None**: No labels are included in the data set.  
  - **Events**: Include events as failures in the data set.  
  - **Notifications**: Include notifications as failures in the data set.  

  **Note**  
  You need to use labeling for the algorithms TEC, AFP, and LOR of the learner type **CLASSIFICATION**. For more information about these algorithms, see [Algorithms for Equipment Health Indicators](page 265). |
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:

\[
\text{Maximum number of features} = (\text{Sum of bucket sizes (aggregation period/step size) over all added features}) \leq 2100
\]

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**

<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>

<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></td>
<td>Not allowed</td>
</tr>
</tbody>
</table>

### 6.2 Managing Models for Equipment Health Indicators

This topic describes how to manage models used for equipment health indicators in SAP Predictive Maintenance and Service, cloud edition.

**Prerequisites**

The following role or roles are assigned to your user:

- For SAP Predictive Maintenance and Service Fiori launchpad: `<pdms_DataScienceUser>`
- For SAP Intelligent Asset Management Fiori launchpad: `<DataScienceUser>` or the two roles `<DataScienceRead>` and `<DataScienceWrite>`
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 258].
2. Once you have configured a model, you can train it. For more information, see Training a Model [page 303].
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 309].

6.2.1 Configuring a Model

This topic describes how to configure models used for equipment health indicators in SAP Predictive Maintenance and Service, cloud edition.

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 about the entries to fill in, see Entries to Configure a Model (page 259).

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.

Related Information

Training a Model [page 303]

6.2.1.1 Entries to Configure a Model

General Information

<table>
<thead>
<tr>
<th>Entry Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>x</td>
<td>The name of the model</td>
</tr>
<tr>
<td>Description</td>
<td></td>
<td>The description of the model</td>
</tr>
<tr>
<td>Entry Field</td>
<td>Mandatory</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| Tags        |           | The tags that you want to add to the model. You can later use these tags to filter and organize your models. To add a tag, enter a value for the tag and press ENTER.
|             |           | i Note: You can use the following characters:  
|             |           | • Uppercase or lowercase letters from a to z  
|             |           | • Numbers  
|             |           | • Hyphens  
<p>|             |           | • Underscores |
| Training Input | x | 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 i. The data set with its details is then displayed in the Health Indicator Data Set Configuration application in a new tab. Once you have selected a data set, the equipment model for the data set including all related equipment is displayed. You can also filter the equipment by choosing v. To delete filters, you can delete each filter individually or delete all filters together by choosing v. |</p>
<table>
<thead>
<tr>
<th>Entry Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scoring Input</strong></td>
<td>x</td>
<td>The data set that you want to use to score the model. You can choose from all configured data sets in the <em>Health Indicator Data Set Configuration</em> application. To view details about the selected data set, choose ![icon]. The data set with its details is then displayed in the <em>Health Indicator Data Set Configuration</em> application in a new tab. Once you have selected a data set, the <em>equipment model</em> for the data set including all related equipment is displayed. You can also filter the equipment by choosing ![icon]. To delete filters, you can delete each filter individually or delete all filters together by choosing ![icon].</td>
</tr>
<tr>
<td><strong>Independent Variables</strong></td>
<td>x</td>
<td>The names of the columns that you want use for the model input. The variables are derived from the selected indicators and aggregation functions of the <em>Health Indicator Data Set Configuration</em> application.</td>
</tr>
</tbody>
</table>
# Algorithm

<table>
<thead>
<tr>
<th>Entry Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algorithm</td>
<td>x</td>
<td>The algorithm that you want to use to train and score the model. You can choose from the following predefined algorithms:</td>
</tr>
</tbody>
</table>
|                   |           | - *Earth Mover's Distance (EMD)*  
Distance-based failure analysis using Earth Mover’s Distance  |
|                   |           | - *Logistic Regression (LOR)*     
Logistic Regression for Failure Prediction  |
|                   |           | - *One Class Support Vector Machine (SVM)*  
One-Class Support Vector Machine for anomaly detection  |
|                   |           | - *Multivariate Autoregression (MAR)*  
Anomaly detection using Multivariate Autoregression  |
|                   |           | - *Principal Component Analysis (PCA)*  
Anomaly detection with Principal Component Analysis  |
|                   |           | - *Tree Ensemble Classifier (TEC)*  
Failure prediction using Tree Ensemble Classifier  |
|                   |           | - *Interquartile Range (IQR)*      
Anomaly detection using Interquartile Range  |
|                   |           | - *Automatic Failure Prediction (AFP)*  
Failure prediction using Automatic Failure Prediction  |
|                   |           | - *Automatic Anomaly Detection (AAD)*  
Anomaly detection using Automatic Anomaly Detection  |
|                   |           | For more information about the algorithms, see *Algorithms for Equipment Health Indicators* [page 265]. |
| Namespace         | x         | The namespace in which the model is created. The namespace for all predefined algorithms is `com.sap.iot.mle`. |
Depending on the algorithm you have selected, one of the following learner types is displayed:

- **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
<table>
<thead>
<tr>
<th>Entry Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable</td>
<td>-</td>
<td>The variable or attribute that you want to train and score on. The variables are derived from the selected indicators and aggregation functions of the Health Indicator Data Set Configuration application.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depending on the algorithm you have selected for your model, this field is displayed or hidden.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></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>The parameters with their default values. The parameters differ according to the algorithm. For more information, see Algorithm-Specific Parameters [page 283].</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You can use the predefined parameters or adjust the parameters by deleting parameters, adding own parameters, or overwriting the values of the predefined parameters.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To define a new value for a parameter, enter the value and press <strong>ENTER</strong>.</td>
</tr>
</tbody>
</table>
Output Mappings

The outputs that you want to assign to an indicator within an indicator group. The names and the meaning of the outputs differ according to the algorithm. For more information, see Algorithm-Specific Outputs [page 299].

i Note

The following restrictions apply:
- At least one output must be assigned to an indicator.
- The indicators and indicator groups must have a matching dimension, unit of measure (if applicable), and datatype. Otherwise the indicators and indicator groups are not available for the assignment.

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 269].
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 271].

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 273].
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 275].

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 277].

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 278].

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 280].

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 281].
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 282].

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 figures:
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 257].

**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 *Entries to Configure a Data Set* [page 254].

**Model Training**

Model training for PCA means calculating the eigenvectors and eigenvalues of the covariance matrix of the training data.

**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 257].

After a training, a model summary of the trained model is displayed in the Trainings table. For more information, see Model Summary [page 307].

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 257].

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 257].

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 Entries to Configure a Data Set [page 254].

To train a model, data scientists also need to specify a number of bins, and can specify the expected minimum and maximum values of data columns. The minimum and maximum values are used for binning.

**i Note**

To define minimum and maximum values, the following syntax needs to be followed:

**Example**

```
<Data_COLUMN_NAME>.min
<Data_COLUMN_NAME>.max
```

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 257].

After a training, a model summary of the trained model is displayed in the Trainings table. For more information, see Model Summary [page 307].
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 257).

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 figure illustrates the predictive model for one input variable:
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 257].

**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 *Entries to Configure a Data Set* [page 254].

For a correct training and scoring, the number of records in the provided data time series used for training needs to be at least $\text{window.size} + 1$ 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 257].

After a training, a model summary of the trained model is displayed in the Trainings table. For more information, see Model Summary [page 307].

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 257].

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 figure 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 257].

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 307].

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 257].

**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](image)

Referring to the figure 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 257].

### 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 257].

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 Entries to Configure a Data Set [page 254].

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 257].

i 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 307].

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 257].

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 257].

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 Entries to Configure a Data Set [page 254].

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 307].

To train a model using LOR, use the Health Indicator Model Management application. For more information, see Managing Models for Equipment Health Indicators [page 257].

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 257].
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 257].

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 257].

After a training, a model summary of the trained model is displayed in the Trainings table. For more information, see Model Summary [page 307].

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 257].

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. The algorithm does not have any hyperparameters that are exposed to the user. The algorithm finds the most suitable hyperparameters for the provided data set.

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 257].

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 307].

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 257].
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 257].

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 algorithm does not have any hyperparameters that are exposed to the user. The algorithm finds the most suitable hyperparameters for the provided data set.

The following figure 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 257].

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 Entries to Configure a Data Set [page 254].

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 257].

After a training, a model summary of the trained model is displayed in the Trainings table. For more information, see Model Summary [page 307].

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 257].

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:

i Note

For all algorithms that are not included in this topic, there are no hyperparameters defined. These algorithms find the most suitable hyperparameters for the provided data set.
**Earth Mover’s Distance (EMD)**

<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. 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>bins</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Positive integer for discretization that is not zero. The default value is 20.</td>
</tr>
<tr>
<td>group.by</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>The default value is Thing.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</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>
</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.                                                                                                                               |
|                  | **Note**               
|                  |     For more information about the normalization of scores, see [Normalization of Scores](page 296).                                                                                                       |
| 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>

**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>
</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.                                                                                                                                                                                                 |
| 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.  

**i Note**  
For more information about the normalization of scores, see Normalization of Scores [page 296].
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>normalizer.value</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>As ( \nu ) specifies the fraction of training samples which you assume to be outliers and, for ( \text{normalizer.type} ), ( \text{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 ( \text{normalizer.value} ) to 0.99 if you use the ( \text{normalizer.type} ) quantile.</td>
</tr>
</tbody>
</table>

**Multivariate Autoregression (MAR)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>target.columns</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>You need to enter the exact name of the columns because this field is case-sensitive.</td>
</tr>
<tr>
<td>window.size</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.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>The default value is 10.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<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. The default value is 1. 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>
</tbody>
</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  
  - Threshold  
    Internally calculates an effective threshold value based on the training data. Raw scores and normalized scores are generated.  
  - None  
    Does not do any normalization of the values. Only raw scores are generated.  
  
  **i Note**  
  For more information about the normalization of scores, see Normalization of Scores [page 296]. |
| 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.                                                        |
## Principal Component Analysis (PCA)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>group.by</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>Thing</em>.</td>
</tr>
<tr>
<td>sort.by</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>smoothing.window.size</td>
<td>Integer specifying the width of the running median window. <strong>Note</strong>&lt;br&gt;This value must be an odd number.&lt;br&gt;Use <code>smoothing.window = 3</code> for minimal robust smoothing so that isolated outliers are eliminated.&lt;br&gt;The default value is <em>1</em>.</td>
</tr>
<tr>
<td>window.size</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>Note</strong>&lt;br&gt;If windowing is applied, the algorithm uses the data of the <code>window.size</code> 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 <em>0</em>.</td>
</tr>
</tbody>
</table>
### Parameter: 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 296).

### Parameter: 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`.

### Tree Ensemble Classifier (TEC)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>number.of.trees</td>
<td>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. The default value is 20.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<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 integer numbers greater than or equal to 1. 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 <code>error</code>. Allowed values are:</td>
</tr>
<tr>
<td></td>
<td>- <code>error</code> (default)</td>
</tr>
<tr>
<td></td>
<td>The error rate for the binary classification that is calculated as <code>#(wrong cases)/#(all cases)</code>. 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></td>
<td>- <code>error@t</code></td>
</tr>
<tr>
<td></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></td>
<td>- <code>auc</code></td>
</tr>
<tr>
<td></td>
<td>Area under the ROC curve.</td>
</tr>
<tr>
<td></td>
<td>Note</td>
</tr>
<tr>
<td></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. <code>#(negative cases) / #(positive cases)</code> will be used implicitly.</td>
</tr>
<tr>
<td></td>
<td>Note</td>
</tr>
<tr>
<td></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.</td>
</tr>
<tr>
<td></td>
<td>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 quantile. 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.</td>
</tr>
<tr>
<td></td>
<td>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>Threshold 1 = 80</strong></td>
<td><strong>Threshold 2 = 450000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>Normalized Score</th>
<th>Score Interpretation</th>
<th>Raw Score</th>
<th>Normalized Score</th>
<th>Score Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>(100/80)*100 = 125</td>
<td>25 % above the threshold = abnormal</td>
<td>10000</td>
<td>(10000/450000)*100 = 2.22</td>
<td>97.78 % below the threshold = normal</td>
</tr>
<tr>
<td>90</td>
<td>(90/80)*100 = 112.5</td>
<td>12.5 % above the threshold = abnormal</td>
<td>400012</td>
<td>(400012/450000)*100 = 88.89</td>
<td>11.11 % below the threshold = normal</td>
</tr>
<tr>
<td>4</td>
<td>(4/80)*100 = 5</td>
<td>95 % below the threshold = normal</td>
<td>412313</td>
<td>(412313/450000)*100 = 91.63</td>
<td>8.37 % below the threshold = normal</td>
</tr>
<tr>
<td>32</td>
<td>(32/80)*100 = 40</td>
<td>60 % below the threshold = normal</td>
<td>477212</td>
<td>(477212/450000)*100 = 106.05</td>
<td>6.05 % above the threshold = abnormal</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.
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</td>
<td>0.04</td>
</tr>
<tr>
<td>Normal score</td>
<td>0.07</td>
</tr>
<tr>
<td>Normal score</td>
<td>0.07</td>
</tr>
<tr>
<td>Normal score</td>
<td>0.15</td>
</tr>
<tr>
<td>Normal score</td>
<td>0.23</td>
</tr>
<tr>
<td>Normal score</td>
<td>0.35</td>
</tr>
<tr>
<td>Normal score</td>
<td>0.35</td>
</tr>
<tr>
<td>Normal score</td>
<td>0.71</td>
</tr>
<tr>
<td>Normal score</td>
<td>0.89</td>
</tr>
<tr>
<td>abnormal score</td>
<td>0.95</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 With an increasing value, the anomaly of the data point increases too.</td>
<td>Numeric</td>
<td>None</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><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 With an increasing value, the anomaly of the data point increases too.</td>
<td>Numeric</td>
<td>None</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><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>Measures the difference between a data point and a predicted value A greater value indicates a bigger abnormality.</td>
<td>Numeric</td>
<td>None</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>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 With an increasing value, the anomaly of the data point increases too.</td>
<td>Numeric</td>
<td>None</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>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 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>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>Output</td>
<td>Description</td>
<td>Data Type</td>
<td>Dimension</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>-----------</td>
<td>-----------</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. The scores are based on the distance to the median and the quartiles.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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 used for equipment health indicators in SAP Predictive Maintenance and Service, cloud edition.

Prerequisites

- At least one model has been configured.
- To download data sets, the following role is assigned to your user:
  - For SAP Predictive Maintenance and Service Fiori launchpad: `<pdms_DataScienceDataExporter>`
  - For SAP Intelligent Asset Management Fiori launchpad: `<DataScienceDataExporter>`
  For more information about these roles, see the Roles section in the Security Information for SAP Predictive Maintenance and Service, cloud edition.

Context

Once you have configured a model, you can train it.

**i Note**

After the first successful training of a model, you can only edit the name, description, and tags of your model configuration.

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 your model. For more information, see Scheduling Regular Training of a Model [page 304].
   - Set up a manual training for your 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:
   - Choose a time frame by using the New Training From and To fields.
   - Choose a time frame by using the data preview. For more information, see Choosing Training Data Using Training Data Preview [page 306].
5. Choose Start Training.

   The training run starts, showing the status in the Trainings table, which 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 307].

**Note**

If the role `<pdms_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 309]

### 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 in SAP Predictive Maintenance and Service, cloud edition.

**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 entries:

<table>
<thead>
<tr>
<th>Entry</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>Set start date 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 your training.</td>
</tr>
<tr>
<td>End Date</td>
<td>Define whether your training schedule should finish on a certain date.</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 303]
6.2.2.2 Choosing Training Data Using Training Data Preview

This topic describes how to choose 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 303]

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>
<tbody>
<tr>
<td><strong>Accuracy</strong></td>
<td>This metric displays the overall fraction of the correctly classified data.</td>
<td>• Logistic Regression (LOR)</td>
</tr>
<tr>
<td></td>
<td>For this metric, values between 0 and 1 are possible. The value 1 refers to</td>
<td>• Automatic Failure Prediction (AFP)</td>
</tr>
<tr>
<td></td>
<td>a perfect model.</td>
<td>• Tree Ensemble Classifier (TEC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="#">i Note</a></td>
</tr>
<tr>
<td></td>
<td>i Note</td>
<td>This metric can be misleading for highly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>imbalanced data sets.</td>
</tr>
<tr>
<td><strong>Kappa</strong></td>
<td>This metric adjusts the accuracy based on the expected accuracy provided by</td>
<td>• Logistic Regression (LOR)</td>
</tr>
<tr>
<td></td>
<td>the class distribution.</td>
<td>• Automatic Failure Prediction (AFP)</td>
</tr>
<tr>
<td></td>
<td>For this metric, values between -1 and 1 are possible. The value 1 refers</td>
<td>• Tree Ensemble Classifier (TEC)</td>
</tr>
<tr>
<td></td>
<td>to a perfect model.</td>
<td></td>
</tr>
<tr>
<td>**Matthews Correlation</td>
<td>This metric takes class imbalance into account.</td>
<td>• Logistic Regression (LOR)</td>
</tr>
<tr>
<td>Coefficient (MCC)</td>
<td></td>
<td>• Automatic Failure Prediction (AFP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Tree Ensemble Classifier (TEC)</td>
</tr>
<tr>
<td></td>
<td>For this metric, values between -1 and 1 are possible. The value 0 refers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to a random prediction.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The value 1 refers to a perfect prediction.</td>
<td></td>
</tr>
<tr>
<td><strong>Sensitivity</strong></td>
<td>This metric displays the fraction of correctly classified positive cases.</td>
<td>• Logistic Regression (LOR)</td>
</tr>
<tr>
<td></td>
<td>For this metric, values between 0 and 1 are possible. The value 1 refers to</td>
<td>• Automatic Failure Prediction (AFP)</td>
</tr>
<tr>
<td></td>
<td>a perfect classification of all positive cases.</td>
<td>• Tree Ensemble Classifier (TEC)</td>
</tr>
<tr>
<td><strong>Specificity</strong></td>
<td>This metric displays the fraction of correctly classified negative cases.</td>
<td>• Logistic Regression (LOR)</td>
</tr>
<tr>
<td></td>
<td>For this metric, values between 0 and 1 are possible. The value 1 refers to</td>
<td>• Automatic Failure Prediction (AFP)</td>
</tr>
<tr>
<td></td>
<td>a perfect classification of all negative cases.</td>
<td>• Tree Ensemble Classifier (TEC)</td>
</tr>
<tr>
<td><strong>Test set size</strong></td>
<td>This metric displays the amount of data that was used to calculate the</td>
<td>• Logistic Regression (LOR)</td>
</tr>
<tr>
<td></td>
<td>metrics.</td>
<td>• Automatic Failure Prediction (AFP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Tree Ensemble Classifier (TEC)</td>
</tr>
<tr>
<td><strong>Estimated Anomaly Fraction</strong></td>
<td>This metric displays the fraction of abnormal training data. The abnormal</td>
<td>Automatic Anomaly Detection (AAD)</td>
</tr>
<tr>
<td></td>
<td>training data are classified by the Automatic Anomaly Detection (AAD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>algorithm.</td>
<td></td>
</tr>
</tbody>
</table>
## 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) |
| **Feature Importance** | This diagram displays the importance of each feature for the model in a bar chart based on the gain provided by the feature. The feature with the highest value is considered to be the most important feature. | - Automatic Failure Prediction (AFP)  
- Tree Ensemble Classifier (TEC) |
| **Score Distribution** | This diagram displays the distribution of the training scores in a histogram. The distribution indicates how well you can separate anomalies from normal scores. The scores are separated by different colors. Green indicates normal data and red indicates anomalies. | - Automatic Anomaly Detection (AAD)  
- Interquartile Range (IQR)  
- Support Vector Machines (SVM)  
- Principal Component Analysis (PCA)  
- Multivariate Autoregression (MAR)  
- Earth Mover’s Distance (EMD) |

### 6.2.3 Scoring a Model

This topic describes how to score models used for equipment health indicators in SAP Predictive Maintenance and Service, cloud edition.

### 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.

**Note**

The latest version of a trained model is used for scoring.

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 your model. For more information, see [Scheduling Regular Scoring of a Model](page 311).
   - Set up a manual scoring for your model. For manual scoring, proceed as described in the following steps:

3. From the **Models** pane, select the model you want to score.

4. Define the time frame of the data that is used for scoring by using the **Score Data From** and **To** fields.

5. Choose **Start Scoring**.

The scoring run starts, showing the status in the **Scorings** table, which 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.
iNote

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 273]
- Managing Models for Equipment Health Indicators [page 257]

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 in SAP Predictive Maintenance and Service, cloud edition.

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 entries:

<table>
<thead>
<tr>
<th>Active</th>
<th>Activate or deactive the scoring schedule for the model.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start</td>
<td>Set start date of the scoring schedule</td>
</tr>
<tr>
<td>Recurrence Pattern</td>
<td>Define whether the scoring job should run once or frequently at certain intervals.</td>
</tr>
<tr>
<td>Data Range</td>
<td>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 your scoring.</td>
</tr>
<tr>
<td>End Date</td>
<td>Define whether your scoring schedule should finish on a certain date.</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 309]

6.3 Managing Models for Failure Mode Analytics

This topic describes how to manage models used for failure mode analytics in SAP Predictive Maintenance and Service, cloud edition.

Prerequisites

The following role is assigned to your user:

- For SAP Predictive Maintenance and Service Fiori launchpad: <pdms_DataScienceUser>
- For SAP Intelligent Asset Management Fiori launchpad: <FMA_MODEL_MANAGER>
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 about the last occurring failures for your equipment and equipment models, you need to analyze the notifications and failure modes 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 [page 328].

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 [page 314].
2. Once you have configured the unsupervised model, you can train it. For more information, see Training a Model [page 322].
3. Once you have trained the unsupervised model, you can configure the supervised model. For more information, see Configuring a Model [page 314].
4. Once you have configured the supervised model, you can train it. For more information, see Training a Model [page 322].
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 [page 326].
6.3.1 Configuring a Model

This topic describes how to configure models used for failure mode analytics in SAP Predictive Maintenance and Service, cloud edition.

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 about the entries to fill in, see Entries to Configure a Model [page 315].
   a. To configure an unsupervised model, select the LDA algorithm and select an equipment model.
   b. To configure a supervised model, select the TextClassEssemble 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 322]
6.3.1.1 Entries to Configure a Model

General Information

<table>
<thead>
<tr>
<th>Entry Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>x</td>
<td>The name of the model</td>
</tr>
</tbody>
</table>

i Note

- The model name must not contain whitespaces.

| Description | -         | The description of the model |

Algorithm

<table>
<thead>
<tr>
<th>Entry Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algorithm</td>
<td>x</td>
<td>The algorithm that you want to use to train and score the model. You can choose from the following algorithms:</td>
</tr>
</tbody>
</table>

- **LDA**
  - Unsupervised topic modeling using Latent Dirichlet Allocation for failure mode assignment
- **TextClassEnsemble**
  - Failure mode analytics with supervised TextClassEnsemble

For more information on the algorithms, see Algorithms for Failure Mode Analytics [page 317].
<table>
<thead>
<tr>
<th>Entry Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learner Type</td>
<td>x</td>
<td>The type of algorithm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depending on the algorithm you have selected, one of the following learner types is displayed:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● UNSUPERVISED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This learner type is displayed if you have selected the algorithm name LDA.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● SUPERVISED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This learner type is displayed if you have selected the algorithm name TextClassEnsemble.</td>
</tr>
<tr>
<td>Equipment Model</td>
<td>x</td>
<td>The equipment model that you want to use as basis for the model</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>This field is visible only when you create an unsupervised model.</td>
</tr>
<tr>
<td>Unsupervised Model</td>
<td>x</td>
<td>The unsupervised model that you want to use as basis for the supervised model</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>This field is visible only when you create a supervised model.</td>
</tr>
<tr>
<td>Parameters</td>
<td>.</td>
<td>The parameters with their default values. The parameters differ according to the algorithm. For more information, see Algorithm-Specific Parameters [page 320].</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You can use the predefined parameters or adjust the parameters by deleting parameters, adding own parameters, or overwriting the values of the predefined parameters.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To define a new value for a parameter, enter the value and press ENTER.</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 318].

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 319].
6.3.1.2.1 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 312].

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.

Example

All failure notification texts that belong to a single equipment model.
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 324].

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 312].

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 312].

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 312].
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 312].

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 312].

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>stopwords</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. <strong>These stopwords are not visible as default values on the UI.</strong> 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>note</td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>To enter own stopwords, you can use the following characters:</td>
</tr>
<tr>
<td></td>
<td>● Uppercase or lowercase letters from a to z</td>
</tr>
<tr>
<td></td>
<td>● Numbers</td>
</tr>
<tr>
<td></td>
<td>● Hyphens</td>
</tr>
<tr>
<td></td>
<td>● Periods</td>
</tr>
<tr>
<td></td>
<td>● Underscores</td>
</tr>
<tr>
<td>alpha</td>
<td>Parameter of the Dirichlet distribution for topics across documents</td>
</tr>
<tr>
<td></td>
<td>The default value is <strong>0.001</strong>.</td>
</tr>
<tr>
<td>beta</td>
<td>Logarithmized parameter of the word distribution for each topic</td>
</tr>
<tr>
<td></td>
<td>The default value is <strong>0.001</strong>.</td>
</tr>
<tr>
<td>num.top.terms</td>
<td>Number of top terms per topic that need to be extracted</td>
</tr>
<tr>
<td></td>
<td>The default value is <strong>20</strong>.</td>
</tr>
<tr>
<td>num.topics</td>
<td>Number of topics</td>
</tr>
<tr>
<td></td>
<td>The default value is <strong>5</strong>.</td>
</tr>
<tr>
<td>burnin</td>
<td>Number of omitted Gibbs iterations at beginning</td>
</tr>
<tr>
<td></td>
<td>The default value is <strong>4000</strong>.</td>
</tr>
<tr>
<td>iter</td>
<td>Number of Gibbs iterations</td>
</tr>
<tr>
<td></td>
<td>The default value is <strong>2000</strong>.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| thin      | Number of omitted in-between Gibbs iterations  
            | The default value is **500**. |
| best      | If **TRUE**, only the model with the maximum (posterior) likelihood is returned  
            | The default value is **TRUE**. |
| ngram     | n-grams used to create Document Term Matrix  
            | The default value is **2**. |

### TextClassEnsemble

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| ngram     | n-grams used to create Document Term Matrix  
            | The default value is **2**. |

## 6.3.2 Training a Model

This topic describes how to train models used for failure mode analytics in SAP Predictive Maintenance and Service, cloud edition.

### Prerequisites

- At least one failure mode analytics model has been configured.
- The notifications for your equipment meet the following three 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 Notifications of Equipment](page 96) and SAP Help Portal → Configuration → API Tutorial → Equipment → Creating Notifications.
i Note
Not all attributes are available on the UI when you use the equipment application to create notifications. For those attributes, such as the breakdown attribute, use the API in the API documentation.

Context
Once you have configured a model, you can train it.

i Note
You start with first training a model of unsupervised learner type, and then a model of supervised learner type.

i 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. Define the time frame of the data that is used for training by using the New Training From and To fields.

i Note
For training a supervised model, select a time range that is a subset of the time range 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, which can be refreshed by clicking the Refresh button 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 324].

Results
Your model is trained.
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>Accuracy</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>

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>
<tbody>
<tr>
<td>Kappa</td>
<td>This metric adjusts the accuracy based on the expected accuracy provided by the class distribution.</td>
<td>Supervised Text Classification Using Ensemble Techniques</td>
</tr>
<tr>
<td></td>
<td>For this metric, values between -1 and 1 are possible. The value 1 refers to a perfect model.</td>
<td></td>
</tr>
<tr>
<td>Matthews Correlation Coefficient (MCC)</td>
<td>This metric takes class imbalance into account.</td>
<td>Supervised Text Classification Using Ensemble Techniques</td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Sensitivity</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>Specificity</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>Test set size</td>
<td>This metric displays the amount of data that was used to calculate the metrics.</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.</td>
<td>Unsupervised Topic Modeling Using Latent Dirichlet Allocation</td>
</tr>
<tr>
<td></td>
<td>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></td>
</tr>
</tbody>
</table>
6.3.3 Scoring a Model

This topic describes how to score models used for failure mode analytics in SAP Predictive Maintenance and Service, cloud edition.

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 your model. For more information, see Scheduling Regular Scoring of a Model [page 327].
   - Set up a manual scoring for your model. For manual scoring, proceed as described in the following steps:
3. From the Models pane, select the model you want to score.
4. Define the time frame of the data that is used for scoring by using the Score Data From and To fields.
5. Choose Start Scoring.

   The scoring run starts, showing the status in the Scorings table, which can be refreshed by clicking the Refresh button 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 use the failure mode analytics functions to get insights about the last occurring failures of your equipment and equipment models. For more information, see Using Failure Mode Analytics [page 47].

Related Information

Managing Models for Failure Mode Analytics [page 312]

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 in SAP Predictive Maintenance and Service, cloud edition.

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 entries:

   | Active | Activate or deactivate the scoring schedule for the model. |

   Application Help for SAP Predictive Maintenance and Service, cloud edition
   Machine Learning Engine
<table>
<thead>
<tr>
<th><strong>Start</strong></th>
<th>Set start date 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 scoring run, or on a limited data set coming in during a certain time period before your scoring.</td>
</tr>
<tr>
<td><strong>End Date</strong></td>
<td>Define whether your scoring schedule should finish on a certain date.</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 326]

**6.4 Validating Failure Mode Analytics**

This topic describes how to validate failure mode analytics in SAP Predictive Maintenance and Service, cloud edition.

**Prerequisites**

- Your unsupervised model has been trained successfully once at least.
- The following role or roles are assigned to your user:
  - For SAP Predictive Maintenance and Service Fiori launchpad: `<pdms_DataScienceUser>` or `<pdms_AppUser>`
  - For SAP Intelligent Asset Management Fiori launchpad: `<FMA_VALIDATION_EXPERT>`
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. 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.

   **i Note**
   
   Only one validation task is generated per trained unsupervised model. The validation is assumed to be a one-time activity for each training run.

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 appropriate failure mode based on the top words of the topic and your own experience. You see the top words by clicking on a topic.

   **i Note**
   
   The topics are pre-assigned to the most appropriate 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.

4. **(Relevant only if there is a more appropriate failure mode)**: Reassign the topic to a different failure mode by using the failure mode selection dialog.

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 appropriate failure mode. You can see details of a notification by clicking the notification link.

   **(Relevant only if there is a more appropriate failure mode)**: Reassign the notification to a different failure mode by using the failure mode selection dialog.
8. To confirm the task, choose Save and Confirm.
9. To complete the task, choose Activate.

The task is completed and removed from the table containing all validation tasks and is removed from the Failure Mode Analytics Validation application.

A new validated model is displayed on the Failure Mode Analytics Model Management application.

10. To apply your 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 312].

Results

For the chosen equipment model, your validation results are displayed.

Next Steps

You can now check the validation results in the failure mode analytics functions. For more information, see Using Failure Mode Analytics [page 47].

6.5 Managing Models for Leading Indicators

This topic describes how to manage models used for leading indicators in SAP Predictive Maintenance and Service, cloud edition.

Prerequisites

The following role or roles are assigned to your user:

- For SAP Predictive Maintenance and Service Fiori launchpad: <pdms_DataScienceUser>
For SAP Intelligent Asset Management Fiori launchpad: `<DataScienceUser>` or the two roles `<DataScienceRead>` and `<DataScienceWrite>`

**i 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 331].
2. Once you have configured a model, you can train it. For more information, see Training a Model [page 335].

### 6.5.1 Configuring a Model

This topic describes how to configure models used for leading indicators in SAP Predictive Maintenance and Service, cloud edition.

### 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 about the entries to fill in, see Entries to Configure a Model [page 332].

4. Save your model.

Results

Your model is configured and added to the Models pane.

Related Information

Training a Model [page 335]

### 6.5.1.1 Entries to Configure a Model

<table>
<thead>
<tr>
<th>Entry Field</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>x</td>
<td>The name of the model</td>
</tr>
<tr>
<td>Description</td>
<td>-</td>
<td>The description of the model</td>
</tr>
<tr>
<td>Entry Field</td>
<td>Mandatory</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Data Set</strong></td>
<td></td>
<td>The data set that you want to use to train the model. You can choose between the following options:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Generate a data set for the training input</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Select this option when you haven't configured a data set yet as a training input.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Select an existing data set for the training input</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Select this option when you have already configured a data set as training input.</td>
</tr>
<tr>
<td><strong>Equipment Model</strong></td>
<td>x</td>
<td>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 <strong>Models</strong> application.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>This field is visible only when you have selected the option to generate a data set.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></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 <strong>Generate Data Set</strong> to generate the data set. The generated data set is then displayed in the <strong>Training Input</strong> field.</td>
</tr>
<tr>
<td>Entry Field</td>
<td>Mandatory</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Failure Mode</td>
<td>-</td>
<td>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></td>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>This field is visible only when you have selected the option to generate a data set.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></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>
<tr>
<td>Training Input</td>
<td>x</td>
<td>The training input for the model training</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To view details about the selected data set, choose View Details. The data set with its details is then displayed in the Health Indicator Data Set Configuration application in a new tab.</td>
</tr>
</tbody>
</table>
6.5.2 Training a Model

This topic describes how to train models used for leading indicators in SAP Predictive Maintenance and Service, cloud edition.

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.

i 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. Define the time frame of the data that is used for training by using the New Training From and To fields.

The training run starts, showing the status in the Trainings table, which can be refreshed by clicking the Refresh button 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 336].

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 100].
- 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 115].

Related Information

Managing Models for Leading Indicators [page 330]

6.5.2.1 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 and a JSON 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 and JSON 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

The following tables provide you with an overview of the metrics with their descriptions:

## Numeric Measurements

<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</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>
</tr>
<tr>
<td><strong>Kappa</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Matthews Correlation Coefficient (MCC)</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Sensitivity</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Specificity</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Test set size</strong></td>
<td>This metric displays the amount of data that was used to calculate the metrics.</td>
</tr>
</tbody>
</table>

## JSON

<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Feature Importance</strong></td>
<td>This JSON displays the importance of each feature for the model as a (feature/ importance) key value pair based on the gain provided by the feature. The feature with the highest value is considered to be the most important feature.</td>
</tr>
</tbody>
</table>
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>Tile</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Profile [page 338]</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 348]</td>
<td>Execute configuration tasks for roles and users and configure the Explorer and analysis tools.</td>
</tr>
<tr>
<td>User Authorizations [page 359]</td>
<td>Define a more granular user authorizations to access SAP Predictive Maintenance and Service.</td>
</tr>
<tr>
<td>Data Protection and Privacy (DPP) [page 369]</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 Maintenance and Service, cloud edition. 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 Maintenance and Service, cloud edition and you have received the necessary information to logon to the SAP Predictive Maintenance and Service, cloud edition and use the applications of SAP Predictive Maintenance and Service, cloud edition.

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 either belongs to the groups AIN_ORG_ADMIN, or has the role COMPANYPROFILE_DELETE, COMPANYPROFILE_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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:

<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>
</tbody>
</table>

**Note**

If you want to use the primary contact person details of your base location, select the checkbox *Reuse Primary Contact Person Details*. 
### Field Description

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Name (*)</td>
<td>Enter the first name of your contact person</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 Maintenance and Service, cloud edition.
- Your user ID either belongs to the groups **AIN_ORG_ADMIN**, or has the role **COMPANYPROFILE_DELETE**, **COMPANYPROFILE_EDIT** assigned.
  For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

**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 Maintenance and Service, cloud edition.
- Your user ID either belongs to the groups AIN_ORG_ADMIN, or has the role COMPANYPROFILE_DELETE assigned.
  For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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 either belongs to the groups AIN_ORG_ADMIN, or has the role COMPANYPROFILE_DELETE, COMPANYPROFILE_EDIT and DOCUMENT_EDIT or DOCUMENT_DELETE assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
### 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>Mnemonics</td>
<td>Enter informal names (for example, obsolete company names, abbreviations or potential wrong spellings) of the subsidiary company that may be used for 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>
</tbody>
</table>
Field: Acquired Subsidiary
Description: Specify if your organization has acquired the subsidiary.

Note
Yes/No is a toggle button. If Yes, specify the date you acquired the subsidiary company.

Field: Contact Person Details
Description: Enter the contact person title, first name, last name, phone number, and e-mail address

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.

<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>

5. Choose Save.

Results

The subsidiary company, as a separate entity, cannot create or access business objects in the network.

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 either belongs to the groups **AIN_ORG_ADMIN**, **AIN_ORG_DATA_EXPERT** or **AIN_ORG_DATA_READ**, or has the roles **COMPANYPROFILE_DELETE**, **COMPANYPROFILE_READ**, or **COMPANYPROFILE_EDIT** assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

#### 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 either belongs to the groups **AIN_ORG_ADMIN**, or has the role **COMPANYPROFILE_DELETE**, **COMPANYPROFILE_EDIT** assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350]

#### 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 Save.

### 7.1.7 Editing Company Profile

**Prerequisites**

Your user ID either belongs to the groups AIN_ORG_ADMIN, or has the role COMPANYPROFILE_DELETE, COMPANYPROFILE_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350]

**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>Background Image</td>
<td>Upload a background image for your company.</td>
</tr>
</tbody>
</table>

**i Note**

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.
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<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>
<tr>
<td>Roles (*)</td>
<td>Select additional roles for your company from the drop-down.</td>
</tr>
<tr>
<td><strong>i Note</strong></td>
<td>The selected roles will indicate to your business partners in which roles you participate in SAP Predictive Maintenance and Service, cloud edition. The role selection here also adds your company name to the respective value helps.</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.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>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 Maintenance and Service, cloud edition 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>
b. 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>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>

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.

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 either belongs to the group ORG_ADMIN OR ORG_DATA_EXPERT, or has the roles TEMPLATE_DELETE or TEMPLATE_EDIT assigned.
  For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
- 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:

- Configure the Explorer and analysis tools (see Explorer and Analysis Tools Configuration [page 386])
- Create user information (see Creating User Details [page 354])
- Update user information (see Updating User Details [page 355])
- Delete user information (see Deleting User Details [page 356])
- 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 357]
- Configure Prefix: Configuring the Prefix for the Object ID of your Organization [page 356].

<table>
<thead>
<tr>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

- 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.
Define retention period for off-boarding objects.
Define the Default Scope (in case your organization is working with multiple scopes).
Define a technical user with user name, user ID and e-mail address.

- You can maintain 2 default indicator names in the header information of all the equipment in your organization using the **Header Status** section.
- 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.

**i Note**

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.

- 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](#).

You can use it later for corresponding External ID mapping in **Company Profile** app.

- 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 maintain the default configuration settings for the equipment, model, and system object page under **Object Page Configurations**.

### 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 (see Additional Roles for Master Data, Processes and Administration [page 350]).
- Configure the Application Settings (see Application Settings [page 348]).
- Configure documents at subclass level (see Configuring the Document Category [page 347]).
### 7.3.1.1 Additional Roles for Master Data, Processes and Administration

SAP Predictive Maintenance and Service, cloud edition provides the following standard role collections for controlling access to master data, processes and administration functions:

- pdms_AssetCoreAdmin - for the administration role
- pdms_AssetCoreExpert - for reading, editing, and deleting data
- pdms_AssetCoreReader - for reading data

pdms_AssetCoreAdmin has the following scopes:

<table>
<thead>
<tr>
<th>Scope</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMPLATE_DELETE</td>
<td>Templates application.</td>
</tr>
<tr>
<td>MODEL_DELETE</td>
<td>Create, update, view, or delete a model using the Models application.</td>
</tr>
<tr>
<td>EQUIPMENT_DELETE</td>
<td>Create, update, view, or delete an item of equipment using the Equipment application.</td>
</tr>
<tr>
<td>INSTRUCTION_DELETE</td>
<td>Create, update, view, or delete an instruction using the Instructions application.</td>
</tr>
<tr>
<td>ANNOUNCEMENT_DELETE</td>
<td>Create, update, view, or delete an announcement using the Announcements application.</td>
</tr>
<tr>
<td>DOCUMENT_DELETE</td>
<td>Create, update, view, or delete a model template, equipment and location templates using the Documents application.</td>
</tr>
<tr>
<td>COMPANYPROFILE_DELETE</td>
<td>Create, update, view, or delete your organization details using the Company Profile application.</td>
</tr>
<tr>
<td>IMPROVEMENT_DELETE</td>
<td>Create, update, view or delete improvement cases using the Performance Improvement application</td>
</tr>
<tr>
<td>FUNCTIONAL_LOCATION_DELETE</td>
<td>Create, update, view or delete locations using the Locations application</td>
</tr>
<tr>
<td>PART_DELETE</td>
<td>Create, update, view or delete locations using the Spare Parts application</td>
</tr>
<tr>
<td>CONFIGURATION_DELETE</td>
<td>Perform all configuration tasks using the Application Settings application</td>
</tr>
<tr>
<td>Scope</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>FAILURE_MODE_DELETE</td>
<td>Create, update, view or delete failure modes using the Failure Modes application</td>
</tr>
<tr>
<td>GROUP_DELETE</td>
<td>Create, update, view or delete groups using the Groups application</td>
</tr>
<tr>
<td>SYSTEM_DELETE</td>
<td>Create, update, view or delete systems using the Systems application</td>
</tr>
<tr>
<td>INDICATOR_DELETE</td>
<td>Create, update, view or delete indicators.</td>
</tr>
<tr>
<td>USER_AUTH_DELETE</td>
<td>Create, update, view or delete user authorizations using the User Authorization application.</td>
</tr>
<tr>
<td>FINGERPRINT_DELETE</td>
<td>Create, update, view or delete fingerprints.</td>
</tr>
<tr>
<td>FUNCTION_DELETE</td>
<td>Create, update, view or delete functions.</td>
</tr>
<tr>
<td>RULES_DELETE</td>
<td>Create, update, view or delete rules.</td>
</tr>
</tbody>
</table>

**pdms_AssetCoreExpert has the following scopes:**

<table>
<thead>
<tr>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMPLATE_DELETE</td>
</tr>
<tr>
<td>MODEL_DELETE</td>
</tr>
<tr>
<td>EQUIPMENT_DELETE</td>
</tr>
<tr>
<td>INSTRUCTION_DELETE</td>
</tr>
<tr>
<td>ANNOUNCEMENT_DELETE</td>
</tr>
<tr>
<td>DOCUMENT_DELETE</td>
</tr>
<tr>
<td>COMPANYPROFILE_DELETE</td>
</tr>
<tr>
<td>IMPROVEMENT_DELETE</td>
</tr>
<tr>
<td>FUNCTIONAL_LOCATION_DELETE</td>
</tr>
<tr>
<td>PART_DELETE</td>
</tr>
<tr>
<td>CONFIGURATION_READ</td>
</tr>
<tr>
<td>FAILURE_MODE_READ</td>
</tr>
<tr>
<td>GROUP_DELETE</td>
</tr>
<tr>
<td>SYSTEM_DELETE</td>
</tr>
<tr>
<td>INDICATOR_DELETE</td>
</tr>
<tr>
<td>USER_AUTH_DELETE</td>
</tr>
<tr>
<td>FINGERPRINT_DELETE</td>
</tr>
<tr>
<td>FUNCTION_DELETE</td>
</tr>
</tbody>
</table>
### Scope

rpms_AssetCoreReader has the following scopes:

<table>
<thead>
<tr>
<th>Scope</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMPLATE_READ</td>
<td>View a model template using the Templates application.</td>
</tr>
<tr>
<td>MODEL_READ</td>
<td>View a model using the Models application.</td>
</tr>
<tr>
<td>EQUIPMENT_READ</td>
<td>View an item of equipment using the Equipment application.</td>
</tr>
<tr>
<td>INSTRUCTION_READ</td>
<td>View an instruction using the Instructions application.</td>
</tr>
<tr>
<td>ANNOUNCEMENT_READ</td>
<td>View an announcement using the Announcements application.</td>
</tr>
<tr>
<td>DOCUMENT_READ</td>
<td>View a document using the Documents application.</td>
</tr>
<tr>
<td>COMPANYPROFILE_READ</td>
<td>View your organization details using the Company Profile application.</td>
</tr>
<tr>
<td>IMPROVEMENT_READ</td>
<td>View an improvement case using the Performance Improvement application.</td>
</tr>
<tr>
<td>FUNCTIONAL_LOCATION_READ</td>
<td>View a location using the Locations app</td>
</tr>
<tr>
<td>PART_READ</td>
<td>View a spare part using the Spare Parts app</td>
</tr>
<tr>
<td>CONFIGURATION_READ</td>
<td>View all configuration-related settings using the Application Settings app</td>
</tr>
<tr>
<td>FAILURE_MODE_READ</td>
<td>View a failure mode using the Failure Modes application.</td>
</tr>
<tr>
<td>GROUP_READ</td>
<td>View a group using the Groups application.</td>
</tr>
<tr>
<td>SYSTEM_READ</td>
<td>View a system using the Systems application.</td>
</tr>
<tr>
<td>INDICATOR_READ</td>
<td>View indicators.</td>
</tr>
<tr>
<td>USER_AUTH_READ</td>
<td>View user authorizations using the User Authorization application.</td>
</tr>
<tr>
<td>FINGERPRINT_READ</td>
<td>View fingerprint.</td>
</tr>
<tr>
<td>FUNCTION_READ</td>
<td>View functions.</td>
</tr>
<tr>
<td>RULES_READ</td>
<td>View rules.</td>
</tr>
<tr>
<td>SAC_READ</td>
<td>View analytics dashboards.</td>
</tr>
</tbody>
</table>
There are additional roles that do not belong to any of the groups. The following table lists these roles:

<table>
<thead>
<tr>
<th>Scope</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANNOUNCEMENT_EDIT</td>
<td>Create, update, or view an announcement using the Announcements application.</td>
</tr>
<tr>
<td>COMPANYPROFILE_EDIT</td>
<td>Create, update, or view your organization details using the Company Profile application.</td>
</tr>
<tr>
<td>DOCUMENT_EDIT</td>
<td>Create, update, or view an document using the Documents application.</td>
</tr>
<tr>
<td>EQUIPMENT_EDIT</td>
<td>Create, update, or view an item of equipment using the Equipment application.</td>
</tr>
<tr>
<td>INSTRUCTION_EDIT</td>
<td>Create, update, or view an instruction using the Instructions application.</td>
</tr>
<tr>
<td>MODEL_EDIT</td>
<td>Create, update, or view a model using the Models application.</td>
</tr>
<tr>
<td>TEMPLATE_EDIT</td>
<td>Create, update, or view a model template using the Templates application.</td>
</tr>
<tr>
<td>IMPROVEMENT_EDIT</td>
<td>Create, update or view an improvement case using the Performance Improvement application.</td>
</tr>
<tr>
<td>FUNCTIONAL_LOCATION_EDIT</td>
<td>Create, update or view a location using the Locations application.</td>
</tr>
<tr>
<td>PART_EDIT</td>
<td>Create, update or view a spare part using the Spare Parts application.</td>
</tr>
<tr>
<td>CONFIGURATION_EDIT</td>
<td>Perform all configuration tasks using the Application Settings application.</td>
</tr>
<tr>
<td>FAILURE_MODE_EDIT</td>
<td>Create, update or view a failure mode using the Failure Modes application.</td>
</tr>
<tr>
<td>GROUP_EDIT</td>
<td>Create, update or view a group using the Groups application</td>
</tr>
<tr>
<td>SYSTEM_EDIT</td>
<td>Create, update or view a system using the Systems application</td>
</tr>
<tr>
<td>INDICATOR_EDIT</td>
<td>Create, update, or view indicators</td>
</tr>
<tr>
<td>USER_AUTH_EDIT</td>
<td>Create, update or view user authorizations using the User Authorization application.</td>
</tr>
<tr>
<td>FINGERPRINT_EDIT</td>
<td>Create, update, view or delete fingerprints.</td>
</tr>
<tr>
<td>FUNCTION_EDIT</td>
<td>Create, update, view or delete functions.</td>
</tr>
</tbody>
</table>
7.3.1.2 Creating User Details

As an administrator you can add the details of the users of your organization to SAP Predictive Maintenance and Service, cloud edition.

Prerequisites

- Your user ID either belongs to the groups ORG_ADMIN, or has the role CONFIGURATION_DELETE, CONFIGURATION_EDIT assigned.
  For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
- The users that you create have been assigned predefined roles of SAP Predictive Maintenance and Service, cloud edition to access and perform appropriate actions using applications of SAP Predictive Maintenance and Service, cloud edition.

Procedure

1. Open the SAP Cloud Platform Cockpit for your account.
3. Choose the respective role and assign the user ID to the role. For more information about roles, see Additional Roles for Master Data, Processes and Administration [page 350]
5. Open the Application Settings application.
   a. Choose Add Single User to add a single user only.
      Enter the user ID, first and last name, email address and organization name.
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.

c. Upload the CSV template with the user information.

Choose Save.

### 7.3.1.3 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 Maintenance and Service, cloud edition.

#### Prerequisites

- Your user ID either belongs to the group ORG_ADMIN, or has the roles CONFIGURATION_DELETE or CONFIGURATION_EDIT assigned. For more information, see Additional Roles for Master Data, Processes and Administration [page 350].
- 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.
7.3.1.4 Deleting User Details

You perform this procedure to remove the user from SAP Predictive Maintenance and Service, cloud edition.

Prerequisites

Your user ID either belongs to the group ORG_ADMIN, or has the roles CONFIGURATION_DELETE assigned.
For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

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.
8. Choose the respective role and unassign the user ID from the role.

7.3.1.5 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.

7.3.1.6 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 belongs to the group ORG_ADMIN.

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.
7.3.1.7  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 either belongs to the group ORG_ADMIN or 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 Maintenance and Service, cloud edition 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

**i 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.


**Process Overview**

- Enable User authorization in [Application Settings > General Application Settings > Organizational Configurations](https://help.sap.com/)

**i 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](https://help.sap.com/) app.
- Assign business objects to the nodes in your organizational hierarchy in [User Authorization](https://help.sap.com/) app. You can directly assign business objects to the nodes in your organizational hierarchy in [User Authorization](https://help.sap.com/) app, create a group in [Groups](https://help.sap.com/) app and assign business objects to this group, and then assign the group to a node in your organizational hierarchy in [User Authorization](https://help.sap.com/) 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

**i 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](https://help.sap.com/).
2. Authorized user at Company B creates an organizational hierarchy in [User Authorization](https://help.sap.com/) app:
   1. Create root node Company B.
   2. Create child node [Company B > Germany](https://help.sap.com/).
   3. Create 2 child nodes [Company B > Germany > Germany North](https://help.sap.com/) and [Company B > Germany > Germany South](https://help.sap.com/).
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.

      **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.
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 ➔ 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.
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/never 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 Tasks in SAP Leonardo IoT

System Setup

The steps are required to sync the user authorizations to the SAP Leonardo IoT tenant to access Things and respective related information:

1. Create the root authorization unit using the User Authorization application.

Configuration on SAP Leonardo IoT Tenant
2. Create the corresponding object group under the tenant using the organization unit ID created, as above. For more information, refer SAP Leonardo IoT → End-User Information → Tenant Administration Apps → Object Authorizations Overview → Create an Authorization Group.

3. Create a new collection for the tenant

   **i Note**
   Assign the tenant only to the tenant root and not to any underlying groups including the group created above. For more information, refer SAP Leonardo IoT → End-User Information → Tenant Administration Apps → Object Authorizations Overview → Create a Collection

4. Using Capabilities, create a new capability of type **Thing** using the collection created, as above, and assign the required actions. Within Conditions, select the following, **assigned authorization group** and **is element of** from the dropdown. This is the default privilege for the things that are assigned to the tenant root. For more information, refer SAP Leonardo IoT → End-User Information → Tenant Administration Apps → Object
5. Using the User Groups application, assign the newly created capability to the user group or role collection.

**i Note**

For new tenants, role collections can be assigned while defining the capabilities using the New Capability Dialog.

For more information, refer SAP Leonardo IoT → Tenant Administration Apps → User Groups: Overview → Create a User Group.

### 7.4.2 Creating Organizational Hierarchy

You perform this activity to define a new organizational hierarchy for your organization.

**Prerequisites**

Your user ID either belongs to the group ORG_ADMIN or ORG_DATA_EXPERT, or has the roles USER_AUTH_DELETE, or USER_AUTH_EDIT assigned.

For more information, see Additional Roles for Master Data, Processes and Administration [page 350].

**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, and parent organizational unit 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.

### 7.4.3 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.

   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
4. Choose Assign in the Models section.
5. Select the relevant models in the Select Models window.
6. Choose Assign to save the changes.

7.4.4 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.
5. Choose Assign to save the changes.

### 7.4.5 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.

### 7.4.6 Assigning Role Collections

**Context**

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 Maintenance and Service, on premise edition. 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 369]

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 Maintenance and Service (PdMS), cloud edition, 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 369]
8 Configuring SAP Predictive Maintenance and Service, cloud edition

Context

To configure SAP Predictive Maintenance and Service, cloud edition, it is recommended to follow the configuration order described in this chapter.

Procedure

1. Configure application settings as described in the chapter Application Settings [page 348]
2. Configure equipment modeling capabilities. For more information, see https://help.sap.com/viewer/067e3d8253654398996ec49271b7441a/1906/en-US/697e20cec0af47d98ea3b76e37c893.html
3. Create and publish your required equipment. For more information, see Creating a Piece of Equipment [page 73] and the topic Important Information When Creating Equipment in SAP Predictive Maintenance and Service, cloud edition in the Getting Started guide
4. Create alert types for alerts as described in Adding Alert Types [page 227]
5. For the alert type created using step 4, the alerts can be created as described in Creating Alerts [page 374]
6. Configure the machine learning engine as described in the chapters Machine Learning Engine [page 251].
7. Perform all configuration steps for analytics dashboards as described in the chapter Configuring SAP Analytics Cloud and Analytics Dashboards [page 378].
8. Configure the Explorer and analysis tool variants as described in the chapter Explorer and Analysis Tools Configuration [page 386].

8.1 Accessing Applications and Functions

Here is an overview of how to reach the various applications and functions for SAP Predictive Maintenance and Service, cloud edition

Access URLs

You can access the SAP Fiori launchpad URLs by choosing Go to Application on the subscription applications in SAP Cloud Platform Cockpit. For more information, see Setting up Account.
The SAP Fiori launchpad URLs give you access to all the available applications. There are two types of SAP Fiori launchpad available. The individual SAP Fiori launchpad for SAP Predictive Maintenance and Service, cloud edition and the SAP Intelligent Asset Management Fiori launchpad that includes the applications from the SAP Intelligent Asset Management relevant products on a single SAP Fiori launchpad based on your subscriptions.

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 Predictive Maintenance and Service Fiori launchpad for a standard license</td>
<td>https://&lt;subaccount&gt;.pdms-sap.cfapps.eu10.hana.ondemand.com</td>
</tr>
<tr>
<td>SAP Predictive Maintenance and Service Fiori launchpad for a test and demo license</td>
<td>https://&lt;subaccount&gt;.pdms-sap-pr.cfapps.eu10.hana.ondemand.com</td>
</tr>
<tr>
<td>SAP Intelligent Asset Management Fiori launchpad for a standard license</td>
<td>https://&lt;subaccount&gt;.iam.cfapps.eu10.hana.ondemand.com</td>
</tr>
<tr>
<td>SAP Intelligent Asset Management Fiori launchpad for a test and demo license</td>
<td>https://&lt;subaccount&gt;.iam-pr.cfapps.eu10.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.

### 8.2 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, two external IDs are created.
8.3 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.

- **i 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 232]. For more general information about templates, see Managing Templates [page 211].
- 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 105]. To add model components, refer to Adding Model Components [page 111]. For more general information, see Managing Models [page 104].

**Related Information**

Configuring SAP Predictive Maintenance and Service, cloud edition [page 371]

8.4 Equipment Alarms

Alerts can also be created by alarms raised by equipment. The configuration for the equipment alarms mapping details allow the equipment 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 Equipment. You can also define the deduplication configuration to reduce the duplication of similar alerts. For more information, refer Adding Alert Types [page 227]

2. Define alert type groups for the alert type created. For more information, refer Adding Alert Type Groups [page 230]

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 113]

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 245]

Related Information

Creating Alerts [page 374]
Creating Rules [page 245]

8.5 Creating Alerts

You can create alerts for the alert types using the following service:

Request
- URL: https://<Application_URL>/ain/services/api/v1/alerts

i Note
Do not call SAP IoT Application Enablement APIs directly as it will impact deduplication and other processing logic.

Event Object Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Type</th>
<th>Mandatory (For Alerts)</th>
<th>Maximum Length</th>
<th>Sample Value</th>
<th>Corresponding Alerts Column Name</th>
<th>Corresponding Alerts Column Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>correlationId</td>
<td>numeric</td>
<td>No</td>
<td>32</td>
<td>854417525154</td>
<td>Not displayed</td>
<td>Unique identifier to group all related events</td>
</tr>
<tr>
<td>Property</td>
<td>Type</td>
<td>Mandatory (For Alerts)</td>
<td>Maximum Length</td>
<td>Sample Value</td>
<td>Corresponding Alerts Column Name</td>
<td>Corresponding Alerts Column Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------</td>
<td>------------------------</td>
<td>----------------</td>
<td>---------------------------------------</td>
<td>----------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>businessTimeStamp</td>
<td>string</td>
<td>Yes</td>
<td>24</td>
<td>2018-04-04T10:00:00Z</td>
<td>Created, Last Updated</td>
<td>Business time-stamp corresponding to the event that is created. UTC timestamp</td>
</tr>
<tr>
<td>type</td>
<td>string</td>
<td>Yes</td>
<td>71</td>
<td>sap-iotaeexplorer.pdms.events:AlertsPST</td>
<td>Type</td>
<td>Type of event. Format is &lt;tenant&gt;.pdms.events:AlertsPST. This is used in 2D chart and the format must be followed.</td>
</tr>
<tr>
<td>eventType</td>
<td>string</td>
<td>Yes</td>
<td>81</td>
<td>sap-iotaeexplorer.pdms.events:E_TemperatureExceeded</td>
<td>Alert Type</td>
<td>Name of the alert type. Format is &lt;tenant&gt;.pdms.events:E_&lt;AlertType_Name&gt;</td>
</tr>
<tr>
<td>status</td>
<td>string</td>
<td>Yes</td>
<td>50</td>
<td>New</td>
<td>Status</td>
<td>Status of event. Only New is allowed.</td>
</tr>
<tr>
<td>code</td>
<td>string</td>
<td>No</td>
<td>32</td>
<td>ErrorCode</td>
<td>Code</td>
<td>This field corresponds to error code field defined during alert type creation</td>
</tr>
<tr>
<td>severity</td>
<td>integer</td>
<td>Yes</td>
<td>1</td>
<td>Severity</td>
<td>Severity</td>
<td>Severity of the event. This value is selected when creating alert type with the options: Information(1), Warning(2), and Error(3).</td>
</tr>
</tbody>
</table>

Severities:
- Information (1)
- Warning (2)
- Error (3)
<table>
<thead>
<tr>
<th>Property</th>
<th>Type</th>
<th>Mandatory (For Alerts)</th>
<th>Maximum Length</th>
<th>Sample Value</th>
<th>Corresponding Alerts Column Name</th>
<th>Corresponding Alerts Column Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>thingId</td>
<td>String</td>
<td>Yes</td>
<td>32</td>
<td>6DAC315F1809 40CB9AAFDC3 2EE808BC0</td>
<td>Component ID</td>
<td>Thing ID corresponding to the event created. You can get this value from the external ID hyperlink provided in the Equipment page. Other columns such as the Equipment ID, Equipment Name, Equipment External ID, Component Name, and Component External ID are derived using this information.</td>
</tr>
<tr>
<td>thingProperty</td>
<td>String</td>
<td>Yes</td>
<td>255</td>
<td>sap-io-taeexplorer.com.sap.asset.tt:M_200_Series/IG_Rotating_Equipment_Mea/I_Bearing_Temperature</td>
<td>Measured Property</td>
<td>Thing property corresponding to the event created. Format is &lt;tenant&gt;.com.sap.asset.tt:M_&lt;ModelName&gt;/IG_&lt;IndicatorGroupName&gt;/I_&lt;IndicatorName&gt;</td>
</tr>
<tr>
<td>AlertDescription</td>
<td>String</td>
<td>Yes</td>
<td>50</td>
<td>Bearing overheating</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>Property</td>
<td>Type</td>
<td>Mandatory (For Alerts)</td>
<td>Maximum Length</td>
<td>Sample Value</td>
<td>Corresponding Alerts Column Name</td>
<td>Corresponding Alerts Column Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------</td>
<td>------------------------</td>
<td>----------------</td>
<td>---------------</td>
<td>----------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>AlertSource</td>
<td>String</td>
<td>Yes</td>
<td>50</td>
<td>Machine</td>
<td>Source</td>
<td>Machine indicates that the alerts are created by machine and not by rules. Rule indicates otherwise.</td>
</tr>
<tr>
<td>Created Time-stamp</td>
<td>String</td>
<td>Yes</td>
<td>24</td>
<td>2018-04-04T10:00:00Z</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sample Code**

```json
{
  "correlationId": "854417525154",
  "businessTimeStamp": "2018-04-04T10:00:00Z",
  "type": "<tenant>.pdms.events:AlertsPST",
  "eventType": "<tenant>.pdms.events:E_<AlertTypeName>",
  "status": "New",
  "severity": 2,
  "code": "ErrorCode",
  "thingId": "E6AC315F180940CB9AAFDCA2EE808BC0",
  "thingProperty": "<tenant>.com.sap.asset.tt:M_<Model name>/IG_<Indicator group name>/I_<Indicator name>",
  "alert_details": {
    "AlertDescription": "Bearing Overheating",
    "AlertSource": "Machine"
    "CreatedTimeStamp": "2018-08-08T10:22:00Z"
  }
}
```

**Note**

Status should be **New**

Values of created timestamp should be same as business timestamp

Value of severity should be same as mentioned in AlertType

Code value should be same as error code as mentioned while creating AlertType. If no error code is defined, use **None**

Indicator value should be the same as used while creating the alert type

Event type can be fetched from the AlertType External ID that is available in the Alert Type list view

Thing ID corresponds to equipment IDs external ID and can be fetched from Equipment's `pdmsSysThing` external ID from the Equipment page under the External ID hyperlink
Response

Response Status and Error Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>An event with correlation ID created</td>
</tr>
</tbody>
</table>

For more information, refer SAP Leonardo IoT

Related Information

Configuring SAP Predictive Maintenance and Service, cloud edition [page 371]

8.6 Configuring SAP Analytics Cloud and Analytics Dashboards

This topic describes how to configure SAP Analytics Cloud and analytics dashboards in SAP Predictive Maintenance and Service, cloud edition to view analytics dashboards.

Context

In order that a business user can view analytics dashboards in SAP Predictive Maintenance and Service, cloud edition, multiple steps are required.

Procedure

Steps related to SAP Analytics Cloud:
1. Request a license for SAP Analytics Cloud and activate your account. For more information about SAP Analytics Cloud, see SAP Analytics Cloud .
2. Create a data connection in SAP Analytics Cloud to use data from SAP Predictive Maintenance and Service, cloud edition. For more information, see Import Data Connection to OData Services.
3. Create a model in SAP Analytics Cloud. For more information, see Creating Your First Model and Creating a New Model.

4. Create a story in SAP Analytics Cloud. For more information, see Creating Your First Story and Creating a New Story.

5. Set up a data replication schedule in SAP Analytics Cloud to regularly refresh data from your data source. For more information, see Updating and Scheduling Models.

6. Create a new user in SAP Analytics Cloud for the user from SAP Predictive Maintenance and Service, cloud edition who wants to view analytics dashboards and assign the BI Content Viewer role with read privileges to the user. For more information, see Creating a New User and Assigning Roles to Users.

i Note

The user is identified by the email address. This means that the email address needs to be the identical in both systems so that the user can view analytics dashboards later.

7. Share the story with the created user. For more information, see Sharing Stories.

→ 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 Maintenance and Service, cloud edition:

8. Create a destination for SAP Analytics Cloud. For more information, see Creating a Destination for SAP Analytics Cloud [page 380].


10. Configure the analytics dashboards types in SAP Predictive Maintenance and Service, cloud edition. For more information, see Configuring Analytics Dashboard Types [page 382].

Related Information

Analytics Dashboards [page 55]
SAP Analytics Cloud
8.6.1 Creating a Destination for SAP Analytics Cloud

This topic describes how to create a destination for SAP Analytics Cloud using OAuth2SAMLBearerAssertion authorization flow.

Prerequisites

You have performed all steps related to SAP Analytics Cloud. For more information, see Configuring SAP Analytics Cloud and Analytics Dashboards [page 378].

Procedure

2. Choose Tenant Connectivity Destinations.
3. The Destination Configuration screen is displayed.
4. Fill in the following fields:

<table>
<thead>
<tr>
<th>Name</th>
<th>SAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>HTTP</td>
</tr>
<tr>
<td>Description</td>
<td>Enter a description to provide additional information.</td>
</tr>
<tr>
<td>URL</td>
<td>Copy and paste your home URL when you log on to SAP Analytics Cloud.</td>
</tr>
<tr>
<td>Proxy Type</td>
<td>Internet</td>
</tr>
<tr>
<td>Authentication</td>
<td>OAuth2SAMLBearerAssertion</td>
</tr>
<tr>
<td>Audience</td>
<td>Paste the entity ID from SAP Analytics Cloud (SAC). To paste the entity ID, open the URL https://&lt;SAC_tenant_subdomain&gt;.authentication.sap.hana.ondemand.com/info. For example, <a href="https://acme.authentication.sap.hana.ondemand.com/info">https://acme.authentication.sap.hana.ondemand.com/info</a>. The entity ID is then displayed in the response.</td>
</tr>
</tbody>
</table>

Application Help for SAP Predictive Maintenance and Service, cloud edition

Configuring SAP Predictive Maintenance and Service, cloud edition
Client Key

Paste your client secret from SAP Analytics Cloud.

To paste the client secret, open SAP Analytics Cloud and create a new OAuth client for SAP data center with Interactivate Usage as purpose. The client secret is then displayed.

⚠️ Caution

Do not share this client secret with anyone.

For more information about creating OAuth clients, see Managing OAuth Clients.

Token Service URL

Paste your token service URL from SAP Analytics Cloud.


Token Service URL Type

Dedicated

Token Service User

Paste your client ID from SAP Analytics Cloud.

The client ID is displayed when you have added a new OAuth client.

Token Service Password

Paste your client secret from SAP Analytics Cloud.

The client secret is displayed when you have added a new OAuth client.

System User

Leave this field empty.

5. Choose New Property.

The Additional Properties fields are displayed.

6. In the left field, enter authnContextClassRef.

7. In the right field, enter urn:oasis:names:tc:SAML:2.0.

8. Activate the Use default JDK truststore checkbox if it is not activated.

9. Choose Save.

Results

The authorization for SAP Analytics Cloud is created.
8.6.2 Configuring Analytics Dashboard Types

This topic describes how to configure analytics dashboard types in SAP Predictive Maintenance and Service, cloud edition.

Prerequisites

- You have configured SAP Analytics Cloud as an external system in SAP Predictive Maintenance and Service, cloud edition. For more information, see Configuring SAP Analytics Cloud in SAP Predictive Maintenance and Service, cloud edition.
- 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. To configure analytics dashboard types, choose between the following options:
   - Configure analytics dashboards for the application. For more information, see Configuring Analytics Dashboards for the Application [page 383].
   - Configure analytics dashboards for the object pages. For more information, see Configuring Analytics Dashboards for the Object Pages [page 384].

Results

The analytics dashboard types are configured. Depending on your configuration, the business user can now view the dashboard either in the Analytics Dashboards application or on the respective object pages. For more information, see Viewing Analytics Dashboards in the Application [page 57] and Viewing Analytics Dashboards on Object Pages [page 58].
You can later edit configured dashboards by selecting the dashboard and choosing Edit. You can also delete dashboards by either selecting the dashboard and choosing Delete when you have configured a dashboard for the application or choosing Edit and deleting the story URL in the dialog box when you have configured a dashboard for the object pages. Once you have deleted a dashboard, it is no longer available for the business user.

Related Information

Configuring SAP Analytics Cloud and Analytics Dashboards [page 378]

8.6.2.1 Configuring Analytics Dashboards for the Application

This topic describes how to configure analytics dashboards for the Analytics Dashboards application in SAP Predictive Maintenance and Service, cloud edition.

Context

When configuring analytics dashboards, you have different options. One option is to configure analytics dashboards for the application.

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 entries:

   | Title | Enter a name for the dashboard. This name is later displayed in the Analytics Dashboards application. |
Story URL

Paste the URL of your story from SAP Analytics Cloud.

To paste the URL, open a story in SAP Analytics Cloud (SAC), copy the URL, replace the <hostname:router> from the story URL with your SAP Predictive Maintenance and Service, cloud edition (PdMS) tenant, and add the parameter ;mode=embed at the end of the URL.

Example

https://<hostname:router from PdMS>/sap/fpa/ui/tenants/<SAC_tenant>/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 Dashboard Types [page 382]

8.6.2.2 Configuring Analytics Dashboards for the Object Pages

This topic describes how to configure analytics dashboards for the object pages in SAP Predictive Maintenance and Service, cloud edition.

Context

When configuring analytics dashboards, you have different options. One option is to configure analytics dashboards on the object pages.
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 entries:

   **Story URL**
   - Paste the URL of your story from SAP Analytics Cloud.
   - To paste the URL, open a story in SAP Analytics Cloud (SAC), copy the URL, replace the <hostname:router> from the story URL with your SAP Predictive Maintenance and Service, cloud edition (PdMS) tenant, and add the parameter ;mode=embed at the end of the URL.

   **Example**
   - The following example shows the structure of the URL: https://<hostname:router from PdMS>/sap/fpa/ui/tenants/<SAC_tenant>/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 a model in SAP Analytics Cloud (SAC) and copy the model ID from the displayed model URL.

   **Example**
   - The following example shows the structure of the URL with the model ID at the end: https://<system URL from SAC>/sap/fpa/ui/app.html#;view_id=model;modelId=<model_id>
The dimension of your business object. The dimension filters the story data by a specific business object ID, for example, the ID of a 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 Dashboard Types [page 382]

### 8.7 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 388].

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>Entries to Configure Alerts [page 389]</td>
<td>Analysis tool with variants</td>
</tr>
<tr>
<td>Equipment Indicators</td>
<td>Entries to Configure Equipment Indicators [page 391]</td>
<td>Analysis tool with variants</td>
</tr>
<tr>
<td>Explorer</td>
<td>Entries to Configure the Explorer [page 392]</td>
<td>Application</td>
</tr>
<tr>
<td>Explorer Global Filter</td>
<td>Entries to Configure the Explorer Global Filter [page 393]</td>
<td>Filter with variants</td>
</tr>
<tr>
<td>Indicator Chart</td>
<td>Entries to Configure the Indicator Chart [page 394]</td>
<td>Analysis tool with variants</td>
</tr>
<tr>
<td>Map</td>
<td>Entries to Configure the Map [page 396]</td>
<td>Analysis tool with variants</td>
</tr>
<tr>
<td>Notifications</td>
<td>Entries to Configure Notifications [page 402]</td>
<td>Analysis tool with variants</td>
</tr>
<tr>
<td>Work Orders</td>
<td>Entries to Configure Work Orders [page 403]</td>
<td>Analysis tool with variants</td>
</tr>
<tr>
<td>Equipment Scores (Obsolete)</td>
<td>Entries to Configure Equipment Scores (Obsolete) [page 405]</td>
<td>Analysis tool with variants</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>Add a new configuration variant.</td>
</tr>
<tr>
<td>Save</td>
<td>Save your configuration.</td>
</tr>
<tr>
<td>Cancel</td>
<td>While configuring, you can cancel your configuration.</td>
</tr>
<tr>
<td>Copy</td>
<td>Copy an existing configuration variant and adjust it.</td>
</tr>
</tbody>
</table>
### Function Description

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Delete</strong></td>
<td>Delete an existing configuration variant.</td>
</tr>
<tr>
<td><strong>Restore Default</strong></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 [SAP Predictive Maintenance and Service, cloud edition 1906](#) [page 6]

### Related Information

Configuring SAP Predictive Maintenance and Service, cloud edition [page 371]

### 8.7.1 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
- A preconfigured variant for the Explorer global filter
- A preconfigured variant for the Explorer including all analysis tools with their preconfigured variants

The settings of the preconfigured variants can differ in every release.
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 386]

8.7.2 Entries to Configure Alerts

You can define variants of this analysis tool. These variants can then be selected by business users from the Explorer.

i Note

We also deliver a preconfigured variant titled Alerts - SAP Default For more information on preconfigured variant, refer Preconfigured Variants [page 388]

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 descending order. The first entry in this list is the default in the alert list.

**Table Details**

In the Alerts analysis tool when you click on an alert you navigate in-place to the indicator chart. Next to the 2D chart you can define further tabs providing more information. In this section 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**

Entries to Map Labels

<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 386]
*Alerts* [page 20]
8.7.3 Entries to Configure Equipment Indicators

You can define variants of this analysis tool. These variants can then be selected by business users from the Explorer.

**Note**
We also deliver a preconfigured variant titled **Equipment Indicators - SAP Default**. For information about preconfigured variants, refer [Preconfigured Variants](page 388).

**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.

**Entries to Define the Columns Displayed in the Equipment Indicators List**

<table>
<thead>
<tr>
<th>Entry 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 <strong>Equipment Indicators</strong> 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 desending order.

**Labels and Translations**

**Entries to Map Labels**

<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>
</tbody>
</table>
Field | Description
---|---
Variant Name | Enter a name for the variant. The name is visible when you select a variant for the analysis tool in the Explorer.
Variant Description | Enter a description to provide more details about the variant. The description is visible in the Variants pane in the configuration screen.

Related Information

Explorer and Analysis Tools Configuration [page 386]
Equipment Indicators [page 27]

8.7.4 Entries to Configure 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 Maintenance and Service preserves the order of analysis tools made by business users in the Explorer and on the Details object page.

Note
We also deliver a preconfigured variant for the Explorer with a predefined order of the analysis tools. For more information about preconfigured variants, see Preconfigured Variants [page 388].

Content

Entries to Define the Analysis Tools Displayed by Default When Logging On to the Explorer for the First Time

Field | Description
---|---
Analysis Tool | You specify the type of analysis tool, for example, Alerts.
Variant | You specify the variant of the specified analysis tool, for example, Work Orders - Pump Variant.
Labels and Translations

Entries to Map Labels

<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>You can use the variant name to specify, for example, a role suitable for this Explorer variant.</td>
</tr>
<tr>
<td>Variant Description</td>
<td>You can use the variant description to provide more details about, for example, the role that uses this Explorer variant.</td>
</tr>
</tbody>
</table>

8.7.5  Entries to Configure the Explorer Global Filter

You can define variants including various filters. These variants can then be selected by business users in the Explorer.

i Note
We also deliver a preconfigured variant titled Explorer Global Filter - SAP Default. For more information about preconfigured variants, see Preconfigured Variants [page 388].

Filters

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>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>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>The abstract representation of an equipment that holds the specifications defined for that equipment.</td>
</tr>
<tr>
<td>Location</td>
<td>The location where your equipment is installed.</td>
</tr>
<tr>
<td>Phase</td>
<td>The phase to which the equipment relates, for example, planned or sold.</td>
</tr>
</tbody>
</table>
### Field Description

**Manufacturer**
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.

**Operator**
The operator who maintains additional information specific to a piece of equipment.

### 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>

### 8.7.6 Entries to Configure the Indicator Chart

When navigating to the Indicator Chart from Alerts, the indicator chart displays the first variant defined in the Indicator Chart configuration.

---

**i Note**
We also deliver a preconfigured variant titled **Indicator Chart - SAP Default**. For more information about preconfigured variants, refer **Preconfigured Variants [page 388]**

### 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.

### Time Filters

Only five time filters can be added for a variant

**Indicator Chart Settings**

<table>
<thead>
<tr>
<th>Entry Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Text Key</strong></td>
<td>Key of the time interval</td>
</tr>
<tr>
<td><strong>Text</strong></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><strong>Value</strong></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><strong>Unit</strong></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

#### Entries to Map Labels

<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 386]
- Features in Indicator Chart [page 38]

### 8.7.7 Entries to Configure the Map

You can define variants of this analysis tool. These variants can then be selected by business users in the Explorer.

**Note**

We also deliver a preconfigured variant titled *Map - SAP Default*. This preconfigured variant 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 (models and indicators). These settings are customer-specific and therefore cannot be added to the preconfigured variant.

For more information about preconfigured variants, see Preconfigured Variants [page 388].
Map Settings

<table>
<thead>
<tr>
<th>Entry Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoom Level</td>
<td>Specifies the initial zoom level when you open this map variant</td>
</tr>
<tr>
<td>Latitude</td>
<td>Initial focus of latitude of the map</td>
</tr>
<tr>
<td>Longitude</td>
<td>Initial focus of longitude of the map</td>
</tr>
</tbody>
</table>

Layers

In the map settings you can configure base layer settings and overlay layer settings.

i Note
When using multiple layers, each layer must have a different layer number.

You can use the following tile providers:
- OpenStreetMap
- Esri

Base Layers

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layer Name</td>
<td>Name of the base layer</td>
</tr>
</tbody>
</table>

i Note
This name should be unique for each layer. The name is displayed later on the UI of the map.
### Field Description

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Layer Type** | Type of the base layer  
You can choose between the following types:  
- **xyz**  
  If you choose this type, make sure you specify a [Layer URL](#).  
- **esri**  
  If you choose this type, make sure you specify an esri Base Layer Type. |
| **Layer URL**  | URL template of the tile provider for the base layer  
**Note**  
When using Open Street Maps with 'https', use `layerUrl`:  
`https://{s}.tile.openstreetmap.org/{z}/{x}/{y}.png`  
**Note**  
Select the **Mandatory** checkbox if you fill in this entry field. |
| **Layer Parameters** | Specifies the base layer type if the base layer is of type esri.  
For more information about esri base layer types, see [http://www.esri.com/data/basemaps](http://www.esri.com/data/basemaps).  
**Note**  
Select the **Mandatory** checkbox if you have filled in this entry field. |
| **Attribution** | A string that defines the copyright of the map provider. You can also include an HTML link that leads to the copyrights of the map provider.  
**Example**  
© Mapbox  
**Note**  
Select the **Mandatory** checkbox if you have filled in this entry field. |
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application ID</strong></td>
<td><em>Note</em>&lt;br&gt;Fill in this entry field if you are using Nokia HERE Maps as the tile provider.&lt;br&gt;App ID used to register with the tile provider.</td>
</tr>
<tr>
<td><strong>Application Code</strong></td>
<td><em>Note</em>&lt;br&gt;Fill in this entry field if you are using Nokia HERE Maps.&lt;br&gt;App code used to register with the tile provider.</td>
</tr>
<tr>
<td><strong>Subdomains</strong></td>
<td><em>Note</em>&lt;br&gt;Fill in this entry field if your tile provider uses subdomains.&lt;br&gt;For more information about subdomains and subdomain prefixes, see <a href="https://developer.here.com/news/201602172#.V-Fc2U1pDct">https://developer.here.com/news/201602172#.V-Fc2U1pDct</a>.&lt;br&gt;<em>Note</em> Select the <em>Mandatory</em> checkbox if you have filled in this entry field.</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Map ID</strong></td>
<td>Version of the map</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>Fill in this entry field according to the requirements and conventions of your tile provider.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>Select the Mandatory checkbox if you have filled in this entry field.</td>
</tr>
<tr>
<td><strong>Base</strong></td>
<td>Map type such as panorama, traffic, or base</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>Fill in this entry field according to the requirements and conventions of your tile provider.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>Select the Mandatory checkbox if you have filled in this entry field.</td>
</tr>
<tr>
<td><strong>Maximum Zoom</strong></td>
<td>Maximum number of levels for zooming into the base layer</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>This setting overrules the generic map zoom level.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>Select the Mandatory checkbox if you have filled in this entry field.</td>
</tr>
<tr>
<td><strong>Initial Base Layer</strong></td>
<td>Value true sets this base layer as the default base layer.</td>
</tr>
<tr>
<td><strong>Hide Logo</strong></td>
<td>Select this checkbox if the logo of the tile provider should not be visible on the map.</td>
</tr>
</tbody>
</table>
### Overlay Layers

#### Overlay Layer Settings

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model ID</strong></td>
<td>Select a model or multiple models from the list provided in the popup. The ID of the selected models is displayed later in the Map Analysis tool's overlay dropdown menu in the top right hand corner.</td>
</tr>
</tbody>
</table>

**Clustering**

You can choose between the following values:

- **Marker**: Equipment is displayed on the map individually.
- **Cluster**: 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.
  - The spider leg only works with clusters at maximum zoom level.
  - If no cluster is configured, the spider leg does not work.

**Remove Cluster at Zoom Level**

Define at which zoom level clusters are removed.

**Note**

The zoom level furthest from Earth is 1.

**Note**

For spider legs to work, the configuration capability to limit clustering to a zoom level has to be inactive. To do this make sure you enter a number that is one higher than the maximum zoom levels for the backdrop maps under *Remove Cluster at Zoom Level*.

### Labels and Translations

#### Entries to Map Labels

<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>
</tbody>
</table>
### Field Description

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<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 386]

### 8.7.8 Entries to Configure Notifications

You can define variants of this analysis tool. These variants can then be selected by business users from the Explorer.

**i Note**

We also deliver a preconfigured variant titled Notifications - SAP Default. For more information on preconfigured variant, refer Preconfigured Variants [page 388]

### 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

Entries to Map labels

<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 386]
Work Orders [page 34]

8.7.9 Entries to Configure Work Orders

You can define variants of this analysis tool. These variants can then be selected by business users from the Explorer.

i Note

We also deliver a preconfigured variant titled Work Order - SAP Default. For more information on preconfigured variants, refer Preconfigured Variants [page 388]
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

Entries to Map Labels

<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>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 386]
Work Orders [page 34]

8.7.10 Entries to Configure Equipment Scores (Obsolete)

i Note

You can define variants of this analysis tool. These variants can then be selected by business users from the Analysis Tools Catalog.
Columns

Entries to Define the Columns Displayed in the Equipment Scores List

<table>
<thead>
<tr>
<th>Entry Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attribute/Indicator</strong></td>
<td>Specifies attributes/indicators to select from your data model (for example, Thing model). You can configure the following attributes/indicators:</td>
</tr>
<tr>
<td></td>
<td>● Equipment/component attributes/indicators</td>
</tr>
<tr>
<td></td>
<td>○ <code>AssetID</code></td>
</tr>
<tr>
<td></td>
<td>○ <code>AssetExternalID</code></td>
</tr>
<tr>
<td></td>
<td>○ <code>AssetName</code></td>
</tr>
<tr>
<td></td>
<td>○ <code>AssetDescription</code></td>
</tr>
<tr>
<td></td>
<td>○ <code>AssetThingType</code></td>
</tr>
<tr>
<td></td>
<td>○ <code>ComponentID</code></td>
</tr>
<tr>
<td></td>
<td>○ <code>ComponentExternalID</code></td>
</tr>
<tr>
<td></td>
<td>○ <code>ComponentName</code></td>
</tr>
<tr>
<td></td>
<td>○ <code>ComponentDescription</code></td>
</tr>
<tr>
<td></td>
<td>○ <code>ComponentThingType</code></td>
</tr>
<tr>
<td></td>
<td>○ <strong>iNote</strong></td>
</tr>
<tr>
<td></td>
<td>Enter the attributes/indicators <em>exactly</em> as displayed above taking account of the upper and lower case letters.</td>
</tr>
<tr>
<td></td>
<td>If there is an error in any of the configured attributes/indicators (for example, a typo or a not existing field), the tool will display no data at all.</td>
</tr>
<tr>
<td></td>
<td>● Master data and time series attributes/indicators: <code>&lt;tenant&gt;&lt;PropertySetType&gt;/&lt;PropertySet&gt;/&lt;Property&gt;</code> For example, <code>tenant.com.sap.pdms.assets.pumps:AssetMasterData/masterData/Manufacturer</code></td>
</tr>
<tr>
<td></td>
<td>● Scores: <code>&lt;tenant&gt;&lt;PropertySetType&gt;/&lt;algorithm&gt;/&lt;Property&gt;</code></td>
</tr>
<tr>
<td></td>
<td>The following machine learning algorithms can be used to display scores:</td>
</tr>
<tr>
<td></td>
<td>○ <code>PCA</code></td>
</tr>
<tr>
<td></td>
<td>○ <code>EMD</code></td>
</tr>
<tr>
<td></td>
<td>○ <code>TEC</code></td>
</tr>
<tr>
<td></td>
<td>○ <code>MAR</code></td>
</tr>
<tr>
<td></td>
<td>○ <code>PAM</code></td>
</tr>
<tr>
<td>Entry Field</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| ○ SVM       | For example, 
  *tenant.com.sap.pdms.datascience.scori*
  *ng:MAR/MAR/normalised_score* |

**Note**

When you configure self-created property set types, ensure that all of these property set types are assigned to all thing types that you want to see in the equipment scores table. Equipment that do not have all property set types assigned will otherwise not be displayed in the equipment scores list.

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Data type of the column value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>You can select the following values:</td>
</tr>
<tr>
<td></td>
<td>● string</td>
</tr>
<tr>
<td></td>
<td>● float</td>
</tr>
<tr>
<td></td>
<td>● integer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Label ID</th>
<th>Key to which a translatable label is mapped in the section <em>Labels and Translations</em></th>
</tr>
</thead>
</table>

**Note**

The label mapped to this key becomes the column header description displayed in the *Equipment Scores* analysis tool.

<table>
<thead>
<tr>
<th>Visible by Default</th>
<th>If you activate this check box, the column is displayed in the <em>Equipment Scores</em> analysis tool by default.</th>
</tr>
</thead>
</table>

### Filters

In this section, you define the default filter for the attributes/indicators. The analysis tool display the contents according to these filters. The values are:

- Contains
- Equals to
- Starts with
- Between
- Ends with
- Less than
- Less than or equal to
• Greater than
• Greater than or equal to

**Sorting**

In this section, you define the attributes/indicators according to which the columns are sorted.

**Labels and Translations**

Entries to Map Labels

<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>The variant name you enter here is visible when you select the variant from the analysis tools catalog.</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>
<tr>
<td>&lt;Label ID&gt;</td>
<td>Give the label ID a text that will be displayed on the user interface.</td>
</tr>
</tbody>
</table>

**Related Information**

Explorer and Analysis Tools Configuration [page 386]
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