SAP Asset Performance Management

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THE BEST RUN SAP

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Agenda

1 **Intelligent Asset Management**
Capabilities and Solutions and closing the Loop from Strategy to Execution

2 **Live Demo SAP Asset Performance Management**

3 **Roadmap, Questions&Answers**

Intelligent Asset Management: Capabilities & Solutions

Maintenance Management (aka “PM”)
Service Management (aka "CS")

Plan, schedule and safely execute maintenance and service activities
to ensure optimal operations

Asset Health Prediction and Optimization

Bring together information from operational and business systems using IoT to predict and simulate asset failure

Asset Strategy and Performance

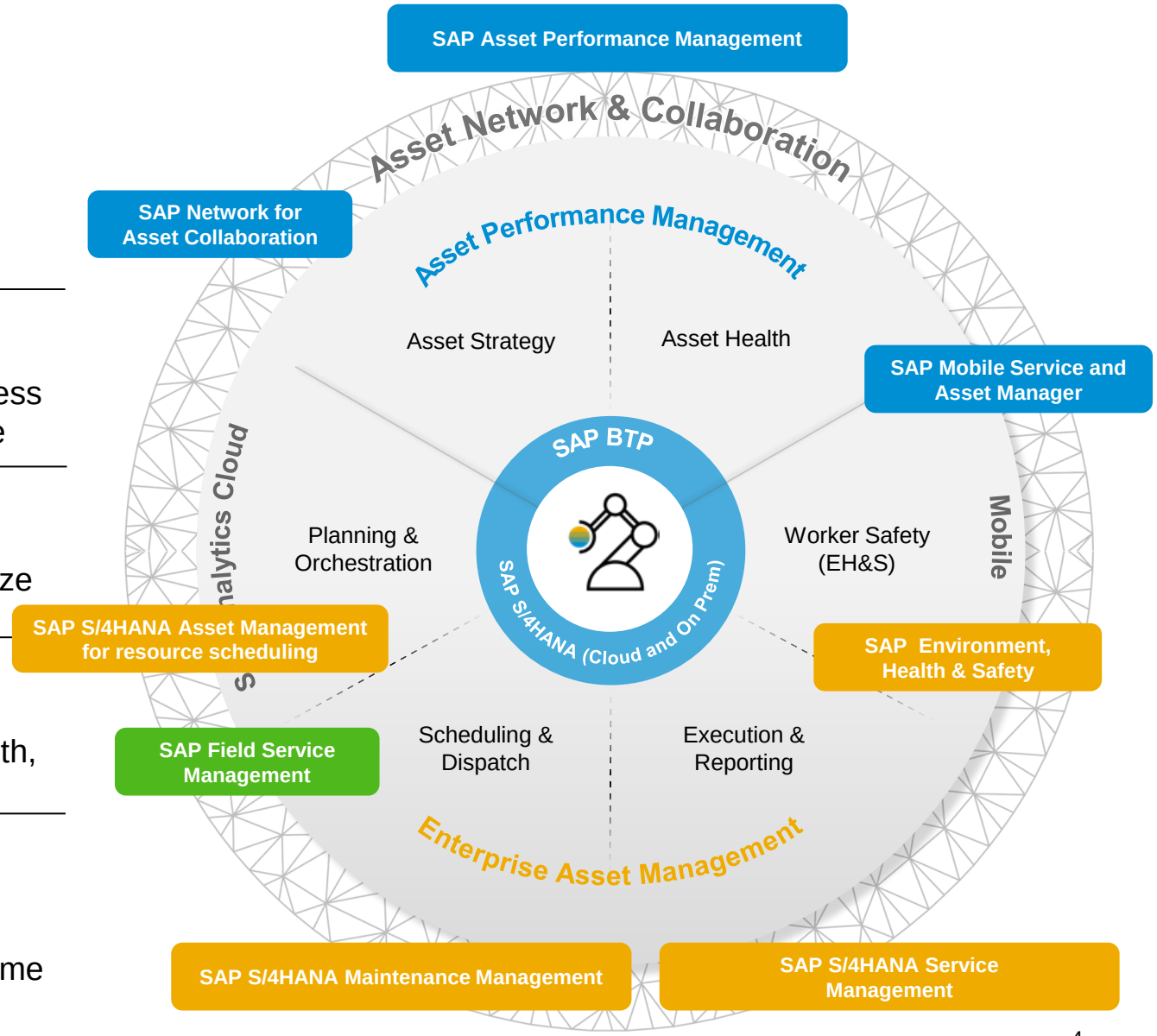
Drive smarter decisions, improve reliability, and optimize maintenance strategies

Asset Network and Collaboration

Share asset information, access one version of the truth, and collaborate on a cloud-based business network

Mobile Asset Management

Leverage mobile technologies to enable new asset management business processes anywhere and anytime



The New Way: Intelligent Asset Management

How to realize the end-to-end closed loop story?

What SAP's customers are demanding!

- Aligned domain models
- Out-of-the-box integrations
- Sustained high-quality of master data
- Flexibility to integrate non-SAP products
- Extensibility and adaptability

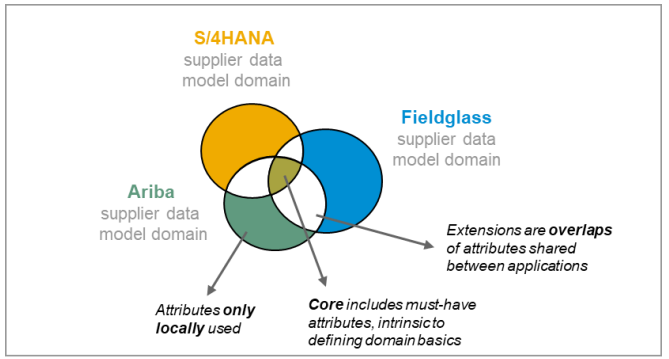
SAP's Strategic Direction

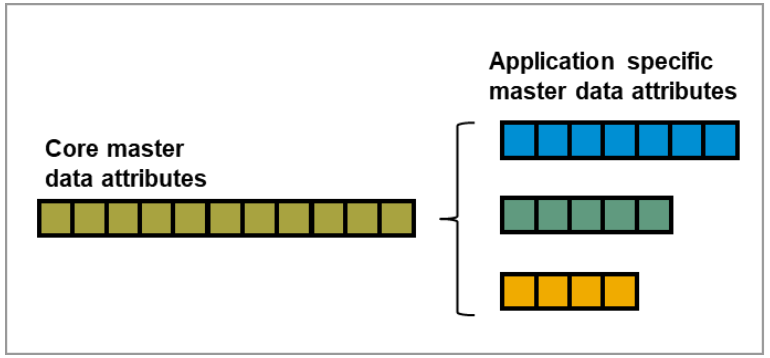
Establishing One Domain Model (ODM) for communication across SAP applications

Motivation
Aligned domain models are an enabler for consistent APIs and reduced dependency on middleware to translate data structures and values

Vision
Creation of aligned data models for all key domains throughout most of the SAP applications and processes

User Story
Users will find support on Domain Model Alignment (DMA) and initiate the alignment of data objects that are relevant in an integration scenario



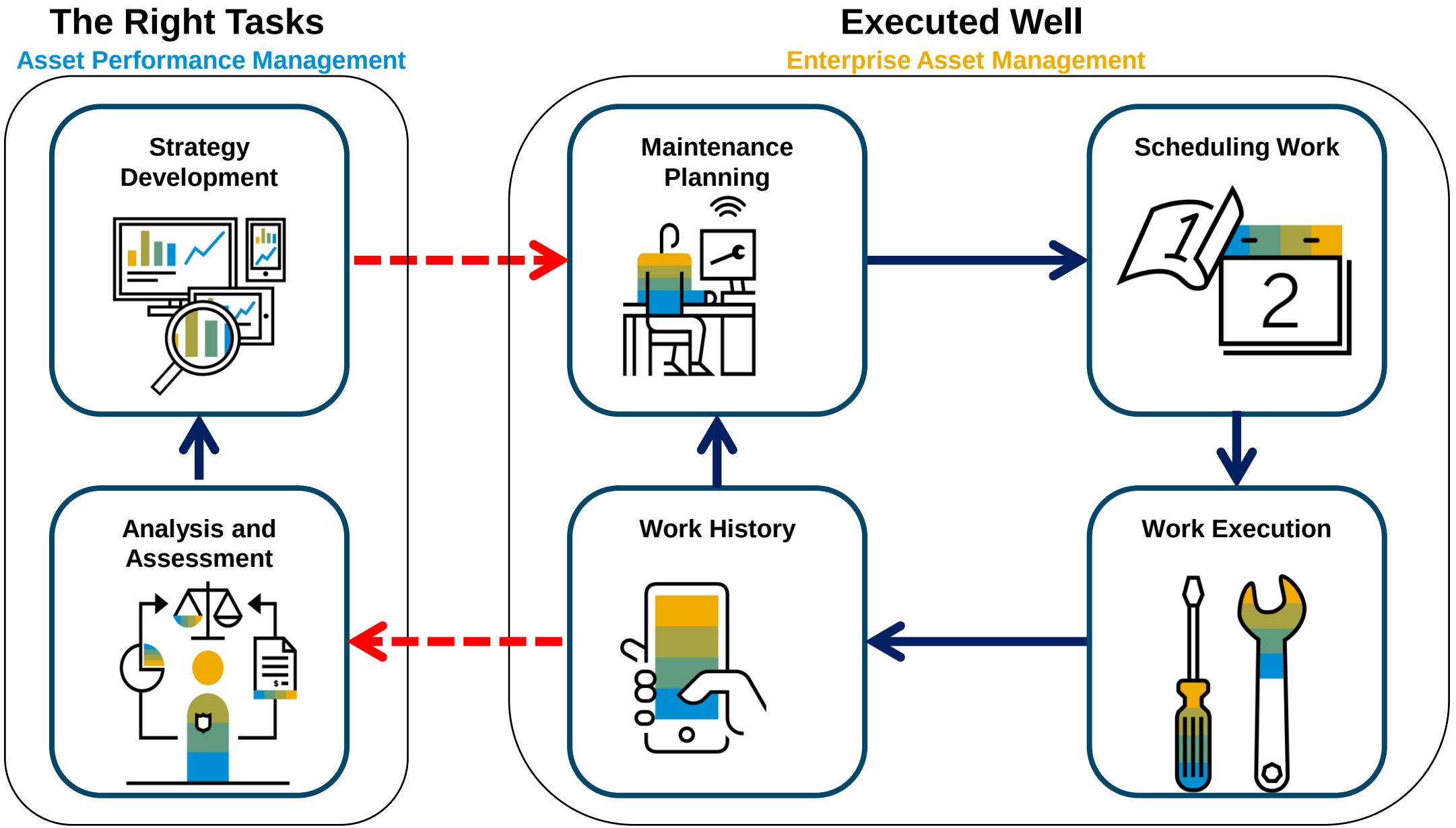


SAP One Domain Model

Define the language applications use to communicate with each other

Lower integration efforts due to aligned objects used across products

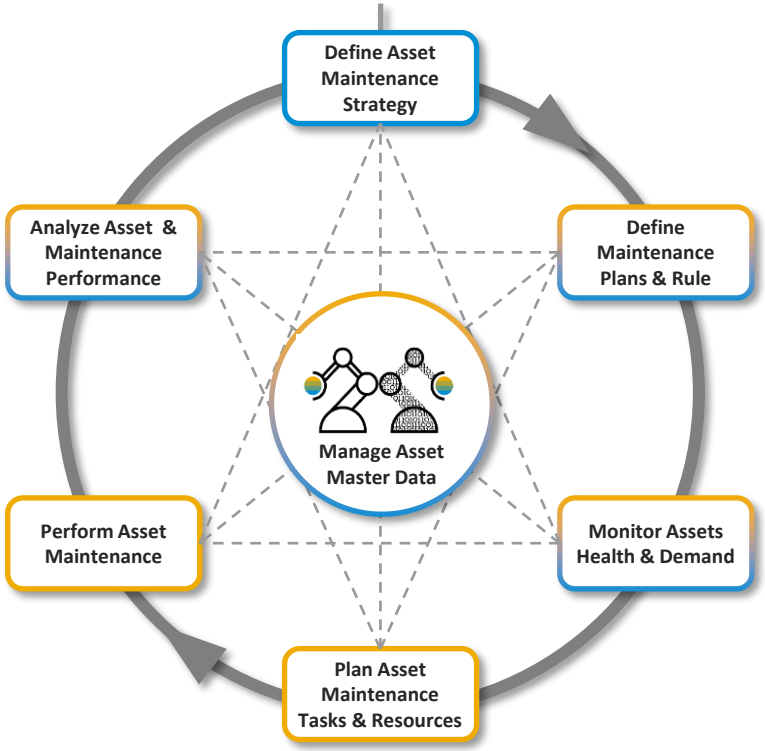
Apply Strategies , monitor the effectiveness and optimize continuously



Drive Business Outcome by Converging Strategy & Execution

Our Vision

Seamlessly extend **Enterprise Asset Management** with **Asset Performance Management** along end-to-end processes to close the loop between maintenance strategy and execution to **define, implement, execute** and **monitor** the **optimal asset maintenance.**



1 Define Asset Maintenance Strategy
- Define risk and criticality for assets
- Develop maintenance strategies

2 Define Maintenance Plan & Rule
- Define time- and usage-based maintenance
- Define condition-, predictive/prescriptive-, risk-based Maintenance

3 Monitor Asset Health and Maintenance Demand
- Manage asset alerts
- Initiate / screen maintenance demand

4 Plan Asset Maintenance, Tasks & Resources
- Order planning, incl. all needed resources
- Order scheduling

5 Perform Asset Maintenance
- Order execution (also mobile)
- Order/notification close-out

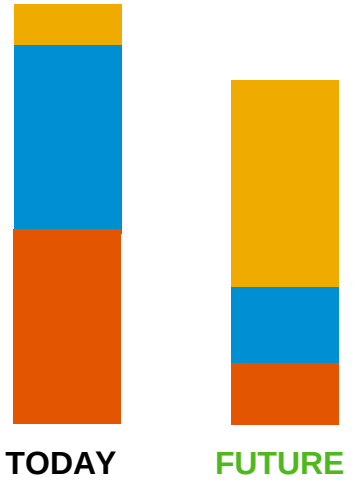
6 Analyze Asset & Maintenance Performance
- Analyze maintenance strategy versus execution in efficiency and effectiveness

0 Manage Asset Master Data
- Manage asset and asset related master data semantically aligned for both disciplines to provide a 360° view in form of a Digital Twin

Evolve from reactive to reliability-centered & prescriptive maintenance

Calendar-based maintenance results in **over-maintaining** assets at higher costs / less availability

Reactive-based maintenance is too late for efficient planning and optimization

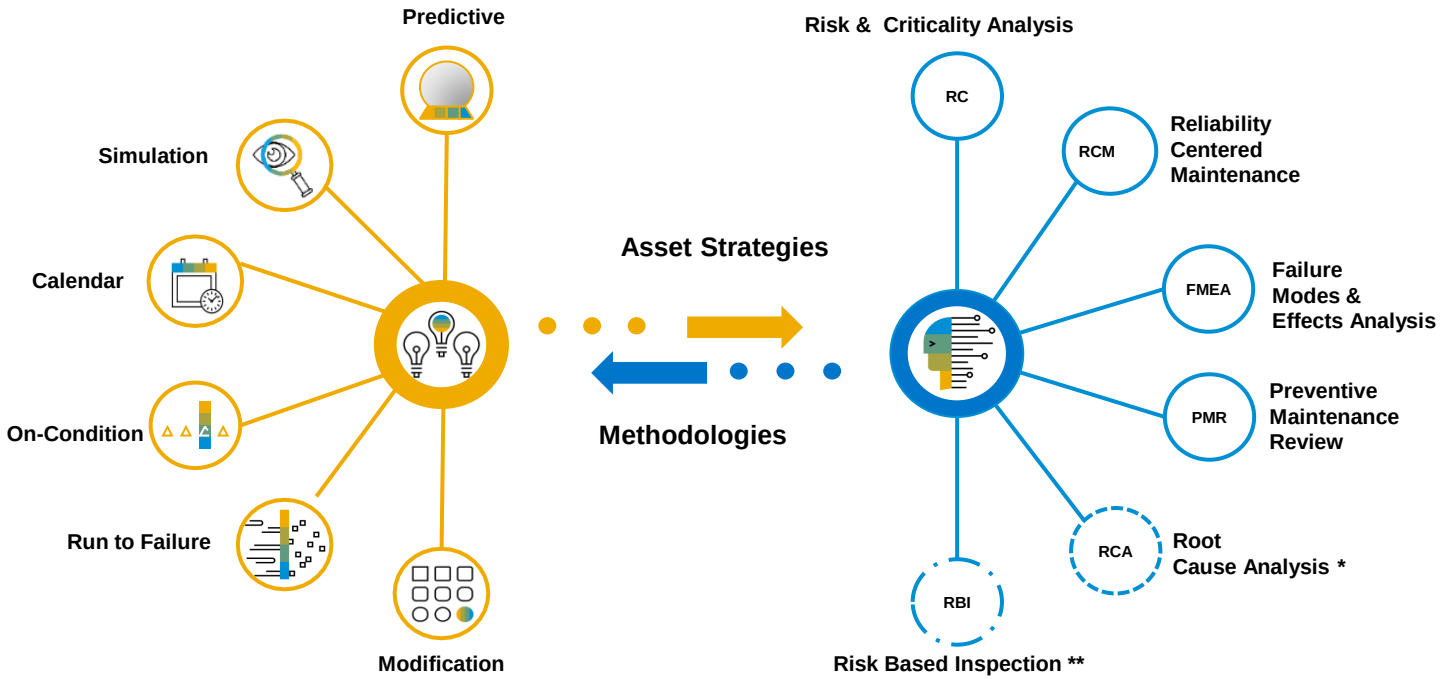


Reactive – After Failure or On-Condition

Proactive – Calendar

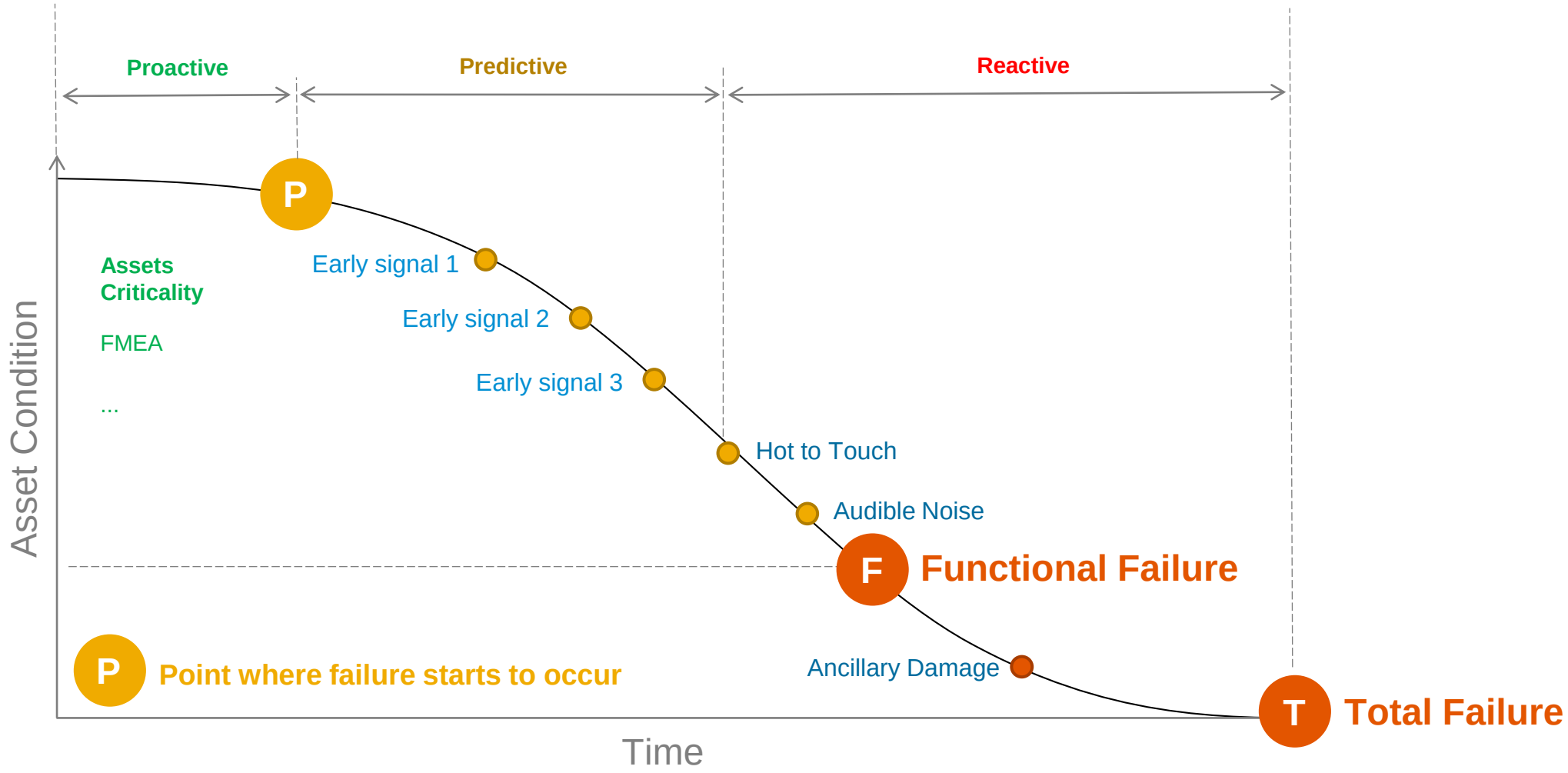
Proactive – Failure prediction with prescriptive recommendations & optimization

Intelligent Asset Management supports **data-driven proactive** strategies with execution and optimization based on reliability & other goals. This achieves the delicate balance of **profitability, asset health** and **availability**

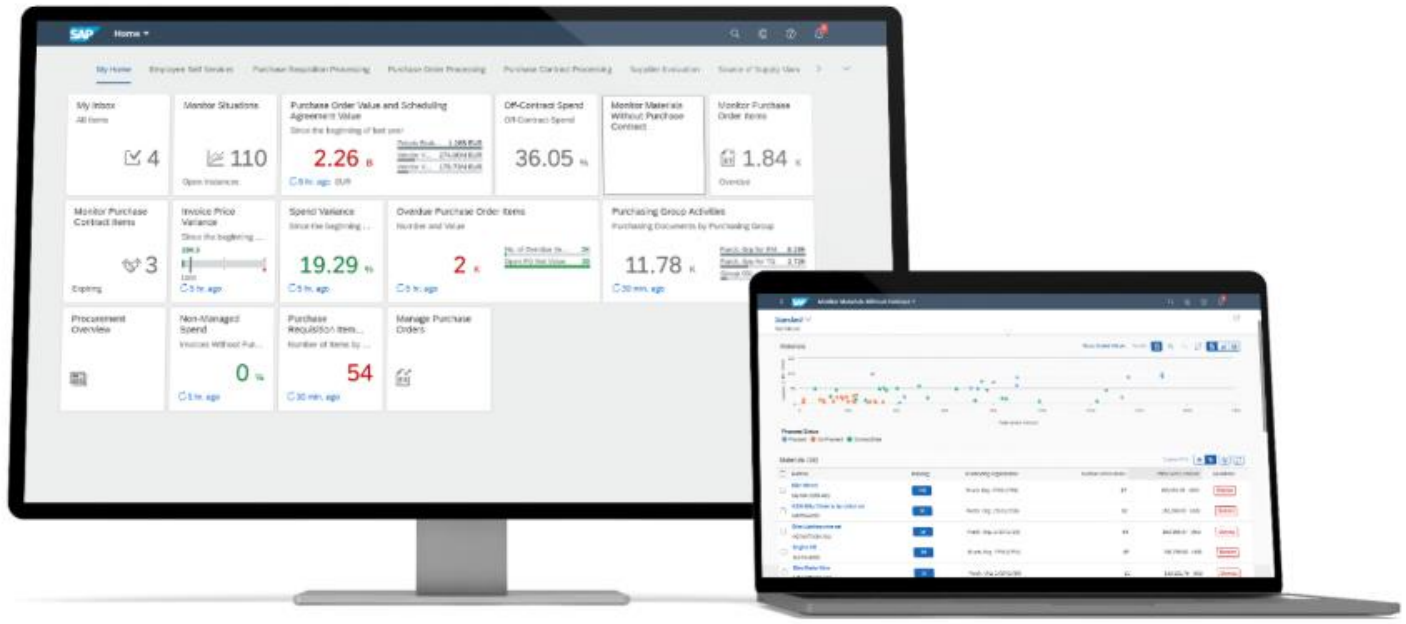


*Future Functionality
** Partner Solution

PF Curve as a starting point towards Proactive Maintenance



Deliver an exceptional User Experience with SAP Fiori



Role-based

Delightful

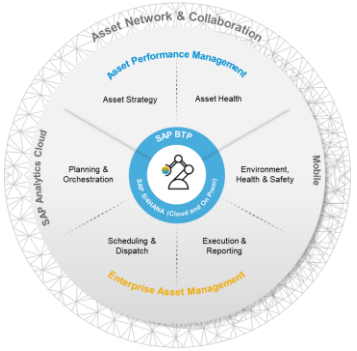
Coherent

Simple

Adaptive

Intelligent Asset Management: Business Benefits

Asset Performance Management



Enterprise Asset Management

End-2-End Business Processes

- Deploy APM capabilities, such as strategy management (e.g. RCM) or condition-based, prescriptive maintenance, seamlessly integrated with maintenance & service planning and execution in the ERP system
- Enable a true, end-2-end “failure mode centric”, Intelligent Asset & Service Management by converging strategy and execution while shifting from time-& usage-based maintenance to condition-based, predictive/prescriptive maintenance

Better Decision Making

- Aligned data models between APM and Asset & Service Management to enable unified views on asset and maintenance & service performance for better decision making along process steps
- Enable a holistic Asset & Service Management to continuously assess asset performance and improve maintenance & service effectiveness for higher asset reliability at lower risk and lower cost

Improved User Experience

- Provide consistent information to the end user on asset and maintenance/service performance for higher user productivity

Easy Adoption of APM Solution

- Customers with S/4HANA (or ECC) can quickly deploy APM capabilities, fully integrated with planning and execution in the ERP system, based on aligned data model (One Domain Model)
- Reduce overall deployment complexities and initial application set-up time

Improve Reliability/ Reduce Failure Rate of:
- Pressure vessels, pipelines
- Rotating equipment
- Safety instrument systems

Manage Compliance to:
- Environmental Regulations
- Safety Laws

Increase Production Throughput:
Increased production throughput from improved availability

Improve Productivity from:
<u>Reduction in Labor/ Services Costs:</u>
- Less travel time, information searching, parts searching

<u>Reduction in Parts Costs:</u>
- Optimized spare parts, tools policies

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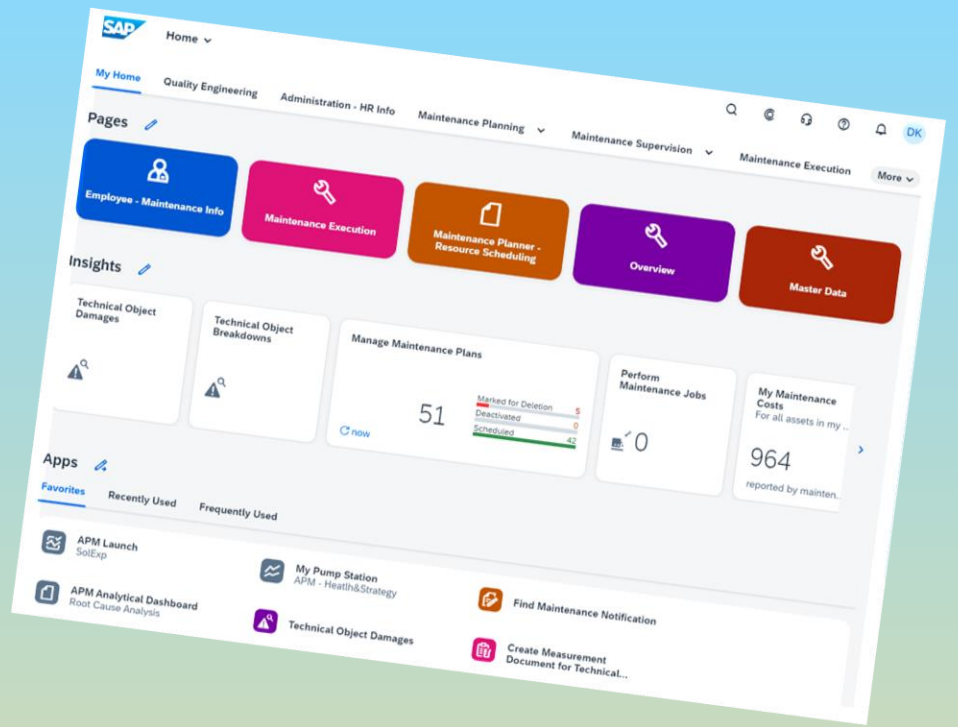
2 **Live Demo SAP Asset Performance Management**

3 **Roadmap, Questions & Answers**

Live Demo -

How does SAP Asset Performance Management look like ?



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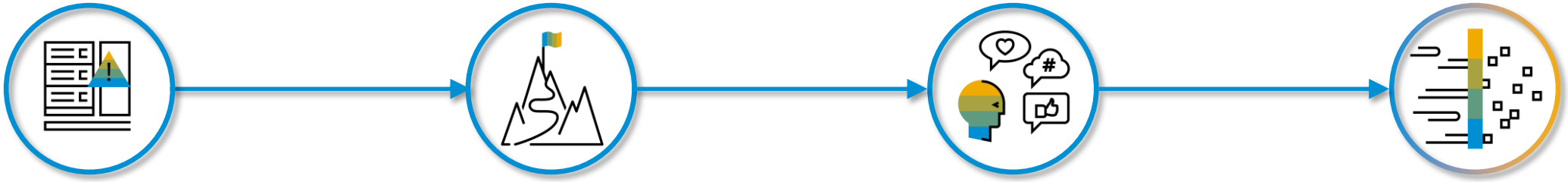
Roadmap

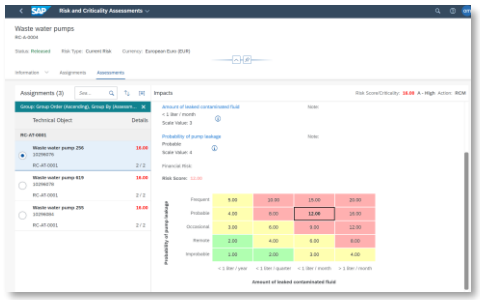
SAP Asset Performance Management 2202 – 2211

Define Asset Maintenance Strategies



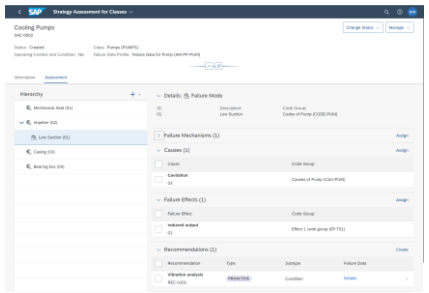
Risk & Criticality Assessment

- Assess risk & criticality for technical objects
- Assess risk & criticality for multiple objects using Microsoft Excel
- Use criticality to update the ABC indicator of technical objects



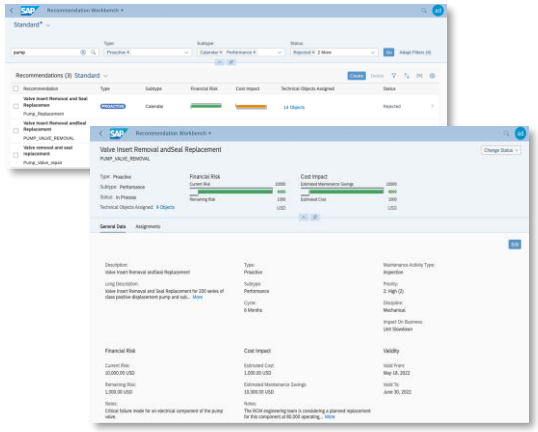
Maintenance & Service Strategy Development by Assessment

- Perform strategy assessments at asset class level
- Apply strategy assessment for classes to technical objects



Strategy and Recommendation Management

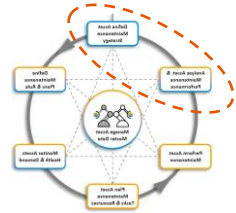
- Review strategy recommendations and manage recommendation status
- Create recommendations without an assessment

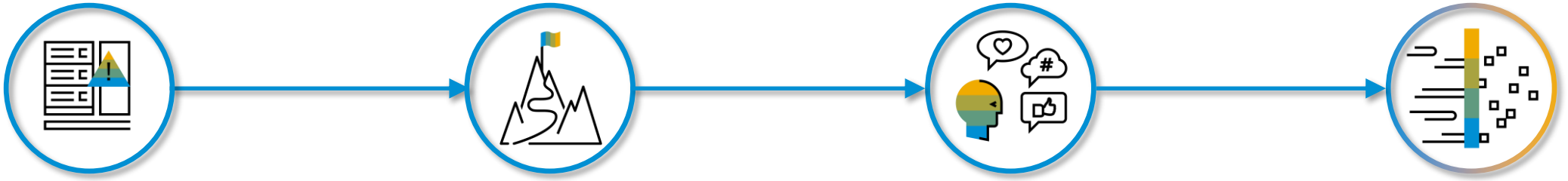


Maintenance & Service Recommendation Implementation

SAP Asset Performance Management Roadmap

Define Asset Maintenance Strategies





Risk & Criticality Assessment

- Trigger follow-up tasks from risk and criticality assessments (Q2/23)

Maintenance & Service Strategy Development by Assessment

- Perform **RCM assessments** on individual technical objects (Q1/23)
- Perform **FMEA assessments** on individual technical objects (Q2/23)
- Copy strategy assessment for classes (Q3/23)
- Perform **root cause analyses** for technical objects (Q4/23)
- Manage the reliability backlog (Q4/23)

Strategy and Recommendation Management

- Manage task lists in recommendations (Q2/23)
- Manage failure modes in recommendations without assessments (Q3/23)
- Manage maintenance plans with task lists in recommendations (Q3/23)

Maintenance & Service Recommendation Implementation

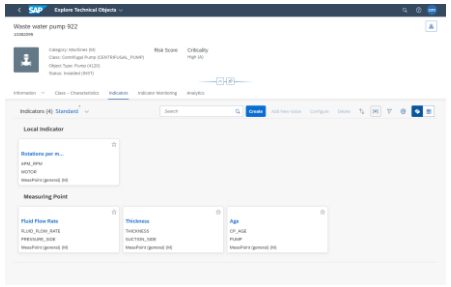
- **Implement recommendations** for condition-based maintenance (Q3/23)
- **Implement recommendations** for reactive maintenance (Q4/23)
- **Implement recommendations** for preventive maintenance (Q4/23)

SAP Asset Performance Management 2202 – 2211

Monitor Asset Health

IoT Data Management

- Configuration of indicators for condition-based maintenance
- Synchronization of technical objects to IoT technology for health monitoring
- Use S/4 measurement documents for condition monitoring



Asset Health Modeling

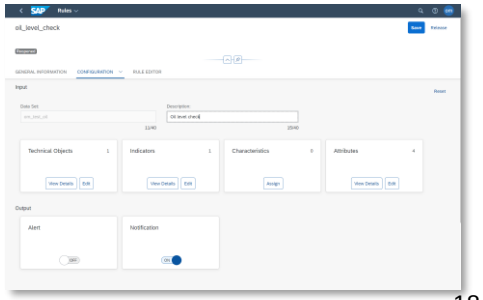
- Manage scheduled and streaming rules
- Calculate derived and aggregated indicators
- Calculate and view failure curves

Asset Health Monitoring

- Monitor rule-based alerts
- View indicator trends of a technical object
- Forecast indicator trends
- Embed custom analytical dashboards to overview asset health

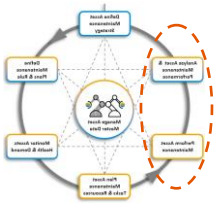
Maintenance Demand Creation

- Create notifications with task list from rules



SAP Asset Performance Management Roadmap

Monitor Asset Health



IoT Data Management

- Use templates to configure technical objects for condition monitoring (Q2/24)

Asset Health Modeling

- Use custom AI algorithms to assess asset health (Q2/23)
- Use time-aggregated indicators and indicator thresholds in rule conditions (Q3/23)
- Configure custom rule-output actions (Q2/24)

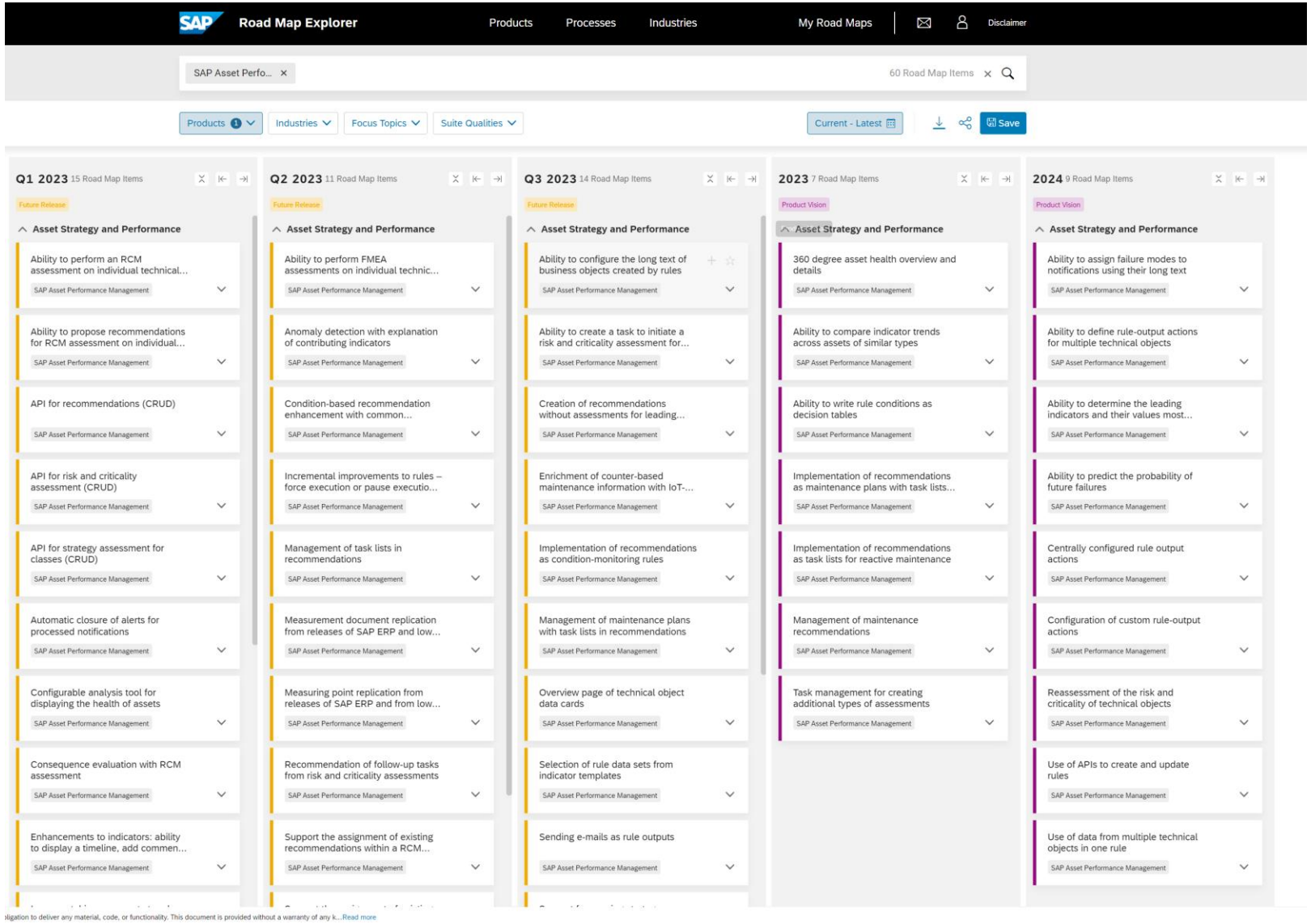
Asset Health Monitoring

- Monitor alerts from machine events and alarms (Q2/23)
- Detect and understand **anomalies** of assets (Q2/23)
- View alerts and custom data sheets for a fleet of technical objects (Q3/23)
- Send customized e-mails as output of a rule (Q3/23)
- **Configure health overview pages from technical object data cards** (Q3/23)

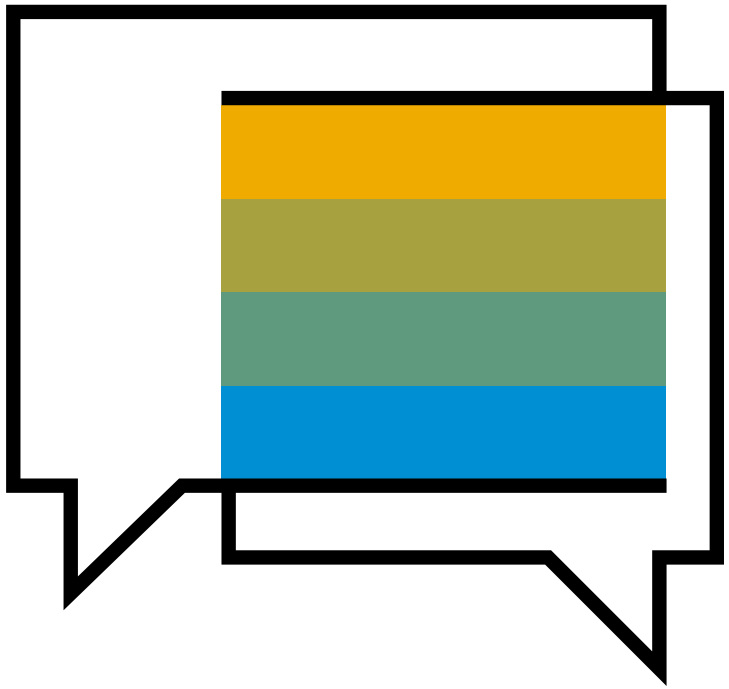
Maintenance Demand Creation

- Manually create maintenance notifications from alerts (Q1/23)
- Use IoT-based counters for counter-based maintenance (Q1/24)
- Manually **create work orders from alerts** (Q3/23)

Aktuelle Informationen finden Sie jederzeit im SAP Road Map Explorer



“Q&A”



Appendix

Harmonized Asset Data

Asset Performance Management and Enterprise Asset Management

Use an aligned data model and an out of the box integration between SAP S/4HANA Maintenance and Service Management and SAP Asset Performance Management to support end to end processes.

- Run Asset Performance Management processes on technical objects like Equipment and Functional location from S/4HANA Maintenance and Service Management
- Leverage filter and sorting criteria to find and select technical objects that are aligned with S/4HANA Maintenance and Service Management like classification data, organizational data etc.
- Integration of Measuring Points and Documents as well as classification data that allows an extension of business processes from SAP S/4HANA and enables assessments and rule definition for classes
- Run assessments and develop maintenance and service strategies on an aligned failure data model between SAP Asset Performance Management and SAP S/4HANA Maintenance and Service Management

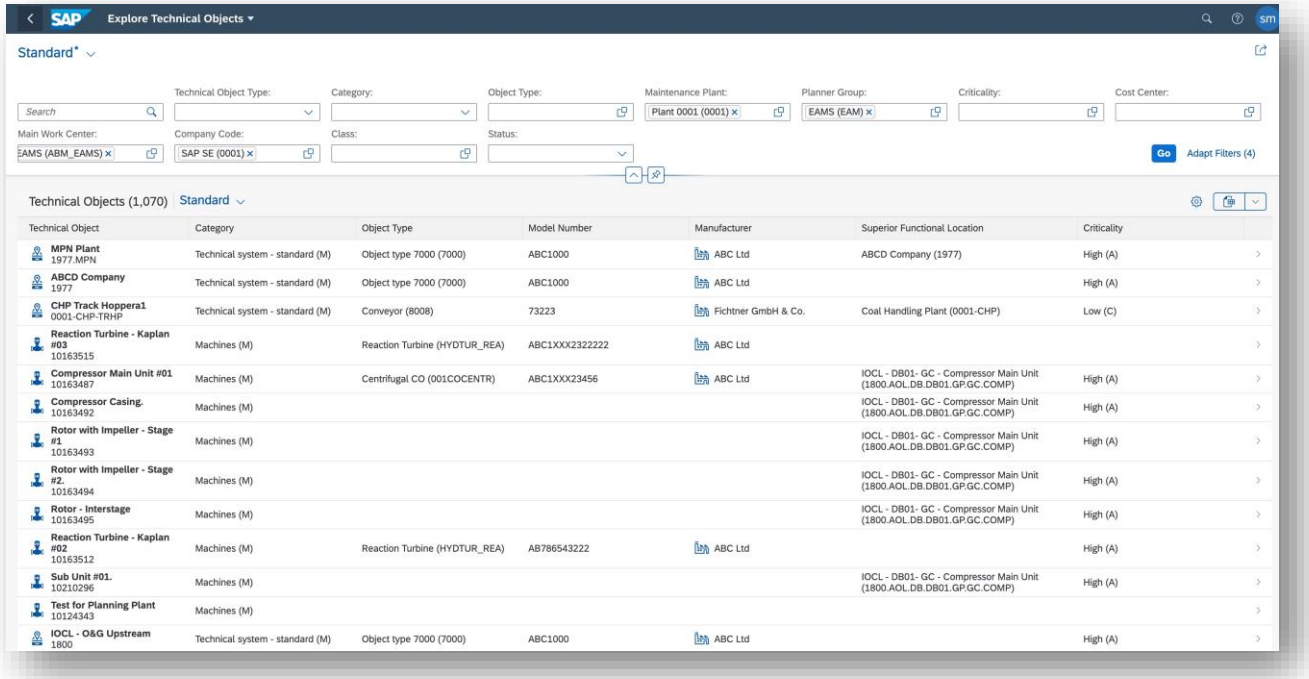


Figure: Technical Object Explorer in SAP Asset Performance Management

Risk & Criticality Assessment

SAP Asset Performance Management: Define Asset Maintenance Strategies

Segment your Assets based on Risk & Criticality to focus on what matters most!

- Out of the box re-use of **aligned master data** and their classification from SAP EAM
- **Classify the risk** of assets by developing a risk and criticality scores calculated based on standard formulars (min, max, average) for different risk impact categories
- Use **alphanumeric risk** matrix to derive the risk score of assets
- Perform assessments on **single** or **multiple** assets
- **Derive actions** and maintenance strategies based on the risk and criticality scores
- Use **custom templates** and criticality thresholds to standardize the risk and criticality calculation

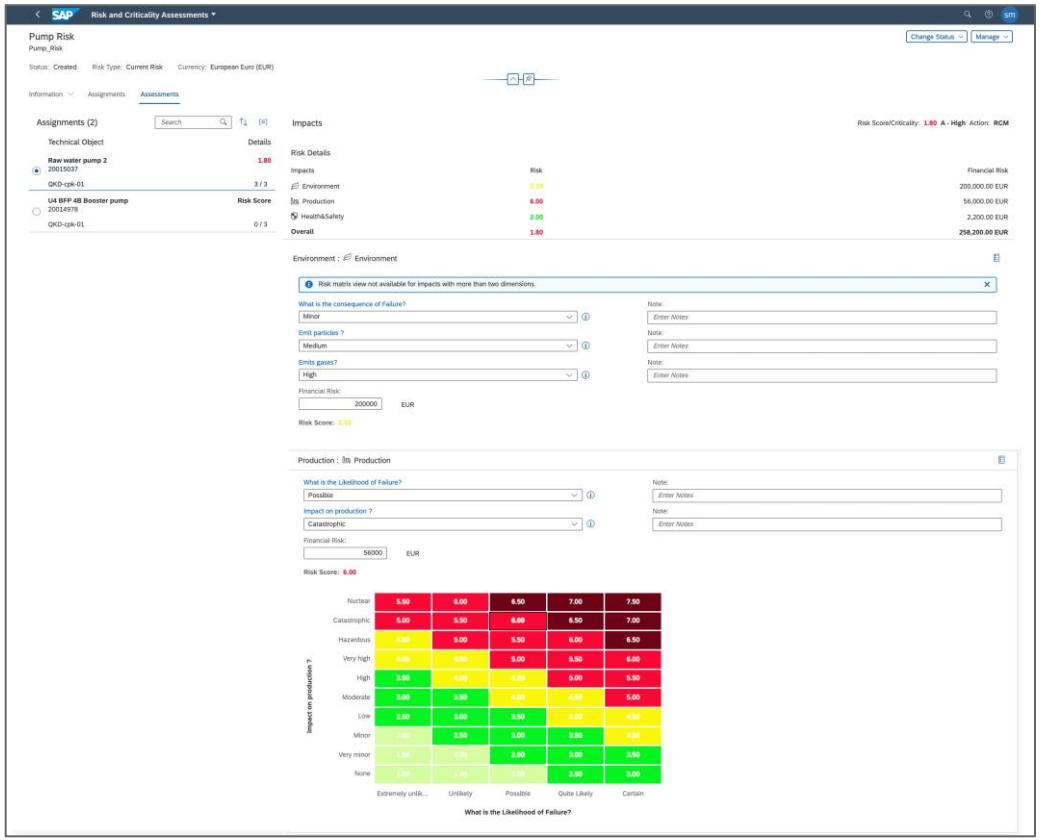


Figure: Risk & Criticality Assessment

Maintenance Strategy Development by Assessments

SAP Asset Performance Management: Define Asset Maintenance Strategies

Analyze potential failure and their impact for your assets to develop the right maintenance & service strategy to mitigate the likelihood of happening, or to restore function if acceptable

- Develop leading **failure data** and maintenance & service recommendations for **asset classes** to **standardize** and **optimize** maintenance & service programs for similar assets
- Use standard **reliability methods** such as RCM, FMEA, or FMECA to develop the best maintenance & service strategy for your critical assets
- Leverage an **aligned** and **harmonized failure data** model between SAP APM and SAP EAM
- Use **maintenance & service history** and patterns as input and guidance for assessments
- Derive and create **maintenance recommendations** to mitigate the likelihood of failures using **task lists** for reactive, proactive or improvement actions

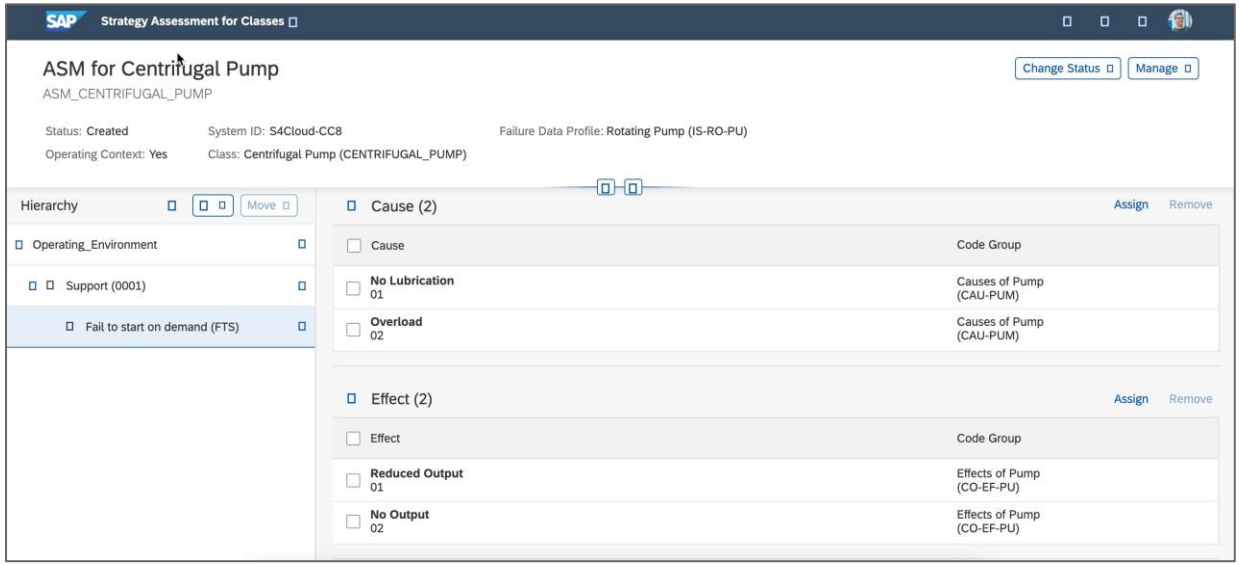


Figure: Development of failure data

Strategy And Recommendation Management

SAP Asset Performance Management: Define Asset Maintenance Strategies

Manage developed maintenance & service recommendations to have the right measure defined for review, approval and release for implementation

- Make use of a **recommendation workbench** to manage developed recommendations **centrally**
- **Review, compare and consolidate** recommendations to derive the best set of recommendations
- Manage the status of recommendations and **approve** and **release** recommendations **for implementation**
- **Create** recommendations independently of assessments and **assign failure data** to be addressed if desired
- **Copy** or **apply** existing recommendations to other technical objects
- Analyze **implemented recommendations** to reveal potential misalignment between recommendation and implemented measure*

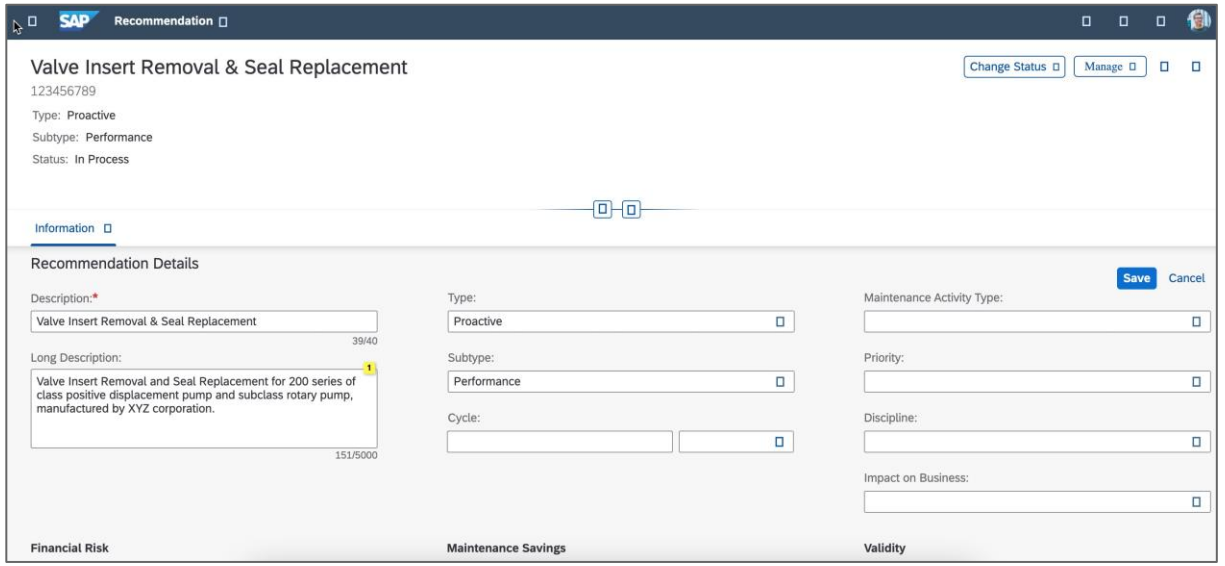
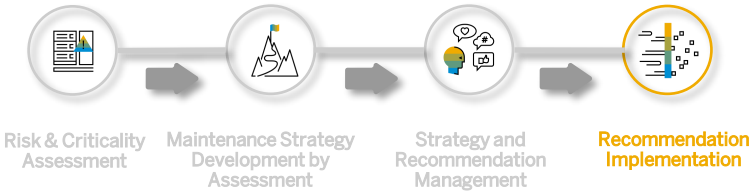


Figure: Recommendation creation

**Future planning*

Recommendation Implementation

SAP Asset Performance Management: Define Asset Maintenance Strategies



Put developed recommendations into action with the right implementation: from reactive and time-/usage based maintenance and service to more condition-based, predictive/prescriptive maintenance and service

- **Analyze** and **review** the promoted recommendations to take the **right actions**
- Leverage the **recommendations and their specifics** to transfer them into the relevant **planning objects**** for execution
- Keep track on implemented recommendations by having **connections established between recommendations and planning objects****
- Use **harmonized master data** to **ease the handover** of maintenance & service recommendations into planning objects for execution

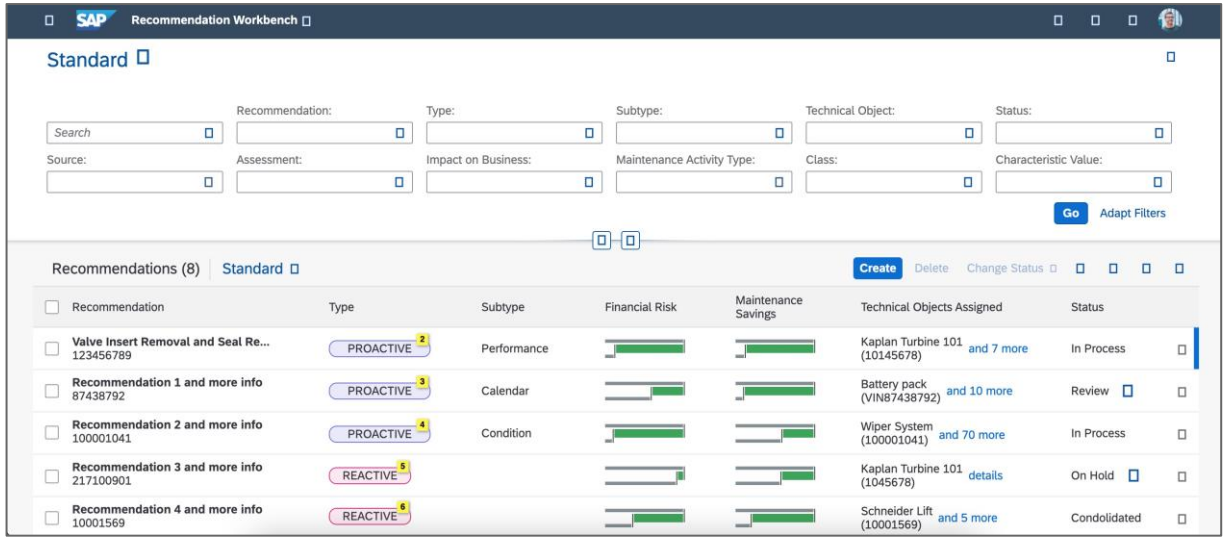


Figure: Recommendation Workbench

**Future planning*
***e.g. Task list, Inspection Template, Maintenance Plan, Maintenance Rule*

Asset and Asset Performance Data

Monitor Asset Health and Maintenance Demand

Use asset master data or transactional data and set up a connectivity to SAP IoT to receive time series data, or events for health monitoring and demand generation

- Out of the box re-use of **aligned asset master data** including measuring points, counters and characteristics between APM and EAM
- Set up **indicators for your assets** and configure thresholds and value ranges
- Establish a **connection with SAP IoT to receive time series** data for your assets
- Incorporate transactional data like **historic maintenance/service notifications from maintenance/service management** or **machine alerts from SAP IoT**

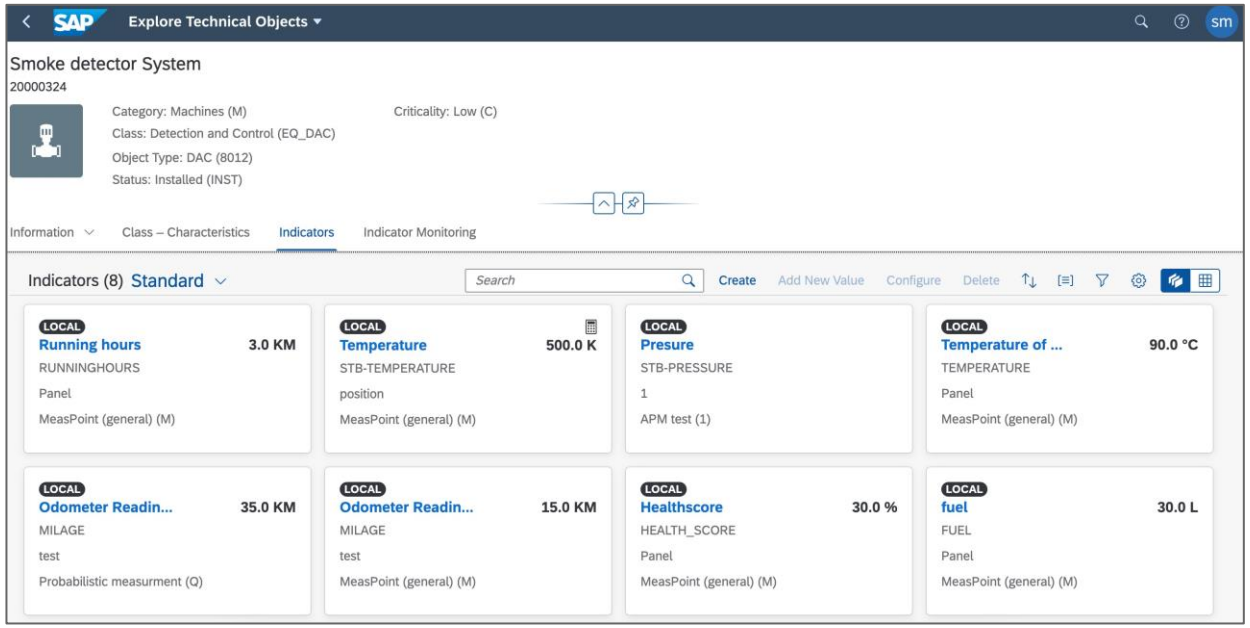


Figure: Indicator Overview

AI Models to Derive Data

Monitor Asset Health and Maintenance Demand

Leverage AI models to process data and gain further insights based on time series data, events, transactional or master data

- Use **out of the box models like anomaly detection or Weibull algorithm** to process raw data
- Derive data like **anomaly score or probability of failure**
- Determine **leading indicators** that contribute the most to **an asset health or failure**
- Calculate an **indicator forecast to show trends** of indicator values
- Store derived data against the asset indicators to gain and provide deeper insights into the asset health

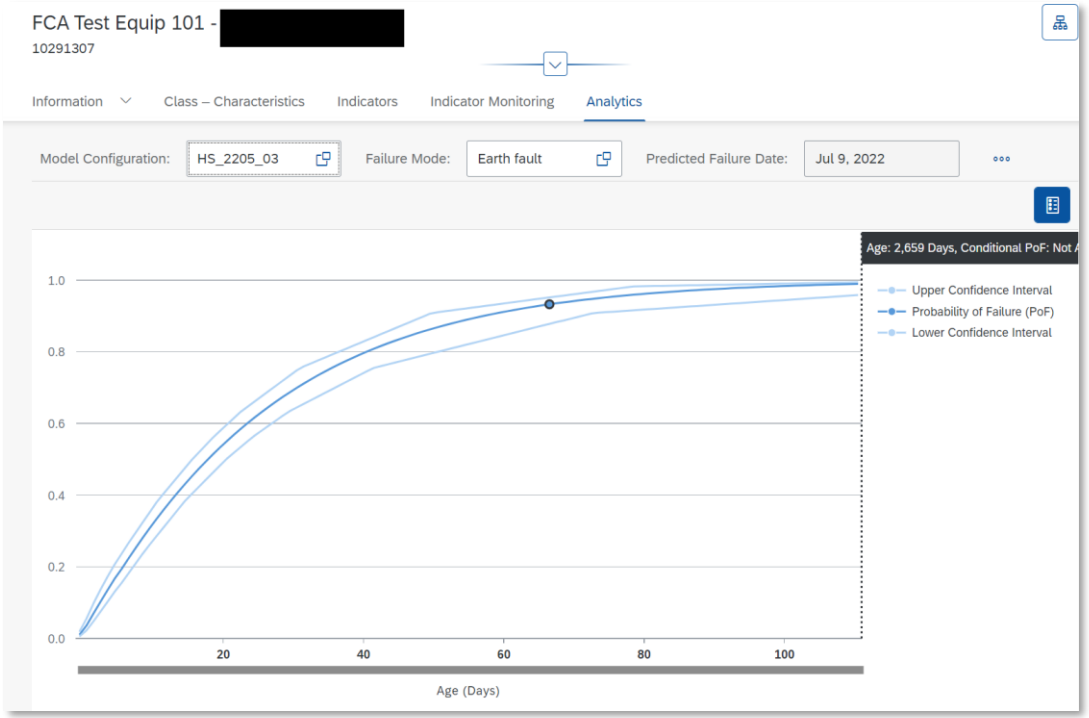
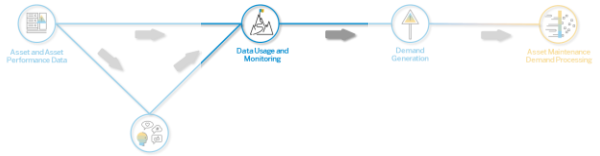


Figure: Technical Object Page → Analytics → Failure Curve

Data Usage and Monitoring

Monitor Asset Health and Maintenance Demand



Set up rules to automate creation of maintenance demand or use the data to examine and analyze the health of your asset or fleet

- Create rules of **different types** (calculated rules, scheduled rules, hierarchical aggregation rules, triggered rules, streaming rules) using **operators** for a set or individual technical objects
- Leverage different rule outputs like calculated indicators, creation of notification with assigned task lists or alerts and emails
- Monitor the **health status** or the **condition** of assets or fleets
- Use **analytics, charts and dashboards** to manage and monitor key data for single **technical objects** or an entire **fleet**
- **Compare** indicator **trends** across assets

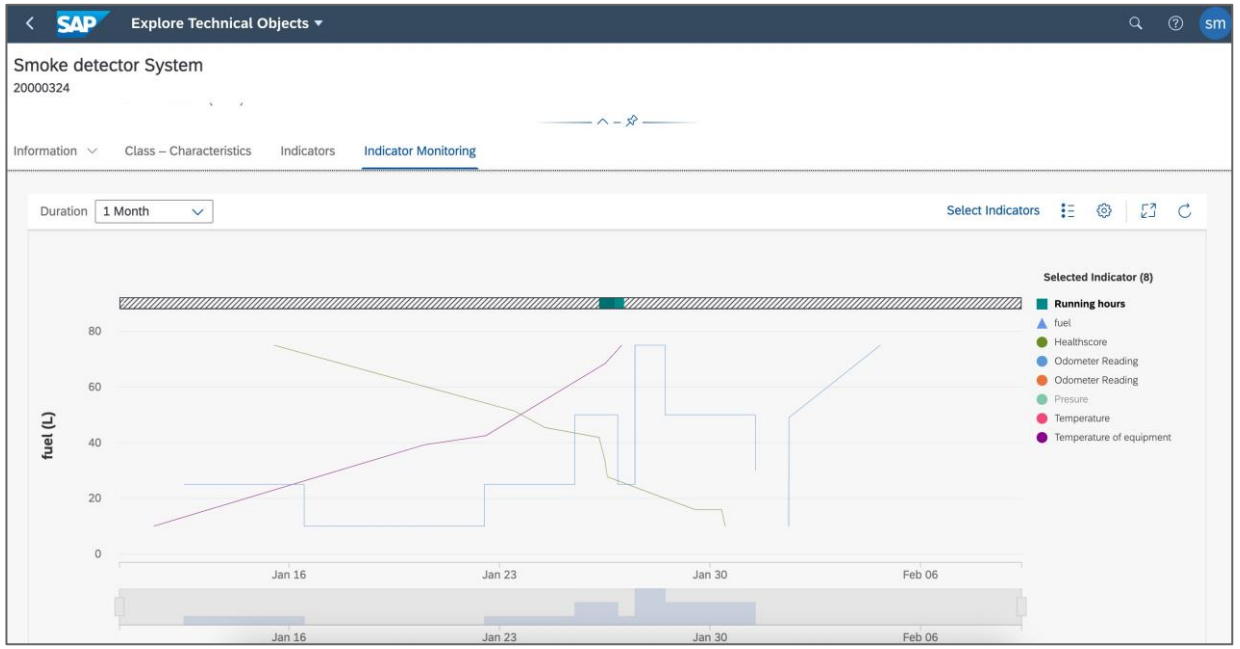


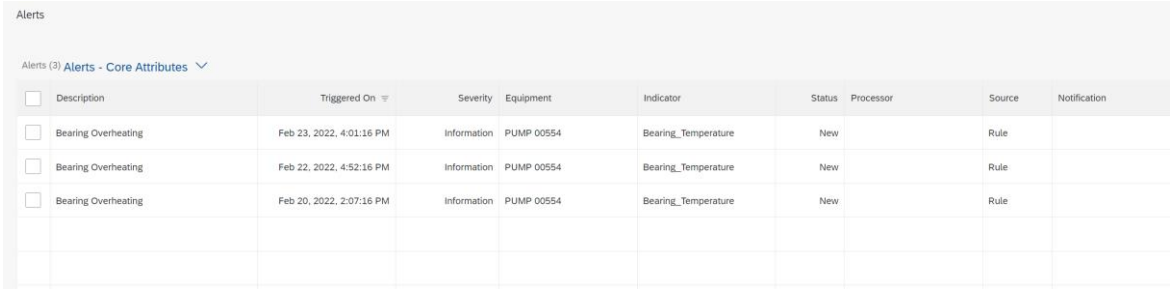
Figure: Indicator Chart

Demand Generation

Monitor Asset Health and Maintenance Demand

Create maintenance/service demand by converting generated alerts into notifications (subsequent work orders) in S/4HANA Maintenance Management

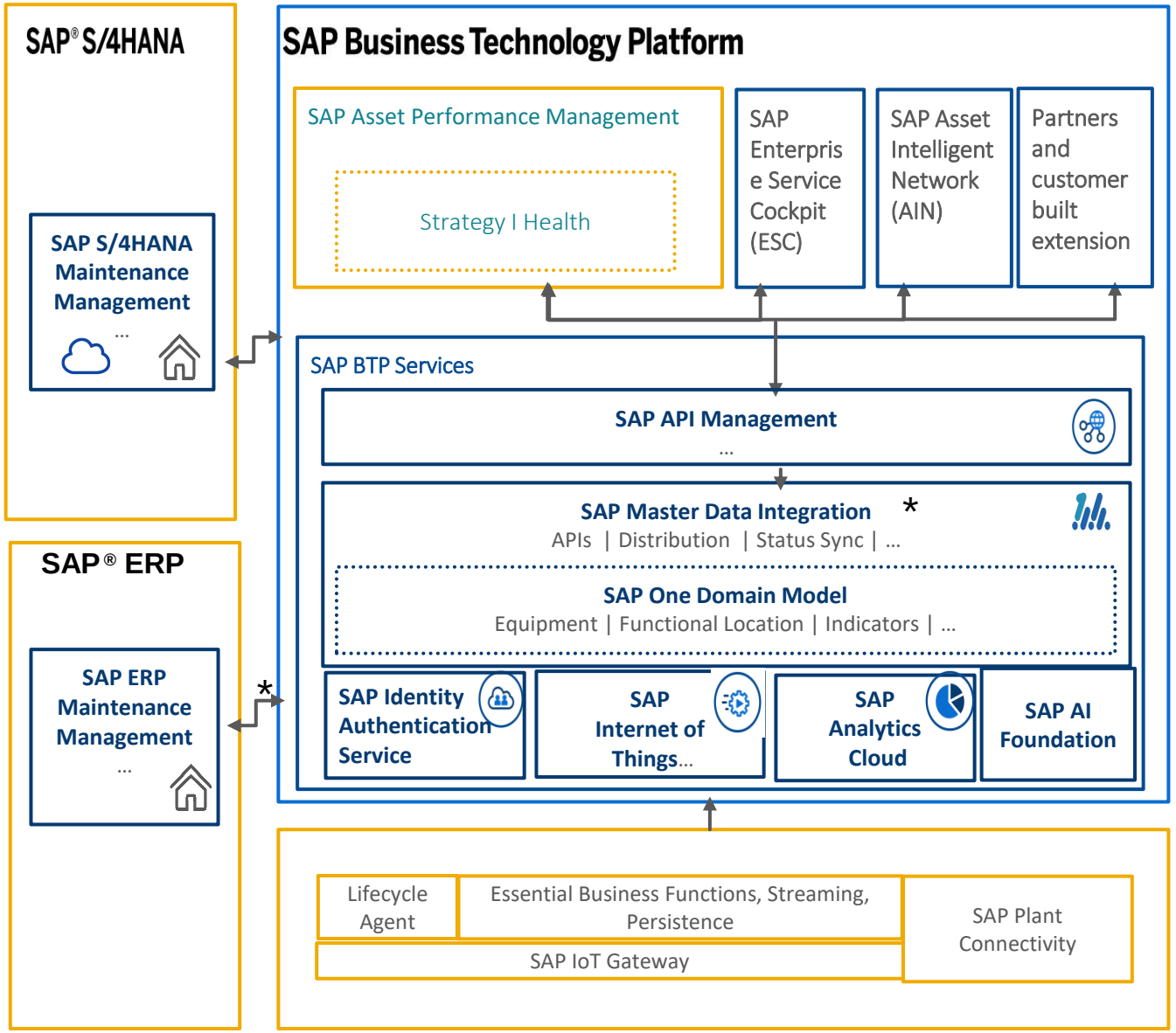
- **Review** created **alerts** and create **maintenance/service notifications** for the same
- **Monitor and review** context information or maintenance history associated with the generated **alerts** and failures for technical objects or fleets to qualify alerts
- **Use rules** with asset health and condition to auto-generate **notification** or **work order**** creation
- Out of the box re-use of aligned master data and **configuration** for notification types, priorities
- Use rules with **pre-defined task lists** to further **specify and qualify the maintenance/service demand** (notification)



Roadmap Link: https://roadmaps.sap.com/board?range=CURRENT-LAST&BC=000D3AAADBCE1EDC98B2F7ECE8D6FBF1#Q4%202022

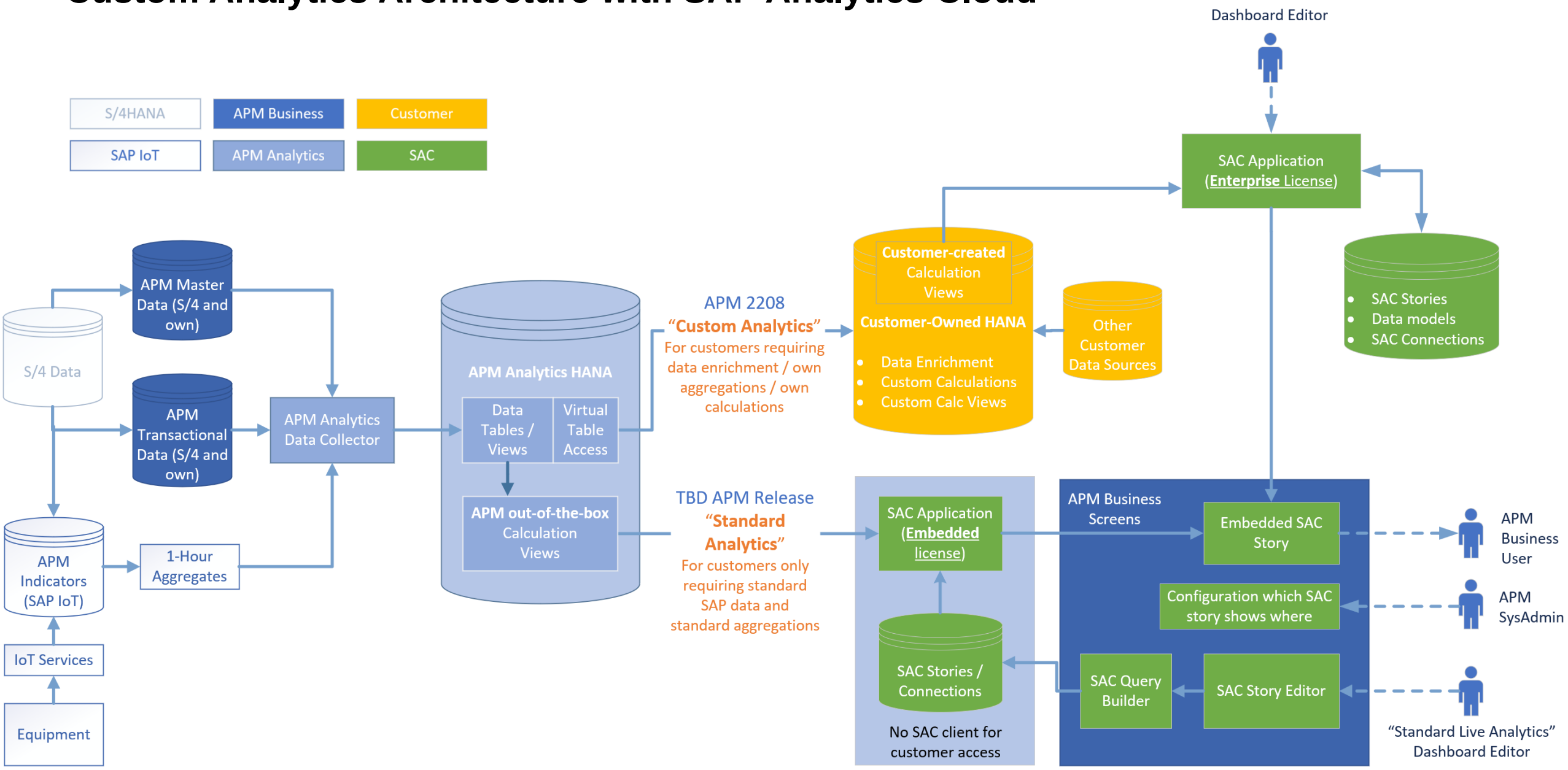
Asset Performance Management Technical Architecture

- Offered as a SaaS application with monthly releases and self service features like automated onboarding, tenant provisioning, user management, etc.
- Domain model alignment to achieve Closed-loop e2e processes, using technologies like One domain model (ODM)
- OData, Events and MDI based integration to achieve seamless integration between applications S/4HANA Maintenance Management (OP and Cloud), SAP ERP, APM, SAP IoT and other applications.
- Microservices and BTP based cloud solution to manage industrial scale assets. A true multitenant solution which isolates tenant resources including storage.
- Optimal granular APIs for integration with SAP and non SAP products. Side-by-side extensibility
- Security: Highly secure application following SAP's secure software development lifecycle (SDLC) . ISO27001 certification underway, SOC certification on roadmap

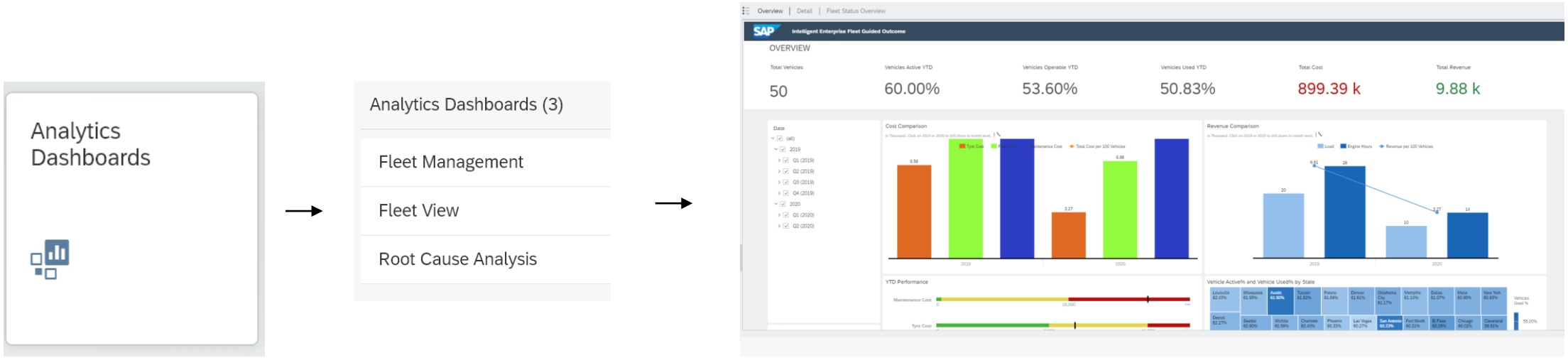


* Planned roadmap item

Custom Analytics Architecture with SAP Analytics Cloud

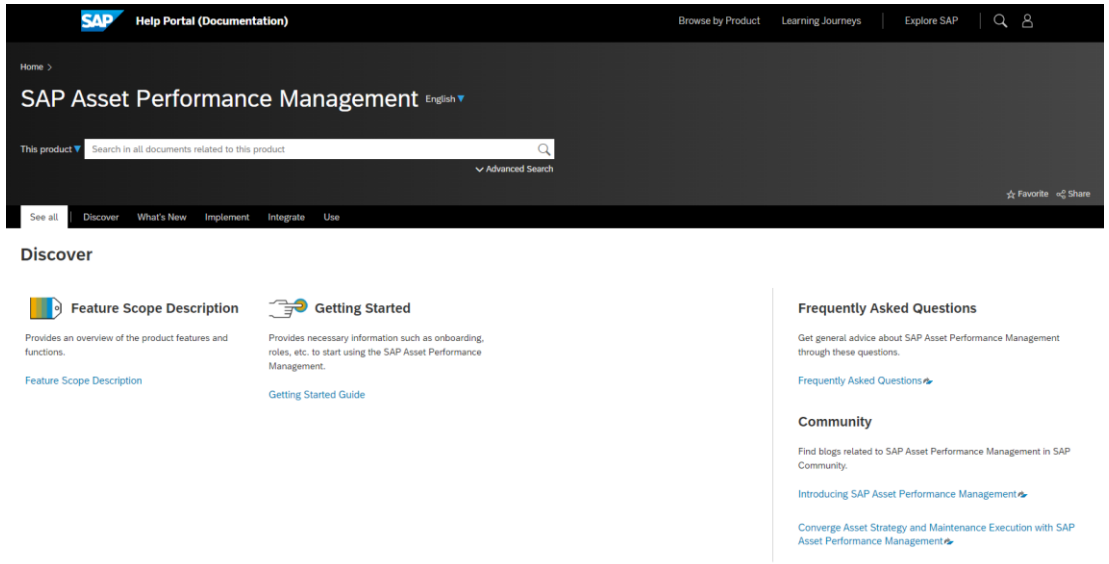


SAP Analytics Cloud - Embedded Analytics Use Cases

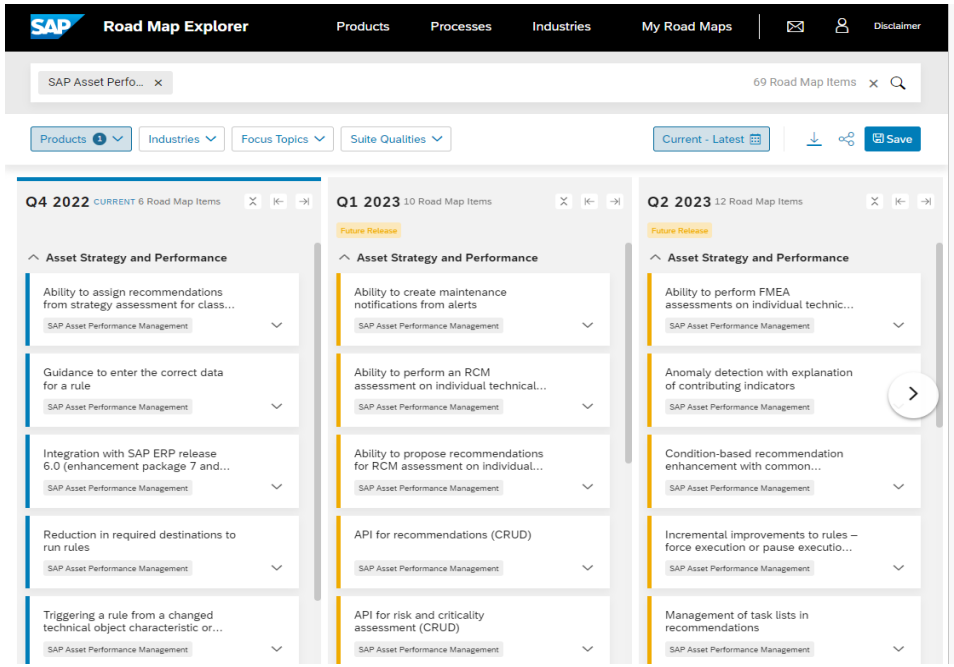


- **Standard data sources as part of APM integration**
  - Technical Objects, Positions, Categories, Alert Types, Alerts, Indicators, Indicator Thresholds, Indicator time series aggregates (count, sum, avg, min, max)
- **Requires customer Owned HANA instance**
  - Supports live connections
  - Support custom calculations

For more information:



https://help.sap.com/docs/SAP_APM



Roadmap

Thank you.

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