1 Introduction.................................................................................................................. 4
2 Design the Catalog........................................................................................................... 4
  2.1 Property Set.............................................................................................................. 4
  2.2 Category .................................................................................................................. 5
  2.3 Plant Information Maintenance.................................................................................. 6
  2.3.1 Plant Information Sources.................................................................................... 6
  2.3.2 Plant Information Catalog..................................................................................... 7
  2.4 Change Management............................................................................................... 14
    2.4.1 Change List....................................................................................................... 14
    2.4.1.1 Create a new change List............................................................................... 15
    2.4.1.2 Setting Change List to Default................................................................. 17
    2.4.1.3 Associate a change to a change List......................................................... 17
    2.4.1.4 Change List - Detailed View...................................................................... 18
    2.4.1.5 Reset Change List...................................................................................... 20
    2.4.1.6 Submit For Approval.................................................................................. 21
    2.4.1.7 E-Mail Notification..................................................................................... 21
    2.4.1.8 Setting an Admin Account for E-mail Notification.................................. 22
    2.4.2 Approval.......................................................................................................... 23
      2.4.2.1 Change List - Approved................................................................. 23
      2.4.2.2 Change List – Reject................................................................. 23
      2.4.2.3 Viewing Details.................................................................................... 25
1 Introduction

This document will explain the various features of Catalog Services functionality.

Catalog services are used to logically group shop floor assets in a hierarchical structure with aliases and hierarchies understandable from a business user’s point of view. The feature can broadly be divided into 2 parts namely ‘Designing’ and ‘Consuming’ the Plant Catalog/Hierarchy.

The designing or creation of the catalog is tracked through a change management process.

2 Design the Catalog

The designing of catalog has can be done by following the below mentioned steps and creation of property sets and categories are not mandatory.

2.1 Property Set

The shop floor assets or the logical grouping of them will have a set of common properties for which the values might differ. In order to facilitate the user to add these properties which also are logically grouped, the ‘Property Sets’ screen/configuration allows users to define a set of properties and later assign the whole set to nodes in the ‘Plant Information’ screen.

The Property sets can be added edited and deleted using the corresponding buttons. The properties for a set can be defined using the ‘Add’ button in the ‘Properties’ tab.

The properties can have a description, data type and a typical value. The allowed set of data types are:

1. String
2. Integer
3. Double
4. Boolean

The ‘Usage’ tab displays the nodes in the ‘Plant Information Maintenance’ screen that are using the selected property set.

If the user tries to edit a property set that is being used by a node in PIM screen a popup is displayed asking whether the changes need to be pushed to the nodes using the property set. The user can selectively push the changes. The nodes that are not selected for update identify themselves with an ‘Out of sync’ status.

Note: The property set cannot be deleted if it is being using in the Plant Information Catalog.

2.2 Category

The measurable shop floor assets include the tags that are defined in various historians, SCADA systems and many more. These tags or measurement points can exist at different levels. For example: Electricity consumption at Plant level and electricity consumption at Work center level.

For this purpose we define the Category.

The Catalog Services section in the MII Administration screen contains a link named ‘Category’ where categories can be defined. The screen is as shown below:

The categories can be created, edited and deleted with the corresponding buttons available on the screen.

The property sets can be added to a category by using the ‘Add’ button in the ‘Property Sets’ tab.

The ‘Localization’ tab allows users to create language specific category names.
The ‘Usage’ tab displays the nodes in the Plant Information Maintenance that are assigned to the selected category.

If the user tries to edit a category that is being used by a node in ‘Plant Information maintenance’ screen, a popup appears asking whether to update the category with the latest property sets for the nodes. User can selectively push the changes. The nodes for which the changes are not pushed will identify themselves with an ‘Out of sync’ status.

**Note:** The category cannot be deleted if it is being using in the Plant Information Catalog.

### 2.3 Plant Information Maintenance

This screen is used to build the catalog. There are two sections in the screen:

#### 2.3.1 Plant Information Sources

This section lists down the PCo type data servers that are defined in the ‘Data Servers’ screen.
On selection of data server the groups and tags defined in the PCo system are populated in the respective tables. If the PCo data server selected does not have any groups, the user will be forced to enter a mask for tag search since the PCo systems may contain huge amount of tags.

Add groups/tags to Plant information catalog

There are 3 ways in which we can add a group/tag to PIC hierarchy:

- Select ‘Add to Catalog’ button in the Available Groups table to add the entire group structure.
- Select multiple tags in the Available tags table and choose ‘Add to Catalog’ button which adds the selected tags under the group selected in Plant Information Catalog section.
- Select a tag in Available tags section and select a tag in the Plant Information Catalog section and choose the ‘Map Tag’ button.

Usage

The ‘Usage’ button is used to show the mapping that exists between the selected tag and the nodes in PIC.

2.3.2 Plant Information Catalog

The Plant Information Catalog section is where the shop floor assets are arranged in a hierarchical manner understandable to the business user. In this section the user will be able to attach context information to the mapped assets.
Note: All the changes that are made are tracked through a change management system which is user based. Hence if the user who intends to edit the catalog he has to have an ‘Open’ change list; if not the system will prompt for creation of one. The details of the change list are explained in section 1.4

### Column descriptions

- **Name** – Name of the tag/group created  
- **Description** – Description of the node  
- **Namespace** – Namespace in the PIC hierarchy  
- **Operation** – Denotes whether the node is in New, Edit, Locked or Marked for delete.  
- **Inactive** – Applicable only for tags. It shows a disconnected symbol which means the underlying PCo tag has been removed from the PCo data server.  
- **Sync Status** - If the ‘Sync Status’ column in the table denotes ‘Out of sync’ then the reasons might be one of the below:  
  - **Category out of sync**: This means the property sets contained in the category have changed and the latest contents are not updated to the PIC node.  
  - **Property set out of sync**: This means the contents of the property sets associated with the node have changed and the latest contents are not updated in the PIC node.  
- **Category** – Denotes the category to which the node is assigned to.

### Details Tab strip

- **General** – This tab provides the basic details like namespace, description, tag alias, server, category, search keywords.
• **Property Sets** – This tab displays the property sets associated with the selected node.

- **Display Properties/Edit Properties** – This button displays the properties of a property set and the custom values for the properties. If the selected node is a tag it also displays the PCo metadata information. The button is displayed as ‘Edit Properties’ when the node is in edit mode. On clicking ‘Edit Properties’ the user can modify property values and assign PCo metadata information in case of a tag.

- **Synchronize** - The button ‘Synchronize’ here synchronizes only the property set selected and this requires the node to be in ‘Edit’ mode.

• **Custom Property** – This tab enables user to add properties that are specific to the node and the chances of reusability in other nodes are less.

• **Translate**

The description of the nodes created can be localized. This tab allows user to create language specific descriptions. If a language is chosen then the language specific description is mandatory.
- **Log**

This tab displays the actions that have been performed on the selected node. It also displays the creation time, user who created, modification time, modifier and the change list to which the object is associated.

--

**Button Options (New/Edit/Un-map/Refresh Mapping/Import/Export/Synchronize)**

All the below operations are tracked through a user based change management process. So if an object is being operated upon by a user then the other user will not be able to modify that node. The access restriction matrix is as given below:

1. The following matrix represents the operations that can be performed on the child, **when the parent is being edited/created/deleted/open** (no operation on the parent).

<table>
<thead>
<tr>
<th>Are the actions below possible for the user who is currently performing the operation on the parent?</th>
<th>Are the actions below possible for another user?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is Edit on child</td>
<td>Is Delete child</td>
</tr>
</tbody>
</table>
2. The following matrix represents the operations that can be performed on the parent, when the child is being edited/created/deleted/open (no operation on the child).

<table>
<thead>
<tr>
<th>Parent is being Edited</th>
<th>Parent is being Deleted</th>
<th>Parent is newly Created</th>
<th>Parent is Open (no operation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Y</td>
<td>N/A</td>
<td>Y</td>
</tr>
<tr>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Are the actions below possible for the user who is currently performing the operation on the child?</th>
<th>Are the actions below possible for another user?</th>
</tr>
</thead>
<tbody>
<tr>
<td>--------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Child is being Edited</td>
<td>Y</td>
</tr>
<tr>
<td>Child is being Deleted</td>
<td>Y</td>
</tr>
<tr>
<td>Child is newly Created</td>
<td>Y</td>
</tr>
<tr>
<td>Child is dead</td>
<td>Y</td>
</tr>
<tr>
<td>Child is Open (no operation)</td>
<td>Y</td>
</tr>
</tbody>
</table>

**New**
User can create a tag/group by clicking the 'New' button options and select the type accordingly.

**Edit**
The Edit button option allows the following operations.

- **Edit**: This operation allows the user to modify the details of a node like description, search keywords, property sets, properties and its values.

- **Cut/Copy/Paste**: Allows rearrangement of hierarchy. The objects that are cut are marked for delete and disappear physically only after the change management lifecycle is complete.

- **Delete**: User can delete nodes. The nodes deleted will move to a status called ‘Marked for delete’. These nodes physically disappear from the screen once the ‘change list’ through which all the changes are tracked completes its lifecycle.

- **Rename**: This operation marks for delete the hierarchy selected for rename and creates a new structure with the new name.

**Import/Export**

These buttons provide the transport capability.

- **Export** - The entire catalog which starts from the ‘Root’ node or a part of the catalog (by selecting a group) can be exported. The export will create an XML file.

- **Import** - The entire catalog or part of a catalog can be imported as an XML file into the hierarchy using this button. The property sets and categories associated with the nodes have to be present in the target system, else the import will fail.

  **Note**: The import from the MII Configuration screen does not impose the above restriction of presence of property sets and categories; instead it creates the missing ones.

**Un-map**

This button is used to remove the mapping of a PIC tag with a tag from Plant information sources.

**Refresh Mapping**

This button is used to refresh the metadata information associated with the selected tag. Example: If ‘Min’ is a metadata associated with a temperature tag and if the value
has changed on the PCo side in comparison with the previous value then the ‘Refresh Mapping’ gets the latest value from PCo.

**Synchronize**

If the ‘Sync Status’ column in the table denotes ‘Out of sync’ then the reasons might be one of the below:

- **Category out of sync**: This means the property sets contained in the category have changed and the latest contents are not updated to the PIC node.

- **Property set out of sync**: This means the contents of the property sets associated with the node have changed and the latest contents are not updated in the PIC node.

The ‘Synchronize’ button is used to update the latest information with respect to category and property sets associated with the selected nodes.

*Note: When the changes to category and property sets are made in the respective screens, the user is given an option to push those changes to the nodes PIC nodes where they are used.*

**Button Options (Expand All/Collapse All/Expand Group/Refresh/Search/Download PIC Schema)**

**Expand All/Collapse All**

These buttons are used to expand/collapse all the nodes in the catalog.

**Expand Group**

This button is used to expand the selected group by one level. It shows the immediate children for a group.

**Refresh**

This button refreshes the catalog and displays the ‘Root’ node.

**Search**

In the PIC there is a possibility of having huge number of tags/groups and hence identifying them will become difficult. Hence there is a search functionality provided based on various parameters. All the parameters are applied for search with an ‘AND’ condition. There are two types of search possible:

- **Basic Search**

  ![Basic search parameters](image)

- **Advanced Search**
The search can also be performed using the wildcard character ‘*’.

**Download PIC Schema**

This button enables you to download the PIC Schema which will be useful in importing and exporting the catalog. It also helps to validate the catalog built manually. The schema is attached as a file below:

CatalogSchema.xsd

### 2.4 Change Management

#### 2.4.1 Change List

The change list is like an activity in DTR or NWDI which holds details regarding the changes made to an object in *Plant Information Maintenance*. An object in *Plant Information Maintenance* refers to a Tag or a Tag Group which is undergoing changes.

The user would be able to create multiple change lists and associate the change lists with distinct objects. A single object cannot be part of multiple change lists.

The operations on the change lists would be triggered from the *Plant Information Maintenance* and would be maintained in a separate screen dedicated to change lists.

A change list can have one of the following statuses:

1. Open
2. Waiting for Approval
3. Rejected
4. Approved
5. Changes Applied

The operations on a change lists are as follows:

1. Create a new change list
2. Setting up a change list as default
   - If there are multiple change lists, then it is mandatory for the user to select one of the change lists as default.
3. See the details of the change list.
4. Reset the whole change list or an object of it.
5. Open a rejected / closed change list for edit
6. Submit the change list for approval.
Note: Only one change list can be set as default and the status for that should be open.

The change list would undergo the following lifecycle in the whole of the approval process:

- The text in the boxes are the states on the change list.
- The texts on the arrows are the actions to be performed on change list.

### 2.4.1.1 Create a new change List

The new change list can be created in the change list screen.

By default, the first change list that is created is marked as current.

#### 1. Change List Screen:
- On the SAP MII administration menu, choose Catalog Services → Change Lists.
- Choose New.
- The Create Change List screen appears.
- Enter the name and description in the fields.
- Choose OK.

A new change list with status Open is created.

If the change list created is the only OPEN change list, then it is marked as Current.
2. ETC Working Version:

The change list can be only created in the *Plant Information Maintenance* if and only if NO change list with status OPEN is present.

A similar pop up appears and the user can create a change list by entering the name and the description. The status of the change list is set to OPEN and it is marked as current.

- **Note**: If a particular object (Tag Group) has already been associated with a change list then the related changes or modifications would be associated with the same change list.

For Example, If an object is associated with a change list 'A ' and the user selects the different change list 'B' as current, then all the changes for that object would fall under the change list A.

3. Property Set Screen

The change list pop up will appear in the Property Set if and only if NO tag using a Property Set with status OPEN is present.
2.4.1.2 Setting Change List to Default

- On the SAP MII administration menu, choose Catalog Services → Change Lists.
- Select any change list and choose Set as Current.

The changes done on the Plant Information Maintenance screen will be reflected in the change list that is set as Current. You can always set any change list as current from the multiple changes lists available.

2.4.1.3 Associate a change to a change List

This happens in the Plant Information Maintenance screen.

Whenever an Object is selected and EDIT button is clicked, following validations are performed and the current state of the Object is updated in the change list on Save.

Validations:
1. Check whether the Selected Object is locked by others and is marked for delete.
2. If any of the above conditions are true, Change list will not be created.
3. If both the above conditions returns false, check whether the selected object is already associated to a Change list.
4. If Yes, all the changes to this object will go the corresponding Change list.
5. If No check whether any change list exists or not, if yes select the change list which is marked as default and add all the changes to this change list.
6. If no change list exists, ask the user to create a new change list, make this change list as default and add all the changes to this change list.

Operations for which a change list entry is created:
1. Create (Tag or Group)
2. Map a Tag
3. Add Tags/Groups to catalog
4. Cut, Copy and Paste
5. Delete
6. Edit
7. Un Map

All the operations are categorized into three categories: **NEW, EDIT, DELETE**

<table>
<thead>
<tr>
<th>Change List status</th>
<th>Object Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPEN</td>
<td>Locked if object is associated with a change list, else OPEN</td>
</tr>
<tr>
<td>CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>WAITING FOR APPROVAL</td>
<td>LOCKED FOR APPROVAL</td>
</tr>
<tr>
<td>APPROVED</td>
<td>LOCKED FOR APPROVAL</td>
</tr>
<tr>
<td>REJECTED</td>
<td>LOCKED FOR APPROVAL, OPEN if the change list is reset, LOCKED for other users if the change list is OPEN FOR EDIT.</td>
</tr>
<tr>
<td>CHANGES APPLIED</td>
<td>OPEN</td>
</tr>
</tbody>
</table>

### 2.4.1.4 Change List - Detailed View

- On the SAP MII administration menu, choose **Catalog Services → Change Lists**.
- Select any change list and choose **Display Details**.

The View Details screen displays the changes for that particular change list.

*New and Delete* tabs present on the screen below will show the list of objects created and deleted respectively.
**Edit** tab shows the objects which are edited and also provide a comparison with the *Plant Information Catalog* screen.

![Screen shot of the Edit tab](image)

**Log** tab shows the logs created for the selected change list. Whenever the status of a change list is changed, some of details are logged as shown in the screen shot below.

![Screen shot of the Log tab](image)
Notes to Approver tab shows all the comments added by user or the approver of the change list.

2.4.1.5 Reset Change List

You can reset changes for a particular object at line level or on a whole change list at header level.

To reset a particular object in a change list, do the following:
- On the SAP MII administration menu, choose Catalog Services → Change Lists ➔.
- Select the object in the change list sand choose Reset.

To reset a change list, select the change list and choose Reset.

Reset in the change list would be possible on a single Object or a whole change list.
Reset would be possible only on the object and not individual operations like EDITING A PROPERTY SET, PROPERTY, etc.

*If the parent is checkout for delete, then the child is not allowed to be reset*

*A tag group with status NEW and tags within it, it should also reset the tags*

When a reset operation is done on an object or an entire change list, then depending upon the status of the object the operation is performed.

<table>
<thead>
<tr>
<th>OBJECT STATUS</th>
<th>OPERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW</td>
<td>Delete the entries in the working version.</td>
</tr>
<tr>
<td>EDIT</td>
<td>Replace the values of the objects with that from the Live Version. Set the object status to OPEN</td>
</tr>
<tr>
<td>DELETE</td>
<td>Set the object status to OPEN.</td>
</tr>
</tbody>
</table>
If the user does a RESET to a whole change list, then all the changes are reverted according to the above table and the Status of the change list is set to CLOSED.

2.4.1.6 Submit For Approval

- On the SAP MII administration menu, choose Catalog Services → Change Lists.
- Select any change list and choose Submit for Approval.

The system displays a message and the status Waiting for Approval appears in the Status column.

If a change list is submitted for approval, then the Status of the change list would become WAITING FOR APPROVAL.

In the ETC Working Version, If an object is associated with a change list and the object status is WAITING FOR APPROVAL, no further modifications of the object(s) is/are allowed (even for the creator/editor of the object) until the change list status is OPEN.

The user would not be able to reset / edit the change list.

2.4.1.7 E-Mail Notification

E-Mail notification would be provided when a change list is submitted for approval, approved or rejected.

E-mail on submission of a Change List for Approval:
- E-mail would be sent to all approvers indicating that a change list has been submitted by the user.
- E-mail would be sent to the submitter informing that the change list has been submitted.

E-mail on submission on Approval/ Rejection of Change List:
- E-mail would be sent to the submitter and approver informing that the change list has been Approved/ Rejected

The E-mail would contain the following information:
- Change List name
- Created On
- Created By (the owner of the change list)
- Change List Description (if present)
- Note (if present)
- Link to access the change list

Separate mails are sent to the approver / submitter since the link present in the changes according to the role and permission.
The template is shown in the following example:

```
Tag Catalog Notification : Change List AnotherChangeListtt has been submitted for approval by I065511

&tufale.ashal@sap.com
Sent: Mon 5/16/2011 1:03 PM
To: &tufale, Rohit & Asha, Tufale, Kumar, Rohit

Change List AnotherChangeListtt has been submitted for approval by I065511

Change List Name: AnotherChangeList
Created On: May 16, 2011 1:02:18 PM
Created By: I065511
Change List Description: AnotherChangeList

Note:

Notes for AnotherChangeList

To access the change list click here
```

The notification is triggered as soon as the user submits / approves / rejects a change list.

### 2.4.1.7.1 Pre-Requisites:

All the approvers should have the role **XMII_APPROVER** assigned to them. Only then the mail would be sent.

### 2.4.1.8 Setting an Admin Account for E-mail Notification

- On the SAP MII administration menu, choose Security Services → Credential Editor. The Credential Editor screen appears.
- Enter the following details:
  - Name: MII_MAIL_ADMIN
  - User Name: Any valid user name
  - Password: SAP MII login password
  - Confirm Password:
- On the SAP MII administration menu, choose Data Services → System Connection Editor. The System Connection Editor screen appears.
- Choose Mail as the connection type from the drop down list.
- Choose New.
- Enter the following details:
  - Name: MII_MAIL_CONFIG
  - Description: Any valid description
  - Server: Valid mail server
  - Port
  - Connection Timeout
  - Read Timeout
  - Protocol
- Choose Save.
2.4.2 Approval

The approver can do the following:

- View changes made to a change list.
- Approve or reject a submitted change list.

**Note:** Only an approver with the UME action XMII_APPROVE_ACCESS can approve or reject a change list.

2.4.2.1 Change List - Approved

- On the SAP MII administration menu, choose Catalog Services → Approval Lists. The Approval List screen along with the details appears.
- Select a changed list and Choose Approve.

When a change list is Approved, the status of the change list is set to APPROVED. The lock on the object is NOT removed. The user would not be able to edit the change list.

When the approver approves a change list, the changes are applied on the live version at a particular time. The versions are staged and the changes are applied accordingly.

When the changes are applied, the status of the change list would be changed to CHANGES APPLIED and the locks on the objects are removed and the status of the object is set as open.

Also, when the status of the change list is CHANGES APPLIED, then all the entries for that change list are removed and the status is marked as CLOSED.

2.4.2.2 Change List – Reject

- On the SAP MII administration menu, choose Catalog Services → Approval Lists. The Reject List screen along with the details appears.
- Select a change list and choose Reject.

When a change list is Rejected, the status of the change list is set to Rejected. The lock on the object is NOT removed.

The user can either RESET the change list or choose OPEN FOR EDIT to make changes on the objects.

If the user chooses Open for Edit, then the objects would be unlocked for that user and would be in a locked state for other users.

The approval process would start as soon as the user submits a change list for approval.

<table>
<thead>
<tr>
<th>CHANGELIST STATUS</th>
<th>OBJECT STATUS</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBMITTED FOR APPROVAL</td>
<td>The locks on the objects are maintained. Further modifications of the object are not possible. The object status would be LOCKED FOR</td>
<td>A notification is sent to the approvers/editor about the submission. The link on the landing page would show the updated</td>
</tr>
</tbody>
</table>
 APPROVAL: number of change lists. The approver would be able to see the change list in the approval screen. The approver can either approve or reject the change list.

| APPROVED | The locks on the objects are maintained. Further modifications of the object are not possible. The object status would be LOCKED FOR APPROVAL. | The approver approves the change list. The changes are now staged. The changes are applied to the live version according to the time scheduled in the scheduler. A notification is sent to the approvers/submitter about the approval of the change list. |
| REJECTED | The locks on the objects are maintained. Further modifications of the object are not possible. The object status would be LOCKED FOR APPROVAL. | The approver rejects the change list. A notification is sent to the approvers/submitter about the rejection of the change list. The submitter of the change list can now either reset the change list or Open the change list for editing. |
| CHANGES APPLIED | Object status is set to OPEN. | When it is time to apply the changes, the changes are copied to the LIVE VERSION. NEW Objects would be added. Object status set to OPEN. DELETED Objects would be deleted. DELETED from working version too. EDITED Objects, the values would be replaced. Object status set to OPEN. |

**If an approver is the creator/submitter of the change list, then that change list will not be displayed on the approval screen of that approver.**
The status of the changes would be CHANGES APPLIED until a system job cleans it. After which the change list would be deleted from the system.

2.4.2.3 Viewing Details

- On the SAP MII administration menu, choose Catalog Services → Approval Lists.
  
  The Approval List screen along with the details appears.
- Select any change list and choose View Details.

The View Details screen displays the changes and notes, if any, for that particular change list.