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Gold Data Analytics
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POC Predictive Maintenance

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CHALLENGES & SOLUTION FRAMEWORK



Challenges And Solution Framework

CHALLENGES



Maintenance teams in IT, Manufacturing and Automobile industries are facing unscheduled downtime of assets and would want to reduce Maintenance, Repair and Operations cost leveraging a predictive maintenance framework

CHALLENGES



to fail and identify the type of failure for an asset in order to initiate preventive maintenance actions for various products and services across industries

BUSINESS IMPACT



Reduced downtime due to early identification & resolution of asset failures



Improved Maintenance Planning leveraging near real time performance monitoring of assets



Reduced operational expenses by predicting unplanned outages & anomalous behavior in advance

SOLUTION FRAMEWORK

ANALYTICAL ENGINEERING

Collate data from disparate sources followed by data sanitization using data imputation techniques to create Analytical Dataset

Azure IOT Hub Azure Data Lake Storage Azure Storage Blob

FORECASTING ENGINE

Machine Learning models are developed to analyze historical performance patterns and predict likelihood of failure

Azure ML Service Azure Cognitive Services

BI-COCKPIT

Decision cockpit monitoring real time/near real time KPIs of asset performance

Power BI

PREEMPTIVE ALERTS

An alert mechanism to notify maintenance teams through an intuitive UI interface

Azure Logic App Azure Monitor

ANALYTICAL APPROACH



Analytical Approach : ML Framework Development

ANALYTICAL DATASET



Raw Data
Data sets will be cleaned and stored in Analytical Datamart

Asset ID	Date	Time Stamp	Sensor Reading	Maintenance Duration (Min)	Asset Deterioration Index	Asset Runtime
AS0001	15-Jul	10:58:18	15	1300	9.8	00:00:00
AS0001	15-Jul	11:01:18	20	1350	9.8	00:03:00
AS0001	15-Jul	11:04:18	21	1050	9.6	00:06:00



Analytical Dataset

PREDICTIVE ENGINE



Training Data (80%)

Test Data (20%)

Neural Network
Decision Tree
Ensemble Methods
Regression Models
ML Techniques



- Model Validation via In sample and Out sample tests
- **Champion Model Selection** via assessing MAPE, residual analysis, confidence interval, significance level, out sample accuracy

OUTPUT



Analytical model will predict the type of outage & predict the time at which heat exchanger failure may occur

Asset ID	Installation Date	Issue Severity	Priority	Issue Type	Issue Expected By	Notification Status
AS1873	01/04/2020	High	High	Wear and Tear	15/05/2024	Alert Sent
AS1994	20/04/2020	Med	Med	Over heating	20/06/2024	Alert Sent
AS1774	18/05/2020	High	High	Reduced Throughput	21/05/2024	Alert Sent
AS1895	07/06/2020	Med	Med	Wear and Tear	24/06/2024	No Alert Sent
AS743	07/06/2020	Low	Low	Over Heating	27/08/2024	No Alert sent



IDENTIFY ISSUE TYPE & SEVERITY



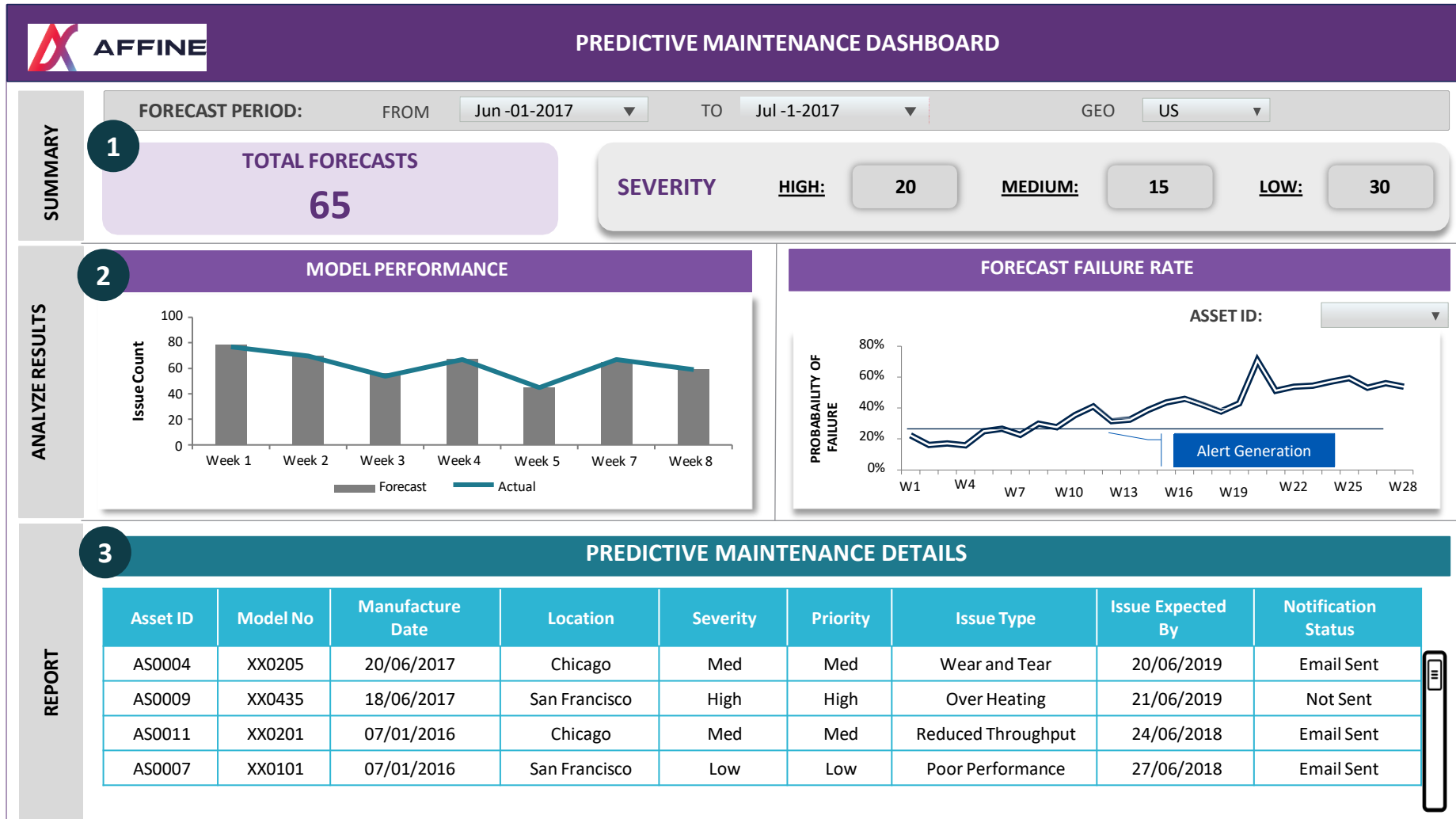
AUTOMATED TIMELY ALERTS



MAINTENANCE SCHEDULES

A Real Time Predictive Maintenance Dashboard

ILLUSTRATIVE



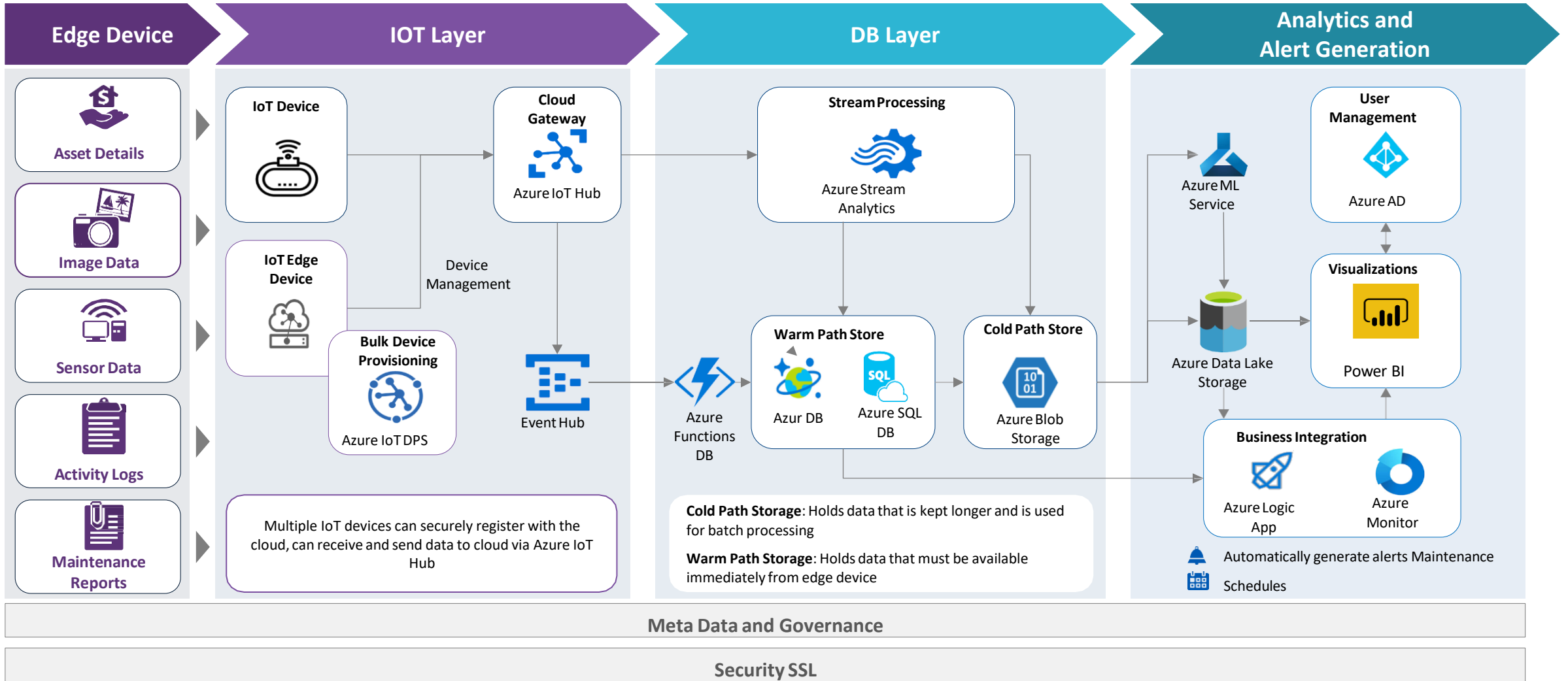
- Notes
- 1 Flexibility to choose different forecast periods across different countries
 - 2 Probability distribution of failure by asset id, customized threshold

values are defined for each asset id A tabular representation capturing when and type of issue expected for each printer id
 - 3

REPRESENTATIVE AZURE ARCHITECTURE



Proposed Technical Architecture – Azure

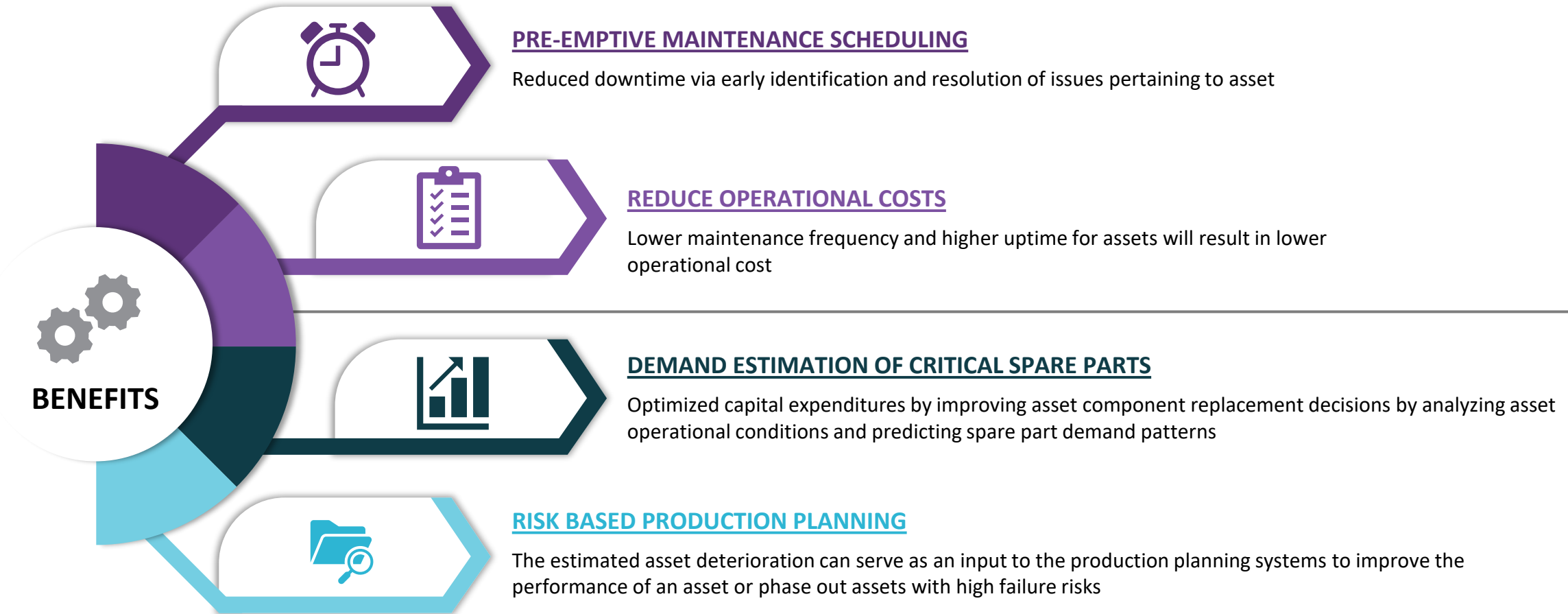


EXPECTED BENEFITS



Expected Benefits Of The Predictive Maintenance Solution

The proposed solution will enable accurate assessment of asset failure thus enabling asset maintenance teams to manage, monitor and address potential failures



SHORT TERM

LONG TERM



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