

Roadmap & Timelines & Solution Overview

SAP Asset Strategy & Performance Management

August 2017



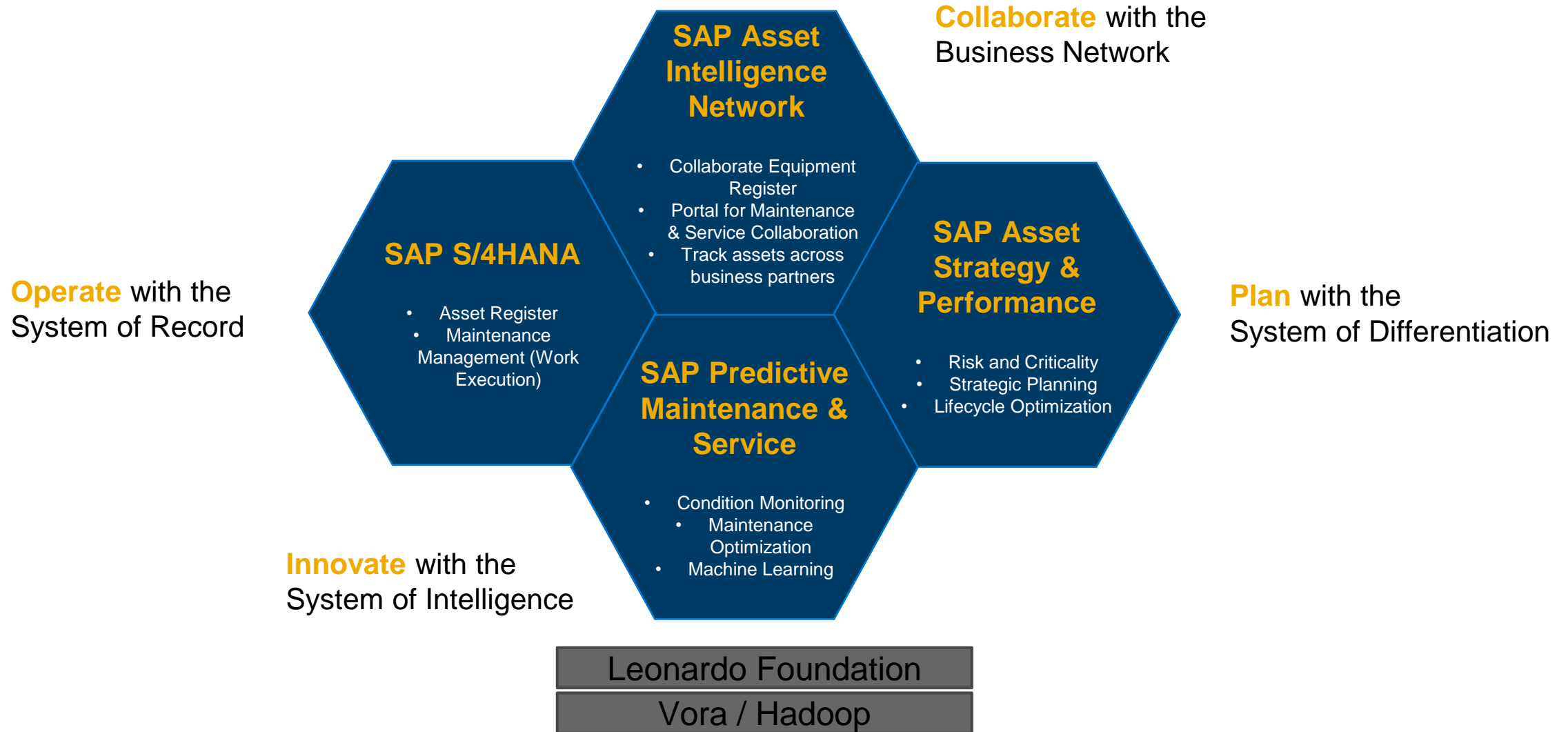
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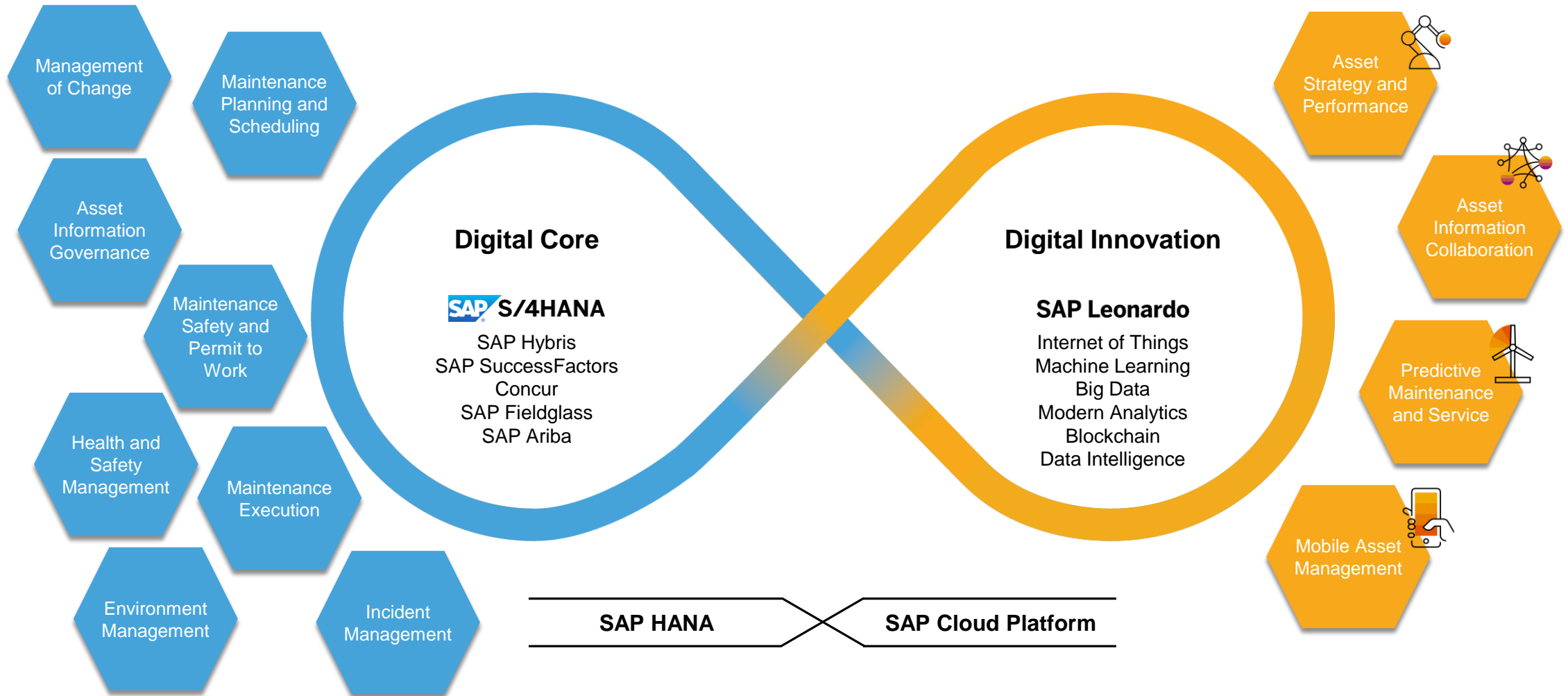
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SAP Leonardo - Digital Asset Suite



SAP Enterprise Asset Management

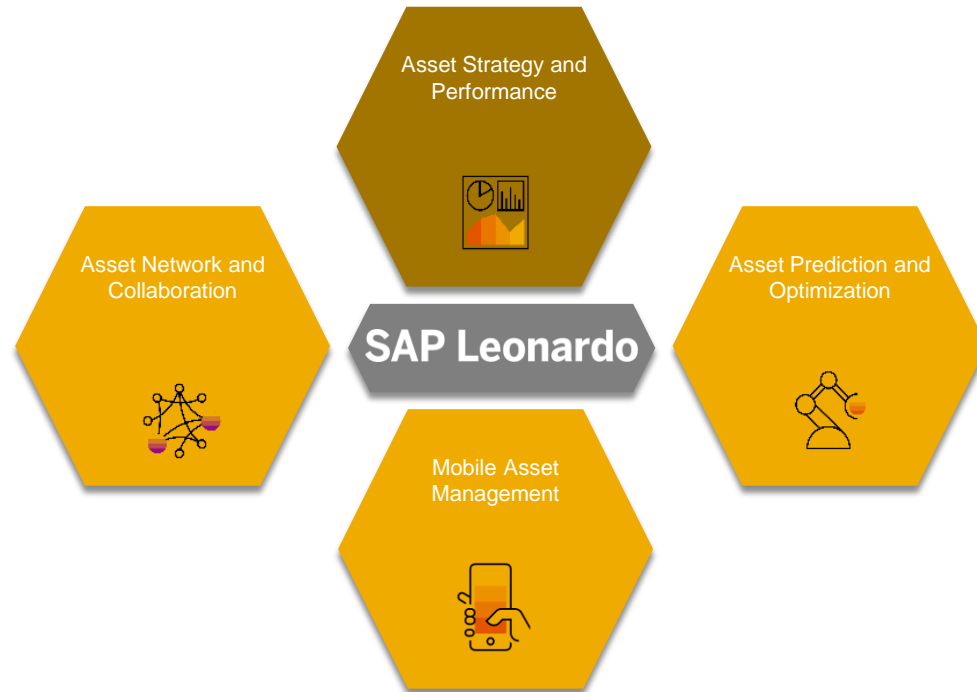
Integrated applications supporting holistic asset management



SAP Asset Strategy and Performance Management

Analyze criticality of assets and optimize maintenance strategies

SAP Asset Strategy and Performance



Solution Capabilities & Benefits

- **Maintenance Strategy Management** (Facilitates the development of operational strategies to define actions and their mitigated risks for any asset, providing the ability to evaluate existing plans with basic qualitative risk analysis)
- **Lifecycle cost analysis** (Analyse asset lifecycle costs and when to “repair vs. replace” by capturing all relevant cost data associated to the entire fleet)

Benefits

- **Improve reliability by using standard methodologies** for lowering risks, maintenance cost, downtime, and energy consumption
- Reduce bottlenecks and **prevent recurrence of incidents**. Hold consistent asset performance reviews, monitor asset performance, and optimize improvement plans
- **Reduce outages and resolution time** by updating asset strategy and performance from preventive to condition-based maintenance.

SAP Asset Strategy & Performance Management

End-2-End Process Enablement

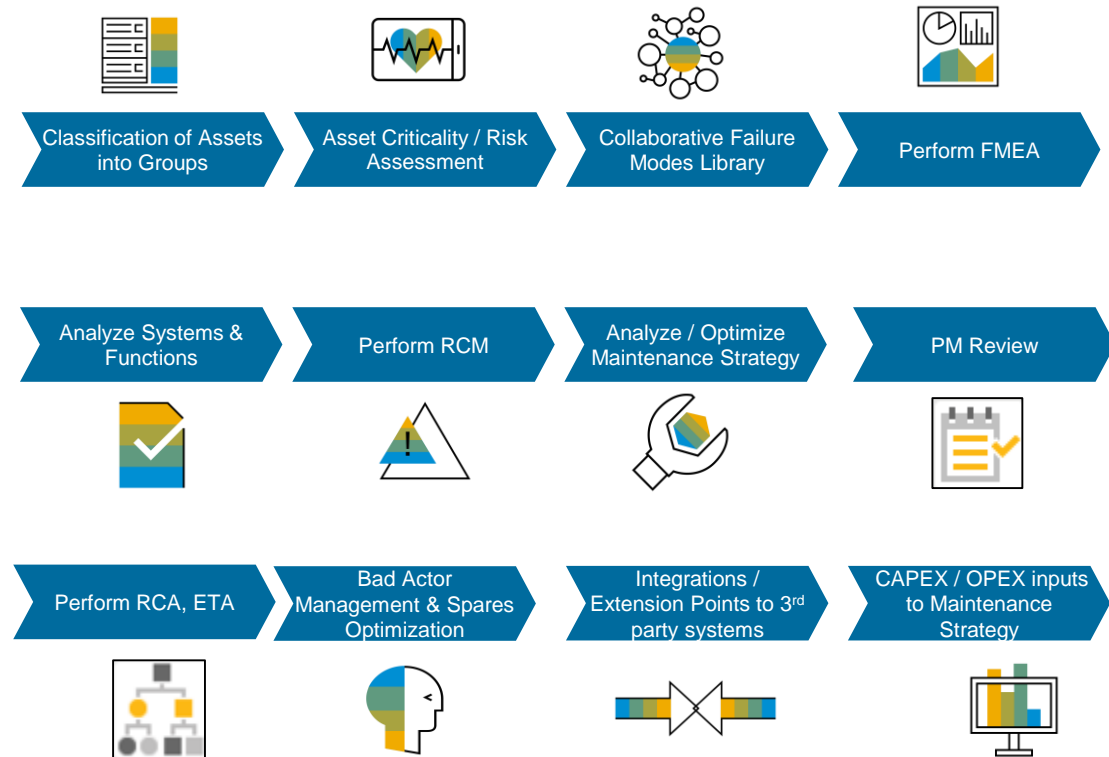
Benefits

- Increase overall asset availability
- Decrease MTBF - Increase equipment reliability
- Better utilization of assets
- Control Maintenance spend
- Reduce work backlog
- Identify savings opportunities through preventive and predictive maintenance
- Reduction of capital tied-up in spare parts inventory
- Adopt a proactive and targeted maintenance strategy
- Ability to change the sequence of processes using Point Apps

Solution Integration Points

- SAP Asset Intelligence Network
- SAP Predictive Maintenance & Service
- SAP Enterprise Asset Management
- SAP ERP (MM, FICO, PP)
- SAP Integrated Business Planning

Process Innovation





Build



Extend



Integrate

On-Premise /
Managed Cloud /
SaaS

SAP ADP

SAP Analytics Cloud

SAP DIM

SAP Hybris

Ariba*

SAP C4S

SAP S/4 HANA

SAP ERP

SAP PdMS

SAP IBP

Work Orders
Change Requests
Maintenance Schedules
Maintenance Strategy
Criticality
RPNs
Failure Modes

Rest API

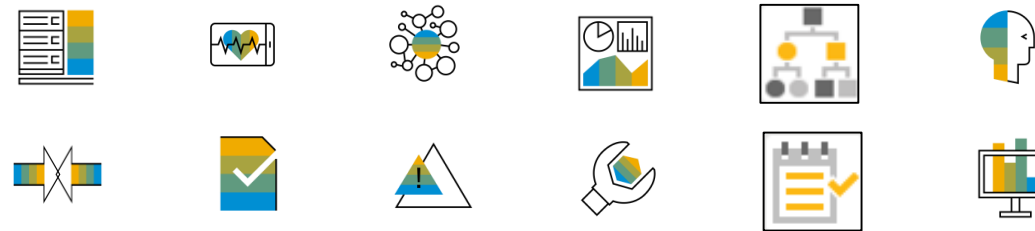
SAP Cloud
Integration
Services
(Cloud)

AIN
Mappings

ABAP
HTTP calls
(on-Premise)

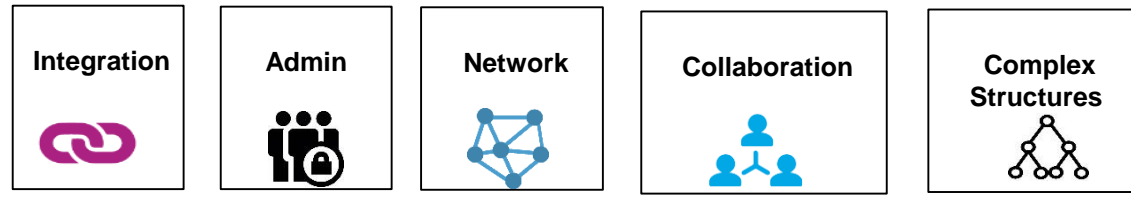
SAP Cloud Platform (SCP) (PaaS)

SAP Asset Strategy and Performance Management



SCP / Java Application

SAP Asset Intelligence Network



SCP Identity
Service



SCP Document
Service



SCP Persistence
Service



Redis



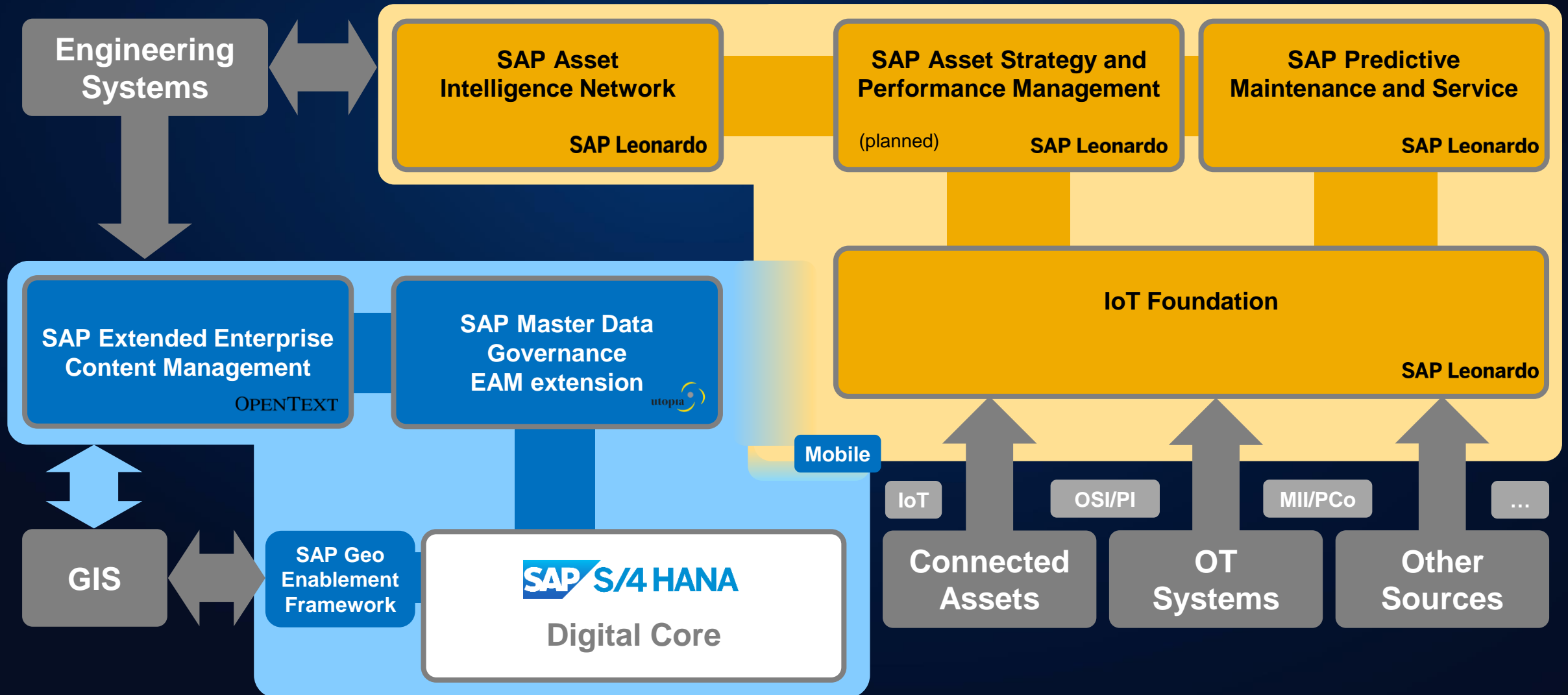
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Search



SAP Clea

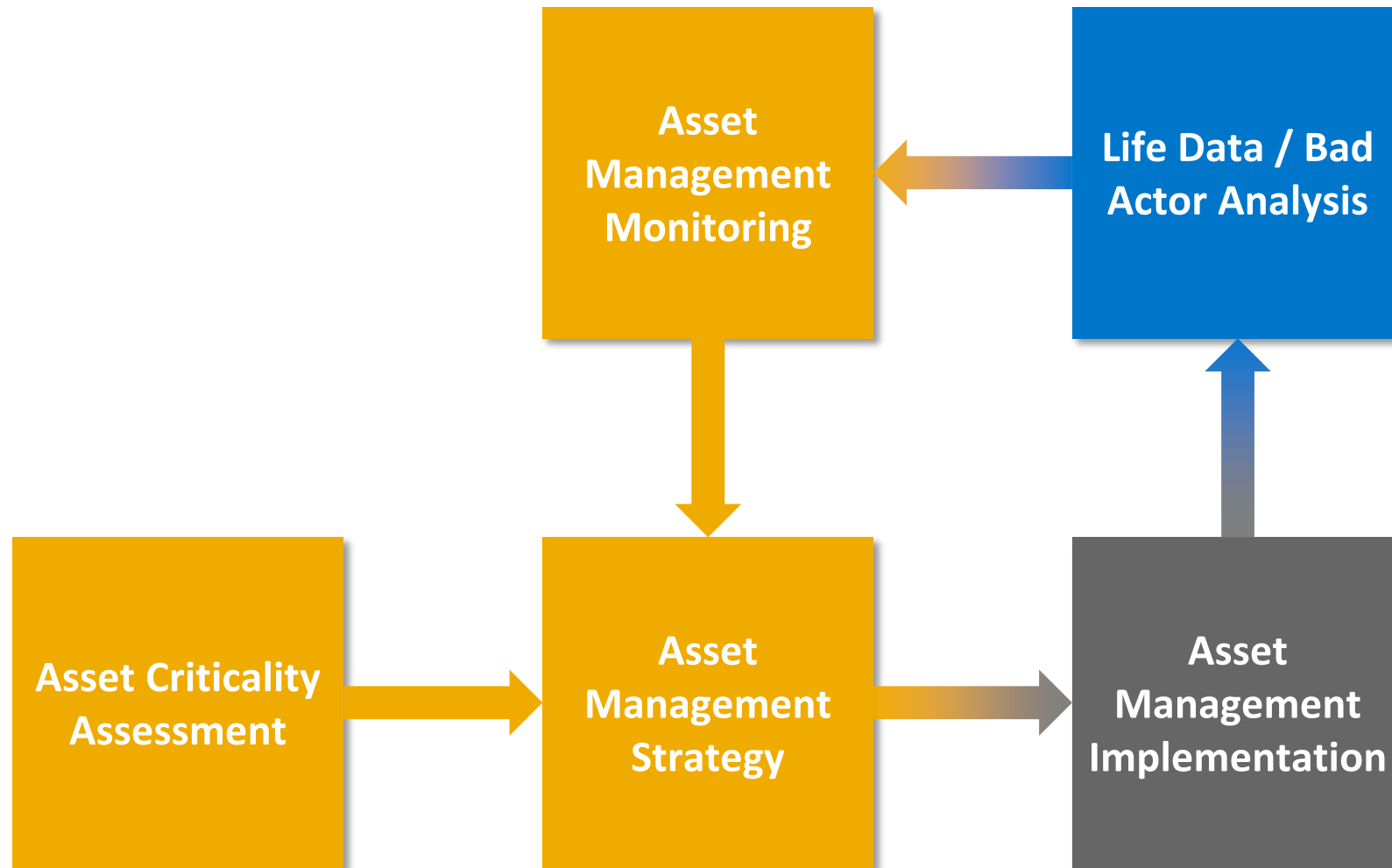


Logical Architecture for Asset Management System and Product View



Asset Strategy and Performance Management

Main Blocks



Legend

- ASPM
- PM
- PdMS

This is the current state of planning and may be changed by SAP at any time.

Asset Strategy and Performance Management

Asset Criticality Assessment

Asset Criticality Assessment

Asset Criticality Assessment

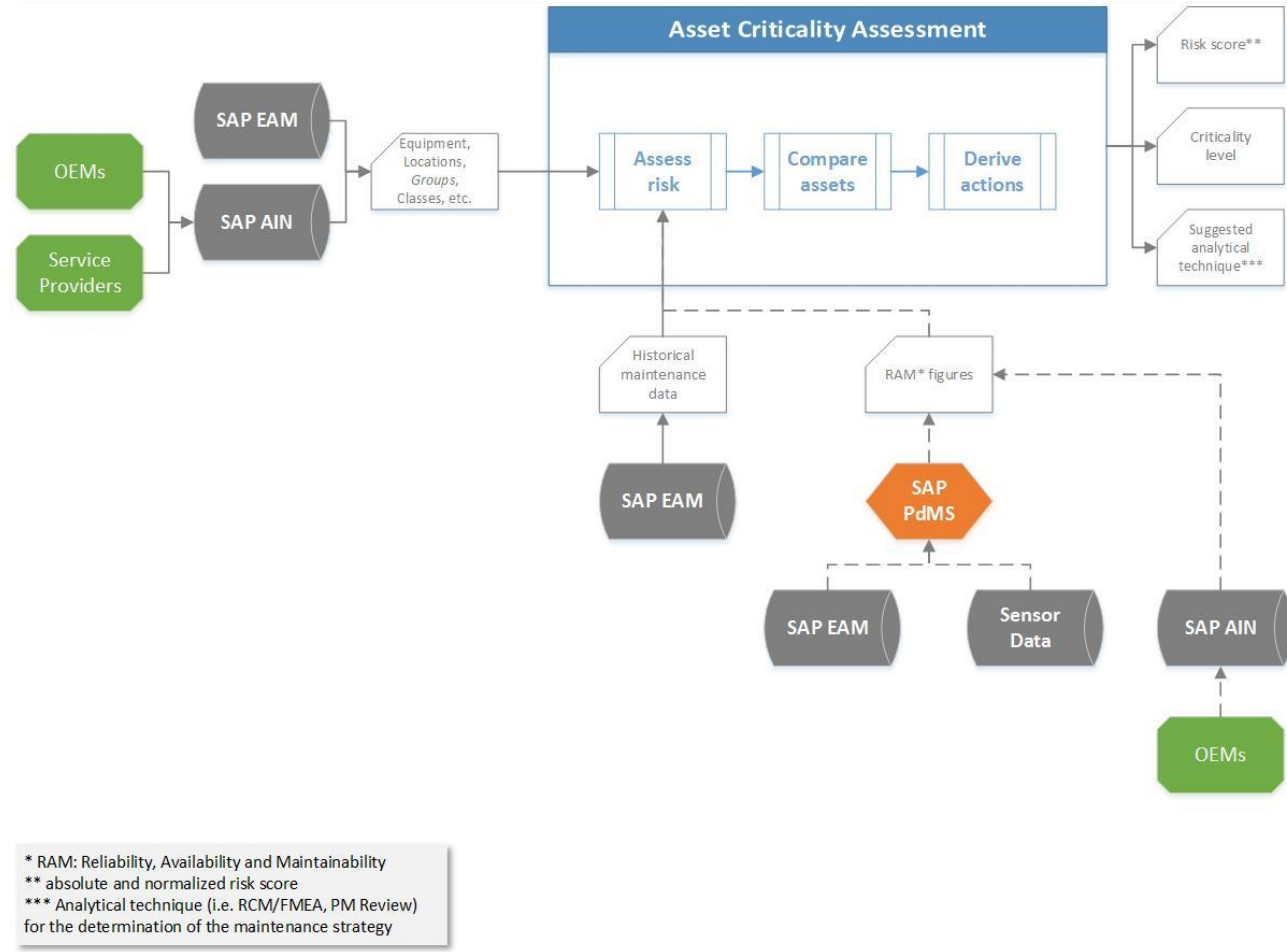
Which are the critical assets? Which assets are likely to benefit most from application of which analytical processes (i.e. RCM, FMEA)?

- **Description:**
 - Assessment of asset (i.e. equipment, location and group of) criticality based on risk score.
 - Informed assessment based on historical maintenance data and relevant KPIs (EAM/PdMS integration).
 - Calculation of risk score based on different dimensions and scales and for different impact categories.
 - Supporting the selection of the most appropriate analytical process (i.e. RCM/FMEA, PM review, CM) based on the result of the criticality assessment.

Asset Strategy and Performance Management

Asset Criticality Assessment

Asset Criticality Assessment

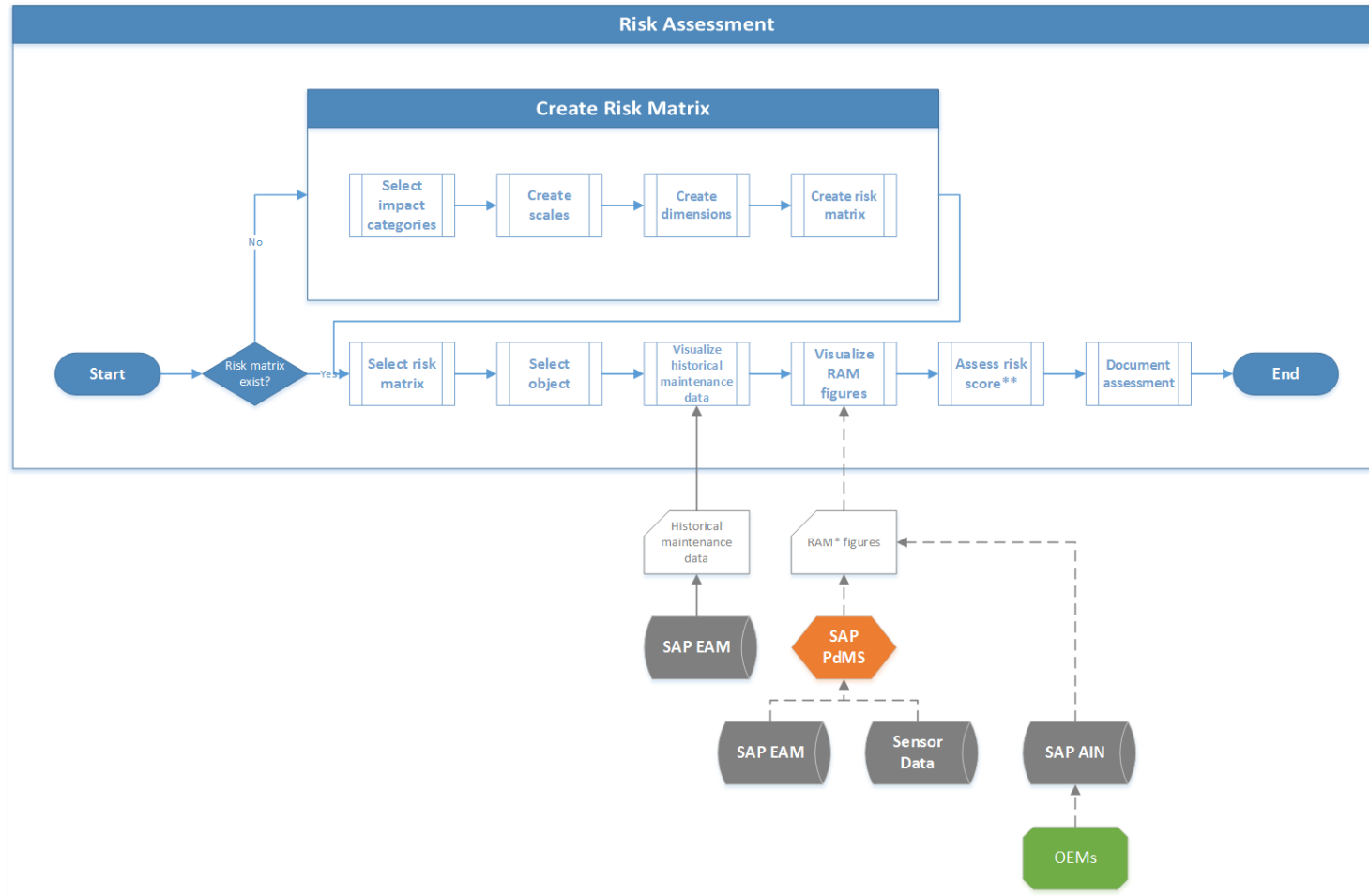


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Asset Strategy and Performance Management

Asset Criticality Assessment

Asset Criticality Assessment



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Asset Strategy and Performance Management

Criticality Assessment

SAP Assessment

Test_assessment_ST_4_n

Risk Score: 50005.00

MV_breakers_on_environment: 10
 0_Severity_Health: 1
 0_Probability: 10

MV_breakers_on_health: 100000
 0_Severity_Health: 10000
 0_Probability: 10

BASIC INFORMATION EQUIPMENT QUESTIONNAIRE

Impact Category: MV_breakers_on_environment

Score: 10

Legend: 500,000, 400,000, 300,000, 200,000, 100,000, 0

0_Severity_Health: 1
 0_Probability: 10

Dimension: 0_Severity_Health

What impact the failure may have on health of people?
 What impact the failure may have on health of people?

Answers	Description	Long Description
<input checked="" type="radio"/> Very Low	Minor medical treatment (First Aid)	Incidence that needs minor medical treatment

KPIs

Availability: 45% (Operational Availability)

Subcontract Work: 15M (EUR)

Maintenance Requests to Correct Incidents: 12 Reported Injuries, 13 Safety Incidents, 24 Enviro Compliance

Stock Outages Average Per Month: 3

Reliability Mean Time: To Repair: 12, Between Repair: 13, Between Failure: 24 (Minutes)

Maintenance Budget Utilisation: 63.72M (EUR), 65%

Number of Work Orders Per Clock Hour

Equipment Overview

Work Orders by Business Objects

Notifications by Business Objects

Incidents by Business Objects

Equipment Details

Work Orders (6)

ID	Name	Type	Frequency	Created By	Performed By	Date	Cost
RM 2134	WO - Weekly Service	Inspection	Weekly	Christian Bale	A N Thomas	12-12-2015	12,000
3290	WO - Replace batteries	Inspection	Monthly	Christian Bale	A N Thomas	12-12-2015	10,000
2398489	WO - Clean DW	Breakdown	Yearly	Christian Bale	A N Thomas	12-12-2015	5,000
329DP	WO - Check temperature	Preventive	Monthly	Christian Bale	A N Thomas	12-12-2015	6,000
2398489	WO - Clean DW	Breakdown	Yearly	Christian Bale	A N Thomas	12-12-2015	5,000
329DP	WO - Check temperature	Preventive	Monthly	Christian Bale	A N Thomas	12-12-2015	6,000

Notifications (5)

ID	Name	Type	Created By	Date	Possible Reasons
RM 2134	Perform Weekly Service	Preventive	Christian Bale	12-12-2015	Reason A
3290	Replace batteries	Inspection	Christian Bale	12-12-2015	Reason A
2398489	Clean DW	Breakdown	Christian Bale	12-12-2015	Reason A
329DP	Temperature is above optimal Level	Preventive	Christian Bale	12-12-2015	Reason A
329DP	Temperature is above optimal Level	Preventive	Christian Bale	12-12-2015	Reason A

Incidents (6)

ID	Name	Created By	Date	Priority
RM 2134	Perform Weekly Service	Christian Bale	12-12-2015	Priority A
3290	Replace batteries	Christian Bale	12-12-2015	Priority B
2398489	Clean DW	Christian Bale	12-12-2015	Priority A
329DP	Temperature is above optimal Level	Christian Bale	12-12-2015	Priority C
3290	Replace batteries	Christian Bale	12-12-2015	Priority B
2398489	Clean DW	Christian Bale	12-12-2015	Priority A

Asset Strategy and Performance Management

Asset Management Assessment

Asset Management Strategy

Asset Management Strategy

What asset management strategy (CM, PM, CBM, PdM) is appropriate at asset and, eventually, failure mode level? How can the current maintenance strategy be improved?

- **Description:**

Supporting the identification of recommended actions at asset and, eventually, failure mode level by providing RCM/FMEA capabilities.

Supporting PM review and optimization.

Integrating OEM/3rd party content libraries.

Enabling collaboration with manufacturers and service (e.g. content) providers on failure modes, recommended actions, etc.

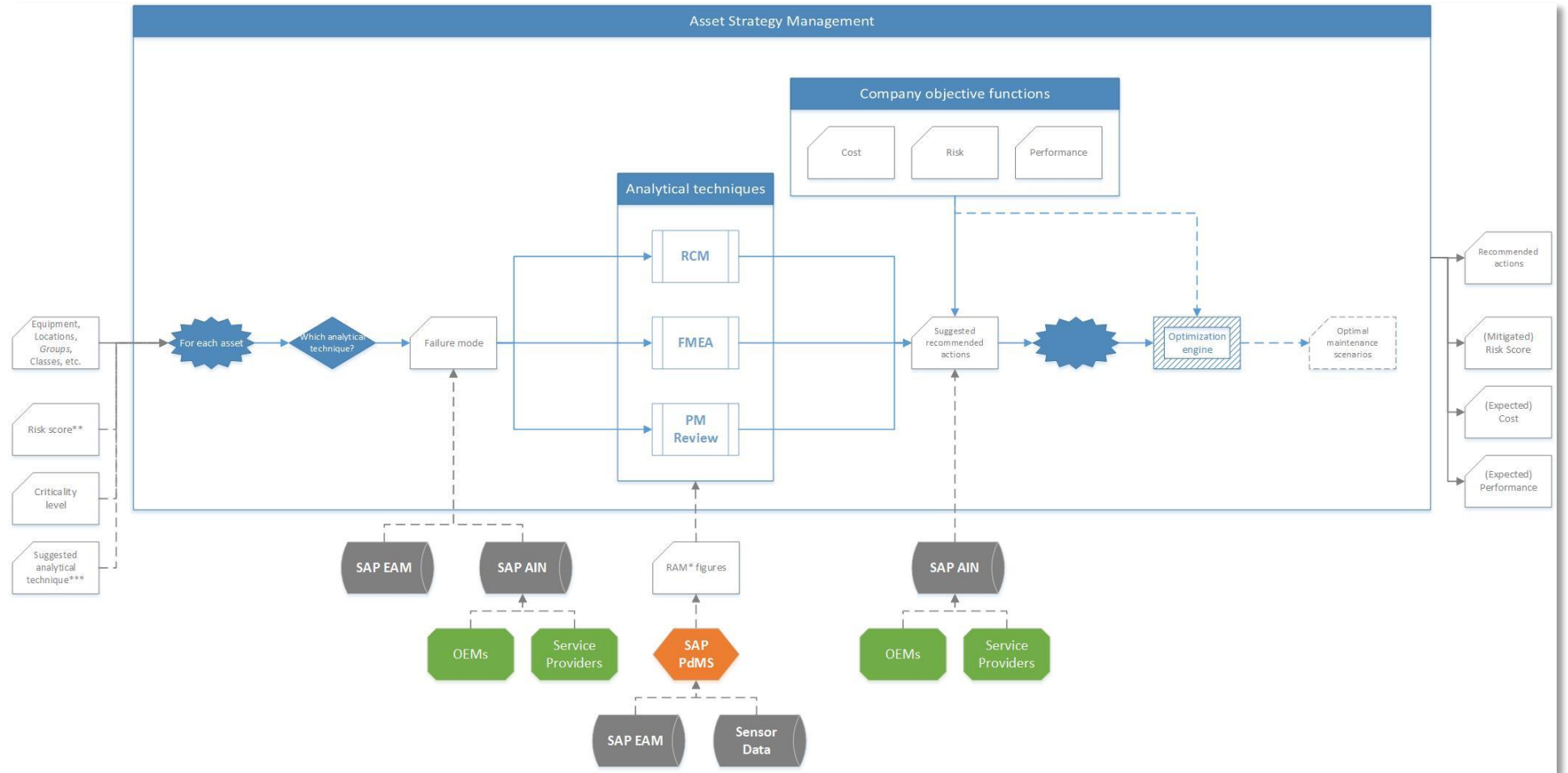
Identifying the optimal maintenance strategy among different scenarios based on risk, cost and performance objective functions.

This is the current state of planning and may be changed by SAP at any time.

Asset Strategy and Performance Management

Asset Management Assessment

Asset Management Strategy



This is the current state of planning and may be changed by SAP at any time.

Asset Strategy and Performance Management

Asset Management Assessment

Asset Management Strategy

The screenshot displays the SAP Failure Mode List interface. At the top, there is a navigation bar with the SAP logo and a search bar. Below this, a filter bar shows 'Filtered by (3): Filter 1, Filter 2, Filter 3'. A search bar is also present. The main content area features a table with 123 items. The table has columns for 'Failure Mode', 'Long Text', 'Assignment', 'Effects', 'Causes', 'Status', and 'Source'. Two rows are visible, both for 'Tank Rupture'. The first row is 'Published' with 'E + H' source, and the second is 'Unpublished' with 'H' source. Below the table, three pop-up windows are shown: 'Long Text' with a search bar and a text area; 'Causes for Tank Rupture' with a search bar and a list containing 'Rust' and 'Pipe'; and 'Effects for Tank Rupture' with a search bar and a list containing 'Water loss' and 'Noise'. Each window has an 'OK' button at the bottom.

Failure Mode	Long Text	Assignment	Effects	Causes	Status	Source
Tank Rupture 1		1 2	2	1	Published	E + H
Tank Rupture 1		1 2	2	1	Unpublished	H

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Asset Strategy and Performance Management

Asset Management Monitoring

Asset Management Monitoring

Asset Management Monitoring

How is the asset and the asset management strategy performing?

- **Description:**
Providing dashboards and reporting capabilities to monitor asset performance in terms of relevant KPIs for different categories (reliability, availability and maintainability, capacity, output quantity, output quality, safety and environment impact, etc.)
Providing dashboards and reporting capabilities to monitor the efficiency and effectiveness of asset management strategy.
Triggering and supporting informed updates of asset management strategy

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Asset Strategy and Performance Management

Asset Management Monitoring

Asset Management Monitoring

Asset Management Monitoring

How is the asset and the asset management strategy performing?

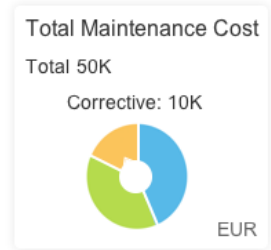
- **Requirements:**
 - Different sections for different categories, i.e. 1. financial (for costs), 2. reliability (for number of failures), availability, maintainability (for available spare parts), 3. performance (for production performance), etc.
 - Ability to drill down from the very high level (i.e. company, installation, plant) to the single asset, i.e. overall availability of the production plant > availability of all pumps in the production plant > availability of the single pump in the production plan. The same applies to all sections, categories, KPIs
 - Ability to show the current as well as the historical behavior, i.e. current reliability and reliability behavior for the past 10 years (the user should define the desired time window)
 - Ability to forecast future behavior, i.e. reliability trend for the next one year (the user should define the desired time window)
 - Actual vs. target/expected

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Asset Strategy and Performance Management

Asset Management Monitoring

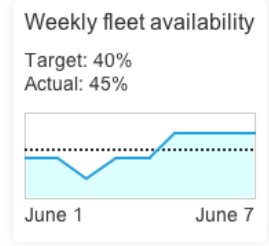
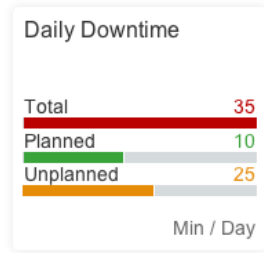
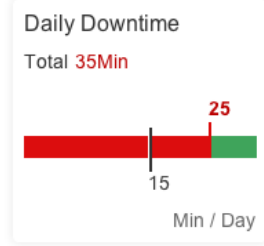
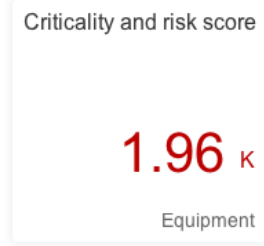
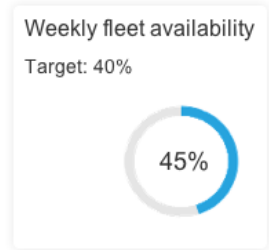
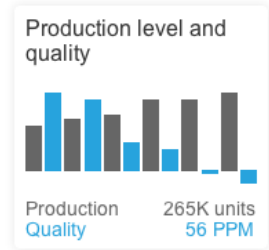
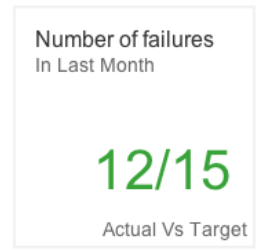
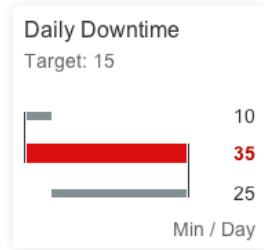
Asset Management Monitoring



Criticality and risk score

Unassessed	1.96 K
Criticality A	234
Criticality B	4359
Criticality C	2039485

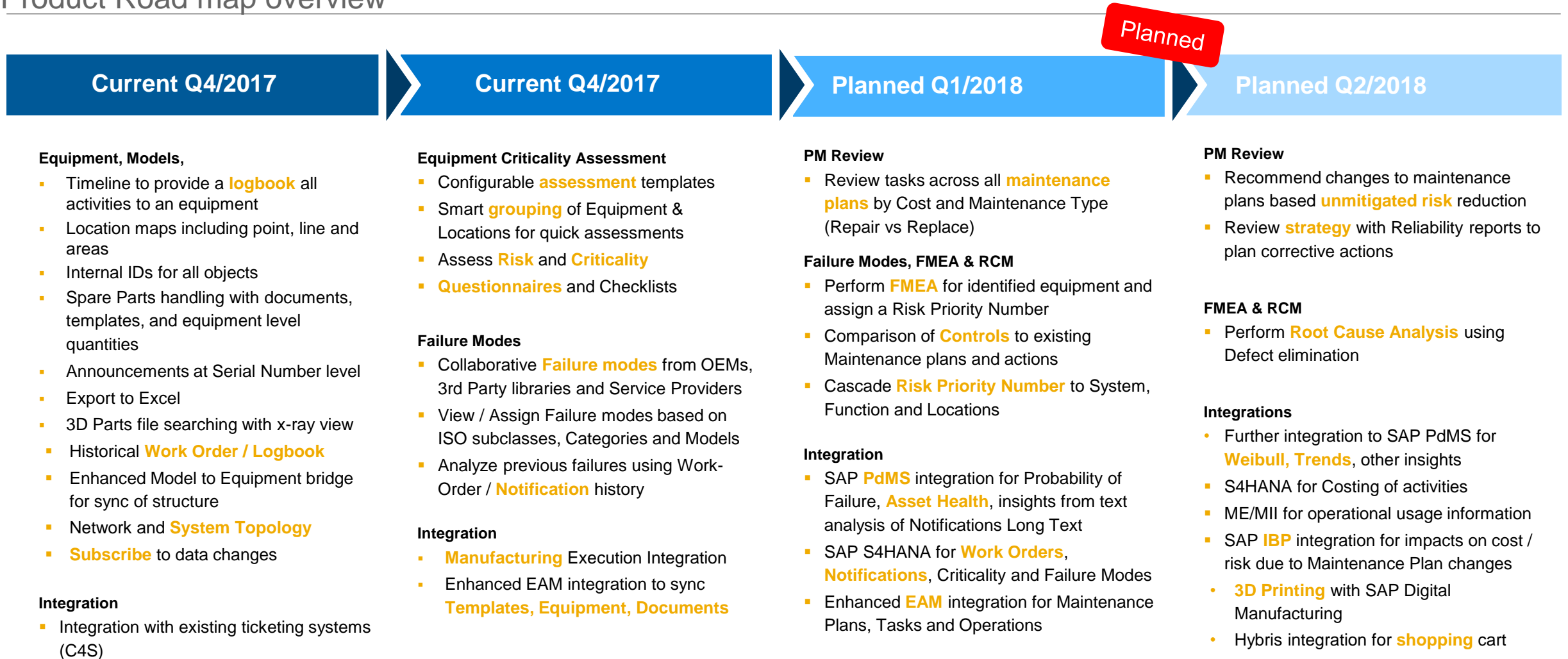
Equipment



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SAP Asset Strategy & Performance Management

Product Road map overview



This is the current state of planning and may be changed by SAP at any time.

Some Screen shots of AIN and ASPM

Overview

This is sample data. The actual risk score will be calculated in the assessment application.

Risk Score: 16
 Normalized Risk Score(%): 15.15
 Criticality: A High

Threshholds

- 1 - 2
- 2.01 - 7
- 7.01 - 19
- 19.01 - 49
- 49.01 - 125

Finance

DM TEDX.69 Scale Details

DM TEDX.68 Scale Details

DM TEDX.67 Scale Details

DM TEDX.69

DM TEDX.68

DM TEDX.67

Impact

Prof_safety

very low

low

medium

high

very high

Basic Information

Short Description: Template for assessing Risk on FlowMeters

Long Description: Template for assessing Risk on FlowMeters

Status: Unpublished

Version: Changed On

Impact Category Selection

ID	Description	Weight
Finance	Finance	33.34
Brand	Brand	33.33
...

Equipment

Equipment

21sep_Class_SK / 21sep_Subclass_SK /

External IDs Share

Equip_23sep_SK
 Equip_23sep_Sk

Model: Model22sep

Manufacturer: AAKMORGCSVTEST081315

Completteness: 95%

Status: Published

Equipment Phase: Sold to Hera_SAP Australia

Overall Risk: 21

Published On: Oct 31, 2016

Shared With: 3 Partners

Revision: 1

STRUCTURE AND PARTS INSTRUCTIONS DOCUMENTS ANNOUNCEMENTS MEASURING POINTS IMPROVEMENT CASES TIMELINE RISK ASSESSMENT

KPIs

Availability: 45%

Subcontract Work: 15M

Maintenance Requests to Correct Incidents: 12

Stock Outages Average Per Month: 3

Reliability Mean Time: 12

Maintenance Budget Utilisation: 63.72 M

Number of Work Orders Per Clock Hour

Associated Documents

Work Orders (6)

Name	Type	Frequency	Created By	Performed By	Date	Cost
WO - Weekly Service	Inspection	Weekly	Christian Bale	A N Thomas	12-12-2015	12,000
WO - Replace batteries	Inspection	Monthly	Christian Bale	A N Thomas	12-12-2015	10,000
WO - Clean DW	Breakdown	Yearly	Christian Bale	A N Thomas	12-12-2015	5,000

Notifications (5)

Name	Type	Created By	Date	Possible Reasons
Perform Weekly Service	Preventive	Christian Bale	12-12-2015	Reason A

Risk Assessment

Risk Score: 21

Impact Categories: Saved On: 12-12-2016

Impact Category Score

Brand: 18

Probability of Failure

Consequence of Failure

Dimension Three

Negligible

Low

Medium

High

Extreme

Negligible

Low

Medium

Equipment

Equipment Name	Description	Class	Subclass	Model	Manufacturer	Operator	Status	Published On	Source	Completeness	Risk	Criticality Score
Equip_E2E	sadad	L_23AUG_CLAS S1	L_23AUG_SUBC LASS1	testingMP2	L_26JULY_IN VITEE1	SAP Operator	Published	Sep 2, 2016	SAP Operator	4%	-	Unassessed
muk_operator1	sd					Hussmann	Published	Sep 2, 2016	Hussmann	27%		
L_25APR_EQ7	L_25APR_EQ7_e dit21	L_21APR_CLAS S1	L_21APR_SUBC LASS1	L_26APR_MODE L2	Hussmann	Hussmann	Published	Sep 2, 2016	Hussmann	56%	19	Moderage
L_2SEP_EQ1	L_2SEP_EQ1				Hussmann	Hussmann	Published	Sep 2, 2016	Hussmann	27%	15	Moderage
L_1SEP_EQ1	L_1SEP_EQ1				Hussmann	Hussmann	In Revision	Sep 2, 2016	Hussmann	25%	12	Moderage
EquipmentAddA nnie	test equipment	L_26AUG_CLAS S1	L_26AUG_SUBC LASS1	L_26AUG_MODE L1	Hussmann	Hussmann	In Revision	Sep 1, 2016	Hussmann	41%	14	Moderage
Eqp2ppl	sd				Hussmann	Hussmann	Published	Aug 31, 2016	Hussmann	27%	7	Low
2pplEditingSam eTime	sd				Hussmann	Hussmann	Published	Aug 31, 2016	Hussmann	38%	7	Low
Muk_moreThan1 pplEdit	sd				Hussmann	Hussmann	Published	Aug 31, 2016	Hussmann	42%	7	Low
Check_Roles_R ead	SD				Hussmann	Hussmann	Unpublished		Hussmann	27%	25	Heigh
L_29AUG_EQ2	L_29AUG_EQ2				Hussmann	Hussmann	Unpublished		Hussmann	29%	24	Heigh

Waldorf

Minimum Temperature: 274.816 K

Maximum Temperature: 278.56 K

Humidity: 97 %

Forecast: light rain

High Humidity. You should operate at a lower rpm.

Equipment

Equipment

External IDs Share

DOCUMENTS ANNOUNCEMENTS MEASURING POINTS IMPROVEMENT CASES TIMELINE NEW EXTENSION PART 9

USER NAME Published an ipment 1/16 at 2:59 PM

PI USER NAME Changed the status to In Revision 10/31/16 at 2:58 PM

John Smith Added Impact Category, Changed Impact Category Weightage 15/12/2015 at 3:00 PM

Risk 21 Critical

Version 16

Equipment

21sep_Class_SK / 21sep_Subclass_SK /

Equip_23sep_SK
Equip_23sep_Sk

Model
Model22sep

Manufacturer
AAKMORGCSVTEST081315

Completeness
95%

Status
Published

Equipment Phase
Sold to Hera_SAP Australia

Risk
21
Critical

Published On
Oct 31, 2016

Shared With
3 Partners

Revision
1

INFORMATION | STRUCTURE AND PARTS | INSTRUCTIONS | DOCUMENTS | ANNOUNCEMENTS | MEASURING POINTS | IMPROVEMENT CASES | **RISK ASSESSMENT** | ...

Risk Assessment Assessment View Previous Version

Risk **21** Critical

Risk by Dimensions

Environment ★

Probability: 2 4 6 8 **10** 12 14 16 18 20

Severity: 3 6 9 12 15 18 **21**

Detectability: 1 2 **3** 4 5 6 7 8 9 10

Health 📉

Probability: 2 **4** 6 8 10 12 14 16 18 20

Severity: 3 6 9 12 15 18 21 24 **27** 30




Impact Category Score
Brand: 18




































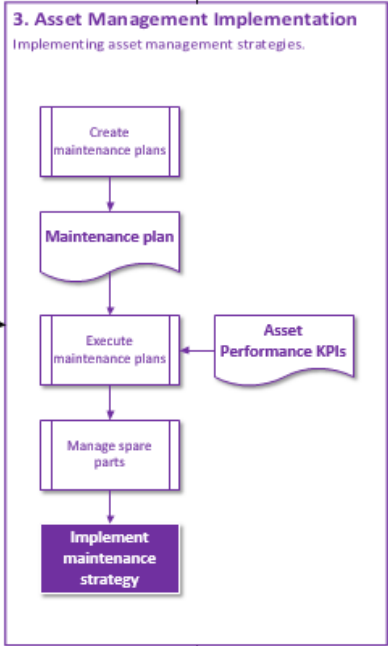
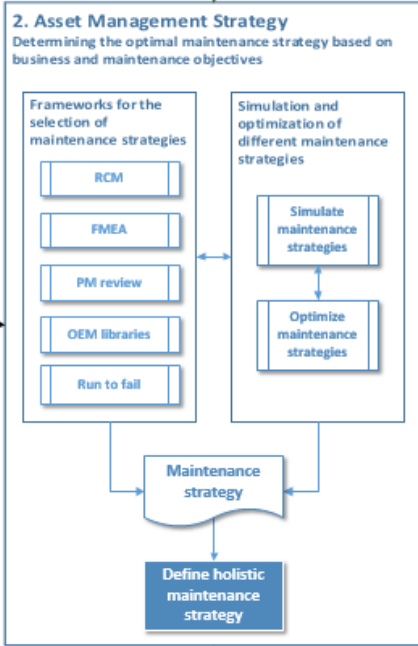
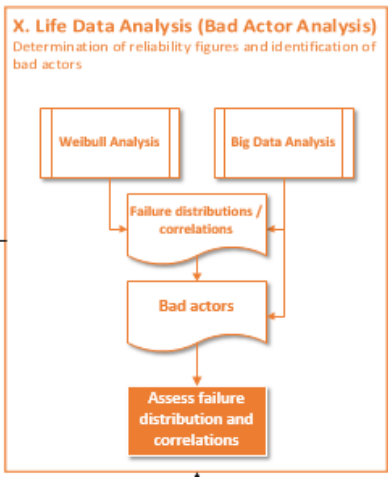
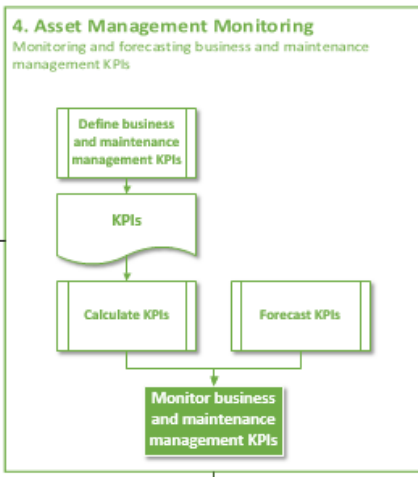
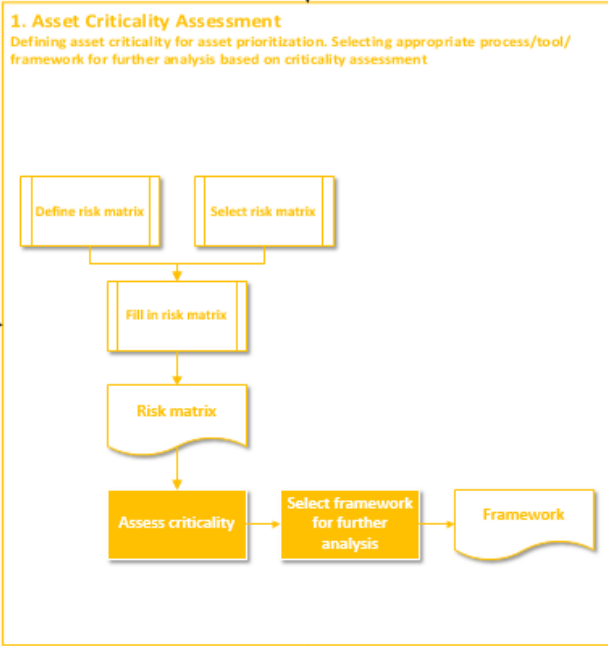
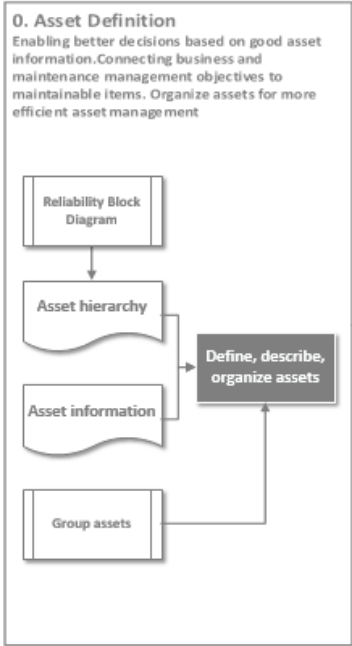
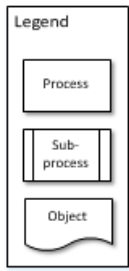
Probability of Failure: 6
Consequence of Failure: 3
Third Dimension: 5

Equipment

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(279) Standard New Equipment Publish   

Equipment Name	Description	Class	Subclass	Model	Manufacturer	Operator	Status	Published On	Source	Completeness	Risk	Criticality Score
Equip_E2E	sadad	L_23AUG_CLAS S1	L_23AUG_SUBC LASS1	testingMP2	 L_26JULY_IN VITEE1	 SAP Operator	Published	Sep 2, 2016	 SAP Operator	<div style="width: 4%;"><div style="width: 4%;"></div></div> 4%	-	Unassessed
muk_operator1	sd					 Hussmann	Published	Sep 2, 2016	 Hussmann	<div style="width: 27%;"><div style="width: 27%;"></div></div> 27%		
L_25APR_EQ7	L_25APR_EQ7_e dit21	L_21APR_CLAS S1	L_21APR_SUBC LASS1	L_26APR_MODE L2	 Hussmann	 Hussmann	Published	Sep 2, 2016	 Hussmann	<div style="width: 56%;"><div style="width: 56%;"></div></div> 56%	19	Moderage
L_2SEP_EQ1	L_2SEP_EQ1					 Hussmann	Published	Sep 2, 2016	 Hussmann	<div style="width: 27%;"><div style="width: 27%;"></div></div> 27%	15	Moderage
L_1SEP_EQ1	L_1SEP_EQ1					 Hussmann	In Revision	Sep 2, 2016	 Hussmann	<div style="width: 25%;"><div style="width: 25%;"></div></div> 25%	12	Moderage
EquipmentAddAnnie	test equipment	L_26AUG_CLAS S1	L_26AUG_SUBC LASS1	L_26AUG_MODE L1	 Hussmann	 Hussmann	In Revision	Sep 1, 2016	 Hussmann	<div style="width: 41%;"><div style="width: 41%;"></div></div> 41%	14	Moderage
Eqp2ppl	sd					 Hussmann	Published	Aug 31, 2016	 Hussmann	<div style="width: 27%;"><div style="width: 27%;"></div></div> 27%	7	Low
2ppleditingSameTime	sd					 Hussmann	Published	Aug 31, 2016	 Hussmann	<div style="width: 38%;"><div style="width: 38%;"></div></div> 38%	7	Low
Muk_moreThan1pplEdit	sd					 Hussmann	Published	Aug 31, 2016	 Hussmann	<div style="width: 42%;"><div style="width: 42%;"></div></div> 42%	7	Low
Check_Roles_Read	SD					 Hussmann	Unpublished		 Hussmann	<div style="width: 27%;"><div style="width: 27%;"></div></div> 27%	25	Heigh
L_29AUG_EQ2	L_29AUG_EQ2					 Hussmann	Unpublished		 Hussmann	<div style="width: 29%;"><div style="width: 29%;"></div></div> 29%	24	Heigh



Thank you.



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