



SAP IAM + SAP PEI enabled by ANSYS

SBN Norge Webinar

Audun Grimstad, SAP Norway Engineering Center of Excellence
November 2019

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THE BEST RUN 

Agenda



Introduction



SAP Intelligent Asset Management suite: Some key concepts and perspectives



The IAM suite solutions



SAP Predictive Engineering Insights: Product overview and use cases



Practical implementation: Models, sensor data, architecture (data logistics)



Closing

Agenda



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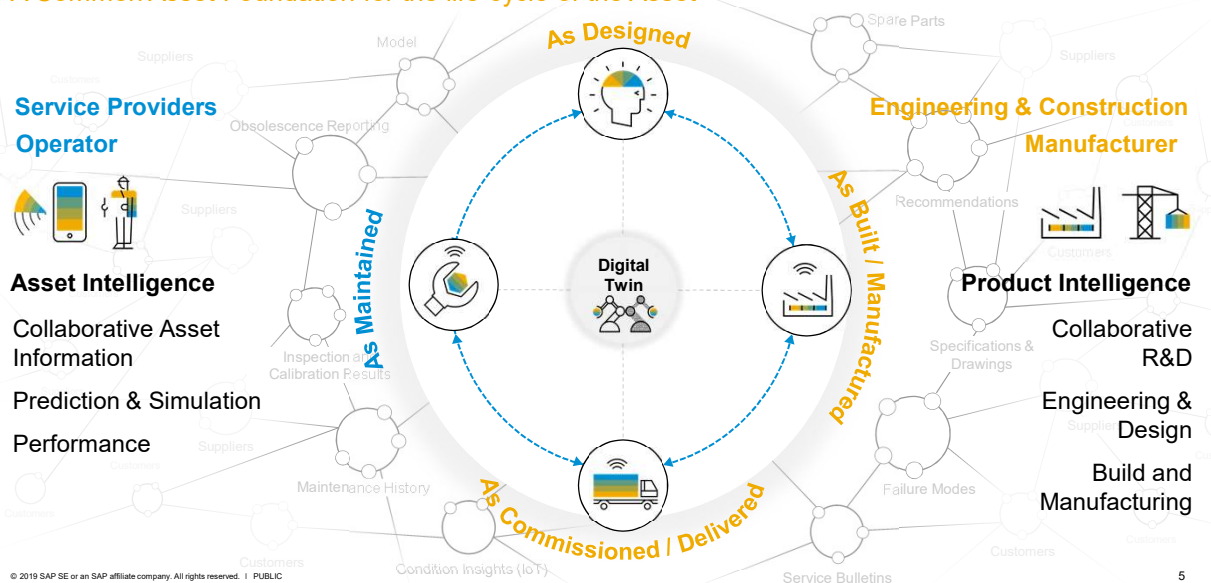
Practical implementation: Models, sensor data, architecture (data logistics)



Closing

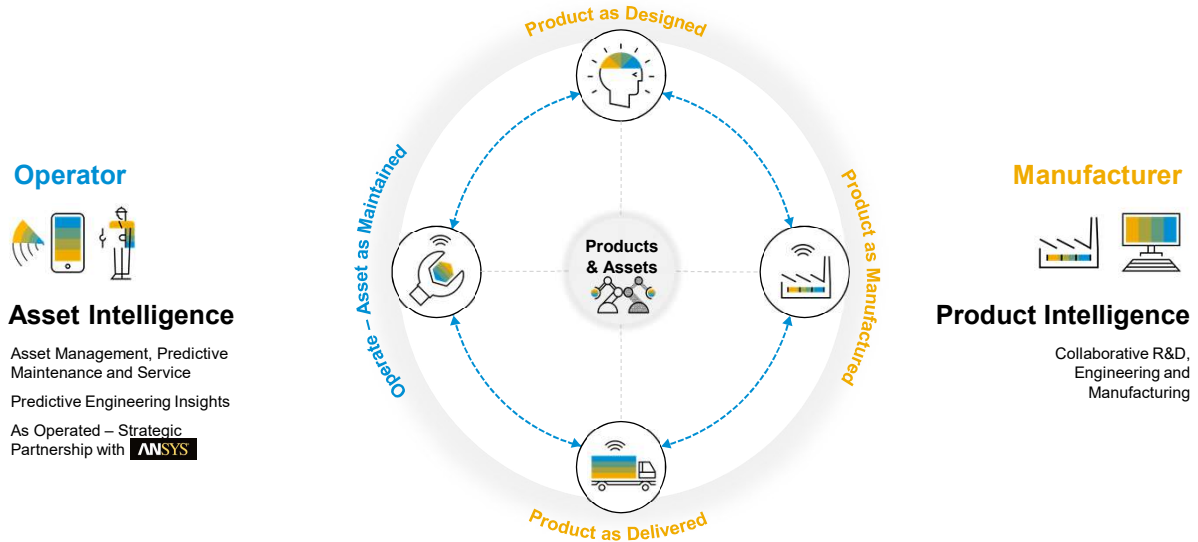
Digital Supply Chain

A Common Asset Foundation for the life-cycle of the Asset



Product and Asset Lifecycle and the Digital Twin

The Asset Management view

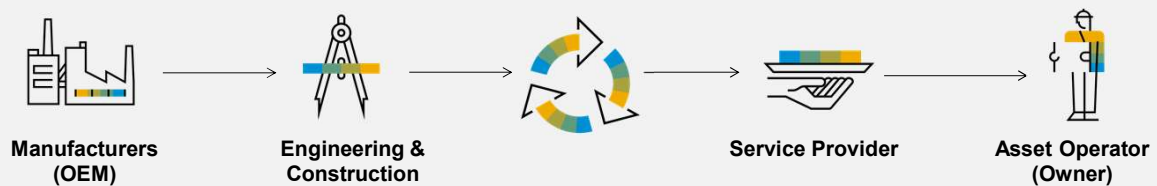


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New Business Models / New Operational Models

Share Asset Information and Collaborate

The new ecosystems and business network enables new business models to buy and sell **digital services** such as content packages, premium services, firmware updates and specialized asset-specific applications on top.



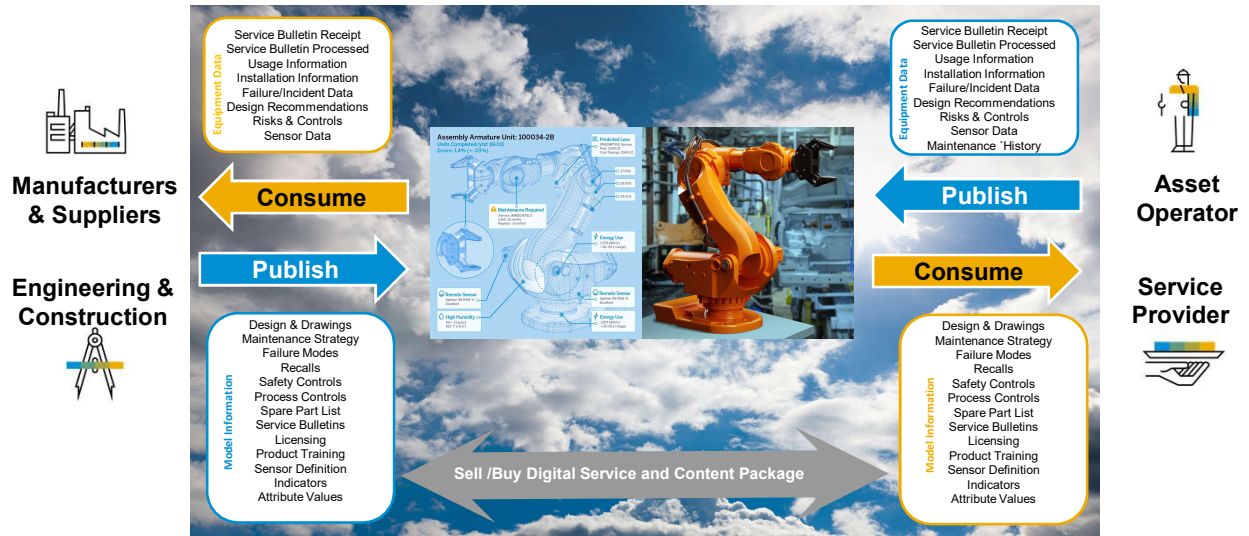
From...	To...
Selling equipment	Pay per use / equipment as a Service
Untrusted asset information	Collaborative Single source of truth
Limited analytical capabilities	Real time analytics with simulation
Reactive maintenance	Prescriptive maintenance

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Digital platform for collaboration on equipment data

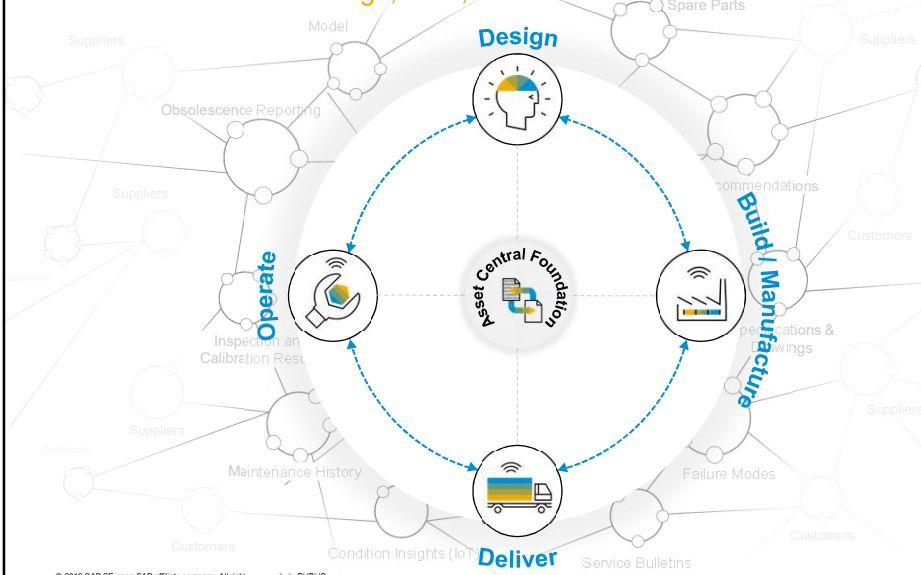
Secure data access, sharing and governance on a global scale



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Asset Central Foundation

The foundation for all design, build, commission and maintain



Asset Central Foundation
SAP's central model, master transactional and operational data repository



Connect to Assets

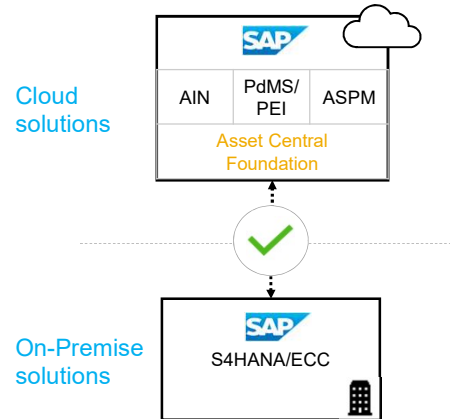
Asset Central Foundation, SAP's digital twin for physical assets. Represents the foundation layer across all design, build and support processes.



Asset Central Foundation

Asset Management integration data layer

- Integration data layer between Intelligent Asset Management suite (AIN, PdMS/PEI, ASPM & Asset Manager) and on-premise Asset Management solutions.
- Integration between Asset Central & On-premise Asset Management solutions covers both data and user experience improvements.
- Integration provides Bi-directional synchronization of asset information for technical objects:
 - Equipment
 - Functional Location
 - Documents
 - Notifications
 - Work orders

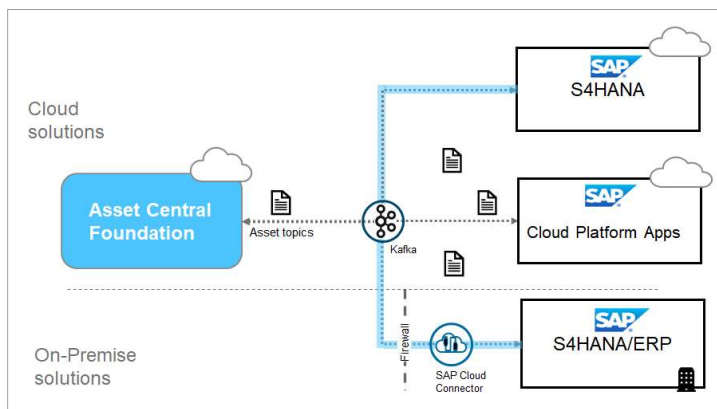


Supported Releases – **S/4 HANA On Premise 1709 & above, ERP Enhancement package 6 & above.**

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Asset Central Foundation – Integration landscape



Asset information is kept current in near real time between asset suite of products in SAP cloud platform and Enterprise Asset Management (EAM)

Single integration for mobile and asset central

Supported Releases :

Cloud: 1906 Asset Central; S/4HANA 1905; **On Premise:** ECC 6.0(EhP7 & above) / S/4HANA(1709 & above)

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◄-----► Asset intensive Integrations
 ◄-----► Standard Integration

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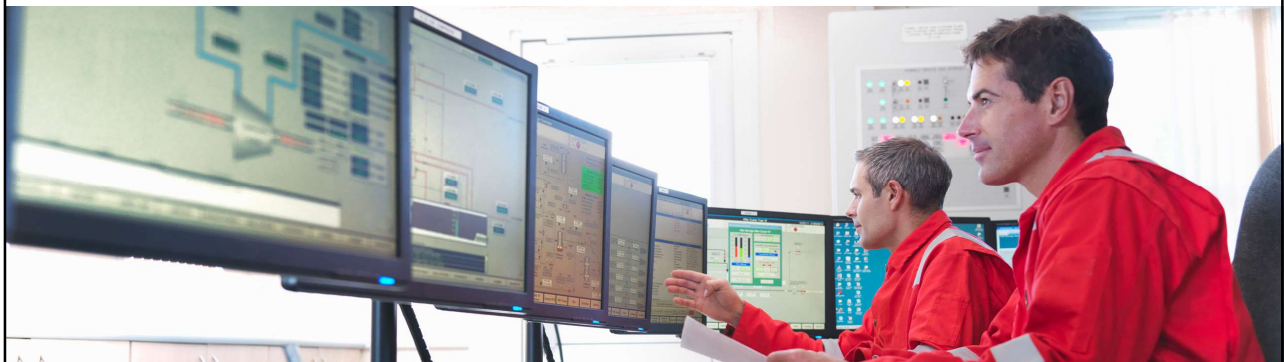


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SAP Intelligent Asset Management Suite



Asset Management in the Intelligent Enterprise



Innovative & Collaborative business processes

Enable best practices for asset performance management.
Transform with shared services for asset intelligence.
Collaborate with partners throughout the asset lifecycle



Real-time insights and Connected Assets

End-to-end visibility on strategic, tactical and operational level,
with real time information from IoT



Predict, optimize, simulate, prescribe

Drive smarter decisions, improve reliability, enable prescriptive
maintenance and automate processes with IoT, advanced
analytics, machine learning and simulation



Experience

Share asset information and access one version of the truth
through amazing user experience, across networks and with
mobility



Integrate

Integrate maintenance strategy, planning and execution across
the enterprise



SAP Intelligent Asset Management

Capabilities & solutions



Asset Network and Collaboration

SAP Asset Intelligence Network



Asset Strategy and Performance

SAP Asset Strategy and Performance Management



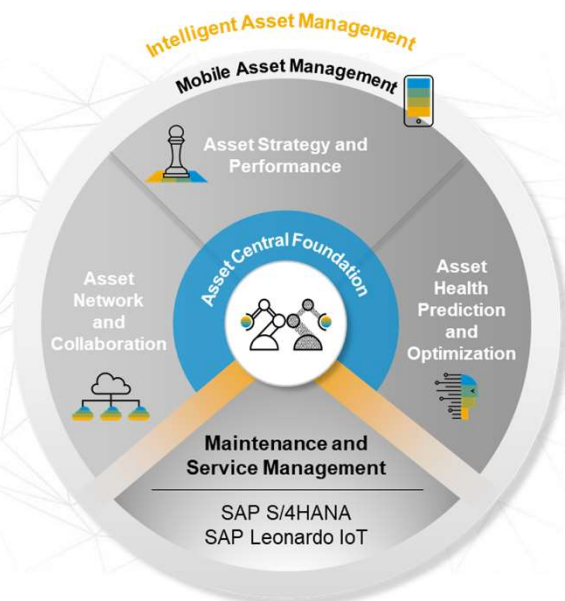
Asset Health Prediction and Optimization

SAP Predictive Maintenance and Service
SAP Predictive Engineering Insights Enabled by ANSYS



Mobile Asset Management

SAP Asset Manager



SAP S/4HANA Asset Management backend Maintenance and Service Management



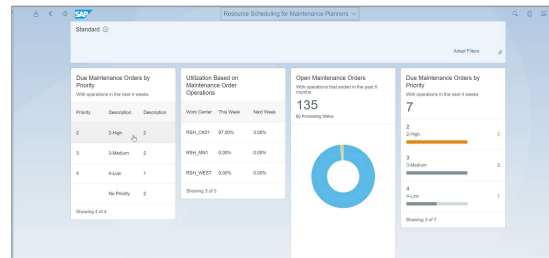
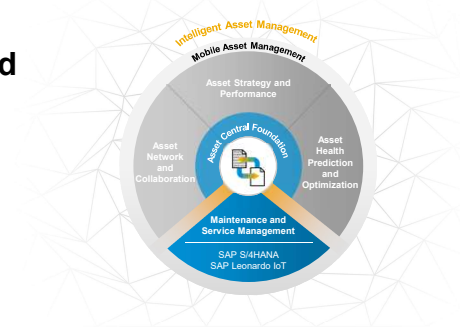
Plan maintenance activities with the right person providing the appropriate tools and resources



Schedule proactive preventive or condition-based maintenance tasks



Leverage integrated documentation for job execution and safety for a holistic view of asset status



SAP S/4HANA Asset Management backend Maintenance and Service Management – Execution



Execute planned and unplanned maintenance tasks to help ensure optimal operations



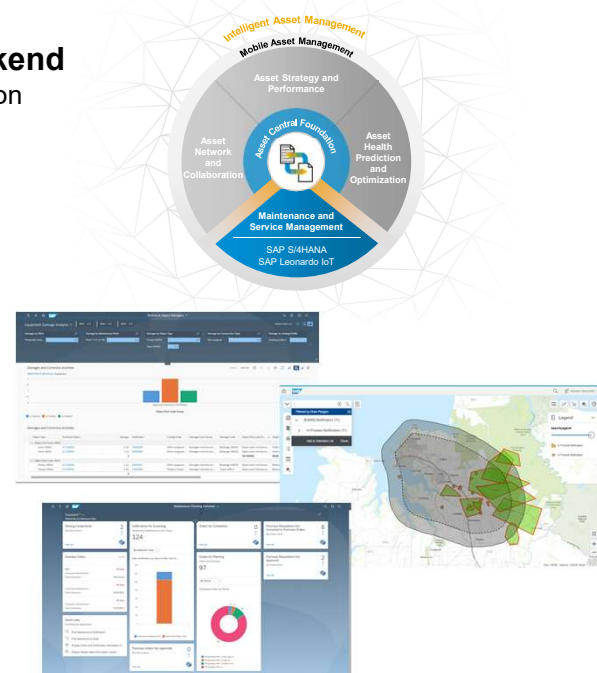
Manage preventive and condition-based maintenance proactively



Increase equipment reliability and improve asset usage as well as safer maintenance processes



Manage asset information for work orders, maintenance, measurements, inspections, metering, and inventory



Asset Network and Collaboration

SAP Asset Intelligence Network



Enable secure asset information collaboration across your business network



Collaborate with manufacturers, operators, service suppliers, across the network on asset information



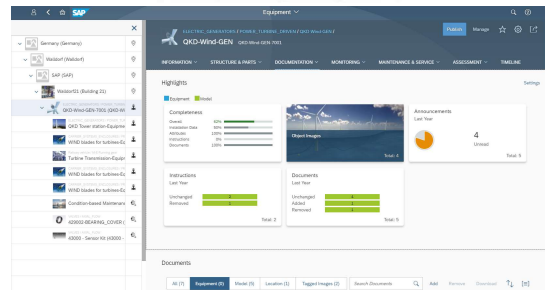
Provide one network channel for electronic handover of technical asset and maintenance data to OEMs, service providers, and procurement vendors



Improve data reliability, reduce master data maintenance, and maintain higher asset availability



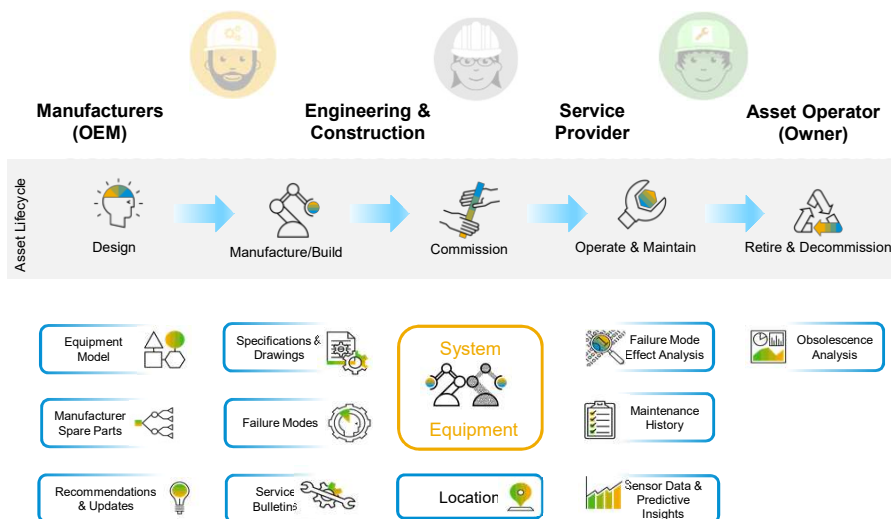
Leverage new ways of monetizing the data by advertising and sell value content packages across the network



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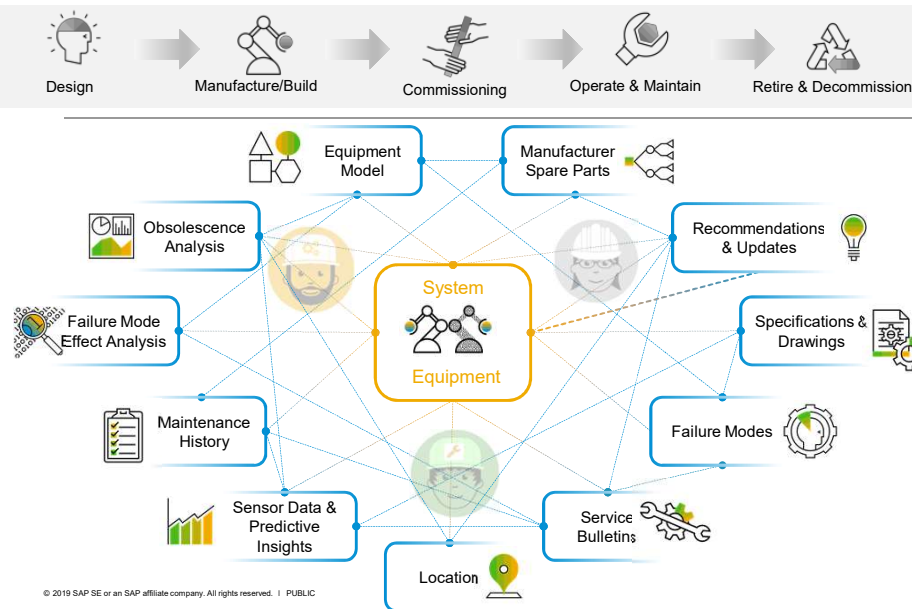
From 'siloed' asset information ...



- No common asset taxonomy
- No business partner collaboration
- Siloed asset data
- Inefficiency asset data maintenance
- Poor asset data integrity

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...to a **collaborative** asset information environment



- Assess key players in your ecosystem and select your preferred alliances
- Find all the asset information in one place
- Share best practices for optimal equipment availability
- Provide opportunity to new business model to monetize content and services

Asset Strategy and Performance Management

Apply industry standard methodologies to suitable asset strategies



Risk-based maintenance approach enables better decision making for maintenance planning and to reduce the probability of asset failure.



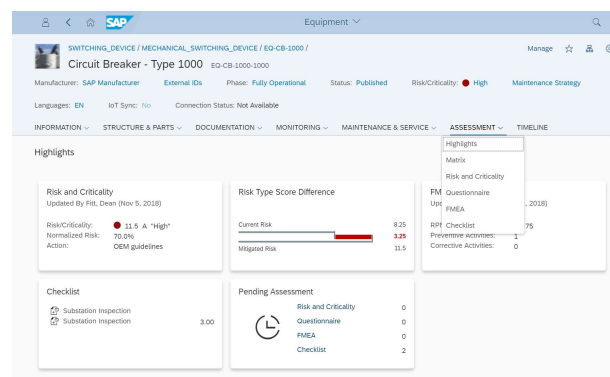
Adopt Reliability Centered Maintenance (RCM) processes, including Failure Modes and Effects Analysis (FMEA).



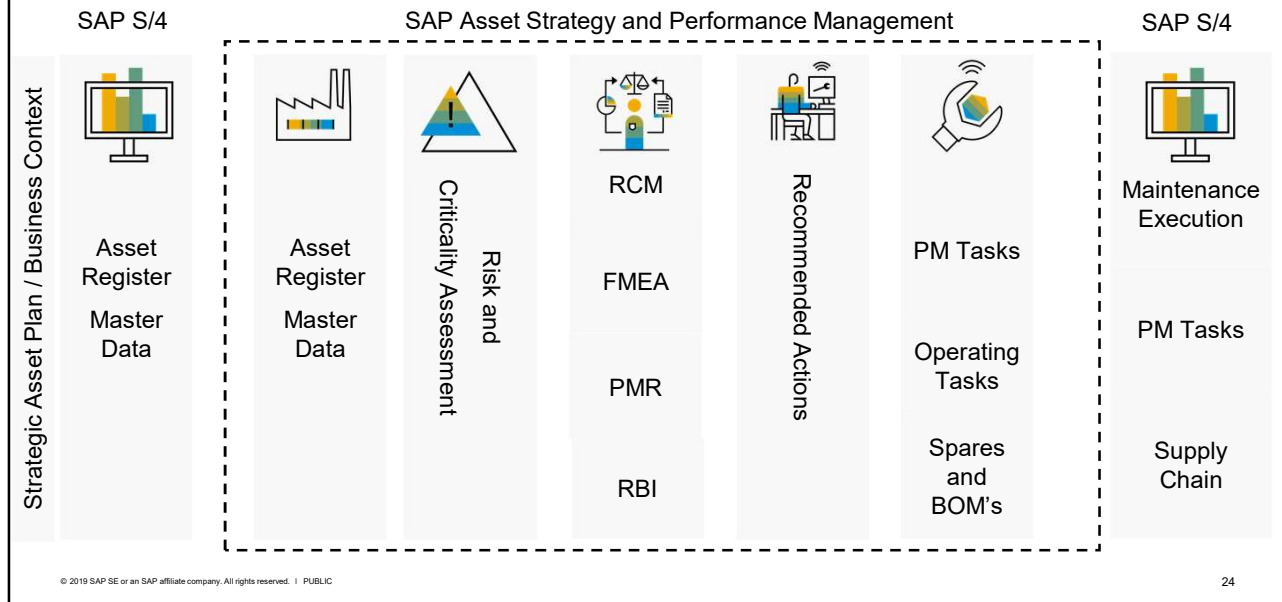
Manage performance to optimize return on assets across lifecycles. Monitor, review, and improve maintenance strategies.



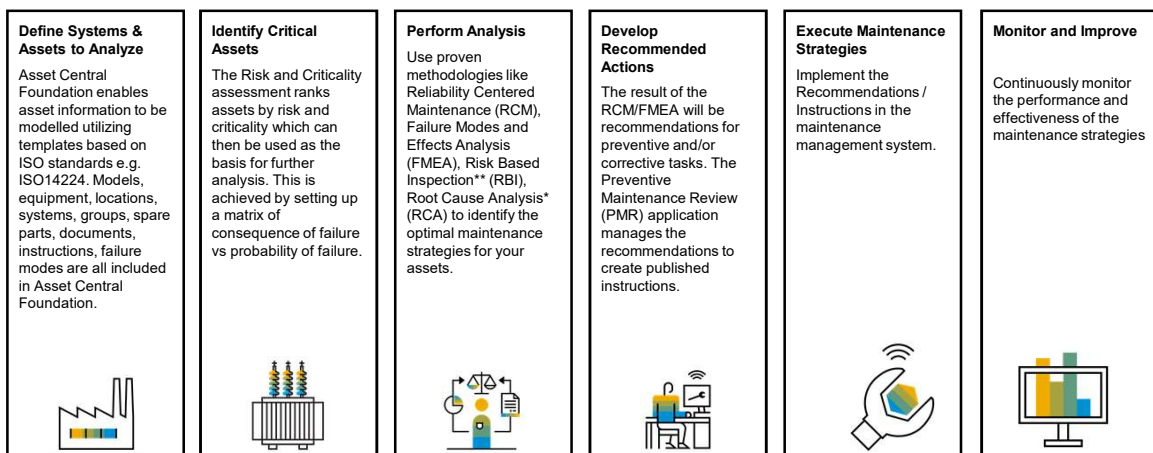
Reduce bottlenecks, improve decision making, and prevent incidents using a holistic view of asset types and maintenance strategies.



SAP Asset Strategy and Performance Management



Scope of SAP Asset Strategy and Performance Management



Adopt a risk based approach to determine critical assets driving optimal asset strategies

SAP Intelligent Asset Management

Asset Health Prediction and Optimization



Optimize the availability of your assets by using predictive maintenance and service capabilities and the Internet of Things to take corrective actions early



Collect and analyze sensor data from physical assets to predict operational failure



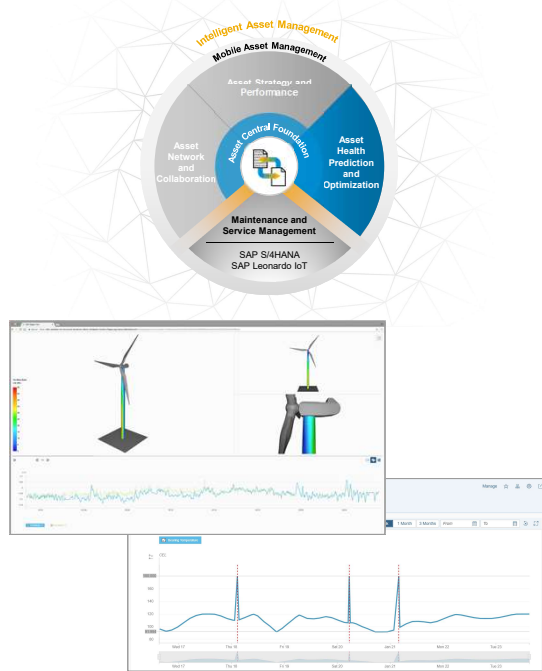
Initiate preventive countermeasures that trigger service or maintenance orders



Optimize asset performance with a closed-loop maintenance and service process



Create physics-based digital twins of industrial assets based on a real-time and predictive engineering analysis



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SAP Predictive Maintenance and Service (PdMS)

A 360 Degree View of Assets... i.e., a Digital Twin



A 360 degree view across asset model, master, transactional and performance data in a single solution



Capability Highlights

Information

Highlight Cards, Data Sheets, Equipment/Model Information, Installation Location, Business Partners

Structure and Parts

Structure, Spare Parts, Visual Parts

Documentation

Documents, Instructions, Failure Modes, Alert Types, Announcements, Improvement Requests, Fingerprint

Monitoring

Alerts, Indicators, Component Indicators, 2D Chart

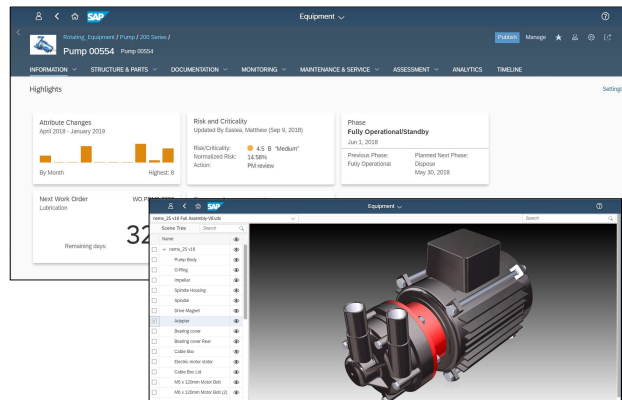
Maintenance and Service (maintenance system integration)

Notifications, Work Orders, Tickets, Contracts

Analytics

Failure Mode Analytics

Model/Equipment History/Timeline



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SAP Predictive Maintenance and Service

Advanced analytics for decision support

Advanced analytics to support maintenance execution and strategy decisions

Capability Highlights



Failure Mode Analytics

Utilizes machine learning to generate KPIs around documented failure modes



Fingerprint Management

A visual approach to capturing asset reference states. Used for visual comparison to current operating performance. (i.e., trend analysis)



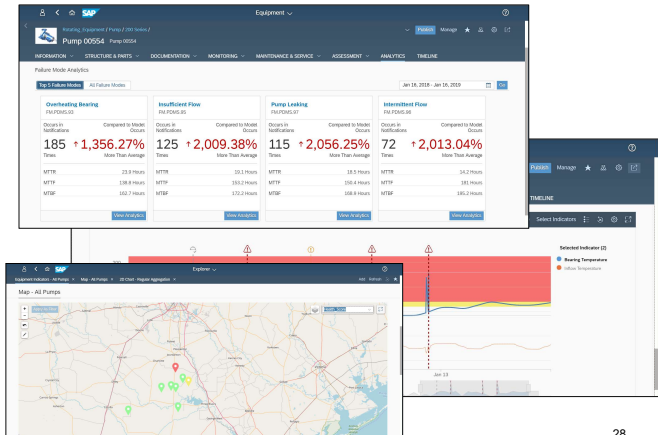
IT/OT Data Fusion Views

Equipment lists and geospatial views combining model data and sensor based health indicators to prioritize maintenance actions and support strategy decisions



Advanced Rule-based Alert Creation

Generate value added alerts for maintenance professionals through an intuitive and flexible rules engine



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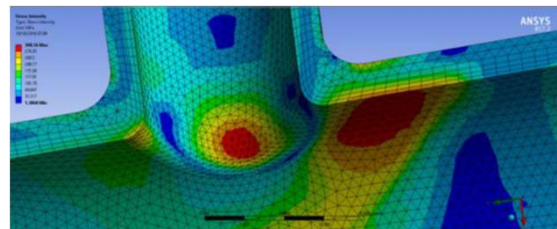
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SAP PEI: Physics Driven Approach to Predictive Maintenance

SAP Predictive Engineering Insights enabled by ANSYS is a cloud-based Internet of Things solution for Digital Twins designed to run engineering simulations in real-time based on sensor feeds to **improve product development lifecycles and optimize asset operations**

Physics-based Evolution

- 1980's: Physics + Mathematics + Computers = Finite Element Analysis
- Today: Real-time & Multiphysics Simulations based on reduced order model technologies and parallel computing



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SAP Intelligent Asset Management

Mobile Asset Management



Eliminate paperwork while reducing downtime and maintenance backlog



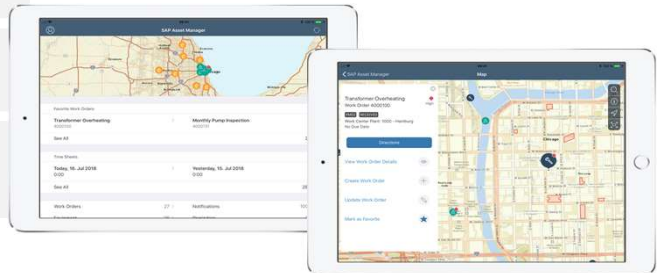
Extend and improve asset life and reliability by shortening work cycles



Turn capital spending into operational investments using cloud deployment



Manage existing work and asset data whether you're online, offline, or occasionally connected



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SAP Norway Engineering Center of Excellence

DSC, P&E, PEI SAP Norway CoE

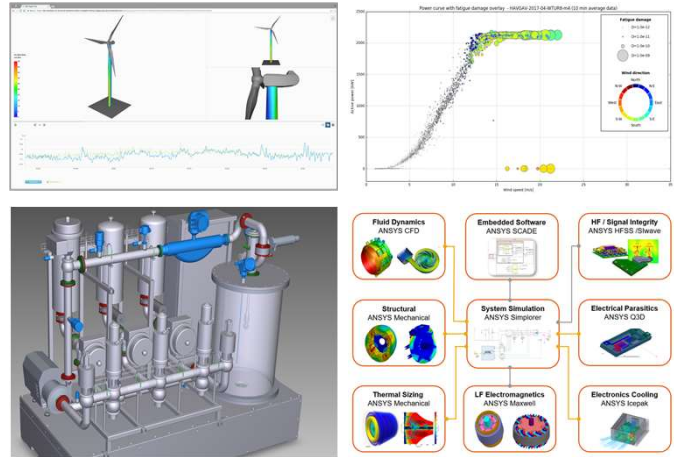
Based on the engineering and development team of Fedem (SAP acquisition 2016) in Trondheim, Norway.

Tight relations with NTNU and UiO on R&D.

Development of physics-based Digital Twins, methodology, signal processing func., sensor applications, data visualisation, IoT data components, ...

Project delivery unit: PMs, product support, services, onboarding/training, ...

Model, implement and integrate ANSYS-based DTs in SAP Asset Management and PLM landscapes.



ANSYS

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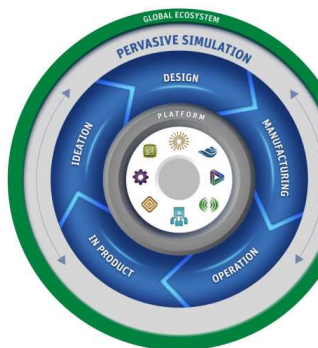
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About ANSYS

Company Profile

ANSYS Vision

Pervasive Simulation integration **across the product lifecycle** on a single platform.



FOCUSED

This is all we do.
Leading product technologies in all physics areas. Largest development team focused on simulation

TRUSTED

97 FORTUNE of the 100 industrials
ISO 9001-2015 CERTIFIED

PROVEN

Member of the prestigious STANDARD & POOR'S 500
\$18B market capitalization

GLOBAL

87 ANSYS offices
3,800 employees globally
>100 channel partners selling in more than 100 countries

LARGEST

3x the size of our nearest competitor (revenue)

INDEPENDENT

Long-term financial stability
CAD agnostic

COMMITTED

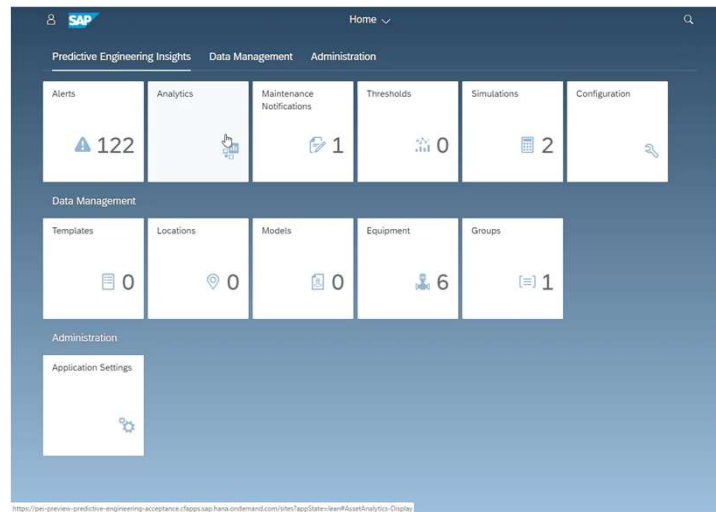
Overall customer satisfaction globally is at 89.1% in 2018

DRIVEN

Helping customers address new market challenges: digital exploration, 5G, additive manufacturing and digital twin

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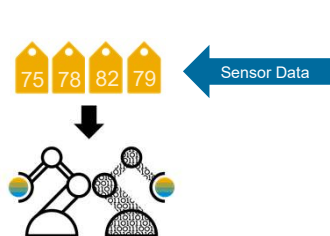
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SAP Intelligent Asset Management

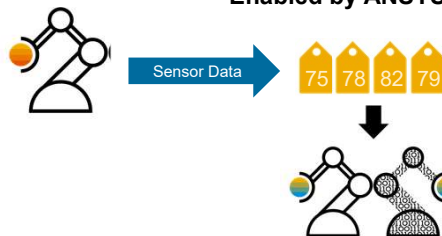
Asset Health Prediction and Optimization

SAP Predictive Maintenance and Service



A **Data Science** Driven Approach to Predictive Maintenance

SAP Predictive Engineering Insights Enabled by ANSYS



A **Physics** Driven Approach to Predictive Maintenance (*Behaviour focus*)

Bypassing the limitations of current condition monitoring software

Problem Statement

The **lack of engineering-based data analytics** can increase the **cost of false predictions** and will thus **reduce the confidence in prediction algorithms**



False positives

Alerts based on data science can lead to false positives (due to wrongly trained models) increasing the cost of wrong predictions



Historical data required

Data science based prediction methods require historical machine data and failure insights. One-off events can not be predicted.



Algorithm selection

Choosing machine learning algorithms for complex predictive maintenance problems is an iterative and time consuming process

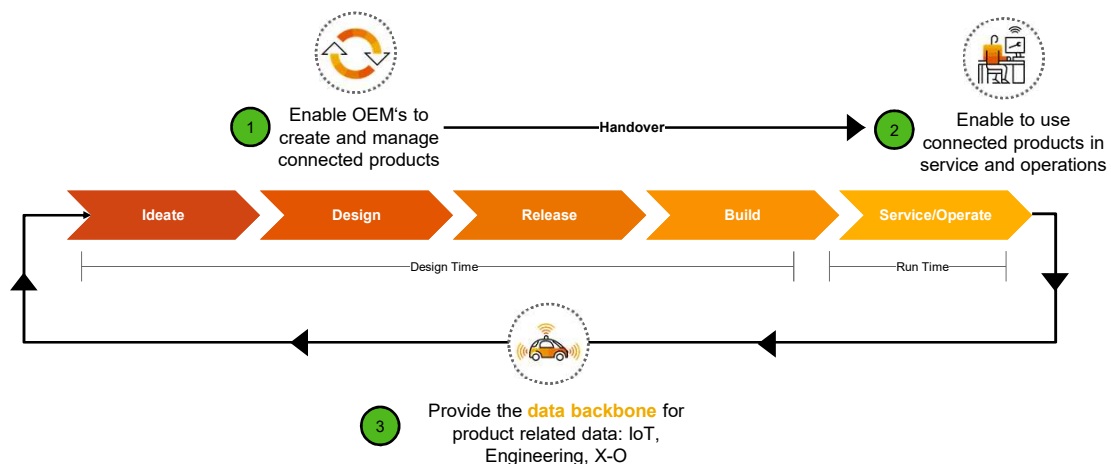


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Engineering models and the business process life-cycle perspective

From a process perspective, we want to enable OEM's to create **digital products** in the design phase, manage the **handover to services & operations** and establish a **data backbone** for all product specific usage and IoT data.

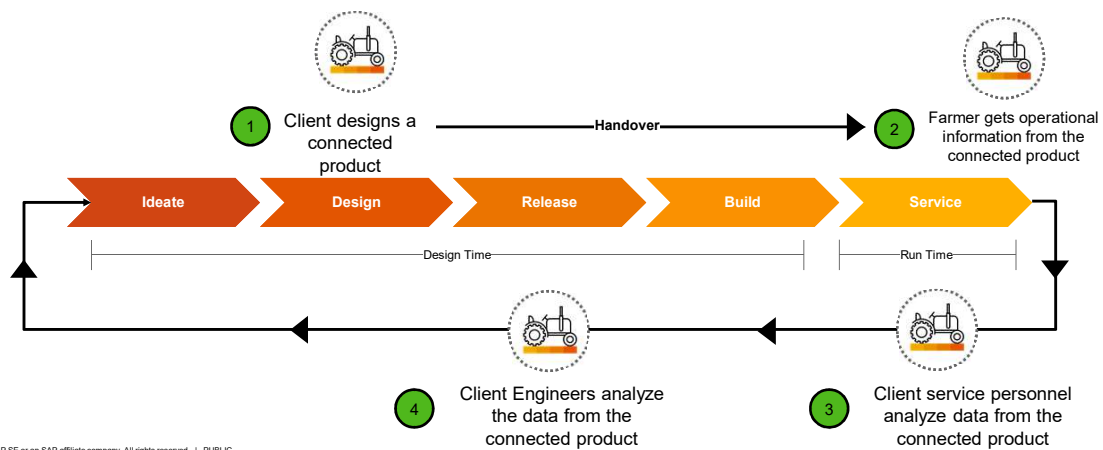


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OEM sample case

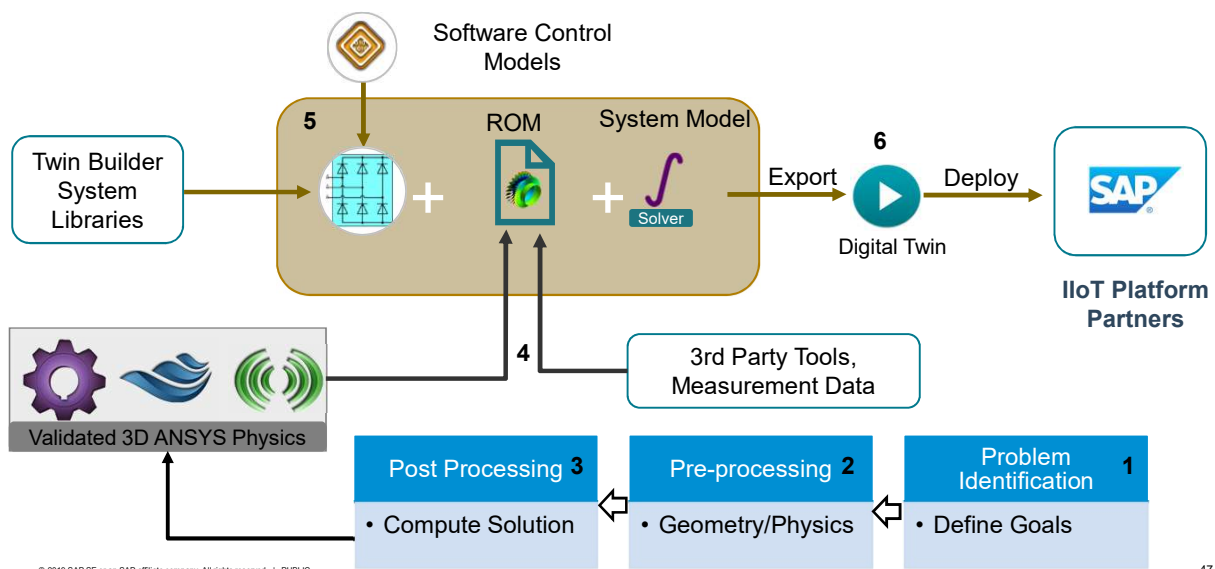
An OEM is evaluating an edge deployment of Predictive Engineering Insights. The goal of deploying a Digital Twin is to enhance the asset with virtual sensors to understand and predict load distributions.



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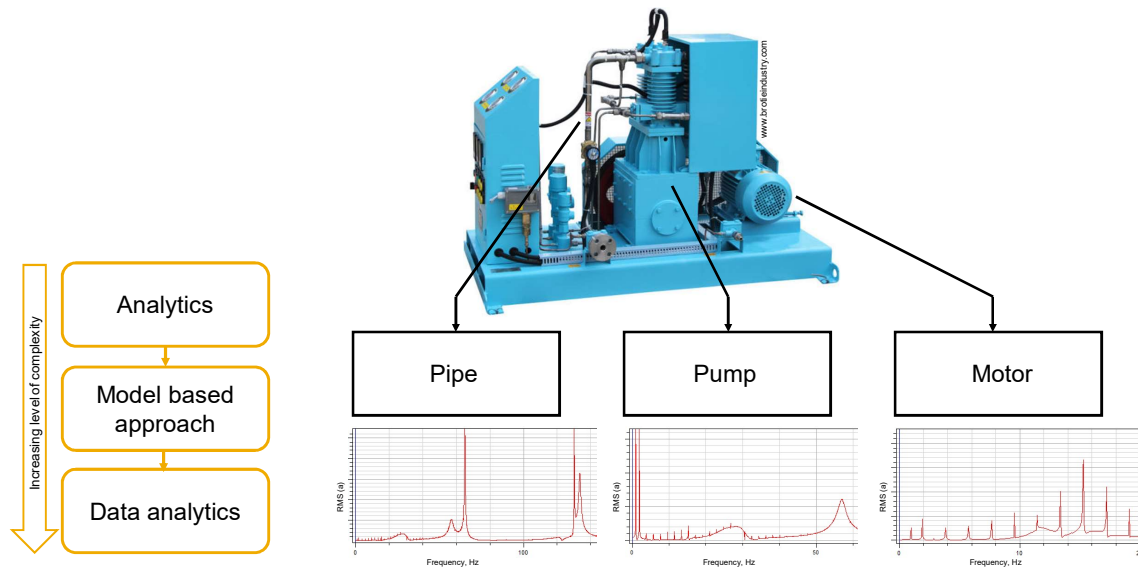
Simulation Based Digital Twin Workflow



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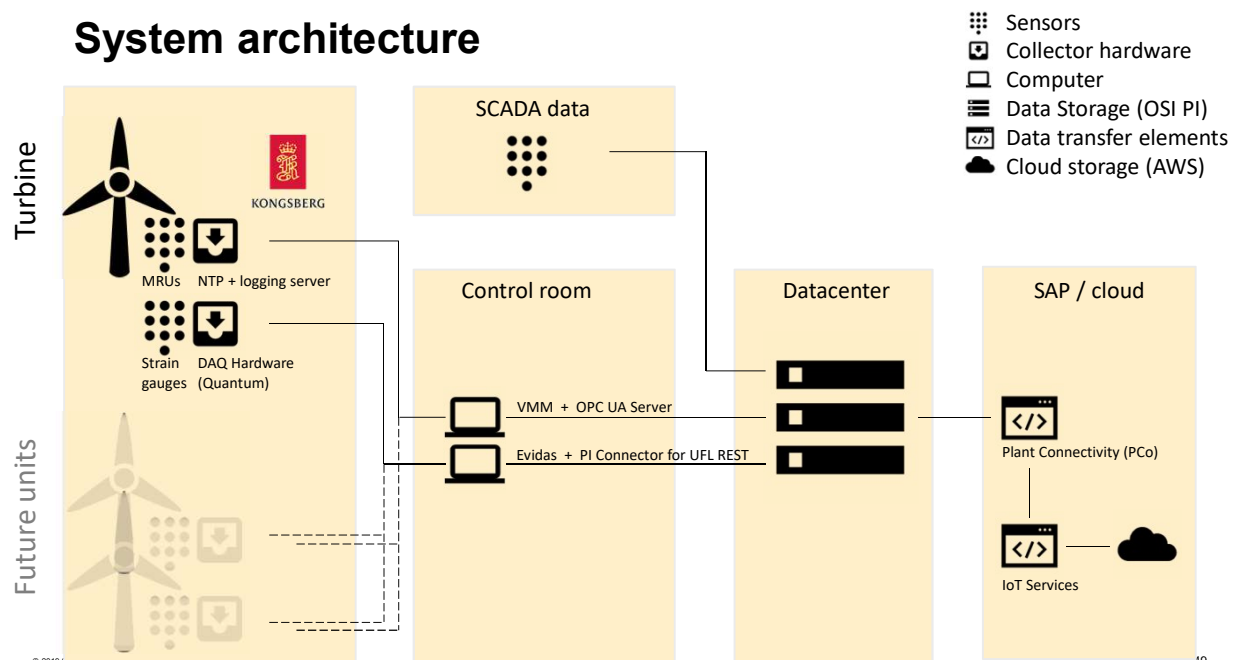
Note: Vibration monitoring is part of PEI and not the data driven solution



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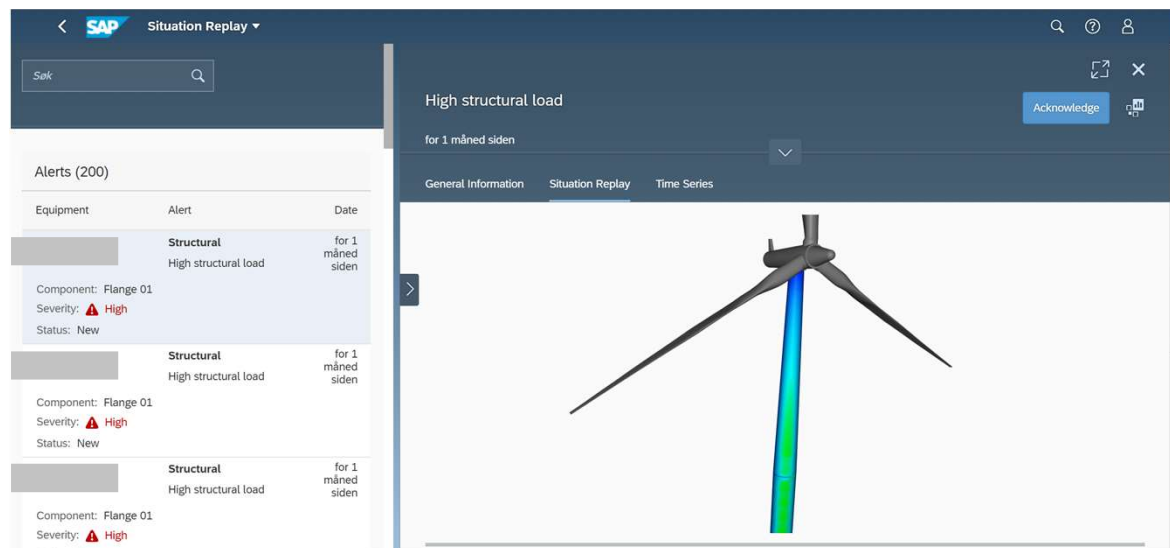
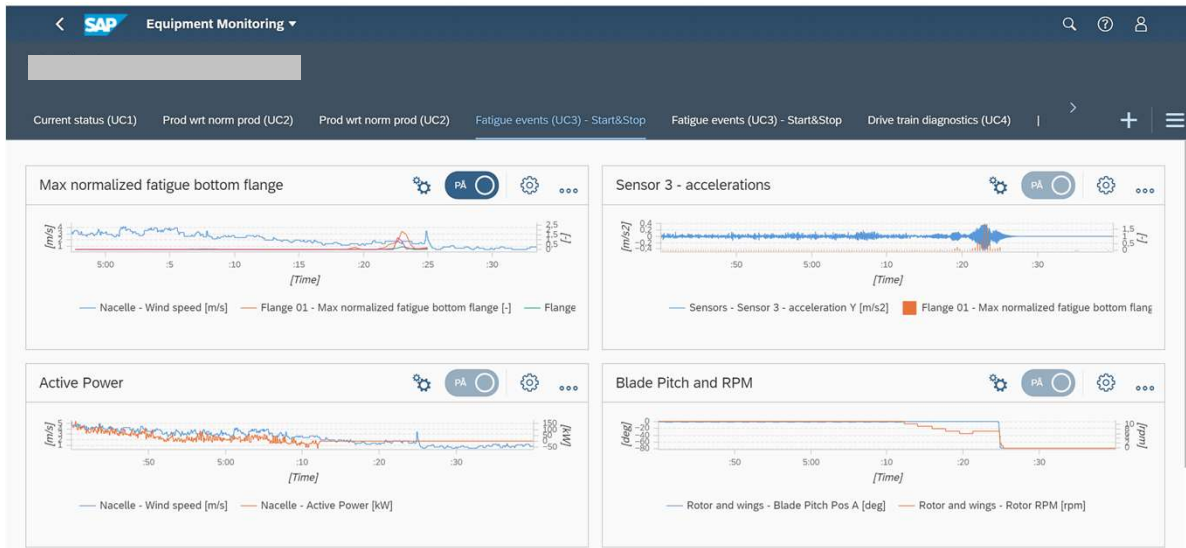
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System architecture



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Teaser: Life-cycle value of an engineering model

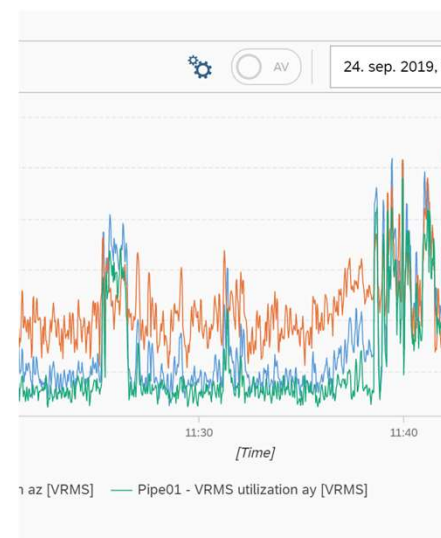


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SAP PEI: Take-home messages

- Digital Twin / SAP PEI implementations are getting mature: Predictive Maintenance solutions as part of SAP IAM portfolio are being delivered from SAP Norway today
- You **don't** necessarily need equipment models to start implementing digital twins (but it will often add value)
- Operator value proposition and OEM value prop are not necessarily the same, but both are likely to be able to extract significant value out of a DT solution.
- Data logistics from edge to corporate systems and to cloud are supported by SAP / CoE as part of the implementation project



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Thank you.

Audun Grimstad

Director – Product Management SAP PEI
SAP Norway Engineering Center of Excellence
audun.grimstad@sap.com

