SAP Asset Intelligence Network
backbone for SAP Internet of Things

Alex Mathew, SAP

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SAP Run Simple

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Market Shifts in Product and Service Innovation by 2020

Focus moves from producing & installation to efficiently operate over entire lifetime

By 2017 IDC predicts

60%

of Global Manufacturers will use analytics to sense and analyze data from Connected Products and Manufacturing and optimize increasingly complex portfolios of products [1]

By 2018 Gartner predicts

6 billion

Connected "Things" will be requesting support [2]

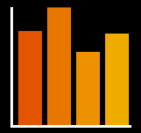
By 2017 IDC predicts

30%

of Top 100 Global Manufacturers will arm field service workforces with Augmented Reality capabilities to bridge the gap between traditional products and connected services [1]

By 2018

40%



of Global Manufacturers will achieve superior "Perfect Service Levels" by investing in analytics to support unified Customer Life-Cycle orientation from sales through service [1]

By 2020

50%+

of major new business processes and systems will incorporate some element, large or small, of the IoT [3]

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[1] IDC - 'Worldwide Manufacturing Product and Service Innovation 2016 Predictions', 2015
[2] Gartner -'Gartner reveals top predictions for IT organizations and users for 2016 and beyond', 2015
[3] Gartner - 'Analysts reveal five unexpected implications from the Internet of Things', 2016

The SAP Internet of Things DNA

Business Process Integration

Social & Collaboration

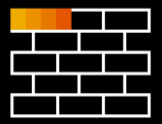
Big Data

Business Models

Intelligently connecting People, Things and Businesses

Artificial Intelligence and Machine Learning

APIs & Microservices



Natural Language

Assets & Machines

Business Applications

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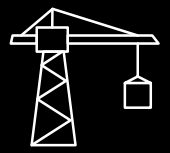
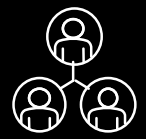
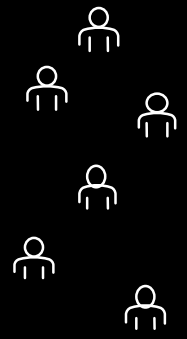
Solution & Innovation Portfolio

Innovation Portfolio

SAP Leonardo Bridge

Connected Product	Connected Assets	Connected Fleet	Connected Infrastructure	Connected Markets	Connected People	Partner Applications
						
Product Insights	Fixed Assets Insights	Mobile Assets Insights	Building Insights	Market Insights	People and Work	
Goods and Equipment	Manufacturing Execution	Logistics Safety	Construction	Rural Areas	People and Health	
Supply Networks	Manufacturing Networks	Logistics Networks	Energy Grids	Urban Areas	People and Homes	

SAP Leonardo for Edge Computing

SAP Leonardo IoT Bridge

SAP Cloud Platform

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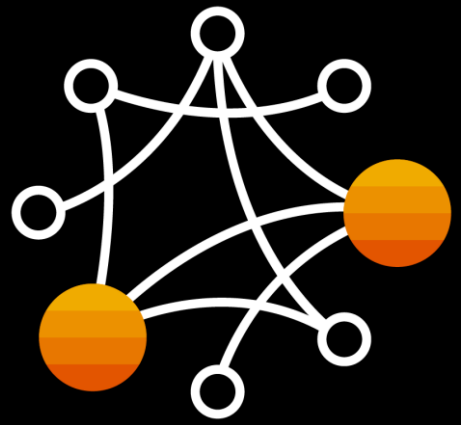
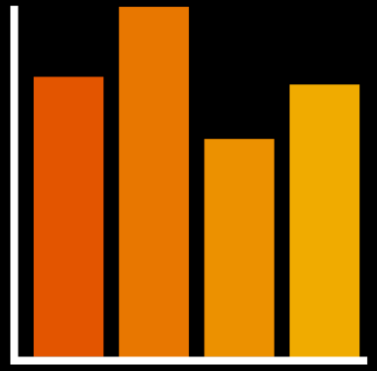
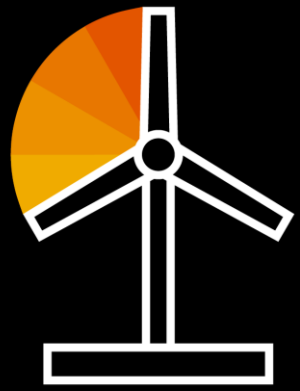
SAP Leonardo Connected Assets – 3 Complementary Digital Twins



SAP Asset Intelligence Network



SAP Predictive Maintenance



SAP Digital Twin for Structural Dynamics

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Asset Management is undergoing a massive change due

- Digital Manufacturing Information (VDI 2770)
- Demographic change
- Collaboration Models enabled by Industrie 4.0

SAP Asset Intelligence Network

Provides a digital representation of all industrial equip-ment used in the field with secure, controllable sharing rights across business partners to enable customer insights, performance analytics & new digital services

Digital Service Instructions

Agile Asset Management

Performance Analytics

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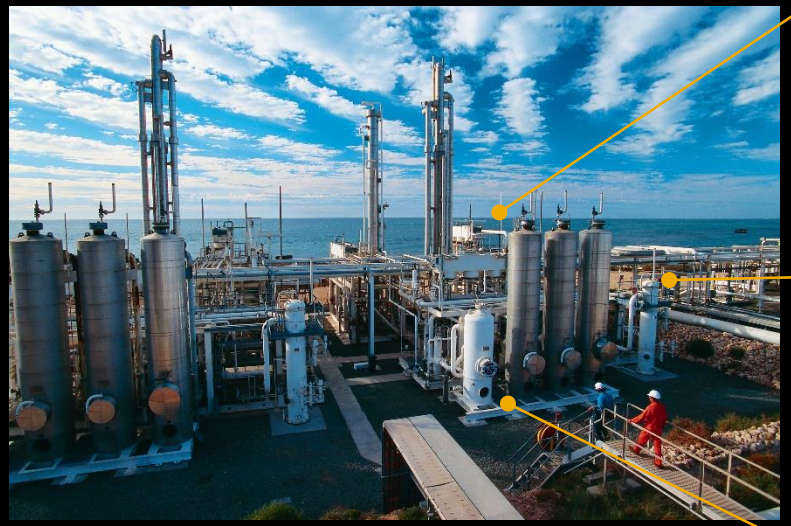
Production planners aim for the following…



Maximize asset productivity

- Overall equipment **effectiveness**
- **Return** on assets
- Unplanned **outages**

Drive **safe** operations

- Annual **OSHA** related **incidents**
- Recordable **accident frequency** rate

Reduce costs

- Annual service and maintenance **cost**
- **Planned** maintenance budget vs. actual cost

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... but face different challenges in Asset Management

Too much administration

Inconsistency

Incompleteness

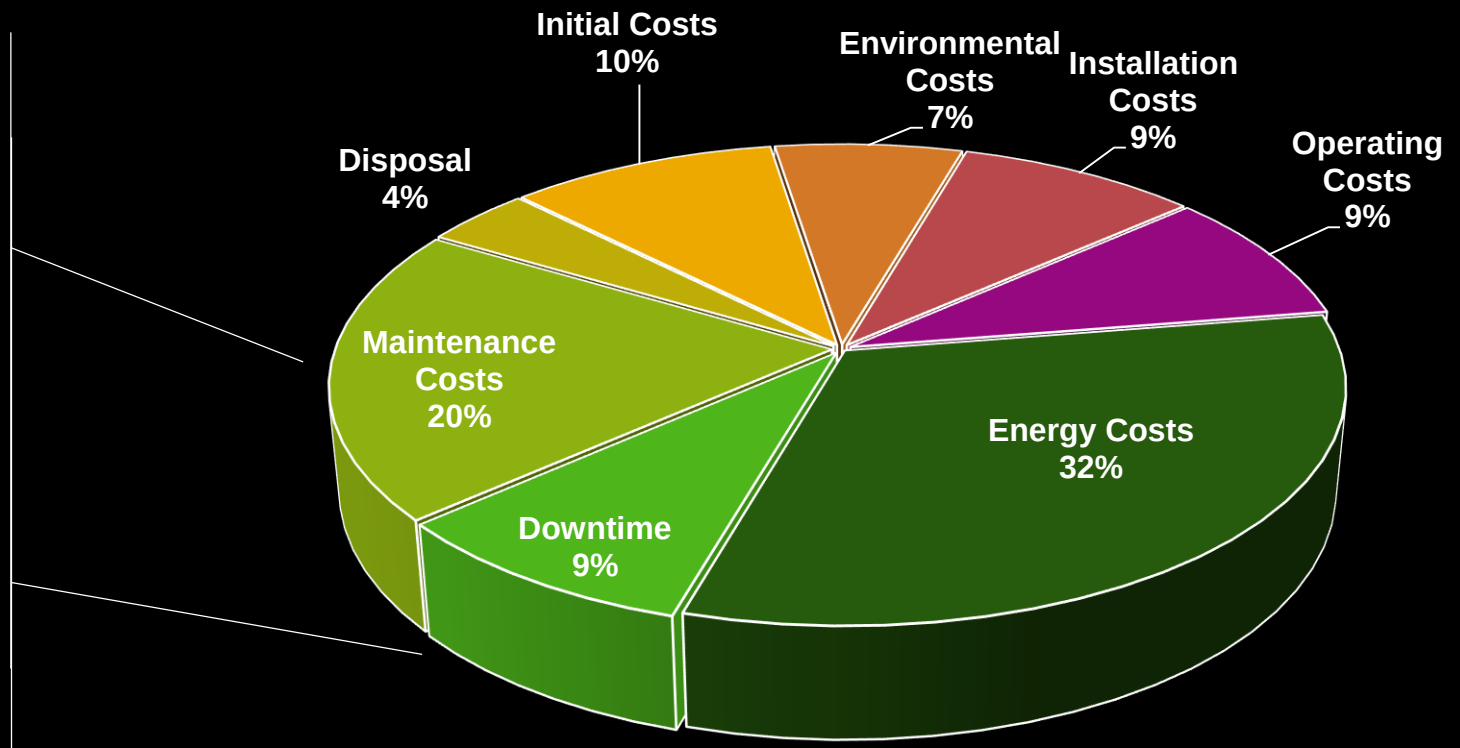
Vastness

Old documentation

Incorrectness

Uncertainty

Average Asset Lifecycle Costs (example Industrial Pump)



*www.pumpsandsystems.com

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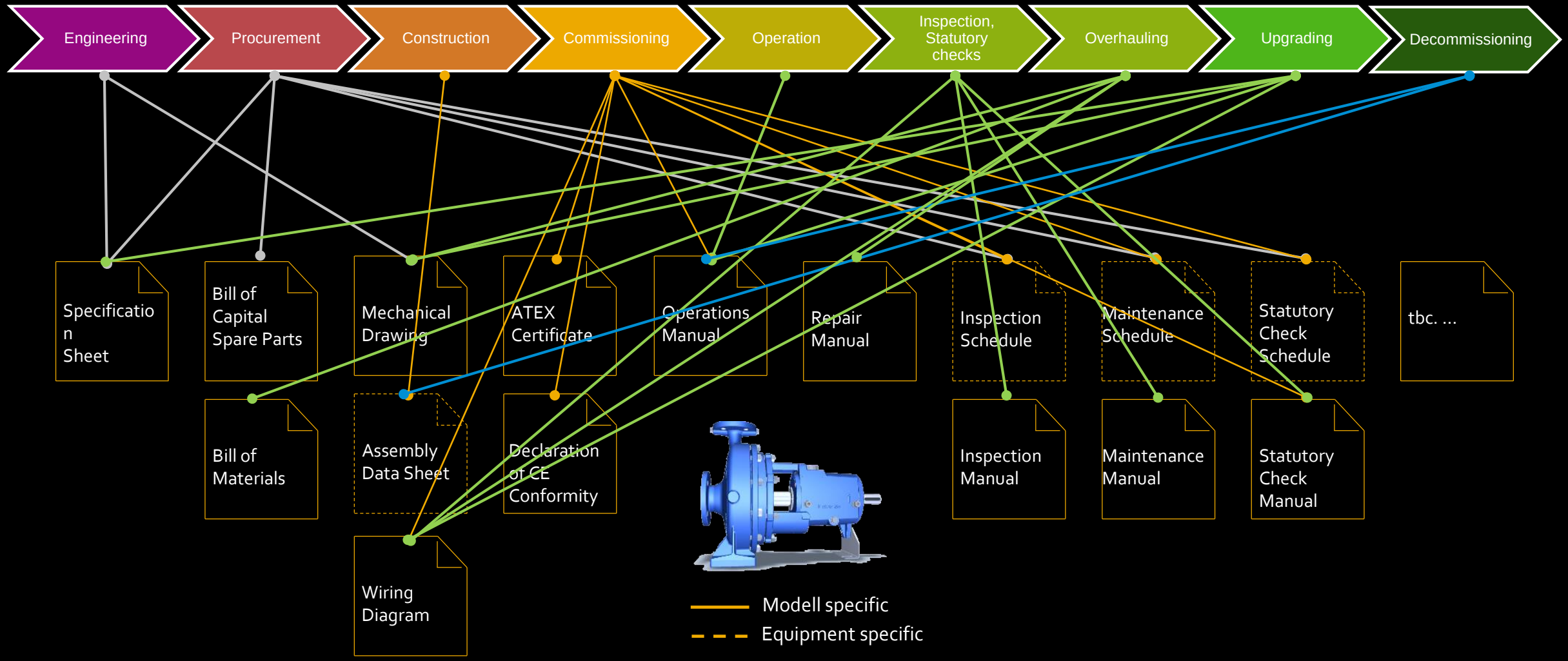
Asset specific documentation during the lifecycle

Digital manufacturing information for all stakeholders



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SAP Asset Intelligence Network

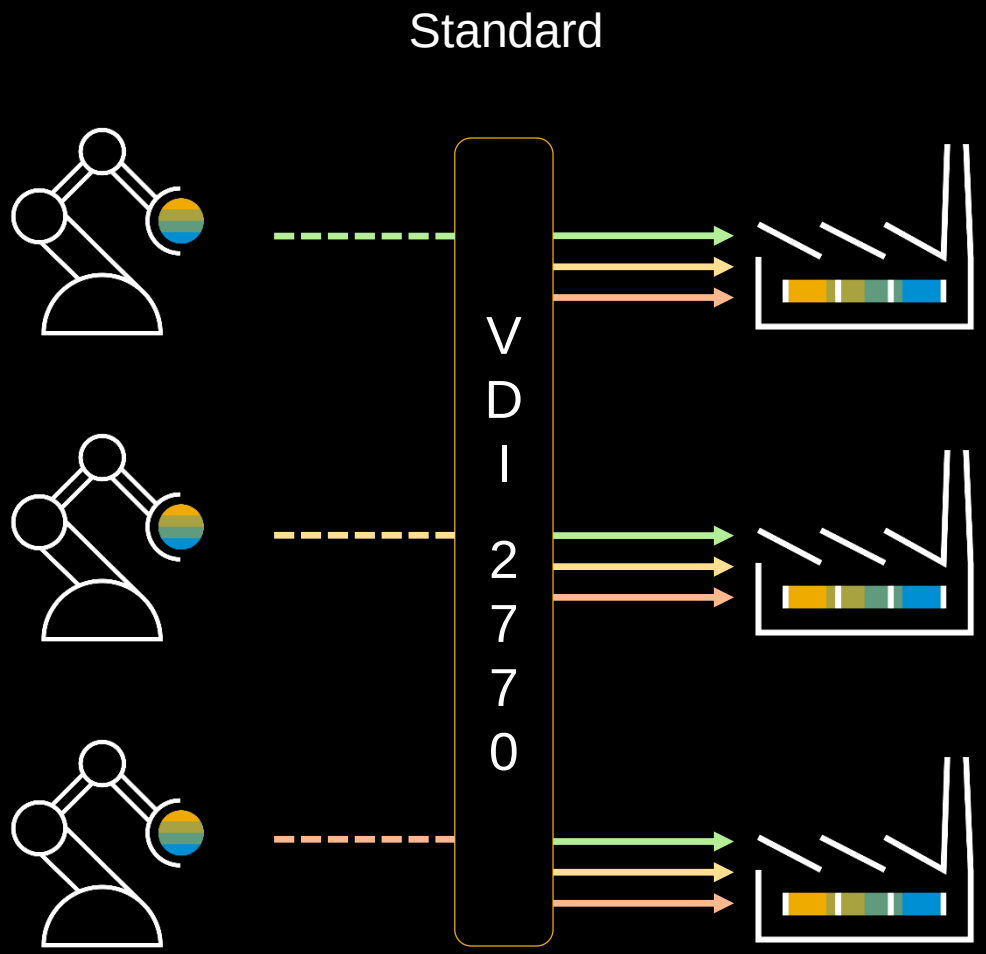
Execution of the digital manufacturer information

Digital Manufacturer Information about:

- Technical Characteristics
- Parameters, Protocols & Interfaces
- Activities carried out by humans (assembly, installation, operation, maintenance, disposal)

Is the foundation

for Industrie 4.0 and the Internet of Things



VDI BASF We create chemistry covestro LANXESS Energizing Chemistry MERCK EVONIK POWER TO CREATE SAP eCl@ss BOSCH WACKER SIEMENS

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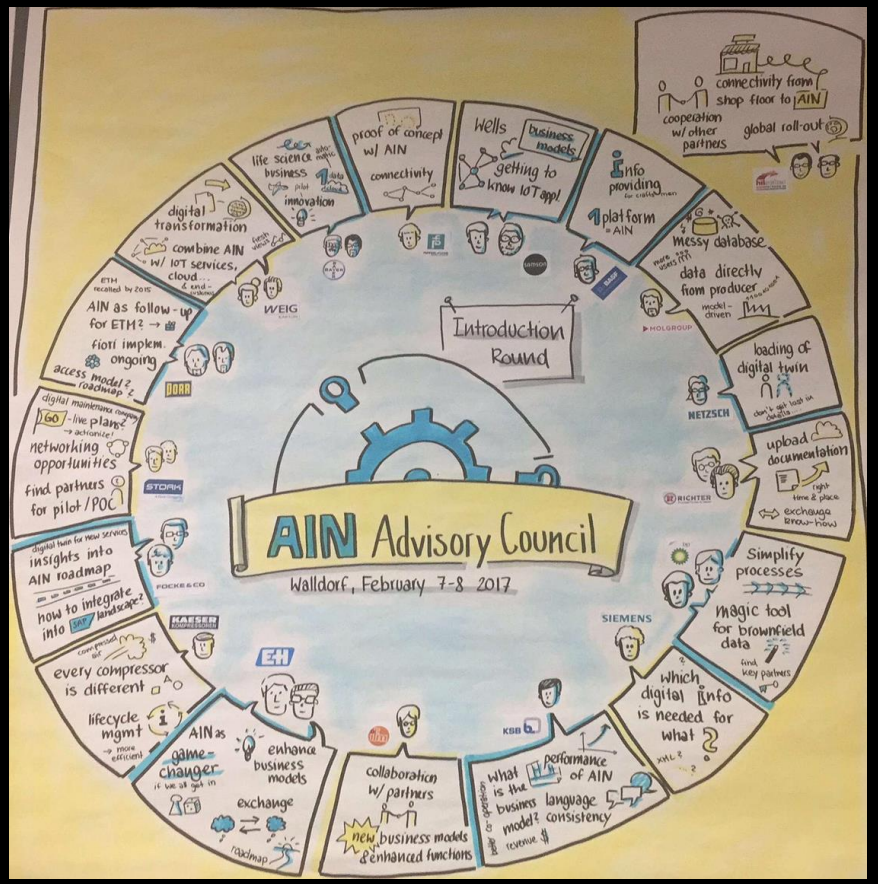
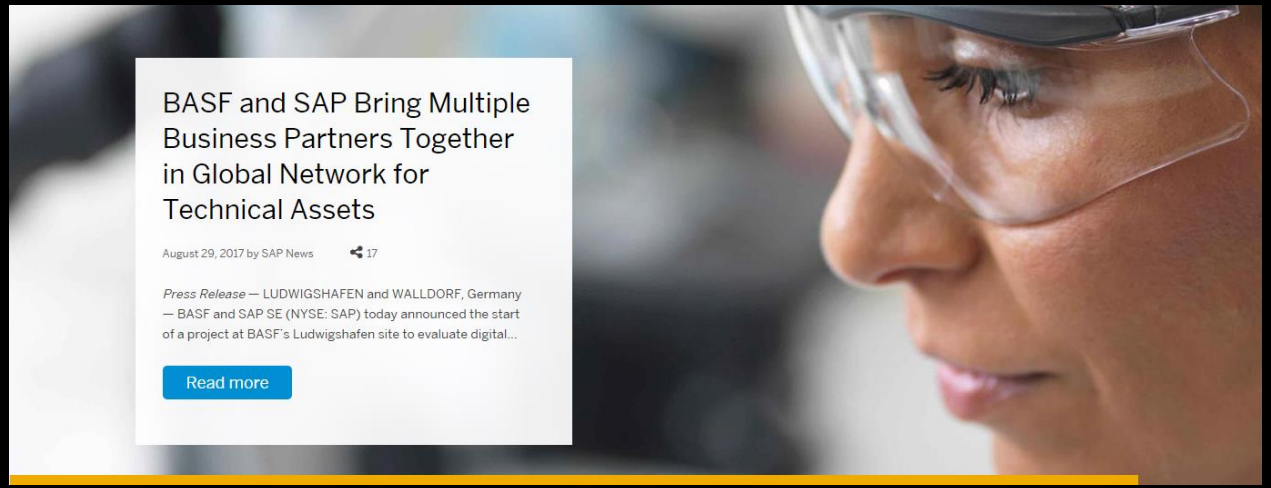
SAP AIN customer numbers are growing and we are accelerating network growth with the biggest Chemical Operator BASF



BASF We create chemistry [Link](#)

SAP [Link](#)



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SAP solution for collaborative asset management

SAP Asset Intelligence Network

Apps

Apps for collaborative processing of service bulletins, performance improvement, and spare parts change management

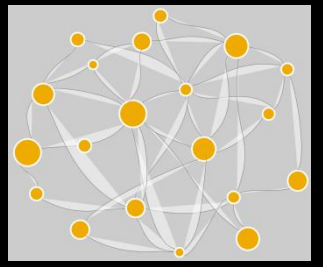
Content

A cloud portal of standardized content that defines and documents equipment and models, shared and stored, for a consistent definition between business partners

Network

A secure network to connect multiple business partners for inter and intra company collaboration

Combined together to deliver



SAP Asset Intelligence Network

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Business Value for Asset Operators

Benefit from a single source of truth

Understand the complete context – one channel to many manufacturers

BUSINESS VALUE

- Establish one channel to many manufacturer's, EPCs and Service providers
- Reduce manual asset search effort
- Lower asset life cycle costs
- Decreased downtime, planned and unplanned
- Lower spare parts inventory
- Receive notifications, service work summaries and service bulletins
- Push communication and alerts to manufacturers / service providers
- Reduce master data maintenance effort
- Higher process safety by transparent and bundled product – service offerings from manufacturer

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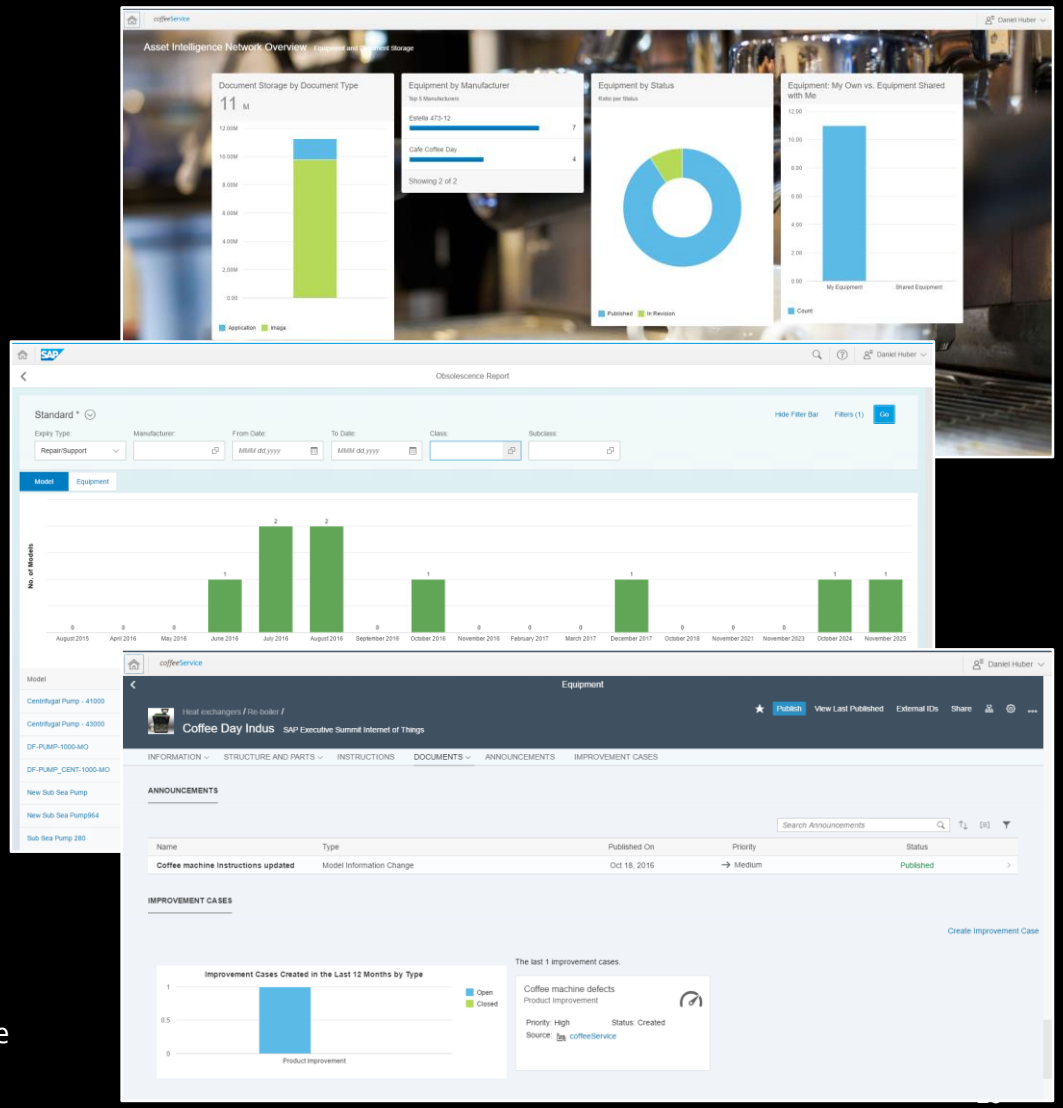
Performance Analytics

Improve product performance allowing customers to benefit from asset insights

Manage assets as a service or redesign them based on performance

- Institute collaborative network services for managing equipment, collecting asset performance analysis and feedback and fostering usage-based design enhancement
- Improved recall capabilities based on equipment status and lifecycle information
- Inform customers about major updates using announcements and 3D instructions
- Embedded analytics for models and equipment



Usage information & feedback for product / service improvement

Closed-loop product observation along the complete asset lifecycle

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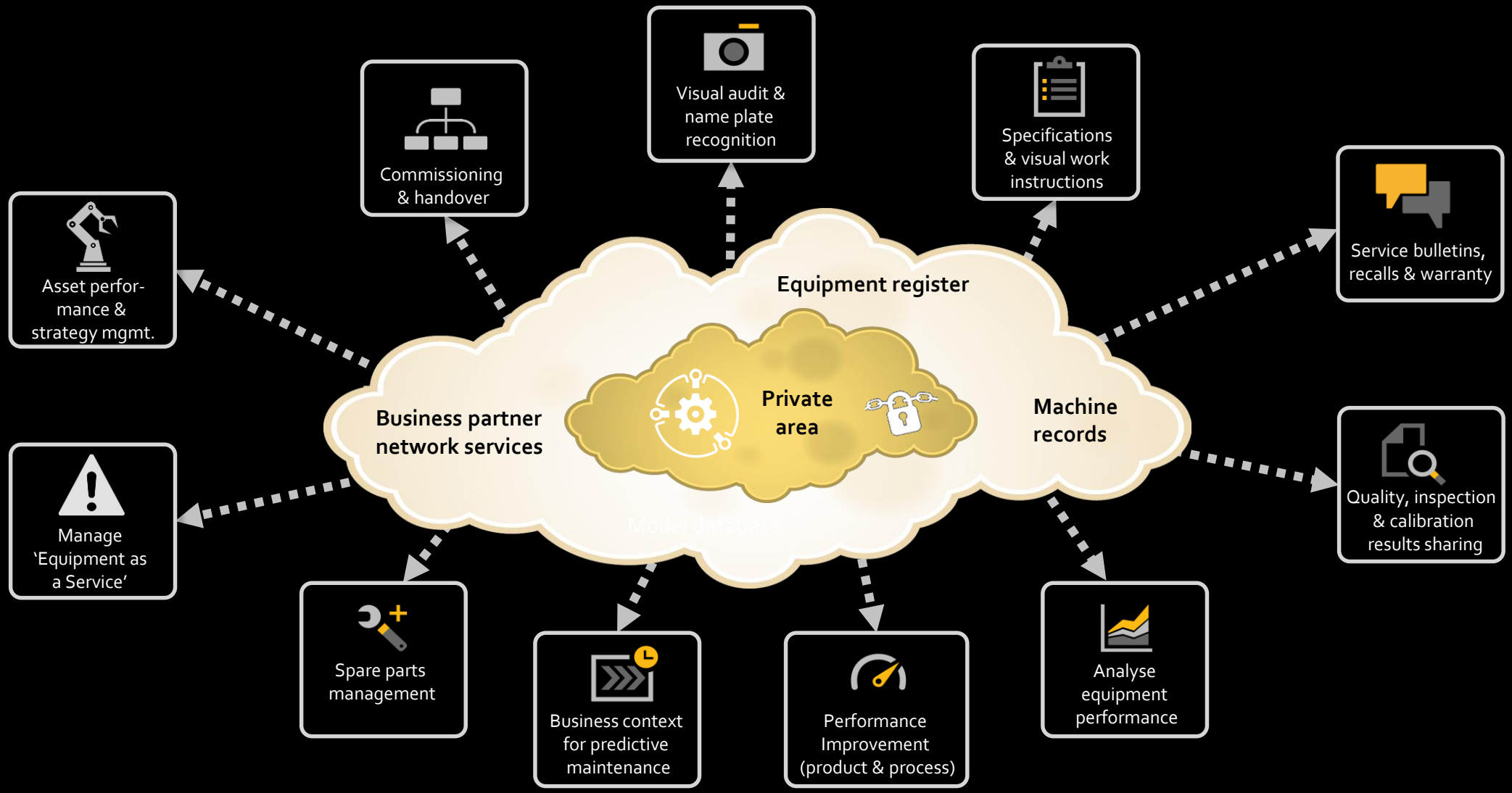
… and finally rethink Business Processes



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SAP Asset Intelligence Network

What it looks like – how it works

Ease of use

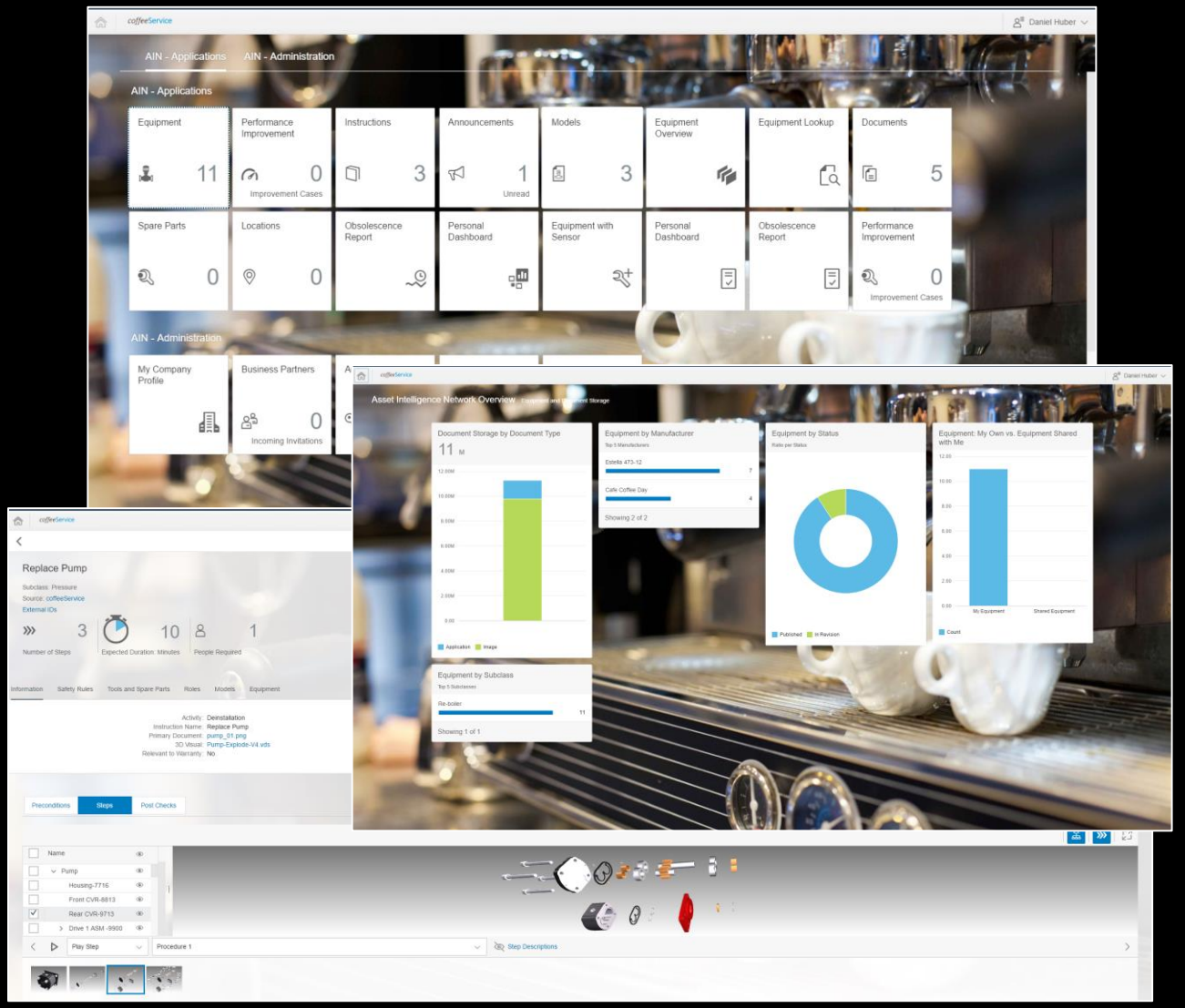
SAP Asset Intelligence Network is a cloud-based business network with consumer-grade user experience, seamlessly integrated with Fiori and SAP Fiori Launchpad

Simple and secure onboarding

For manufacturers, operators, EPCs and service providers

Powerful business content and analytics

- Introduce a digital twin to represent each physical machine or product along it's asset lifecycle
- Standardize equipment management through asset master data and and spare-parts information available for update from the network
- Streamline maintenance through access to the latest documents and service bulletins on maintenance strategies
- Achieve collaborative design and execution for complex installation or maintenance procedures



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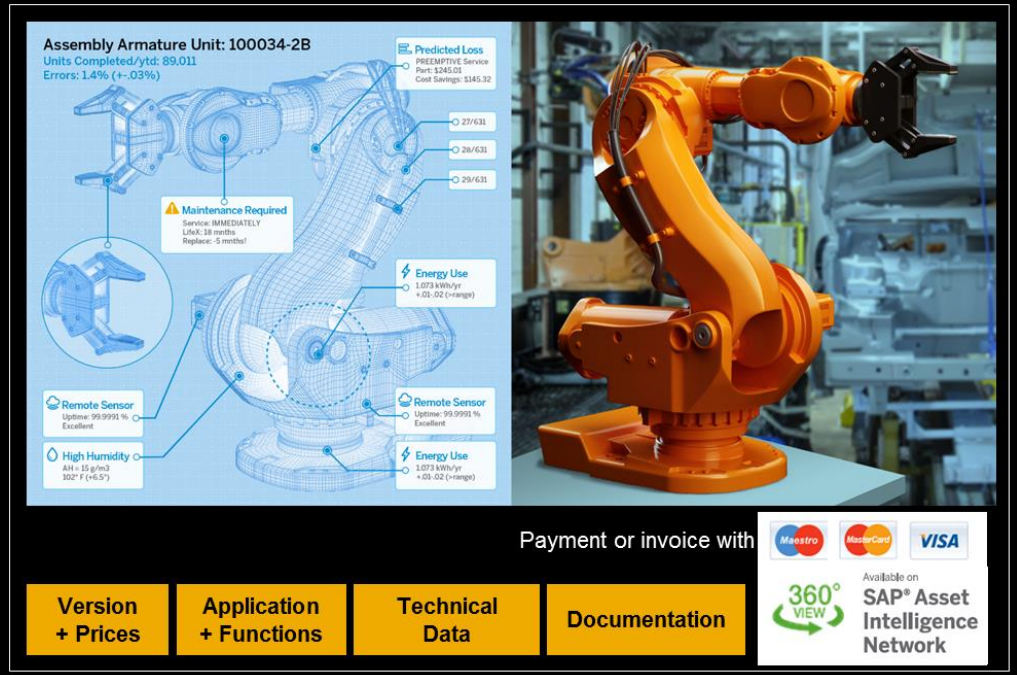
Leverage manufacturer information along the Lifecycle

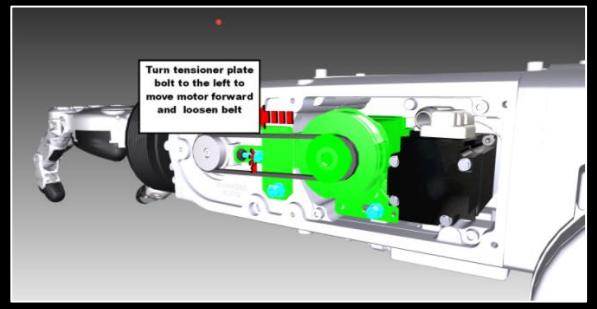
3D Data, Service Instructions & Announcements

Digital Twin for Business

New digital services like Firmware updates, recalls, spare parts updates etc. require a completely different approach to asset management:

- Every equipment has one unique identifier and one master record accessible by all relevant parties throughout it's lifecycle
- The Digital Twin brings together the
  - Sensor information (asset health)
  - Installation and service information
  - Sales and contextual information





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Performance Analytics

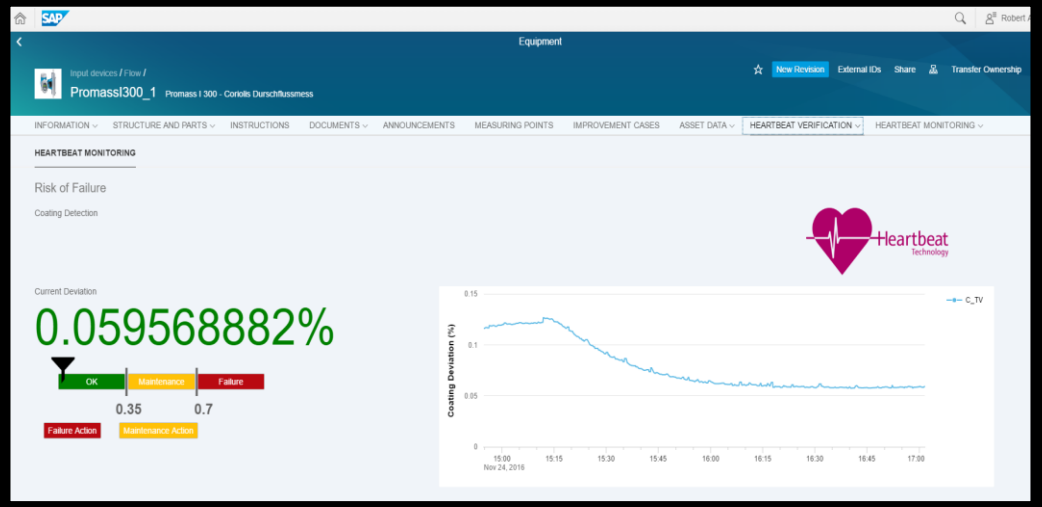
New approach to asset management

SAP AIN as single source of Asset Information

+ SAP IoT Application Enablement

+ SAP Cloud Platform Manufacturer Apps

- SAP AIN open architecture UI Extension Concept enables operators to integrate different Applications using the API Interfaces (native SCP, Siemens Mindsphere etc.)
- 1 source of asset information enriched by OEM data
- Integrated into SAP Plant Maintenance System



SAP IoT Application Enablement

Wireless Hart

Profibus

HART

SAP Plant Maintenance

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Industrial IOT in a “box”

In Construction

Process Automation - https://youtu.be/DJ2eQV-cicQ

Tour of IoT Wall https://youtu.be/OjuzyXKotaM

At SPS Drives

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End to end scenario

As designed | **As built** | **As maintained** | **Cont. Improvement**

Connected Products

- Engineering BoM
- Material master
- Drawings and Specifications

Manufacturing Execution

- Serialized Structure
- Configuration
- Equipment Onboarding

Fixed Assets Insights

- Functional Locations
- Ticket Federation
- Spare Parts Ordering

Digital Services

- Product Observation
- Firmware Update
- Equipment as a Service

Manufacturer | **Operator** | **New Business Models**

Product Design Network | **SAP Asset Intelligence Network + SAP Hybris Cloud for Customer**

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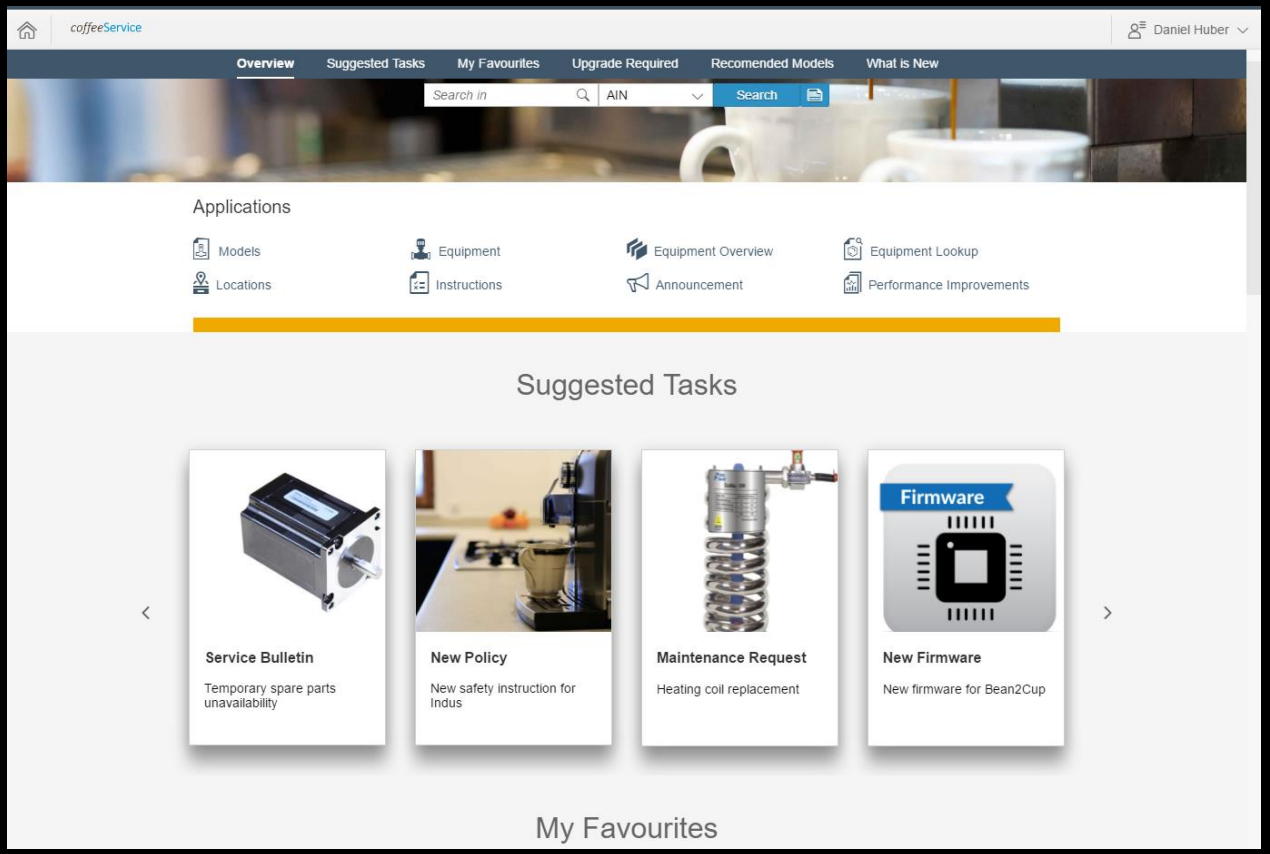
Integration Scenarios

Customer Portal & HCP extension capabilities

Customer Portal & HCP extension capabilities

- SAP provides a standard role-based personal dashboard acting like an equipment portal providing insights into the frequently viewed equipment, favorites and suggested tasks.
- Customers can easily enhance and adjust this personal dashboard using the extension capabilities of HANA Cloud Portal and SAP Fiori Launchpad.



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Integration Scenarios

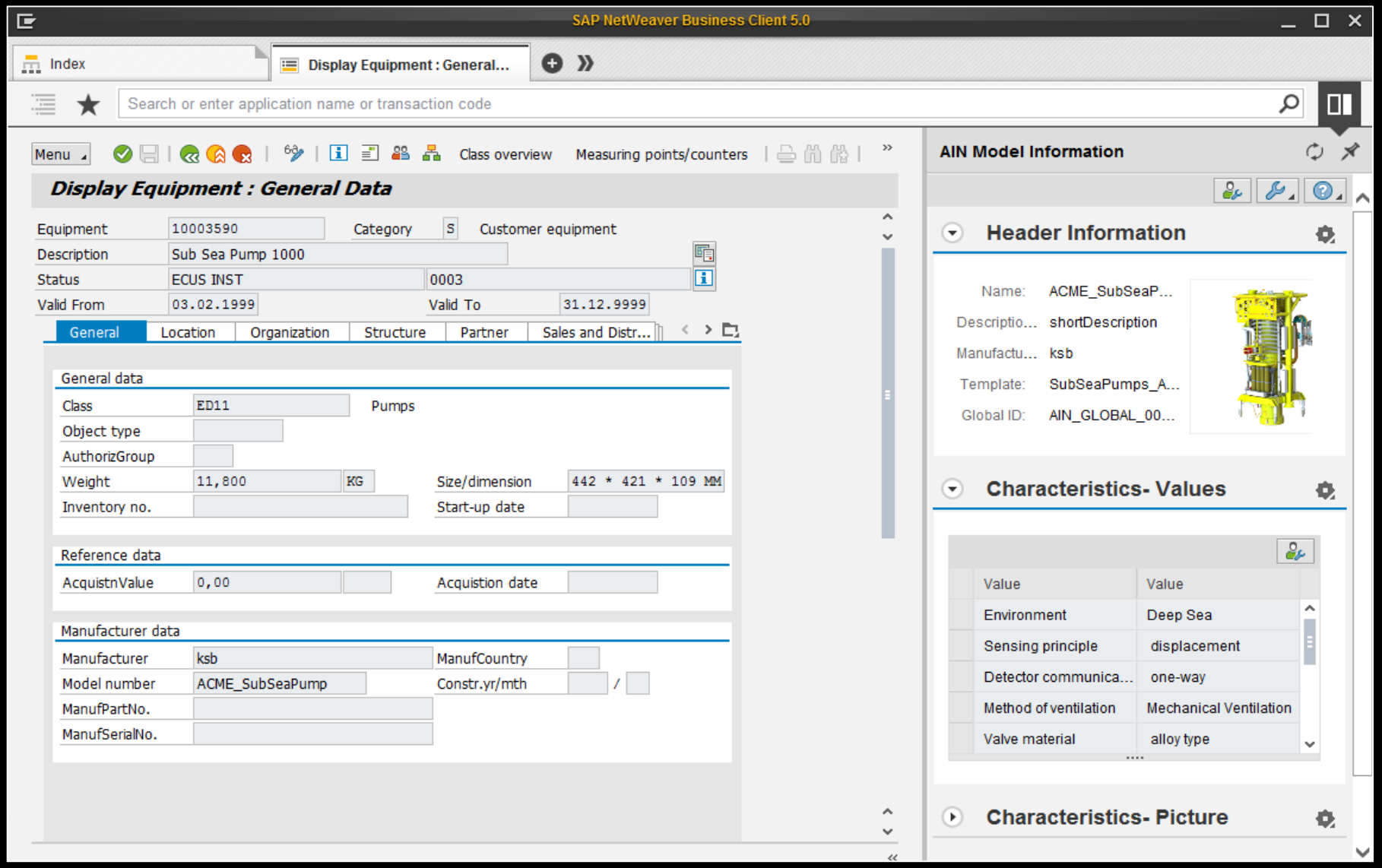
Integration with Enterprise Asset Management

The integration options are available via notes :

- Display of model information in custom EAM side panel
- Creation of model attachments in EAM for linked EAM objects

Pre-requisites for both of the above capabilities is the implementation of the following notes:

- Linking of EAM objects to AIN Models (Note 2327152)
- AIN Authentication (Note 2382489)



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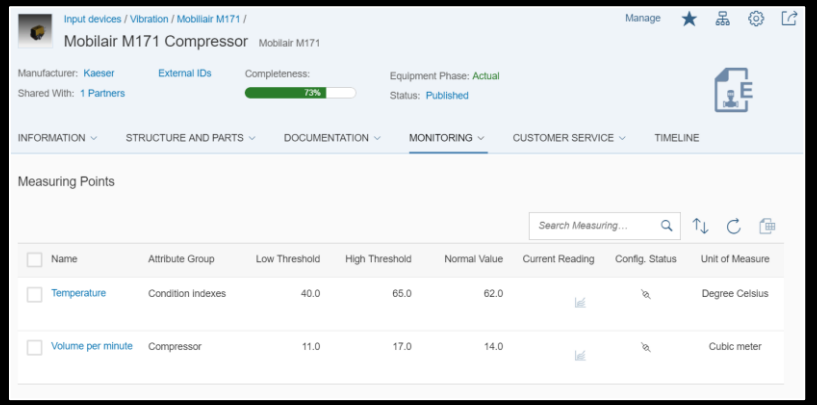
Connect with Sensor data using SAP IoT AE

Digital Twin connected to IoT Thing Model

SAP Asset Intelligence Network can be connected with SAP IoT Application Enablment Services for Time Series Data.

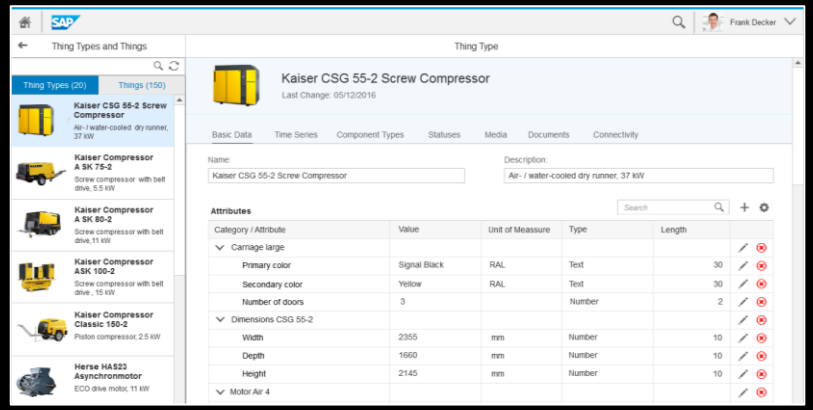
- Digital Twin leverages the defined Thing Model defined by SAP IoT AE
- SAP IoT AE providing business semantics to model physical devices and processes
- Time Series Data is not stored in SAP AIN
- SAP IoT AE stores Data using Dynamic Tearing

→ 1 Single Source of Asset Information Data bringing together static static Master Data (OEM and Operator) with dynamic sensor information (asset health)



SAP Asset Intelligence Network

SAP IoT Application Enablement



Protocols

Shop Floor

HTTP	DDS	OPC UA
IEEE 802.15.4	Profibus	XMPP
MQTT	Infibus	LoRa
HART & W-HART	DLMS/COSEM	…

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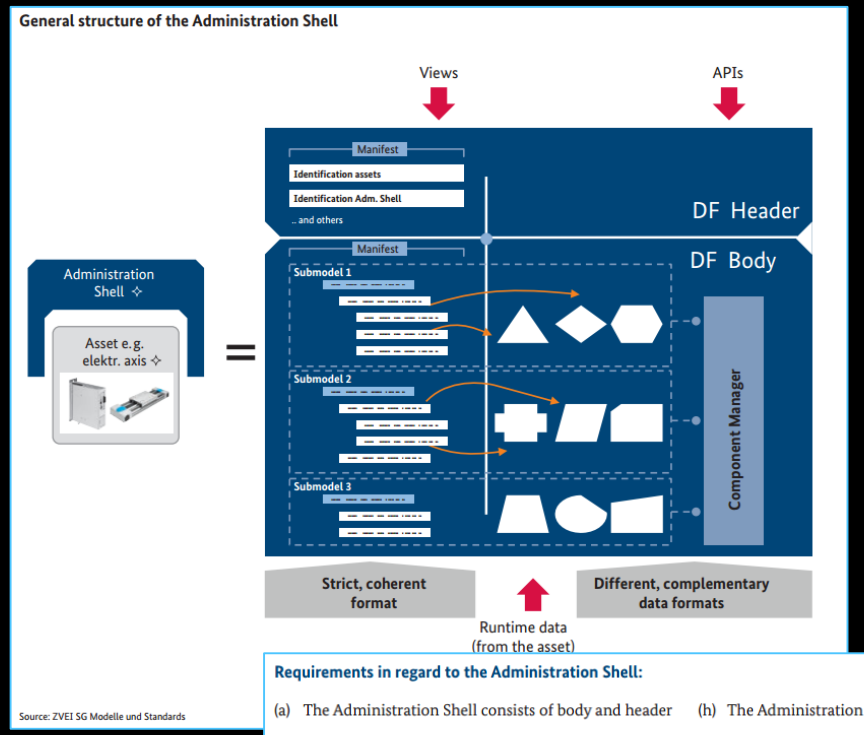
Integration Scenarios

Support for the RAMI 4.0 Administration Shell

SAP Asset Intelligence Network supports the RAMI 4.0 Administration Shell

- One single source of truth for the asset / equipment
- Information about the utilization of the asset
- Accessible via APIs, based on a service-oriented architecture
- Contains information about different application aspects (installation, business partners, condition monitoring, tickets, spare parts, etc.)
- Supports unique Identifiers, types and instances
- Manufacturer and operator specific attributes



Requirements in regard to the Administration Shell:

(a) The Administration Shell consists of body and header

(b) The body contains information about the respective asset

(c) The header contains information about utilisation of the asset

(d) It consists of the Manifest and Component Manager

(e) The information in the Administration Shell is accessible by means of a service-oriented architecture (API)

(f) It represents information about different application aspects of the asset

(g) Structuring according to views (pursuant to MES ISO/IEC81346, Digital Factory BCFLP, ...)

(h) The Administration Shell has an unique ID

(i) The asset has an unique ID

(j) Also a factory is an asset, it has an Administration Shell and is accessible by means of ID

(k) Types and instances must be identified as such

(l) The Administration Shell can include references to other Administration Shells or I4.0 information

(m) Additional properties, e.g. manufacturer-specific, must be possible

(n) A reliable minimum number of properties must be defined for each Administration Shell

https://www.produktion.de/iot-by-sap/iot-by-sap/mit-dem-digitalen-zwilling-zu-mehr-effizienz-bei-industrie-4-0-262.html

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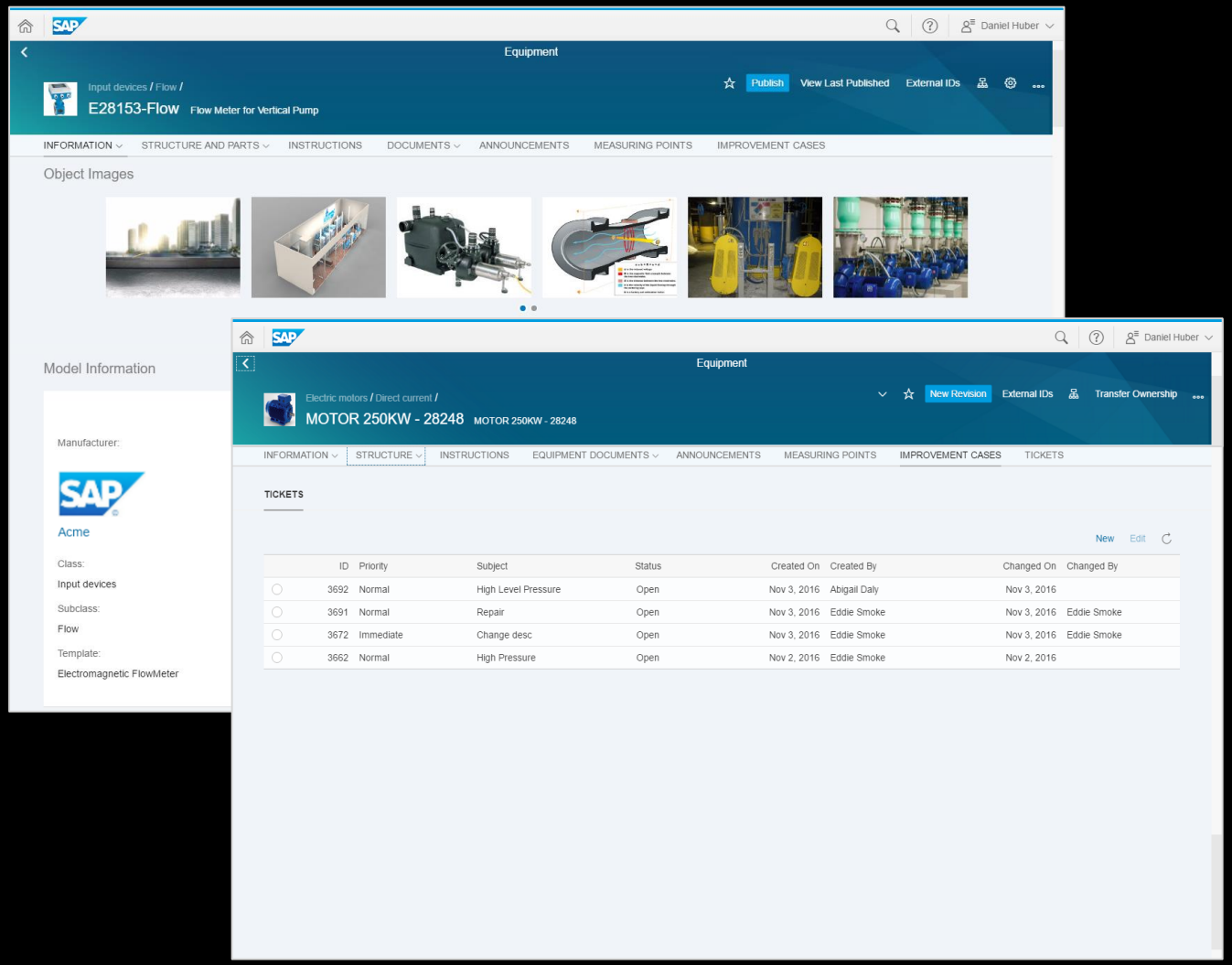
Source: Plattform Industrie 4.0, http://www.plattform-i40.de/I40/Redaktion/EN/Downloads/Publikation/structure-of-the-administration-shell.pdf?__blob=publicationFile&v=5

Integration Scenarios

SAP Cloud for Customers

Integration with Cloud for Customers

- SAP Cloud for Customers is just one integration possibility
- Manufacturers can easily access all available tickets for an equipment and control the access for Operators and service providers
- Operators can create service requests directly on the equipment level
- If the collaboration is in place, manufacturers can apply this on their customer equipment to fulfill service agreements and increase uptime & customer satisfaction



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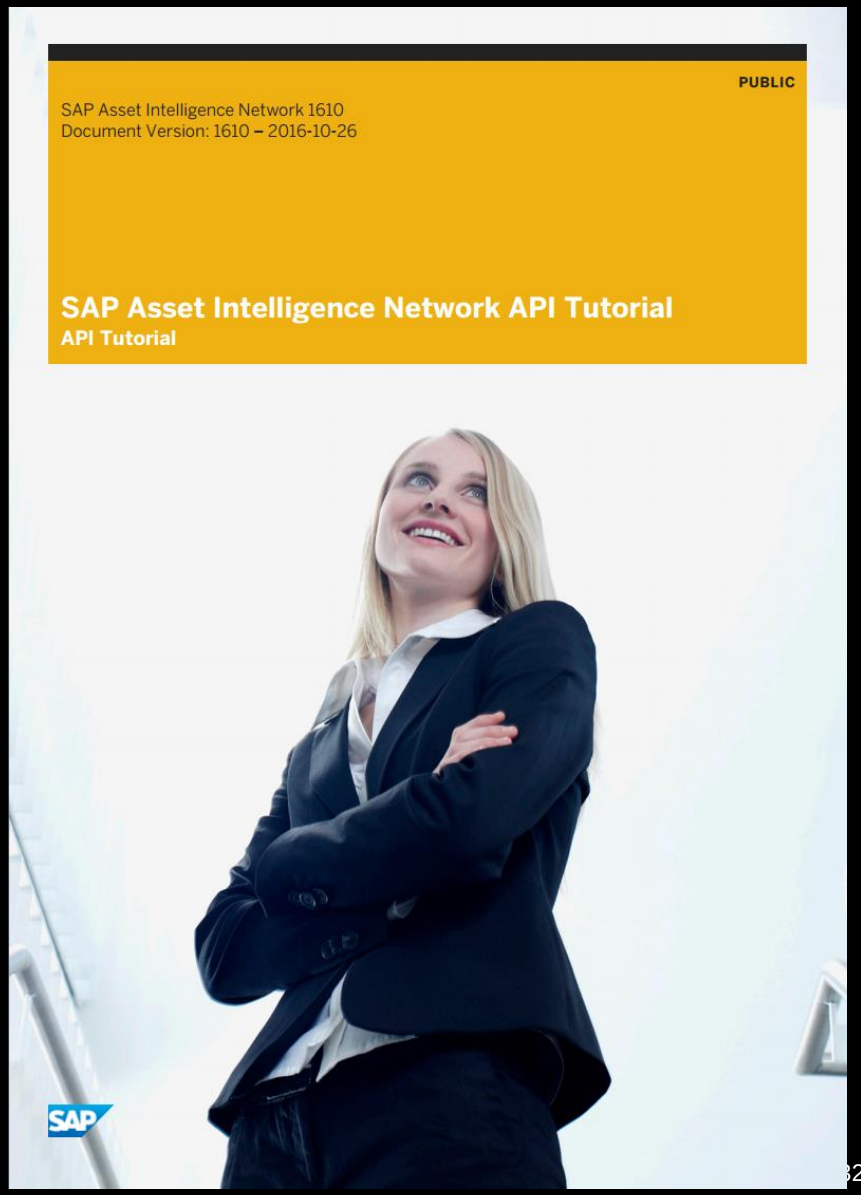
Integration Scenarios

API Integration

Powerful REST APIs and API tutorial for SAP Asset Intelligence Network

- Publicly available at http://help.sap.com/ain-current
- Model APIs: Here
- Equipment APIs: Here
- Template APIs: Here
- Location APIs: Here
- Document APIs: Here
- Spare Part APIs: Here
- And many more



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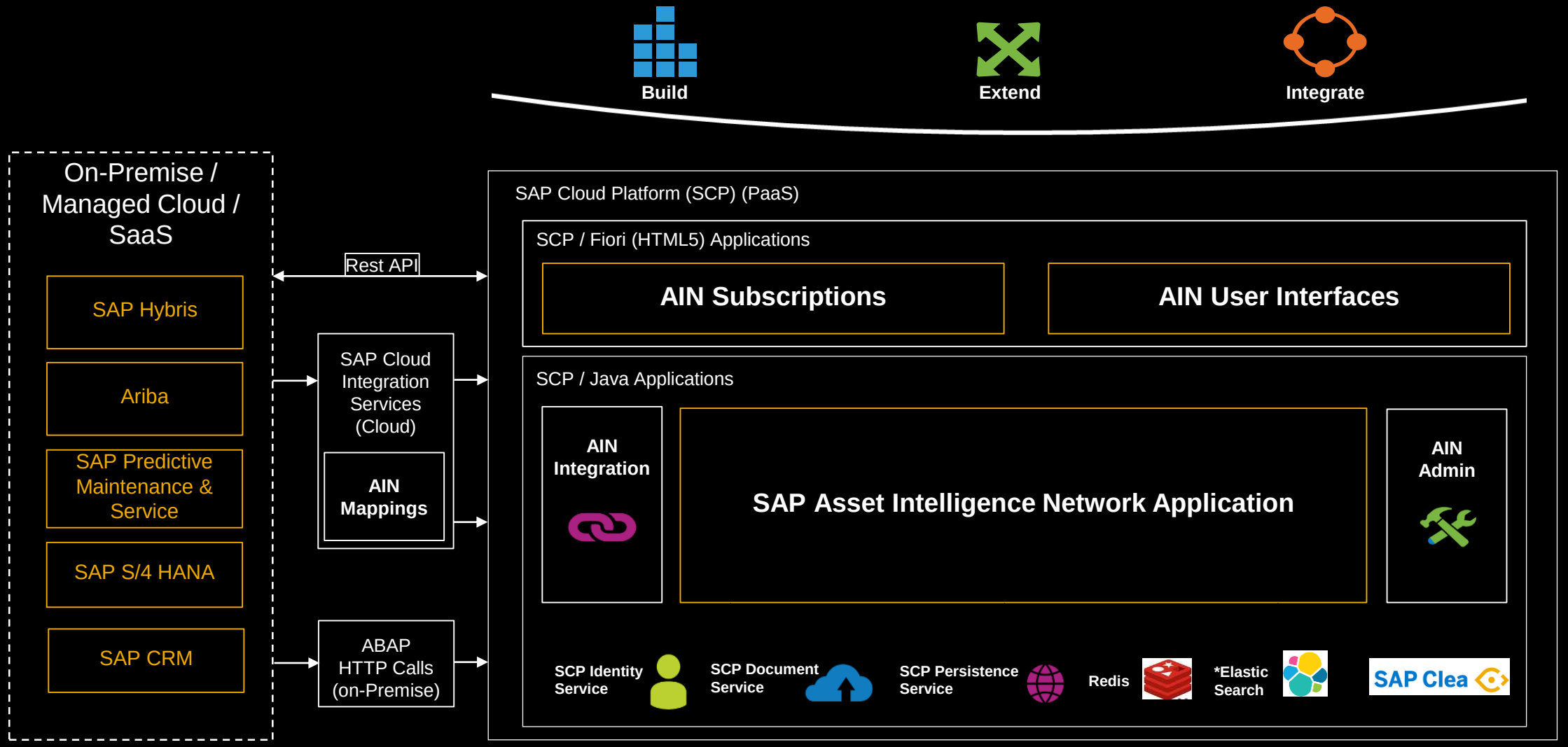
SAP Asset Intelligence Network

Architecture



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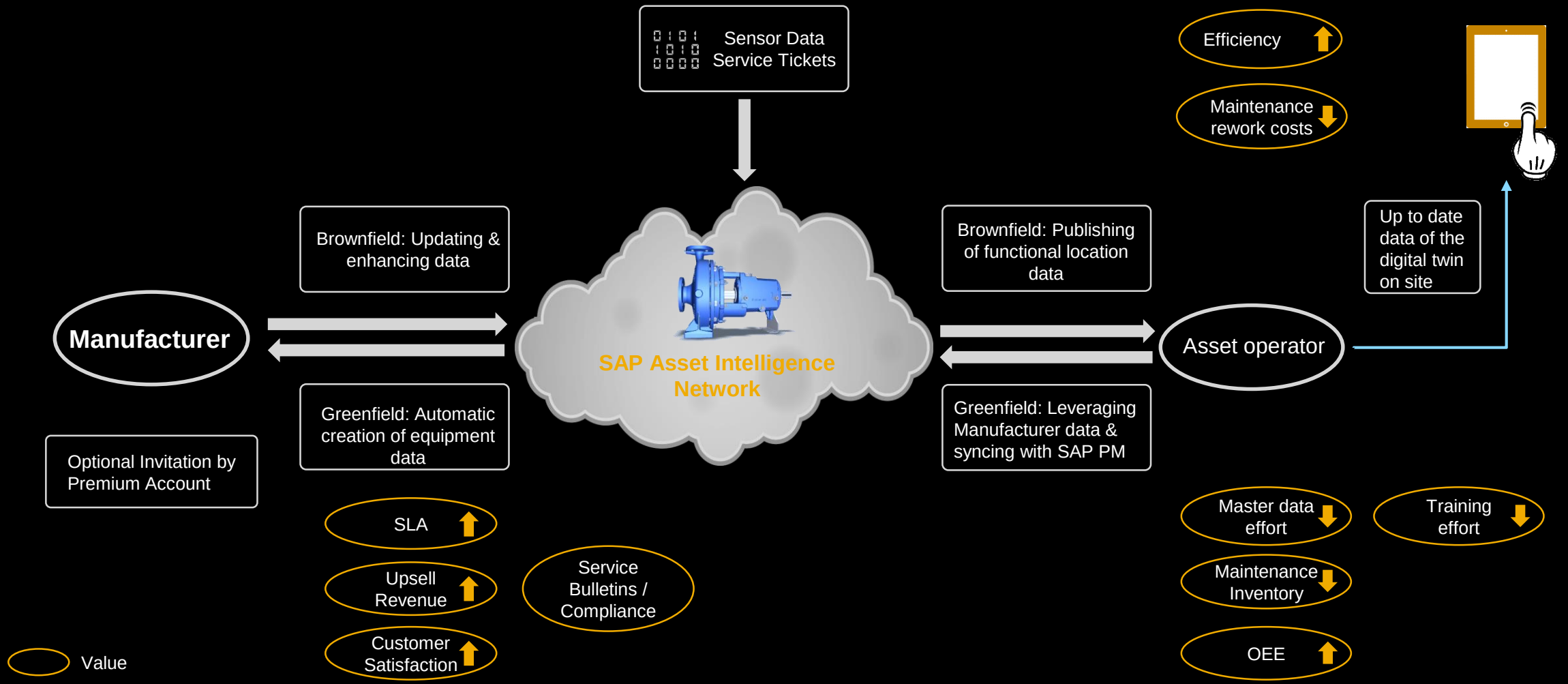
SAP Asset Intelligence Network – Chemical Customer A

Use Case 1 - Equipment Installation – Next Level Plant Maintenance



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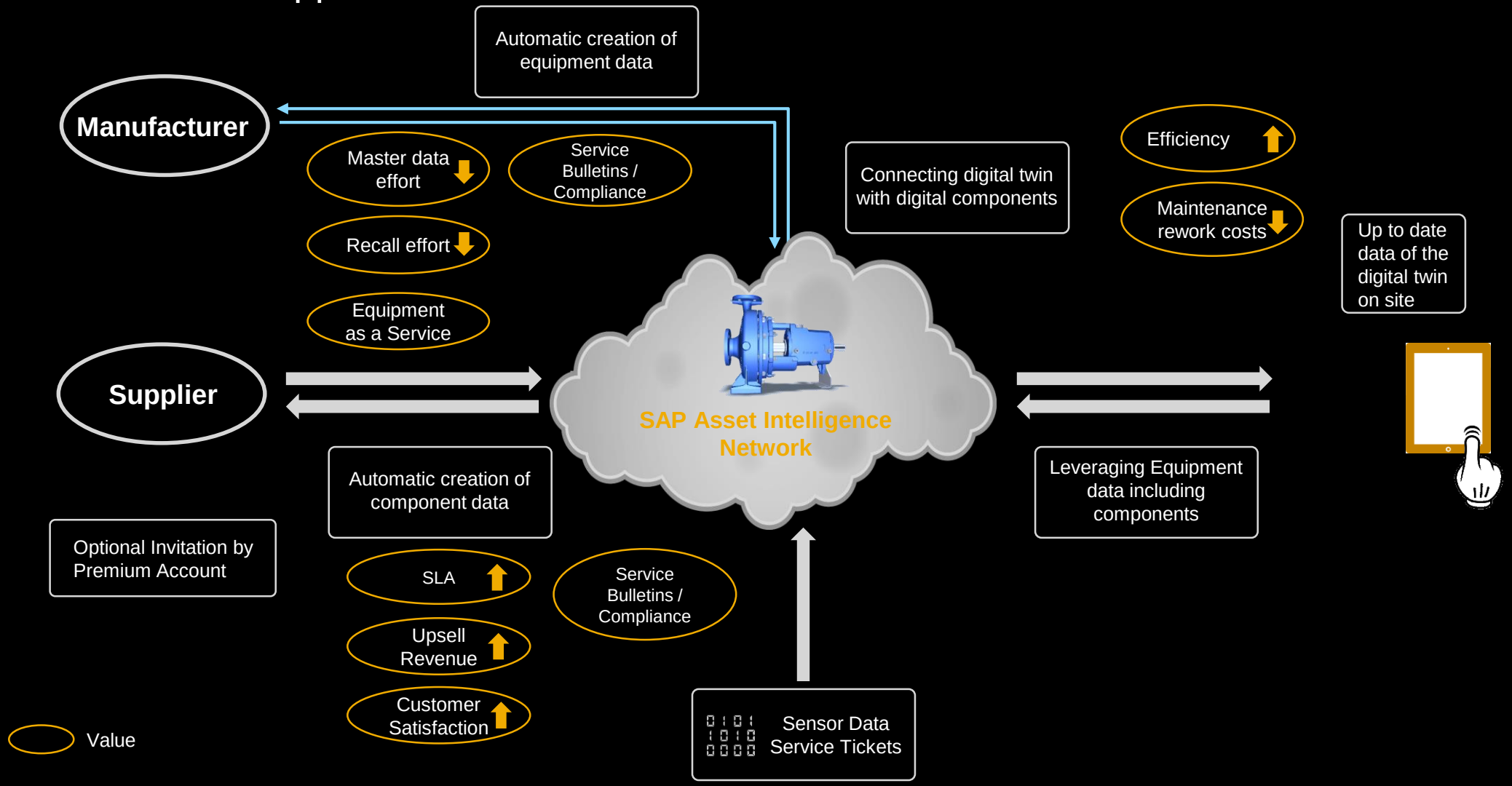
SAP Asset Intelligence Network – Discrete Customer 2

Use Case 2 – Supplier Track and Trace



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SAP Asset Intelligence Network

Product road map overview - key themes and capabilities

Planned

Recent innovations

- **Process Improvements:**
- Historical **Work Order / Logbook**
- Multi-level equipment creation based on **hierarchical model templates**
- Clustering of equipment with **Groups**
- Manufacturer refined **failure modes**
- Enhanced **Template Navigation**
- Improved **Spare Parts handling** with Documents, Templates, and Equipment Level Quantities
- Extending Group Analytics by **Group Population**

- **Integration:**
- Enhanced EAM integration to sync

SAP AIN 1708

Planned Q4/2017

- **Process Improvements:**
- Historical **Notifications / Logbook**
- Extended organizational Authorization
- Modelling of **Key Figures** for condition based and predictive maintenance (Design Time)
- **Dashboard** for condition based and predictive maintenance (Run Time)
- **System Modelling**
- Automatic **Registration** and **Topology Detection**
- Obsolescence Management for **Spare Parts**
- Model Structure **Cardinality Ranges**
- **Unified Equipment Status** with PdMS and Device Connectivity
- Introducing **Reliability Availability and Maintainability Figures** to Failure Modes
- Extending Group Analytics by **Group Age**
- New Authorization Group to **share Headers only**

- **Integration:**
- **Shopping Cart**
- **3D Printing** with SAP Distributed Manufacturing
- SAP PdMS and IoT Application Enablement Integration

SAP AIN 1711

Planned Q1/2018

- **Process Improvements:**
- Creation and editing of **Work Orders / Notifications**
- Introduction of **Collaborative Work Order**
- **Subscribe** to Data Changes
- **System Functions**
- **Operating Context**
- **Cross Timeline** Event Reporting

SAP AIN 1802

Planned Q2/2018

- **Process Improvements:**
- Advertising of Digital Services (content, requests and applications)
- Progress tracking (with SAP Project Information Network)
- Checklist during Project installation
- Blockchain Integration

- **Integration:**
- Integration with SAP PLM

SAP AIN 1805+

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

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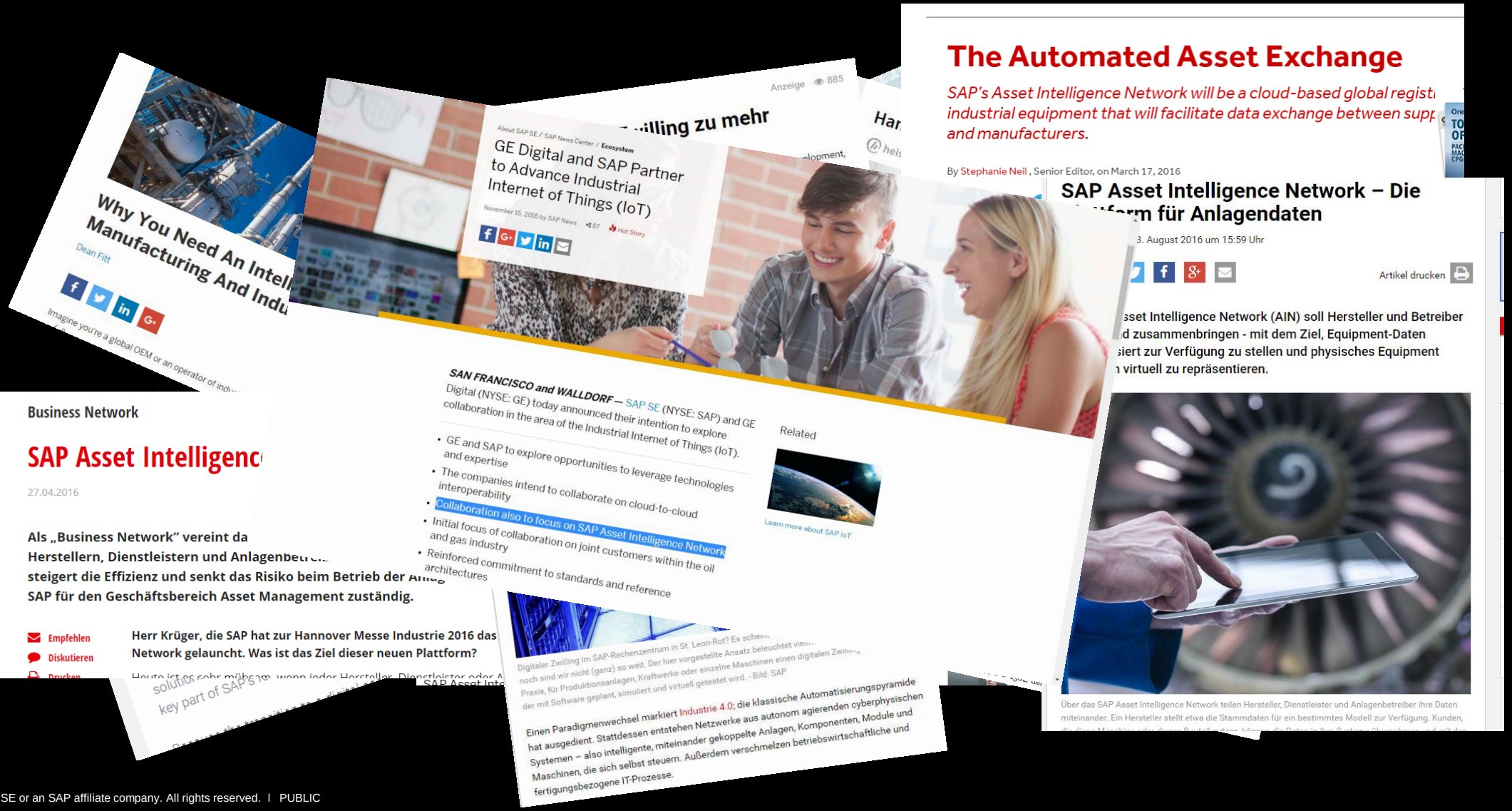
Press coverage

From design thinking project to a vibrant business network



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Foundation for a successful, global, single network of assets

All business partners need to talk a common language

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Typical journey to get there?

1

An internal Installed Base / Asset Portal across multiple in-house systems

2

An external Installed Base / Asset Portal where you invite key Service Providers and Manufacturers

3

Progressively benefit from an expanding network of contributors

Propose an Industrial IoT Pilot with your customers

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SAP Asset Intelligence Network

Service Offerings

Business Assessment Service

Approach

SAP AIN introduction & use cases

Report from customer backend system to find SAP Asset Intelligence Network support assets

Business case calculation & validation

Deliverables

Business case

Dedicated business transformation roadmap in asset management

Final presentation

Value and benefits

Dedicated use cases with business balue for further procedures

Clear road map with integration possibilities

Adoption of an ideal model for asset management processes and solutions

Jump Start Service

Customer specific system instance

Enables you and a collaboration partner to leverage network capabilities in asset management

5 models & 100 equipment

8 weeks

Optional add-ons

API automation

Integration (CS/CRM or PM)

Synching PM/CS/CRM task lists

Value and benefits

Very affordable prototype with your own equipment data in SAP HCP

Basis for a project decision, reusability for an implementation project

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Summary

SAP Asset Intelligence Network

Provides a digital representation of all physical equipment in the field with secure, controllable sharing rights across business partners to enable:

- Customer insights: Leverage the installed base in the business network to grow aftermarket business
- Performance analytics: Improve product performance allowing customers to benefit from asset insights
- Digital services: Win in the new digital market space by driving advanced business models into the customer base

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Admin Guide – SAP AIN 1705 Release

Operations Guide – SAP AIN 1705 Release

Security Information – SAP AIN 1705 Release

Thank you.

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