

# MAXIMO PREDICT

## HANDS-ON LAB

In this Exercise, you will learn how to setup Predict score for End of Life curve.

### **Important Note :**

**In this lab exercise, I'll be creating records using XX as prefix, Please make sure you replace the word XX with your initials during the lab.**

## **Prerequisite**

- 1) Ensure that you have completed the Maximo Monitor hands-on Lab
- 2) Ensure that you have completed the Maximo Health hands-on lab

Note: Understanding & Availability of sensor data sets in Monitor application and asset data in Manage application is important.

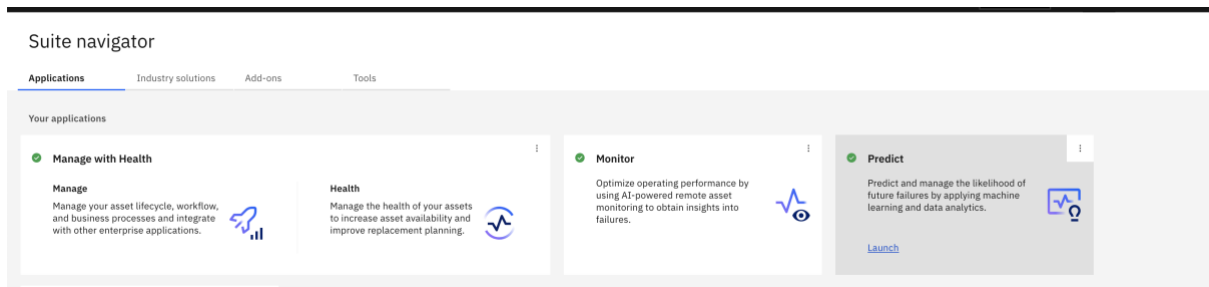
- 3) Predict\_Envs.json
- 4) db2\_certificate.pem
- 5) ca\_public\_cert.pem
- 6) Create your own user in CP4D to run predict models.

## **Setup Manage Application**

- 1) Open Manage application.
- 2) GO TO Assets application and filter the asset records created in Maximo Health lab exercise. E.g XX\_ASSET%
- 3) Change the status of any two to three asset to "DECOMMISSIONED" e.g you can pick XX\_ASSET2 and XX\_ASSET4 and change the status from Active to DECOMMISSIONED.
- 4) Make sure you populate Installation Date, Expected life in years and Estimated EOL fields populated for each asset, without this Predict models will not execute.

## **Setup Predict Application**

- 1) Open the Predict application from Suite Navigator



2) To create a Predict Group : Click on left menu and select -> Predict Grouping

The screenshot shows the IBM Predict application interface. The left sidebar contains a navigation menu with 'Predict grouping' selected. The main area displays a table of asset data.

Type	Location	Health	Criticality	Days to failure	Installation Date	Age in Years	Total Cost
BUS	MOFLOOR1	--	--		03/28/2001	22.3	0.00
	MOFLOOR2	--	--		03/28/2001	22.3	0.00
	MOFLOOR3	--	--		03/28/2001	22.3	0.00

3) Click on blue Create group + button to create a new group.

4) Provide the name and description as : XX\_predictscores

5) Select the query you created in Manage application e.g xx\_asset

IBM

Predict

Predict grouping /

Create a predict group

\*Name

XX\_predictscores

Description

16/255

XX\_predictscores

Object

Asset

Assets

The assets returned by the query will be scored by the trained models that you configure.

\*Query

ASSET:xx\_asset

Edit

Cancel

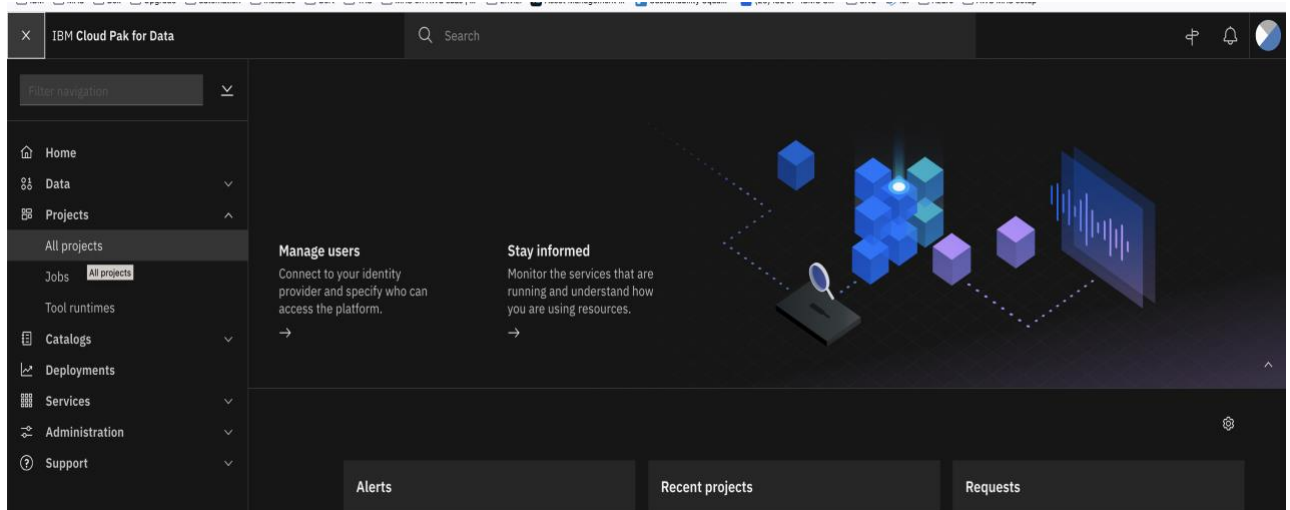
Create

- 6) Click on Create button.
- 7) Verify the group has been created. And Note down the value for Group Id column.  
Here in below screenshot it is : 1005

IBM   Predict				
Predict grouping ⓘ				
Results: 5				
Group Name	Description	Group ID	Query	Object
ROBO_ARM_PREDICT_GROUP	Robo Arm Predict Group	1002	RoboAssetList	ASSET
level3	level3	1003	ASSET:xx_asset	ASSET
predictscorelevel4		1004	ASSET:testquery	ASSET
XX_predictscores	XX_predictscores	1005	ASSET:xx_asset	ASSET
ASSETGROUPDEMO	Demo Data for PM1 cron task	ASSETGROUPDEMO	ASSET:Demo Potable Wate...	ASSET
Items per page: 10 ▾ 1–5 of 5 items				

## Setup Cloud Pak for Data

- 1) Take the CP4D url and credential from github : File name : hpsupport
- 2) Click on left hamburger menu and select All Projects



- 3) Click on blue button New Project + to create a new project.

Projects				
Find a project				New project +
<input type="checkbox"/> Name	Date created	↓	Your role	Collaborators
<input type="checkbox"/> predictscorelevel4	2 days ago		Admin	AA ⋮
<input type="checkbox"/> level3	4 days ago		Admin	AA ⋮
<input type="checkbox"/> Level 2	1 week ago		Admin	AA ⋮

- 4) Choose Create an empty Project.
- 5) Enter project name and description as XXPREDICTSCORE

## New project

**Define details**

Name

XXPREDICTSCORE

Description

XXPREDICTSCORE

**Choose project options**

☐ Mark as sensitive ⓘ

☐ Log all project activities ⓘ



Cancel

Create








### 6) Click on Create button

IBM Cloud Pak for Data

Search



Projects / XXPREDICTSCORE



Overview


Assets

Jobs

Manage

**Assets**

Assets that you create with tools show here. See data assets on the Assets page.



[View all](#)

**Storage**

Storage used

0 Bytes

**Readme**

Type project notes, reminders, or instructions

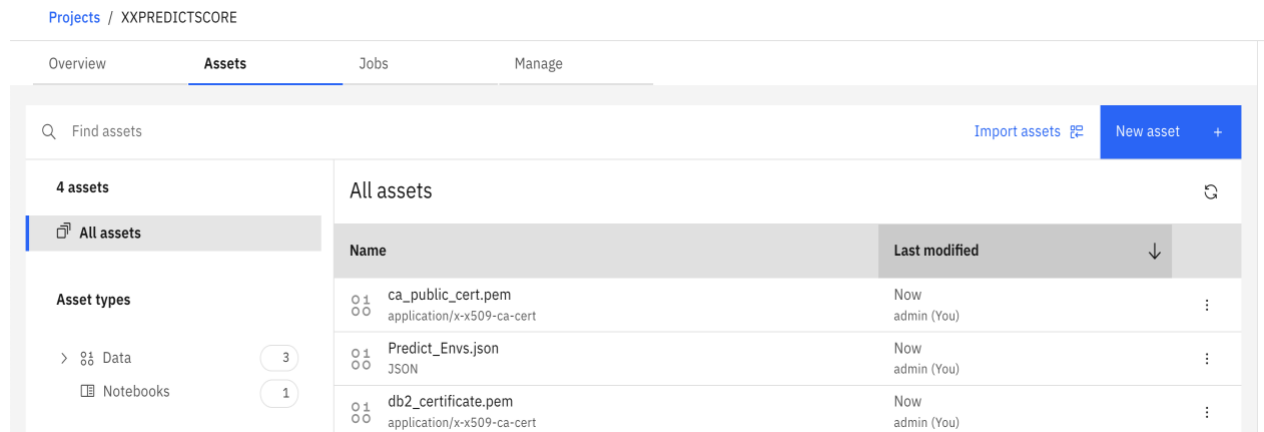
**Project history**

You created project [XXPREDICTSCORE](#)

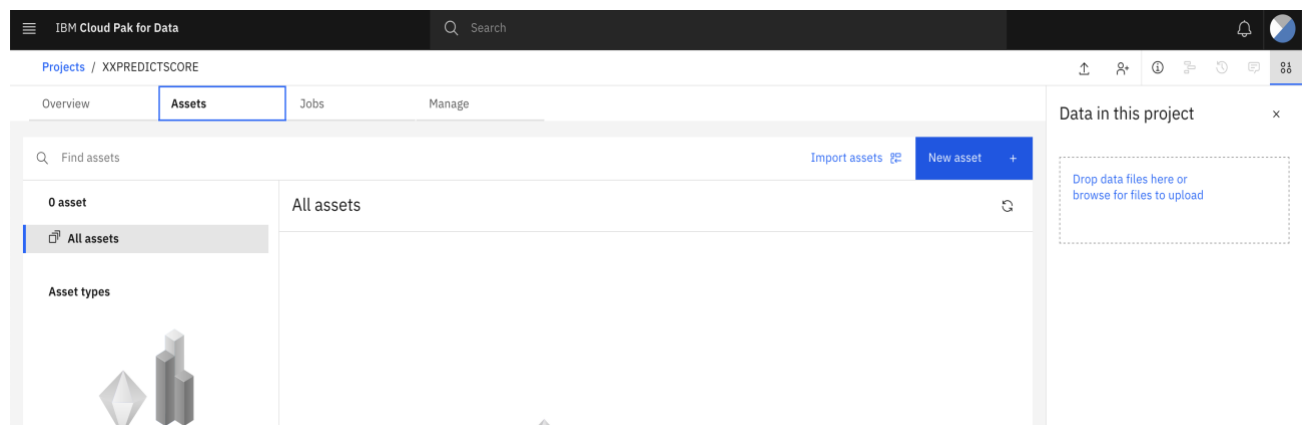
Today at 07:56 AM

### 7) Select the Assets tab and Click on Drop data files section and select the below files, downloaded from github.

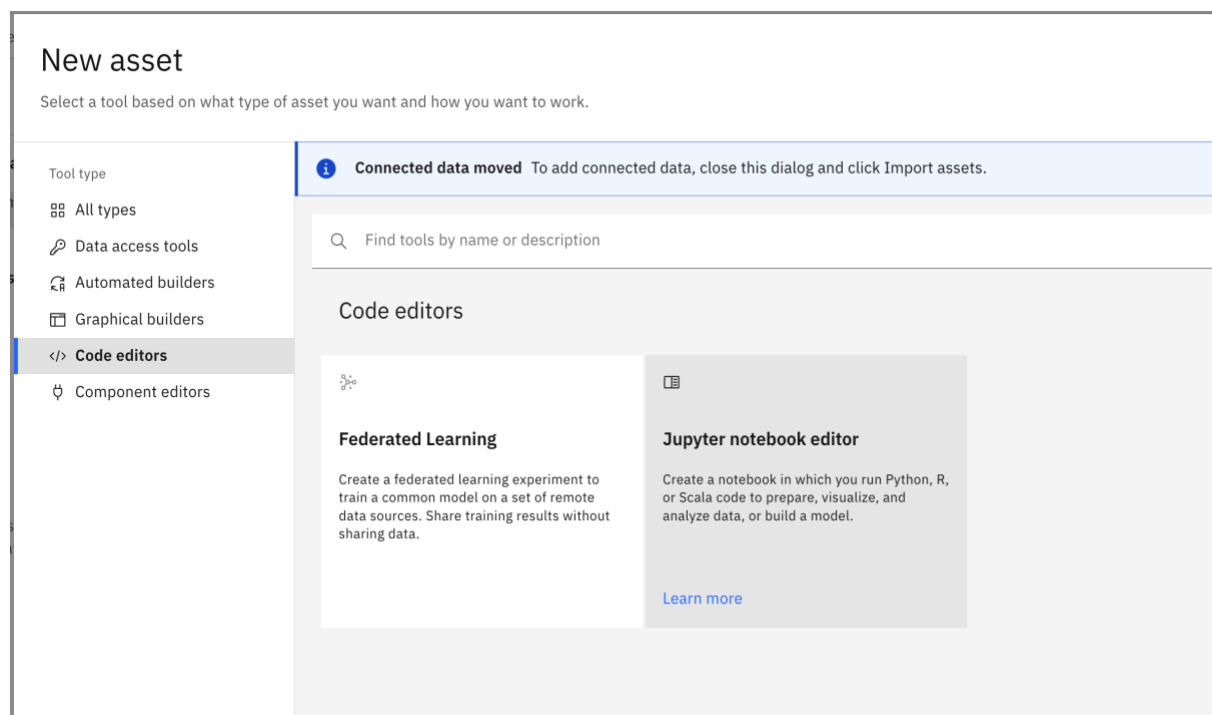
- Predict\_Envs.json
- db2\_certificate.pem
- ca\_public\_cert.pem



8) Select Assets tab and click on New Assets + button



9) Select Code Editor and then choose Jupyter notebook editor



10) Click on From File tab and Drag and drop the PMI – End of life curve.ipynb file

New notebook

Blank **From file** From URL

Name  
PMI - End of Life Curve

Select runtime  
Runtime 22.2 on Python 3.10 (1 vCPU, 2 GB RAM)

Description (optional)  
Type your description here

The selected runtime has 1 vCPU and 2 GB RAM.

Notebook file  
Upload only .ipynb files. 52 MB max file size.

Drag and drop files here or upload.

PMI - End of Life Curve.ipynb

Cancel Create

11) Click on Create button. It opens the PMI – End of life cure notebook

IBM Cloud Pak for Data

Projects / **XXPREDICTSCORE** / PMI - End of Life Curve

In [ ]:   
'''  
Licensed Materials - Property of IBM  
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IBM Maximo APM - Predictive Maintenance Insights SaaS  
# IBM Maximo Application Suite  
© Copyright IBM Corp. 2019,2020,2021 All Rights Reserved.  
US Government Users Restricted Rights - Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.  
'''

### Maximo Predict - End of Life Curve Model Template

- 1. Introduction
- 2. Install Maximo Predict SDK
- 3. Setup the Model Training Pipeline
- 4. Train the Model Instance
- 5. Register the Trained Model Instance
- 6. Model Template Internals

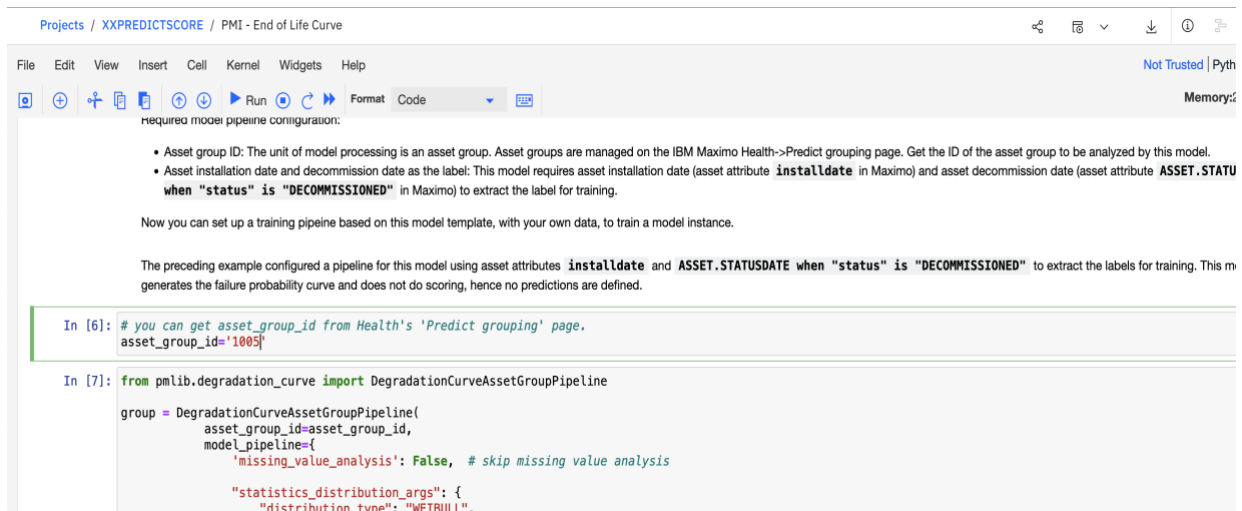
### Introduction

Statistically, to evaluate mean life of assets, the sample mean or the average age method is acceptable if a big population has end-of-life information. But assets such as generators, transformers, reactors, cables, and so on, have a relatively long life up to and even beyond 40 years and generally there are very limited end-of-life failure data. This algorithm is designed to address this use case: to estimate mean life with limited end-of-life failure data. In fact, the proposed algorithm works best when fewer than 20% of the assets has end-of-life failure data.

This notebook predicts failure probability curve for a type of asset. In the challenges of asset health assessment, the asset failure probability and its expected remaining life are the key aspects to analyze the asset health status.

The Failure Probability Curve model uses statistics distribution to assess the failure probability versus year. This model has two methods:

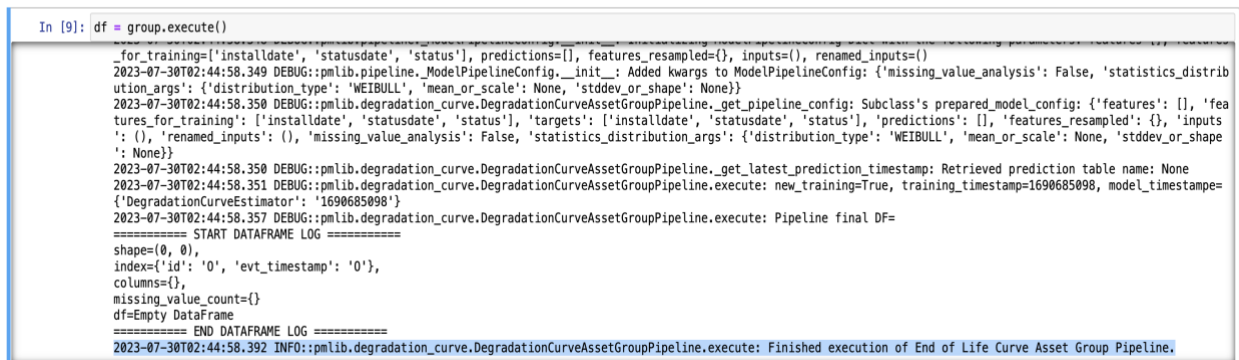
12) Change the Asset group id from the predict application.



- 13) Select first cell and Click on the Run button. It executes each cell one after other.
- 14) Verify the output for Train the model instance. It should display – “ Finished execution of End of Life Curve Asset Group Pipeline.” At the end.

#### Train the model instance

Now you can train the model instance.



After this method completes successfully, you have a trained model instance ready, and the prediction results are returned as a dataframe for visualization.

- 15) Execute till Register the trained model instance cell.
- 16) The final outcome should display the message

Registration was successful. New model ID = 20BB65D9-BA25-4173-95EC-A9E7E58DA5C7



## Register the trained model instance

If the trained model instance looks good, you can register it to Maximo Predict:

```
In [11]: group.register()

or: {'1690685098'}}}, 'output': {'names': [], 'backtrack': {'days': 0, 'hours': 0, 'minutes': 0}}, 'granularity': {'name': 'GroupDaily', 'description': 'GroupDaily',
'frequency': 'Daily', 'dataItems': [], 'entityFirst': False}, {'name': 'Hourly', 'description': 'Hourly', 'frequency': 'Hourly', 'dataItems': [], 'entityFirst': True},
{'name': 'GroupHourly', 'description': 'GroupHourly', 'frequency': 'Hourly', 'dataItems': [], 'entityFirst': False}, {'name': 'Minute', 'description': 'Minute summary',
'frequency': 'Minute', 'dataItems': [], 'entityFirst': True}, {'name': 'GroupMinute', 'description': 'GroupMinute', 'frequency': 'Minute', 'dataItems': [], 'entityF
irst': False}], 'postProcessing': [], 'publishedOutputs': {}}, session=None, kwargs={})
2023-07-30T02:47:50.128 DEBUG:pmlib.util.api_request: Received API Response: resp.status_code=200, method=post, url=https://masocp-igki4x-predict-api.mas-masocp-igki4
x-predict.svc/ibm/pml/service/rest/ds/inuqrvb39kbuc4odt7ntmqr3niof68ojjtt606t/1005/model?instanceId=masdev
2023-07-30T02:47:50.130 DEBUG:pmlib.degradation_curve.DegradationCurveAssetGroupPipeline.register: <Response [200]>
2023-07-30T02:47:50.131 DEBUG:pmlib.degradation_curve.DegradationCurveAssetGroupPipeline.register: Registered model instance with response: {'modelInstanceId': '20BB65D
9-BA25-4173-95EC-A9E7E58DA5C7', 'message': 'Created', 'status': 0}

2023-07-30T02:47:50.132 DEBUG:pmlib.degradation_curve.DegradationCurveAssetGroupPipeline.register: Registration succeeded. Writing initial prediction results...
2023-07-30T02:47:50.188 DEBUG:pmlib.degradation_curve.DegradationCurveAssetGroupPipeline._validate_checkpoint: entity_type=1005 with entity_type_id=14 does not have a
ny type-level checkpoint yet
2023-07-30T02:47:50.196 DEBUG:pmlib.degradation_curve.DegradationCurveAssetGroupPipeline._validate_checkpoint: entity_type=1005 with entity_type_id=14 type-level chec
kpoint inserted
2023-07-30T02:47:50.197 INFO:pmlib.degradation_curve.DegradationCurveAssetGroupPipeline.register: Registration was successful. New model ID = 20BB65D9-BA25-4173-95EC-
A9E7E58DA5C7

Out[11]: '20BB65D9-BA25-4173-95EC-A9E7E58DA5C7'
```

## Verify the Scores

- 1) Go to Predict Application and open the Predict group created earlier.
- 2) Click on the Trained Instance model link

Predict grouping /

XX\_predictscores

Group details ⓘ

Name  
XX\_predictscores

Description  
XX\_predictscores

ID  
1005

Trained instances registered for this group

Results: 1

Model template	Trained instance	Trained instance ID	Schedule	Metrics	Active
End of Life Curve	<a href="#">1005_DegradationCurve...</a>	20BB65D9-BA25-4173-...			false

Items per page: 10 ▾ 1-1 of 1 items

1 ▾ 1 of 1 pages ◀ ▶

Scored assets

Results: 5

Asset	Description	Site	Type	Failure Class
<a href="#">XX_ASSET1</a>	XX_ASSET1	BEDFORD		
<a href="#">XX_ASSET2</a>	XX_ASSET2	BEDFORD		
<a href="#">XX_ASSET3</a>	XX_ASSET3	BEDFORD		
<a href="#">XX_ASSET4</a>	XX_ASSET4	BEDFORD		
<a href="#">XX_ASSET5</a>	XX_ASSET5	BEDFORD		

- 3) Choose options as below  
Active : ON  
Run every : 1 Day  
Starting At : 9 AM  
Date : Enter future date

Update trained instance

1005\_DegradationCurveAssetGroupPipeline\_2023-07-30T02:47:49.565633

Model Template

End of Life Curve

Active

On

Scoring schedule

Run every

1

-

+

Day

Starting at (GMT)

9:00

AM

Date

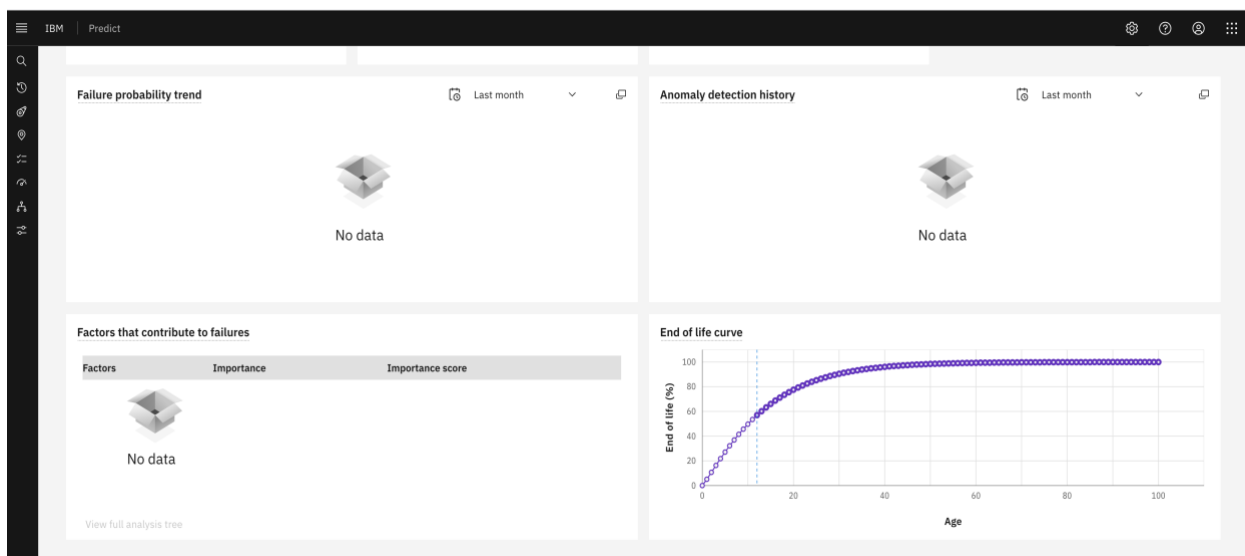
08/01/2023

Cancel

Save

4) Click on Save

5) Open any asset in the list and verify that End of life curve is populated.



**Congratulations !!**  
**You have successfully completed the Maximo Predict Lab**

### Document History

Date	Author	Reviewer
02-Aug-2023	Megha Jingar Megha.jingar1@ibm.com	Satish Narasimha - <a href="mailto:ssnarasi@in.ibm.com">ssnarasi@in.ibm.com</a> Amitabha Kanjilal - <a href="mailto:amkanjil@in.ibm.com">amkanjil@in.ibm.com</a>