Asset Optimization with SAP Enterprise Asset Management
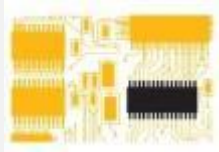
Dean Fitt, Solution Manager, EAM
SAP Mining and Metals Forum. Darmstadt, Germany, 9 October 2014   Public

Evolution of Technology Changing Asset Management?

M2M	Smart World	Cyber-Physical Systems	Internet of Things	Social	Mobile and Cloud
Self-regulation	Assets provide information	Machines connected to the business	Connected via one protocol	Knowledge shared in communities	Access to information everywhere

Smart products, assets, and human beings in a hyper connected world

*Source: acatech POSITION Cyber-physical Systems

Asset Management
ISO 55000 series influencing our processes

Value:

Assets exist to provide value to the organization and its stakeholders

Alignment:

Transform organizational objectives into technical and financial activities, decisions and tasks

Leadership:

Leadership and workplace culture are determinants of value realization
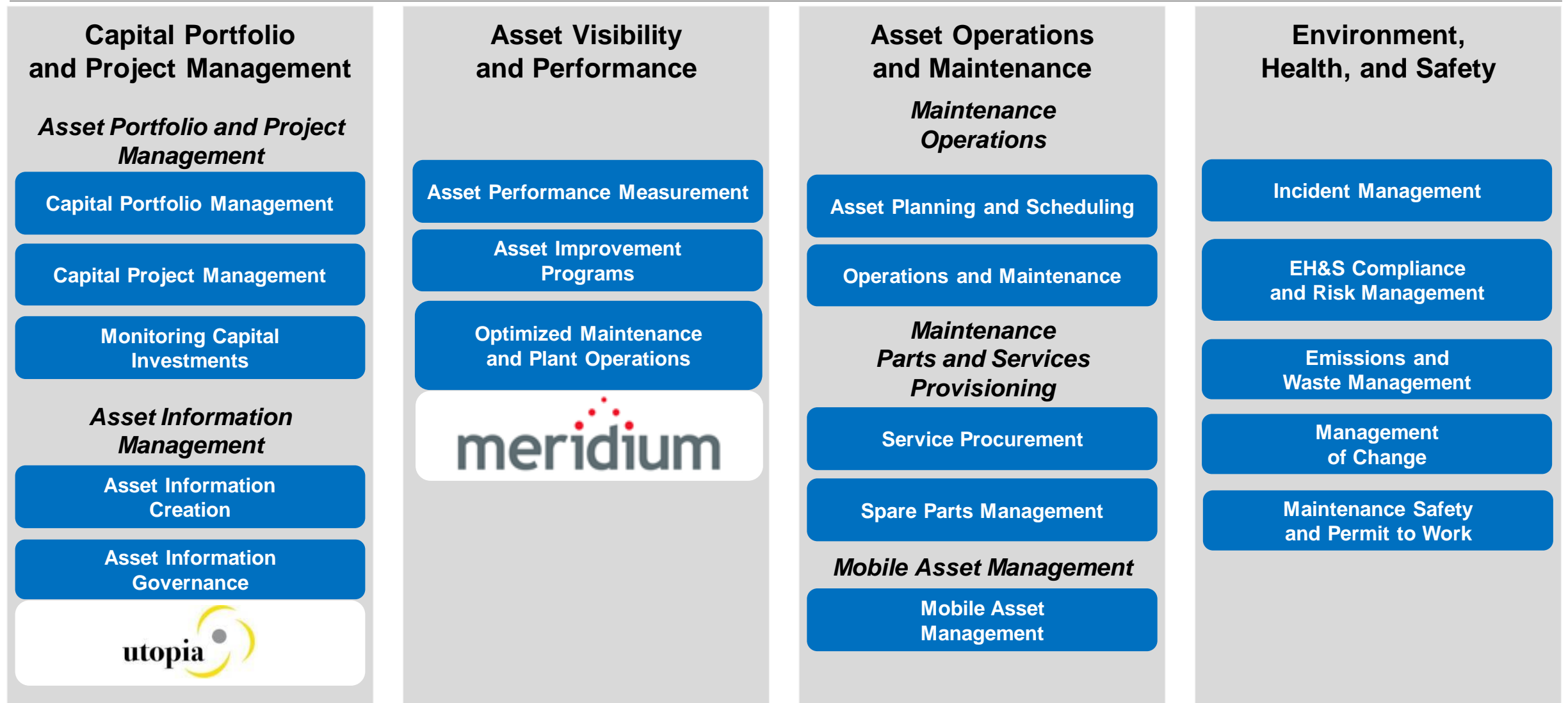
Assurance:

Asset management enables the assets to fulfil their required function

SAP Enterprise Asset Management
Covering the complete asset lifecycle

Capital Portfolio and Project Management

Asset Portfolio and Project Management

- Capital Portfolio Management
- Capital Project Management
- Monitoring Capital Investments

Asset Information Management

- Asset Information Creation
- Asset Information Governance

utopia

Asset Visibility and Performance

- Asset Performance Measurement
- Asset Improvement Programs
- Optimized Maintenance and Plant Operations

meridium

Asset Operations and Maintenance

Maintenance Operations

- Asset Planning and Scheduling
- Operations and Maintenance

Maintenance Parts and Services Provisioning

- Service Procurement
- Spare Parts Management

Mobile Asset Management

- Mobile Asset Management

Environment, Health, and Safety

- Incident Management
- EH&S Compliance and Risk Management
- Emissions and Waste Management
- Management of Change
- Maintenance Safety and Permit to Work

Asset Management
How can we meet the challenges?

Connect, analyze, predict, and act

- Leverage real-world data
- Build models of asset behavior
- Predict the future
- Take appropriate action

Increase value, reduce consumption

- Ensure asset data accuracy
- Collaborate with OEMs and service providers
- Optimize performance

Simplify the complex

- Make information digestible
- Bring information on site
- Enable users to take decisive action

Asset Information

SAP Enterprise Information Management Solutions
Run Assets Better with complete and accurate information

SAP Data Services:
Quality controls for asset information

SAP Document Presentment by OpenText:
Automate assembly & transmission of asset-related documents

SAP Information Lifecycle Management:
Manage retention and destruction asset information in SAP

CLEANSE & MONITOR

INTEGRATE

MANAGE

ASSOCIATE

ARCHIVE

DISTRIBUTE

Before   After
Data Quality Management

Data Integration

GOVERN

Master Data Management

Content Management

Content Distribution

Information Lifecycle Management
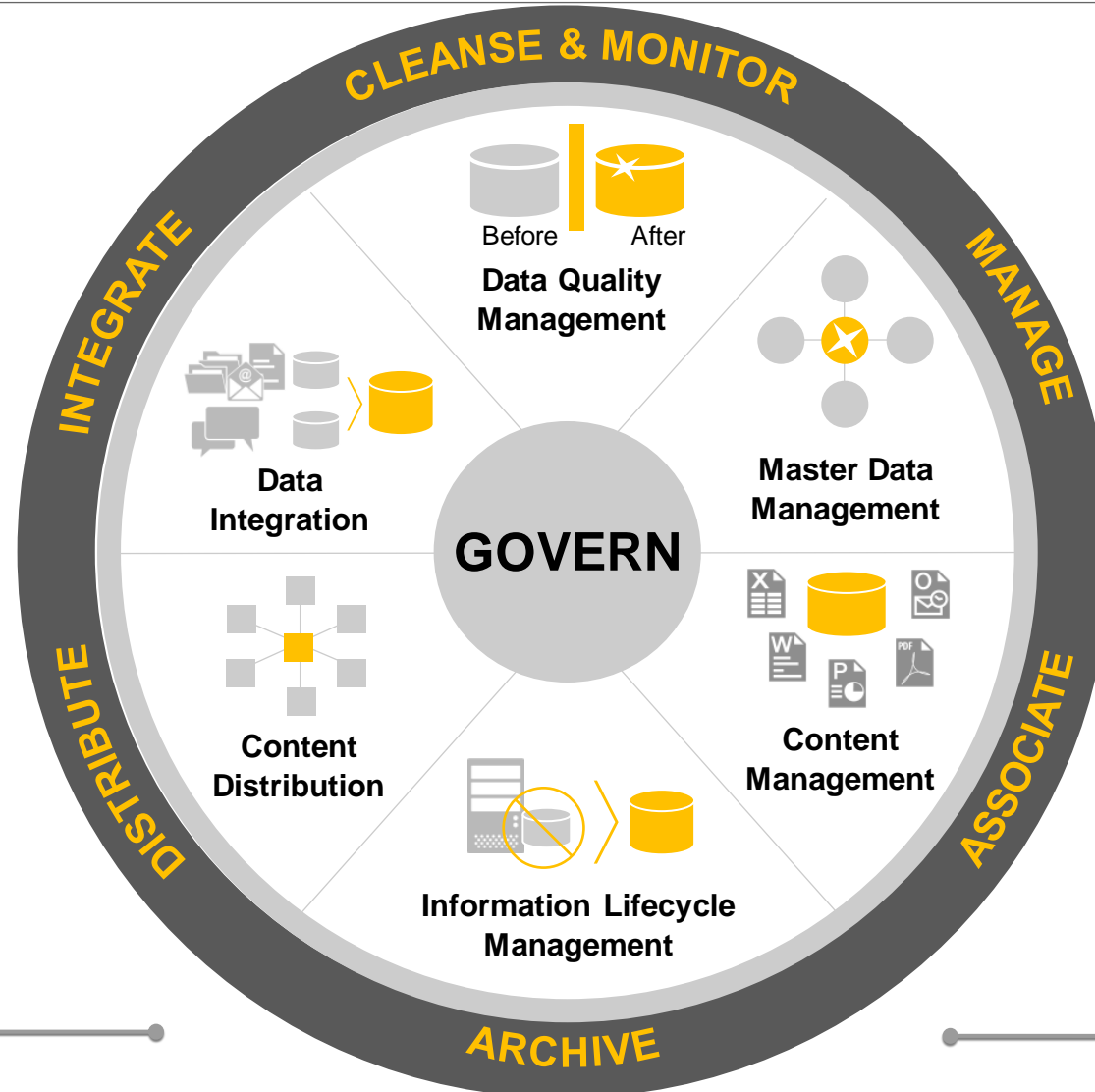
SAP Information Steward:
Monitor & govern data quality to improve asset information

SAP Master Data Governance:
Enterprise-wide master data control for assets, vendors materials, etc.

SAP Extended ECM by OpenText:
Document control and collaboration throughout asset lifecycle

SAP Asset Data Quality Solution
Data Insight of Asset Master Data

The SAP Asset Data Quality rapid-deployment solution allows customers the ability to assess, validate and continuously monitor the quality of their asset master data.
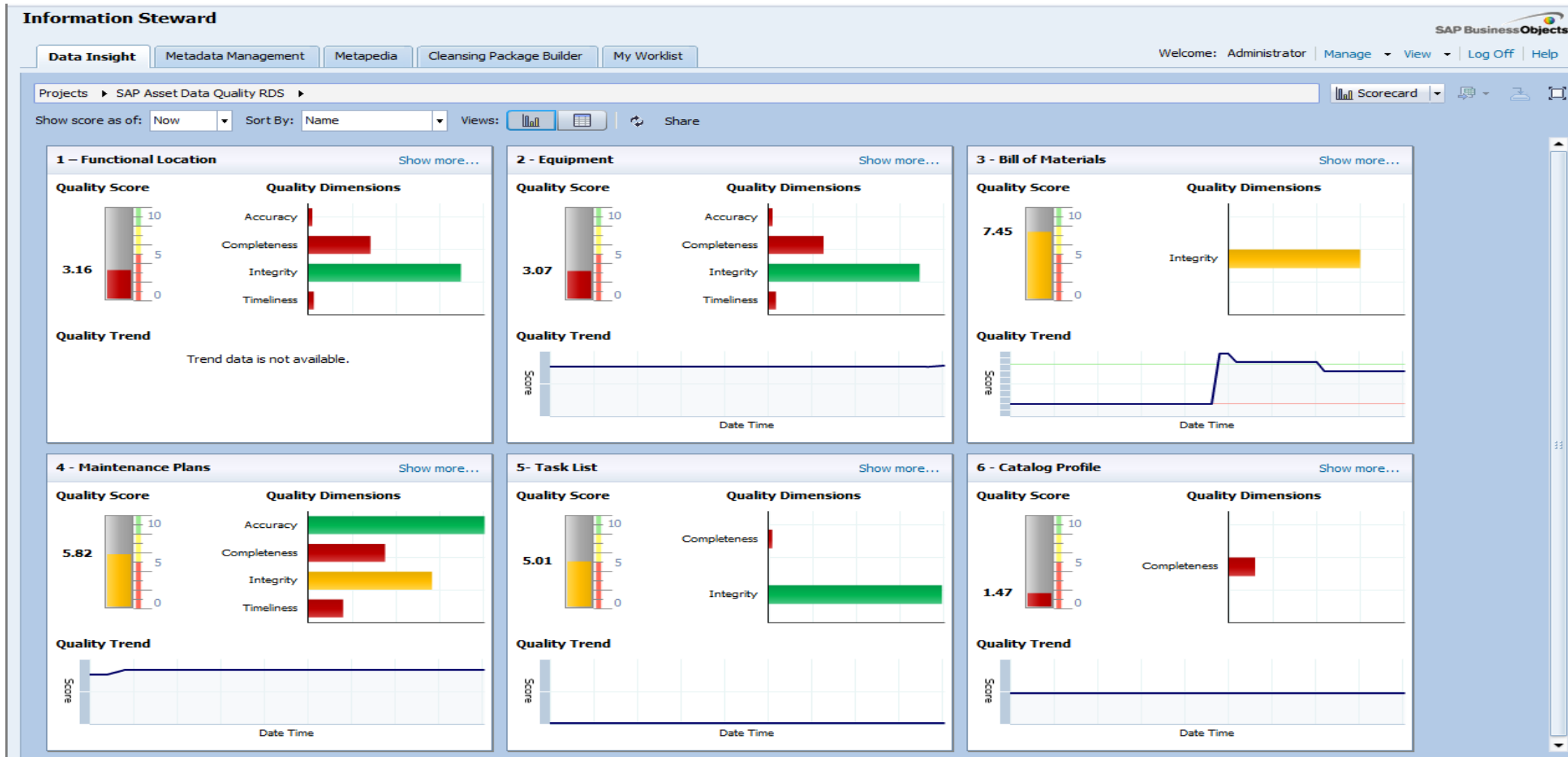
Examples of Asset Data Quality Rules

Maintenance Plans / Items

- Safety Critical Equipment (SCE) with Maintenance Plan Items
- Failed Records will indicate Safety Critical Equipment without Assignment to Maintenance Plan Items

Bills of Material (BOM)

- Identify repair parts that are not on a BOM. Repair parts not on a BOM are considered obsolete.
- Failed records: Repair parts with Inventory but not on a BOM

Technical Objects (Functional Locations / Equipment)

- Check that the Technical Object has been modified in the last 5 years
- Failed records are Technical Objects that have not been modified in the last 5 years

Managing Master Data

Optional EIM Parts

Central System for Master Data Processes

Client Systems

Portal / NetWeaver Business Client

SAP Master Data Governance

User Interfaces, Roles, Work Centers

Workflows	Financials	Material
Staging	Business Partner	Other Objects
Validation	EAM extension by Utopia	

Change Request, Governance Model, Search & DQ Adapters, UI Framework, Analytics, Replication, Key / Value Mapping

SAP ERP 6.0

AS ABAP 7.3x

- Information Steward
- Data Services
- Enterprise Search
- NetWeaver MDM

SAP Information Management Suite

Client Systems:
- ERP
- SRM
- CRM
- EAM
- On Premise Apps
- Cloud Systems
- 3rd Party

Integrate services for data cleansing, matching & consolidation

Tight integration into SAP Business Logic and leveraging standard AS ABAP
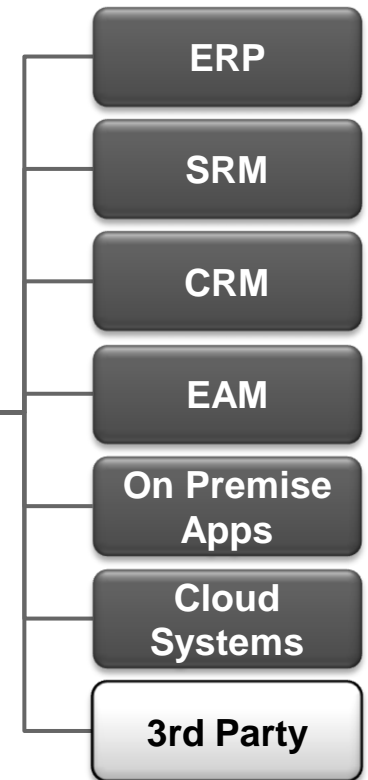
Client systems are integrated via various channels (such as SOA, ALE, RFC, File)

SAP Master Data Governance
Process flow archetype

External Providers

External Services

Master Data Governance

Re-Use existing business logic
Integrate external services
Data Enrichment, Duplicate Check **2**

Collaboration
Adaptable Workflow
Auditable Change Process **3**

Central maintenance of master data in staging area **1**

Maintain **1** → Validate **2** → Approve **3** → Replicate **4**

Automatic replication to non-SAP and SAP systems **4**

Business Processes

3rd party systems

Business Suite systems

Adapt **5**

Adaptation / Enrichment in local systems **5**

Asset Information Network

planned

Predictive Maintenance	Asset Lifecycle	Work Schedule	Global Inventory
Manufacturer Specific Apps	Service Providers / Dealers	Benchmarking	Parts Verification

Publish

Subscribe

OEM

- Nameplate Info
- Maintenance Strategy
- 3D Parts # / BOM
- Service Bulletins & Revs
- Failure Modes
- Recalls
- Safety Controls
- Process Controls
- Service Bulletin
- Designs & Drawings
- Design Improvements
- Sensor Definition
- Licensing

- Op Instructions
- Maint Instructions
- Safety Instructions
- Product Training

Information Provider Network

Information Consumer Network

- Service Bulletin Receipt
- Service Bulletin Processed

- Usage Information
- Installation Information
- Failure / Incident Data

- Design Recommendations
- Risks & Controls

- Measurement Documents
- Telemetry

Site-specific Information

Operator

Leveraging operational data

The Technology Advantage
SAP Business Suite Powered by SAP HANA – Platform for Innovation

Role-Based Applications
New class of real time applications
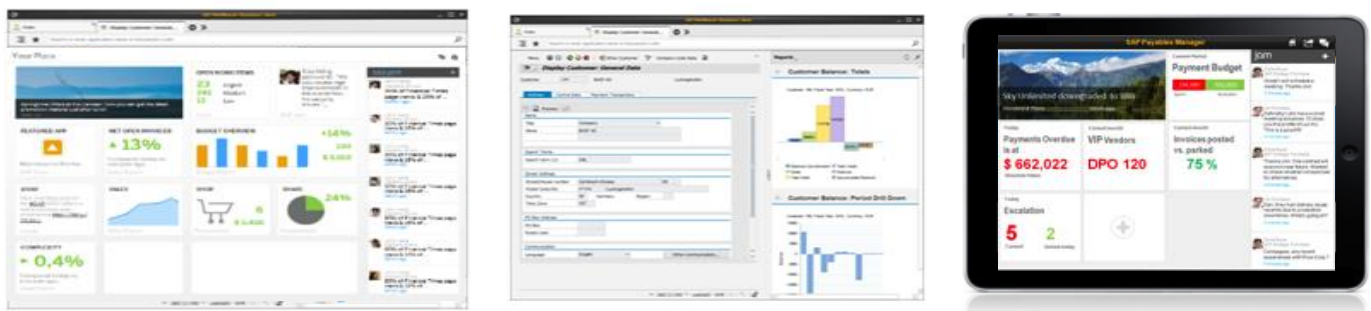
Real Time Analytics
Transactions and detailed analytics together
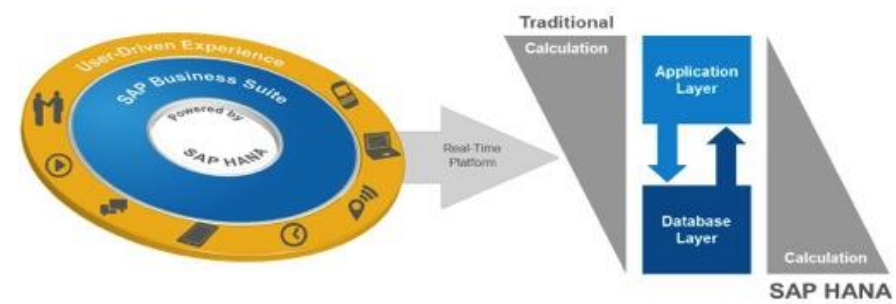
Faster
Significant Performance Advantage

Real-Time Maintenance Plan Scheduling

	Today		**With Suite on HANA**
Increase asset utilization and reduce unplanned asset downtime	• Maintenance scheduling consumes a great deal of time		• Accelerated mass transaction IP30H • Instant analysis on top of transactions
Maximize asset availability	• Manual and error-prone process of pre-selection of maintenance plans • Potentially missing necessary objects for maintenance calls		• Pre-selection of due plans speeds up the process significantly • Real-time analytics on all data including machine sensor information • Schedule all maintenance plans within a specific timeframe
Up-to-Date scheduling information on maintenance operations	• High number of maintenance plans which need to be scheduled frequently		• Planning several times a day (instead of once a week) results in up-to-date scheduling information in maintenance operations • Faster response times leads to more accurate maintenance scheduling

KPI improvements are high-level estimates, and will have to be validated for each customer situation

SAP HANA Live in SAP ERP Enterprise Asset Management

Target Roles

‣ Maintenance Manager/ Planner

Analysis Report Areas

‣ Maintenance Orders, Maintenance Notifications, Technical Objects

Business Questions

‣ How much were the maintenance costs in the past in a specific plant?

‣ What are the estimated maintenance costs for a specific piece of equipment at a specific plant?

‣ Which planner group had the highest maintenance costs?

‣ How many 'general maintenance activities' were carried out as a result by a specific planner group?

‣ Which technical objects have the most breakdowns?

‣ What kind of damages occurred for a specific piece of equipment?

‣ Did some causes occur more often than others?

‣ What were the most common damages for a specific piece of equipment?

‣ What were the most common activities carried out for a specific damage?

‣ How much was spent on pieces of equipment of a specific class (for example, pumps)?

‣ How much was spent on new pieces of equipment of a specific class (for example, monitors) last year?

‣ How much were the actual maintenance costs compared to the planned maintenance costs for a specific order type ?

Key Metrics

‣ Estimated Total Order Costs
‣ Estimated Maintenance Costs
‣ Actual Maintenance Costs
‣ Number of Created Maintenance Notifications
‣ Number of Created Maintenance Orders
‣ Number of Actual Maintenance Breakdowns
‣ Total repair time
‣ Time between repairs
‣ No. of Maintenance Notification Damages/Causes /Activities
‣ Acquisition Value …

Dimensions

‣ Maintenance Plant
‣ Maintenance Planner Group
‣ Fiscal Year Period
‣ Value Category
‣ Plant Section
‣ Maintenance Planner Group Name
‣ Breakdown Date Year Month
‣ Equipment, Functional Location
‣ Maintenance Notification Damages/Causes /Activities
‣ Maintenance Order Type

Assets Providing Information - Data Sources

SCADA / HMI / PLC	DCS	Historians	MES	LIMS
Wonderware *invensys*	Honeywell	OSIsoft.	SAP	Thermo SCIENTIFIC
Rockwell Automation	EMERSON Process Management	aspentech	Rockwell Automation	Sample Manager
SIEMENS	ABB	Honeywell	SIEMENS	aspentech
GE	invensys		werum SOFTWARE & SYSTEMS	SIEMENS
	YOKOGAWA		mpdv	Unilab
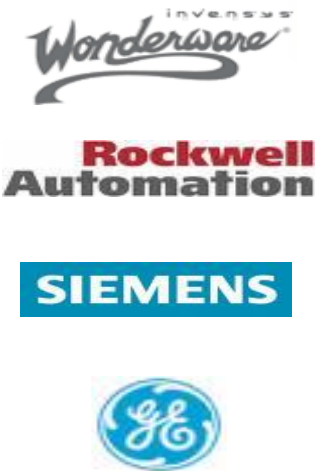
Predictive Maintenance and Service
What really matters

planned

Telemetry Data

- Sensor measurements
- Geospatial data
- Diagnostics
- Events
- Performance metrics
- Battery status

Business Data

- Sales contract
- Warranty information
- Maintenance/ Service history
- Customer profile
- Dealer events
- Cost and risk

Third party data …

- Structured and unstructured
- e.g. weather forecast

Predict

Sense

Act

In-Memory

SAP HANA

Design improvements

Machine health monitoring

Early warnings to prevent downtimes

Prioritize maintenance and service activities

Optimized warranty and spare parts mgmt

Benchmarking

Predictive Maintenance and Service

planned

SAP ESP and SAP HANA are available today to combine business with operational data:

Analytic tools	Analytic apps	Partner apps	SAP Business Suite

Virtual data models and predictive algorithms (R, PAL, SAS)

SAP IQ	SAP HANA	Hadoop

SAP Event Stream Processor

SCADA HMI/PLC | Tele-metry | IoT | Onboard systems | MES | Data historians | DCS | LIMS
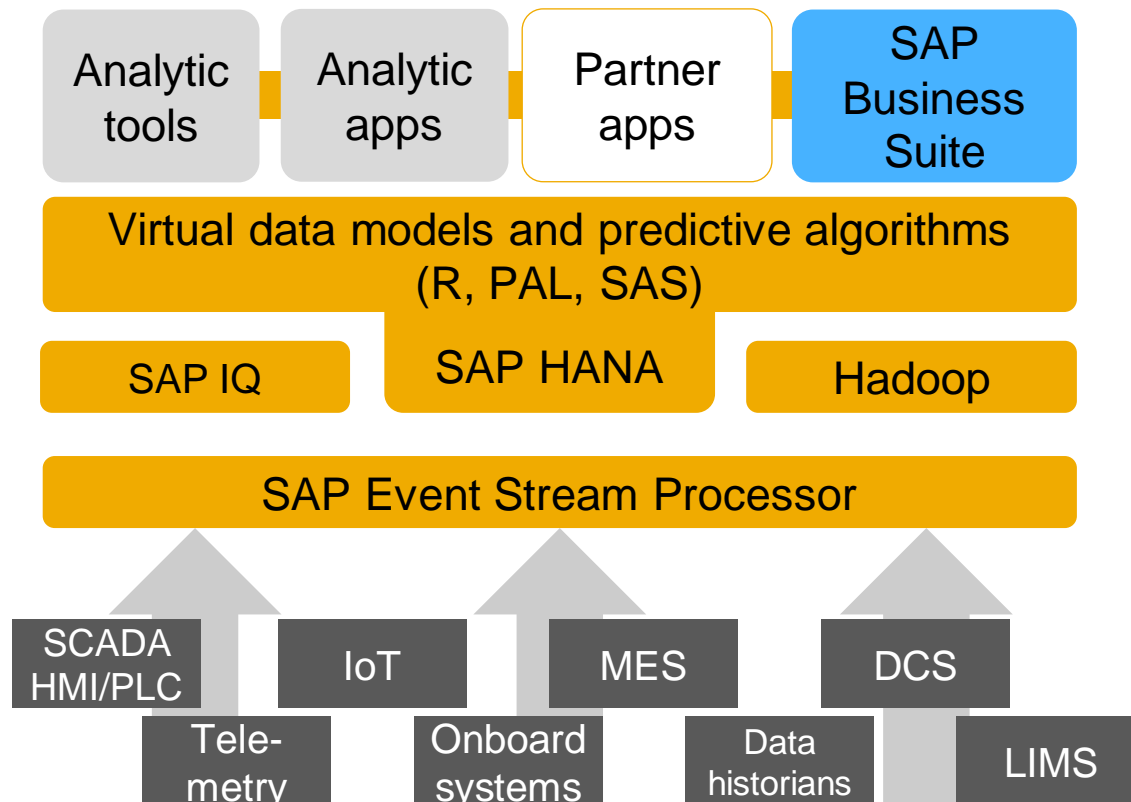
- Generic analytic tools can **TODAY** already be used to find patterns and build models.

- Algorithms are available from both the Predictive Analysis Library (PAL) and "R". Furthermore, a partnership has recently been announced to include further analytics from SAS.

- **Integration with maintenance and service management, warranties, spare parts, and so on can be done today on a customer-specific basis.**

- Further out-of-the-box functionalities are planned, like:

  - Machine health prediction to improve manufacturing quality, service planning, and customer satisfaction.

  - Early identification of emerging issues to avoid unplanned downtime.

  - Prioritization of maintenance and service activities.

SAP Vision: Delivering more than Island Solutions
Solution Stack based on SAP HANA IoT Edition

planned

Industry Solutions

Re-Usable Services | Predictive Maintenance and Service | Tracking & tracing | Remote Consumables Management | …

SAP HANA IoT Edition

Hot | Cold

Connectivity Platforms (by Telco) | 3rd Party Device Cloud

Communication Networks (by Telcos)

IoT Connector | Devices
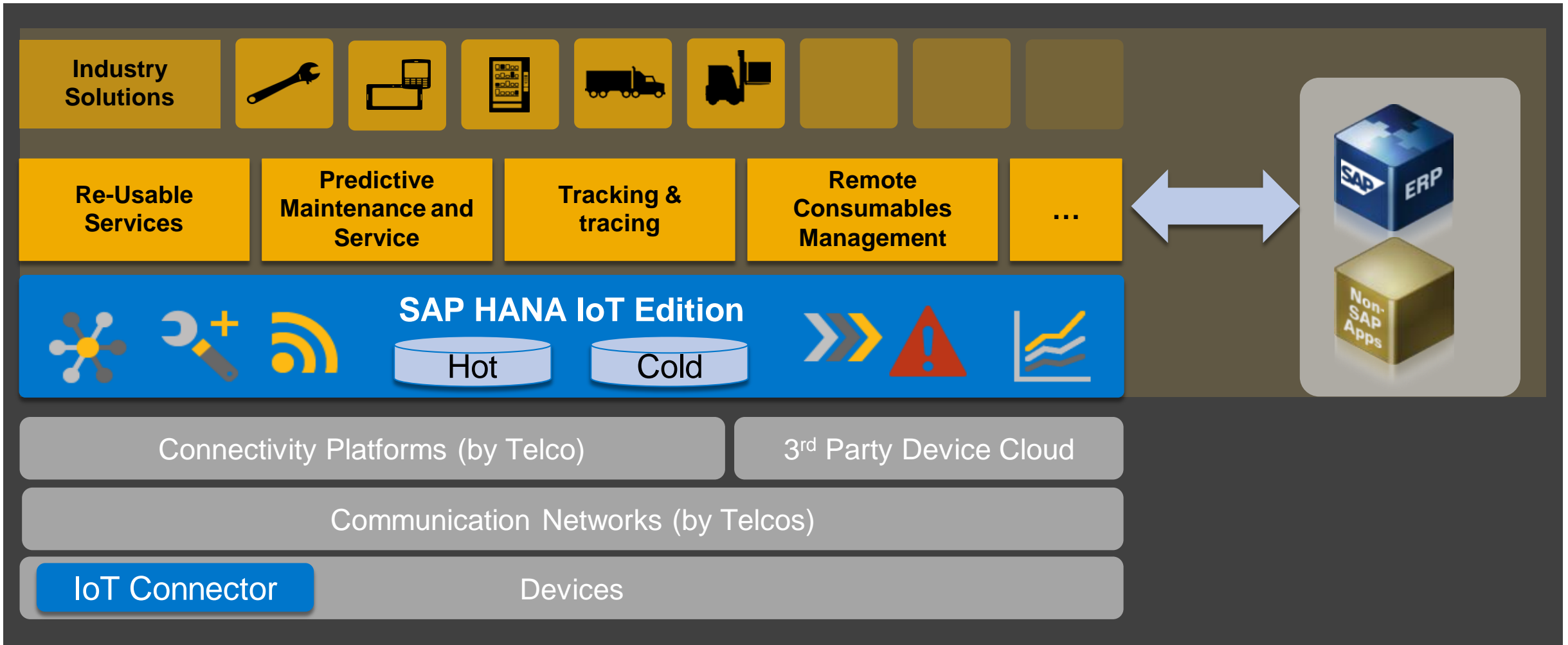
User Experience

The SAP User Experience Strategy

New Applications
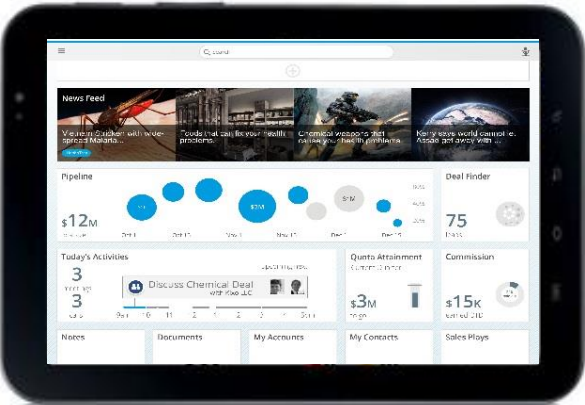
Existing Applications

Usage/Reach

SAP Fiori

Renovation

Enablement Tools

Customer 1
Customer 2

NEW
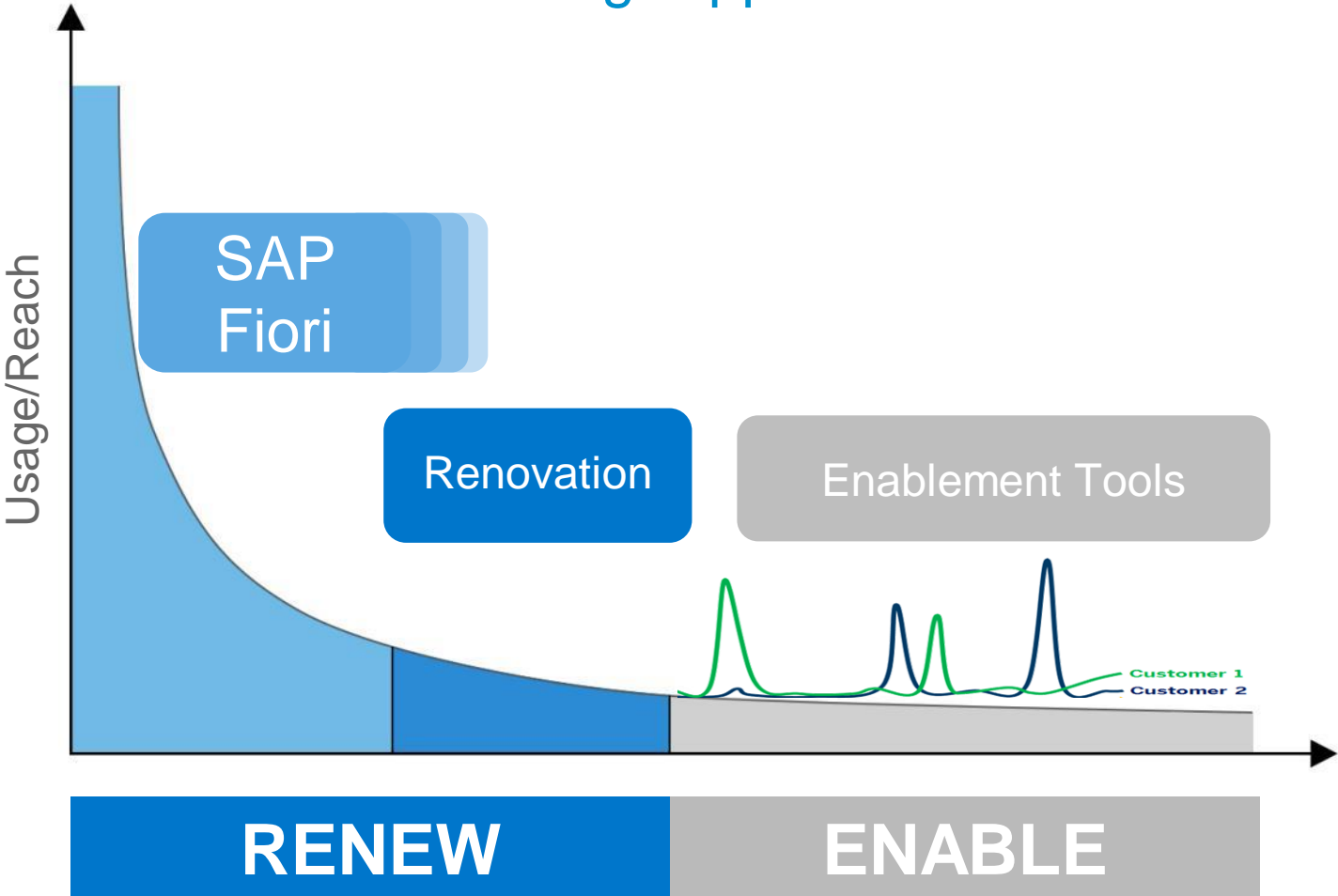
RENEW

ENABLE

Examples for Fiori in EAM

← Maintenance Order

4500002349
Maintenance Order
1 day ago

General

| Order Type: | System Status: | Mai |
| PM01 Regular Maintenance | Released | 300 |

Priority:
2 High

Equipment:
2345432 Pump Wirtex4355

Operations

| 010 | 030 |
| Perform Vibration Analysis | Capture Measuremen |

| 020 | 014 |
| Visual Inspection | Test run |

← Maintenance Notification

10031562
Maintenance Notification
1 day ago

General

| Notification Status: | Notification Type:: | Notification Date:: |
| NOPR ORAS | M2 Malfunction Report | 02.04.2013 / 17:16 |

| Priority: | Maintenance Order: | Breakdown: |
| 2 High | 4039670 Order Description | Yes |

Items

| PC Personal Computer | PC Personal Computer |
| Display Black | No movements |

2

← Equipment

4500002349
Equipment Description
1 day ago

General

Category:	Manufacturer:	Superordinate
M Machines	Siemens	Equipment:
		P-100-10S Super
Type:	Functional Location:	Machine
Pump	C1 Compressing Unit	

Orders

50002342 ORD1	50009871 ORD3
Released	In Process
50003451 ORD2	50003458 ORD4
Open	Released

30

Notifications

40002386 Notif 1	40003655 Notif2
High	Critical
40004356 Notif3	
High	

3

Maintenance Items

23844760 Item1	23845679 Item3
High	Critical
2384769 Item2	
High	

3

Open in …   Actions

RENEW the most widely-used scenarios
Harmonize and simplify UIs for key roles

User ➡ **Entry Point** ➡ **Applications & Content**
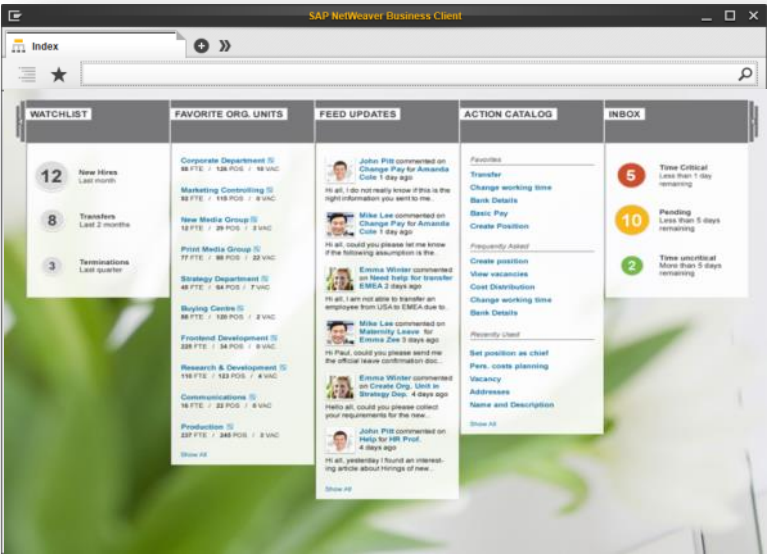
SAP NetWeaver Business Client
SAP Enterprise Portal
SAP Fiori Launchpad
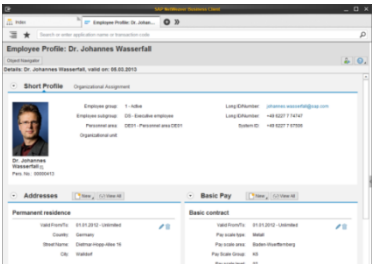
Floorplan Manager
(WebDynpro ABAP)
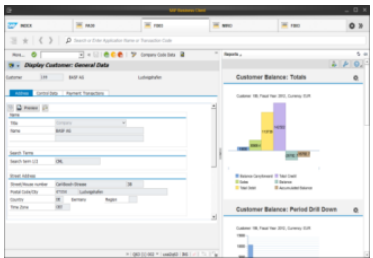
SAP GUI &
Side Panels
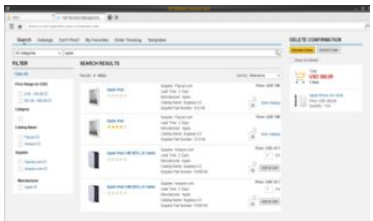
SAPUI5

. . .

WebDynpro Options for EAM
WebDynpro for ABAP / Floorplan Manager

- **EAM Roles for "<u>Maintenance Worker</u>" and "<u>EAM Generic Functions</u>" shipped with EHP 5 & 6**
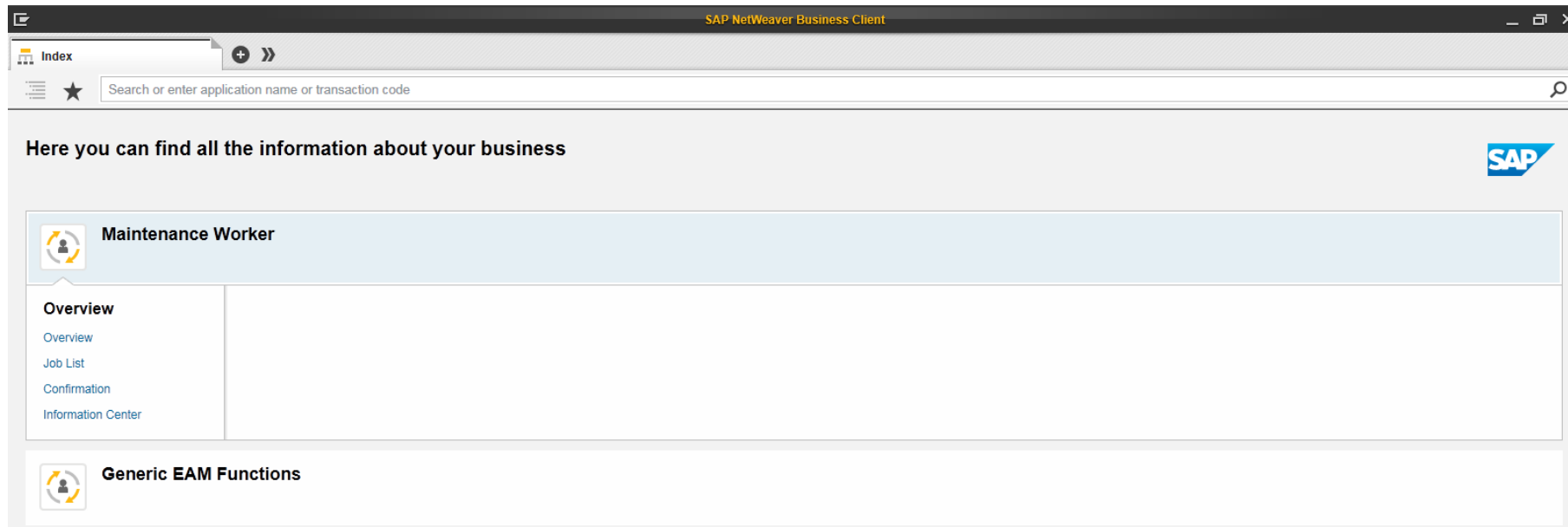
- **Substantial Enhancements and Improvements shipped with EHP 7**

Asset Viewer - Technical Object Structure

Asset Viewer

Complete overview of asset information on one screen

Maintenance Worker Role - Job List

Simple actions to display Job – Print – Start Processing - Reassign

Hyperlink navigation to objects

Basic details for job shown below

Information Center - Search

Information Center

Search

All Objects   Confirmation   **Document**   **Job**   **Maintenance Plan / Item**   More.

Search For: valve   [Search]   Advanced Search

Home > All Objects > Document, ...

All Objects		Results 1 - 10 of about 535

All Objects
Document (9)
  Document Info Record (9)
Job (13)
  Maintenance Order (12)
  Maintenance Notification (1)
  Choose more...
Maintenance Plan / Item (6)
  Maintenance Plan (2)
  Maintenance Item (4)
  Choose more...
Material (12)
  Material (12)
Maintenance Notification (1)
  Maintenance Notification (1)
Maintenance Order (12)
  Maintenance Order (12)
Task List (28)
  Task List for Function...(3)
  Task List for General...(25)
  Choose more...
Technical Object (467)
  Functional Location (389)
  Equipment (78)
  Choose more...

▷| 10000000212   *Document Info Record*
Document Type: DOC   Document Part: 000   Document Version: 00
Description: Turbine   Laboratory/Design Office: Status:
       Specification   Deletion Indicator:
Change Number:
Display Document Info Record (CV03N)   Display Document Info Record in Asset Viewer   Add to Favorites

▷| 800271   *Maintenance Order*
System Status: CRTD MANC NMAT   Order Type: ZMR3   Description: valve to be fixed
Maintenance work center: WC_ELEC   Plant Associated with Main Work Center: 3200   Equipment:
Functional Location: Basic Start Date: 20.11.2013
Details   Display Order (IW33)   Display Order in Asset Viewer   Add to Favorites

▷| 10000677   *Maintenance Notification*
Typ: M2   Description: Valve dirty   Functional Location: C1-B01-1
Work Center: MECHMNT   Equipment: P-3000-N001   Maintenance plant: 3000
Date: 05.07.2000
Details   Display Notification (IW23)   Display Notification in Asset Viewer   Add to Favorites

▷| 310   *Maintenance Plan*
MaintPlan dscrptn: PM for pump Relief Valve P1504   MPTYP: PM   Strategy:
MaintPlan sort field: No. of MaintItems: 0001   Call Number: 0
Display Maintenance Plan (IP03)   Add to Favorites

▷| 83   *Maintenance Item*
Maintenance item description: Servicing of the outlet   Maintenance Plan: 21   MPTYP: PM
       valve   Equipment: Functional Location: C1-B02-1B
Strategy: A   Task List Group: 00000011   Task List Group Counter: 0
Task List Type: A
Details   Display Maintenance Item (IP06)   Display Maintenance Item in Asset Viewer   Add to Favorites

▷| 3139   *Material*
International Article Number: Material Description: 161001-CHECK_VALVE   Old material number:
Industry Standard Description (such as A: Material Group: Manufacturer Part Number:
Number of a Manufacturer: Base Unit of Measure: EA
Details   Display Material (MM03)   Display Material in Asset Viewer   Add to Favorites

▷| T/33/1   *Task List for Functional Location*
Task list description: Pm for Pump Relief valve   Functional Location: OM.MMA.P1504-RV01   Plant: 3200
       P1504   Planning Plant: 3200   Maintenance strategy:
Status: 4   System Condition: Usage:
Assembly:
Details   Display Task List for Functional Location (IA09)   Display Task List for Functional Location in Asset Viewer   Add to Favorites

Search results returned

Add to Favorites

Hyperlink navigation to object

Side Panel

Change Maintenance order: 4007898   Side Panel

Save | Read Only | Check Entries | Status Information | Set System Status ▾ | Additional Functions ▾ | You can also ▾

Order 4007898   Description Seawater Pumps - Replace Bearing   Order Type PM01, Maintenance order   Technical Object NF01-1000-01   Priority Low
System Status LRRA REL PCNF CSER JIPR MANC PRC SETC

General Data   Location Data   Organizational Data   Operation Data   Object List   Costs   Documents   Permits

General Data

Description:	Seawater Pumps - Replace Bearing
Required Start:	10.04.2014
Technical Object:	NF01-1000-01 Pump, Cooling, No 1
Material:	
Assembly:	
Assigned Notification:	10004324 Seawater Pumps - Inspection Round
	Remove Notification
Task List:	Assign Task List

Priority: Low
Required End: 10.04.2014
Technical Object Type: Functional Location
Serial Number:
System Condition:

Responsibilities

* Work Center:	EAMT-M
Planning Plant:	0001 Werk 0001
Planner Group:	STB STB

Work Center Plant: 0001   Werk 0001
Person Responsible:

Side Panel

▾ Overview

▾ **Overviews**

Select Content: Confirmation for PM order ▾   R

▾ **(1EAMS_BP_CONF_PM_ORD_BY_AUFNR_V1)**

Oper./Act.	Work center	Actual work
0010	EAMT-M	2,0
0010	EAMT-M	0,0
0020	EAMT-M	2,0
0020	EAMT-M	0,0
0030	EAMT-M	0,0
0030	EAMT-M	0,0
0040	EAMT-M	0,0
0040	EAMT-M	0,0

> Query Views
> Dashboards
> Favorites
> Launchpad
> Viewer

Contextual information available in the side panel e.g. dashboards, 2D/3D visuals etc.

Sidepanels and CHIPS Variations
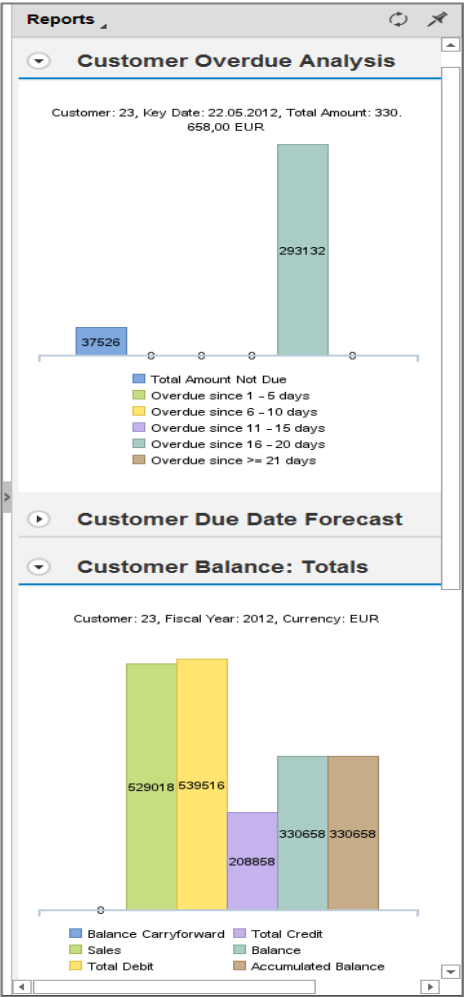
Reports   **Application Details**   **Visual Enterprise Integration**   **Social Media**   **Notes / Attachments**

User Interface Enhancements (SAP EAM)
List ATS Components (delivered via EhP7 SP05 on 18.07.2014)

All list components have been switched to the new list ATS component technology within the entire EAM application.

Benefits:
- Improved search
- Mass change
- Personalization of views
- Sorting and grouping
- Filtering
- Aggregation
- Export to / Import from Excel

User Interface Enhancements (SAP EAM) Quickviews (delivered via EhP7 SP05 on 18.07.2014)

Equipment

10000287

Category: M, Machinery
Functional Location:
Object Type: 4120, Pump
Model number: KSB ETANORM 1000
Manufacturer: KSB
System Status: AVLB, Available
User Status:
Location: 0001
Room: D-E-420

Quickview when hovering over description

- **Quickviews available for**
  - **Technical Objects**
  - **Notifications**
  - **Maintenance Orders**
  - **Maintenance Plans**
  - **Materials**
  - **Long Texts**
- **Example here for Technical Object: Shows an overview of the most important information about the technical object, such as:**
  - **Object Type**
  - **Status**
  - **Location**
  - **Room**
  - **….**
- **Available in:**
  - **Technical Objects**
  - **Notifications**
  - **Maintenance Orders**
  - **Task Lists**
  - **Maintenance Plans**

Integrating Visual Enterprise
Assign Materials (Spare Parts) to Operation from 2/3D Catalog

Integrating Visual Enterprise
Visual Job or Safety Instructions assigned to order operations
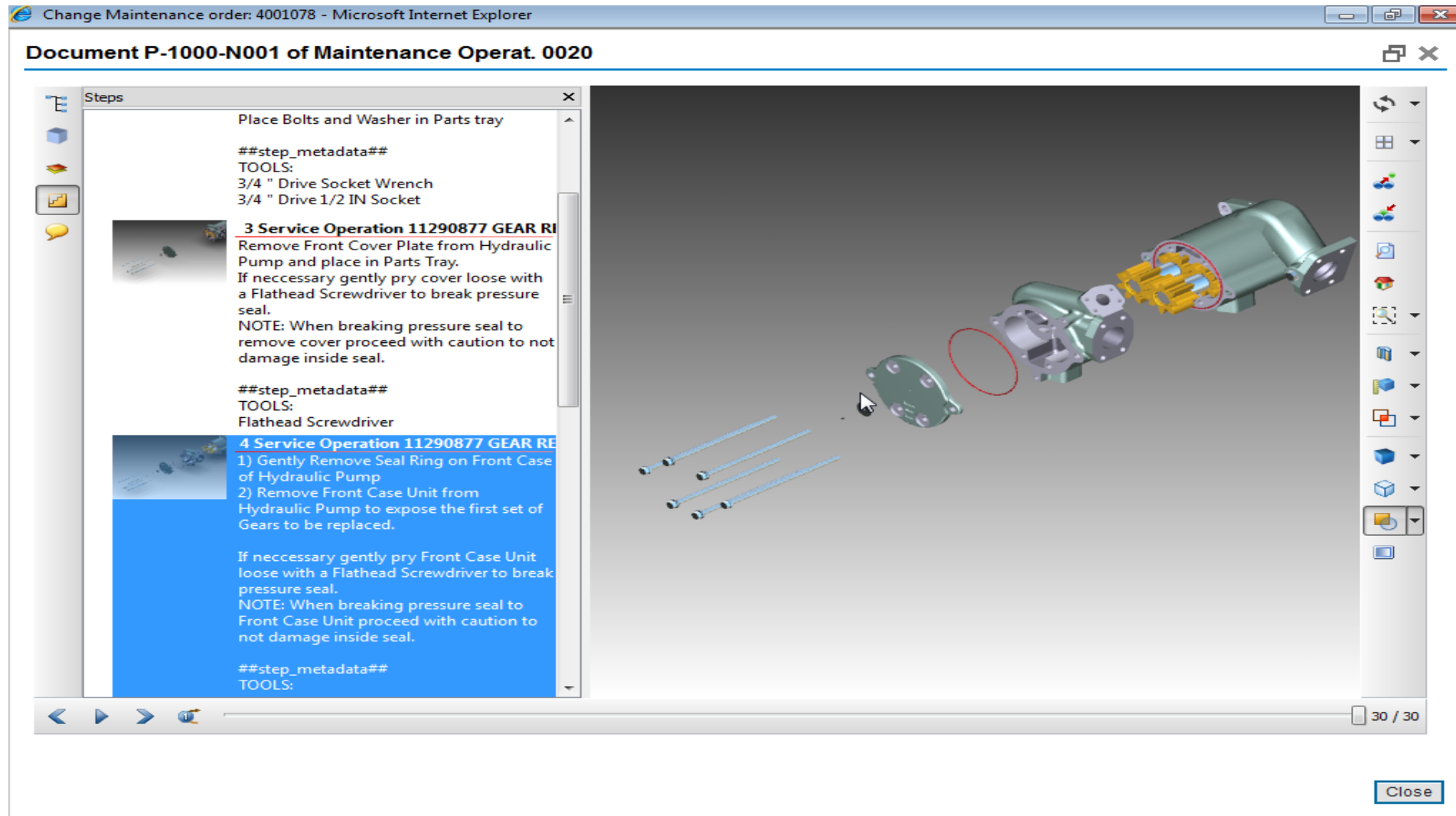
Empowering maintenance technicians
To inspect, maintain, and repair assets

SAP Work Manager	SAP Inventory Manager	SAP Rounds Manager

Asset Management

- Complete work orders and capture all relevant data
- Access to asset location, repair history, work order details, materials needed
- Create notifications or work orders on the spot
- Integration with GIS (ESRI)
- Integration with ERP CS
- Crew Management
- Guided Workflow

Material Management

- Speed receipt / back-order reporting to-and-from shipping/receiving
- Perform physical and cycle counts quickly
- Check availability of materials while on-the-job
- Accept & distribute incoming materials by purchase order

Condition Monitoring

- Take measurements and readings
- Historic standards and safe ranges
- Generate notifications on-the-spot
- Trend readings, points and sequences to avoid emergencies and outages

SAP Work Manager 6.1

- Integration with GIS*
- Integration with SAP 3D Visual Enterprise
- ERP Customer Service
- Crew management
- UX enhancements

* Open UI Integration seamlessly ties in 3rd party applications (ESRI)

Delivered on SAP Mobile Platform 3.0

SAP Work Manager 6.1 – Android & iOS & Windows

Work Order Management

- Notifications
- Repair history
- Work order details
- Materials needed
- Time & attendance confirmation
- Measurement docs and attachment support
- Linear Asset Management
- GIS and 3D Visual Enterprise integration
- Integration with inspection rounds
- SAP MRS integration

Available on the App Store

Google play
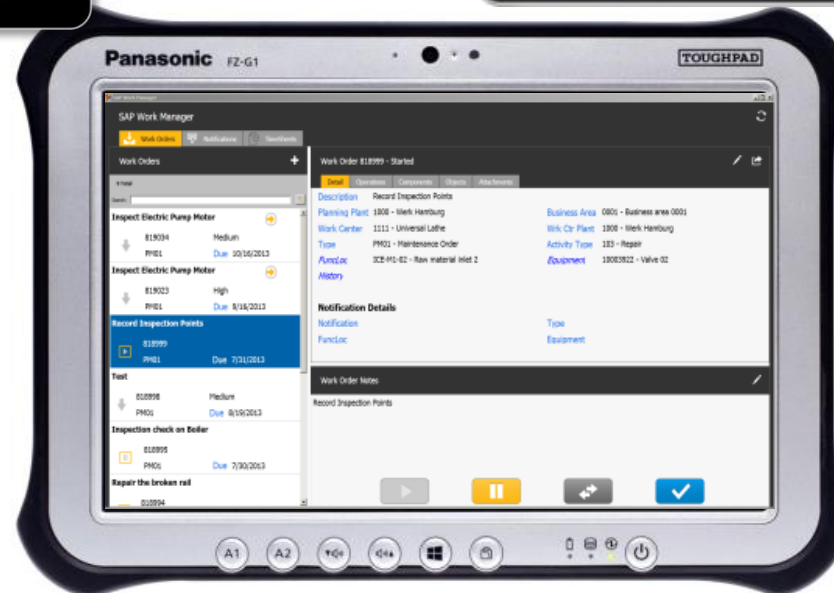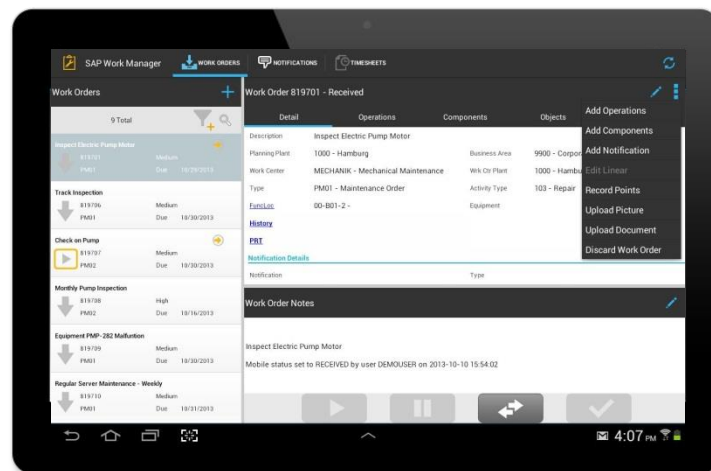
Above example screen shown on a Windows 8 rugged tablet.

SAP 3D Visual Enterprise Viewer – Android & iPad

3D Work Instructions

- Assembly
- Installation
- Maintenance
- Repair / Service
- Training

Analytics

Integrated SDK

Available on the App Store

Google play
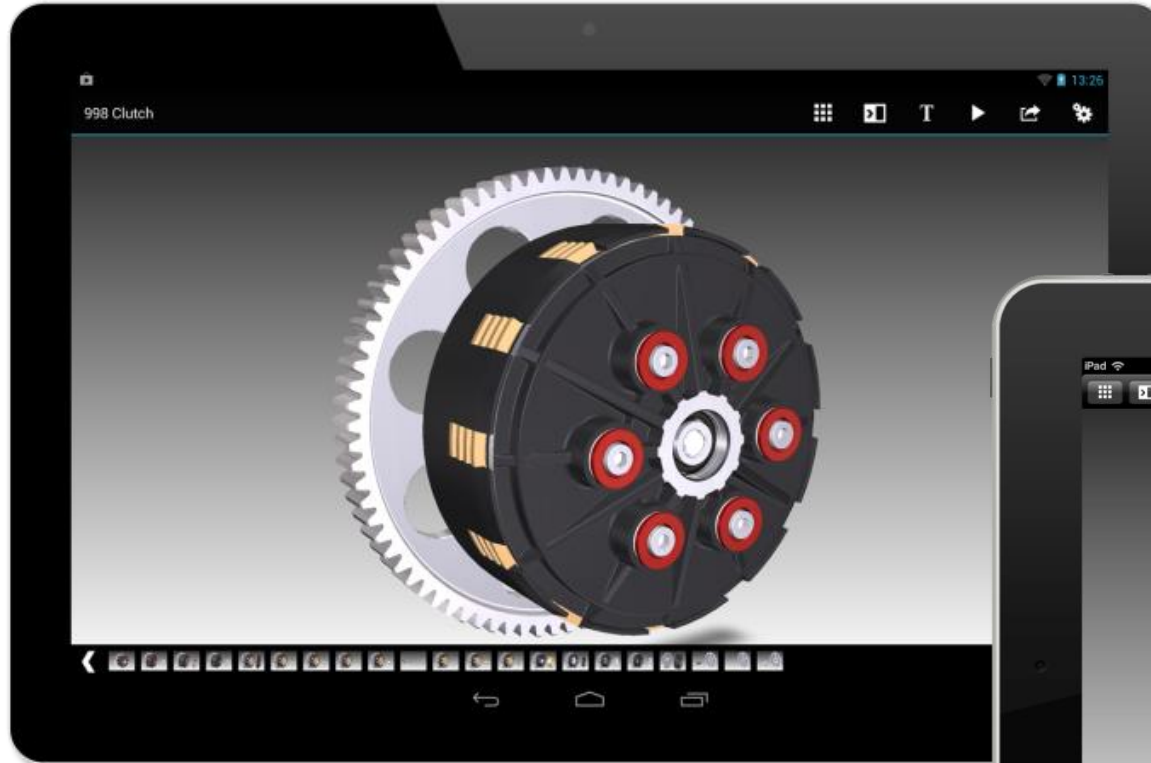
Augmented Reality
SAP AR – Service Technician

Companion Application to SAP Work Manager

- Link to the SAP Work Manager mobile app through a simple QR-Code scan

Visual Enterprise 3D model visualization and animation

SAP 3D Visual Enterprise steps browsing

Equipment notes

Remote expert calling

Hands-free application

- All the application steps can be completed without gestures or touch events
- Required inputs are managed through voice recognition

Video
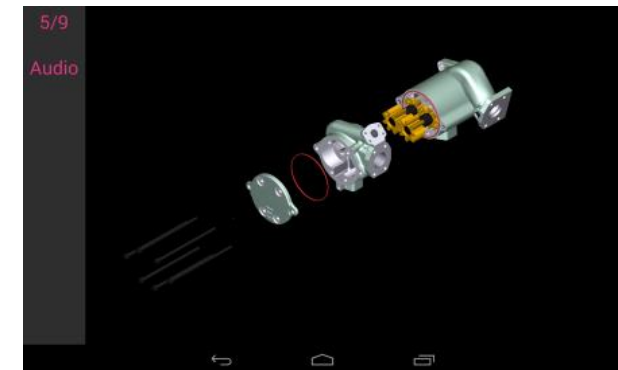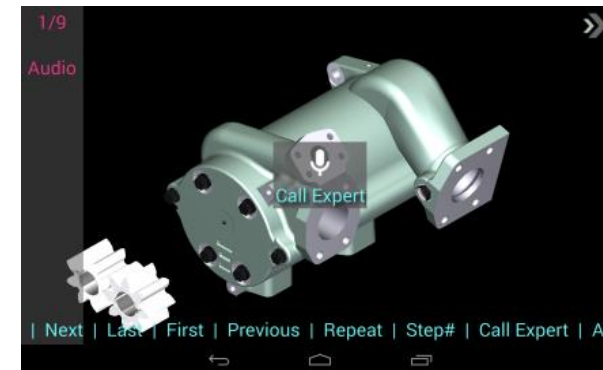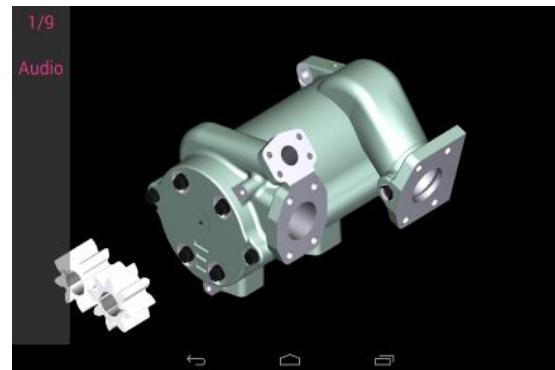
Maintenance Inspections with Drones

- Showcase to extend the SAP Service Scenario based on the SAP HANA IoT Platform

- Support the interactive visual inspections of assets and plants

- Leveraging state of the art technologies

  - Sensors

  - Object Recognition

  - Face Recognition

  - GPS

  - Drone steered with smart glasses
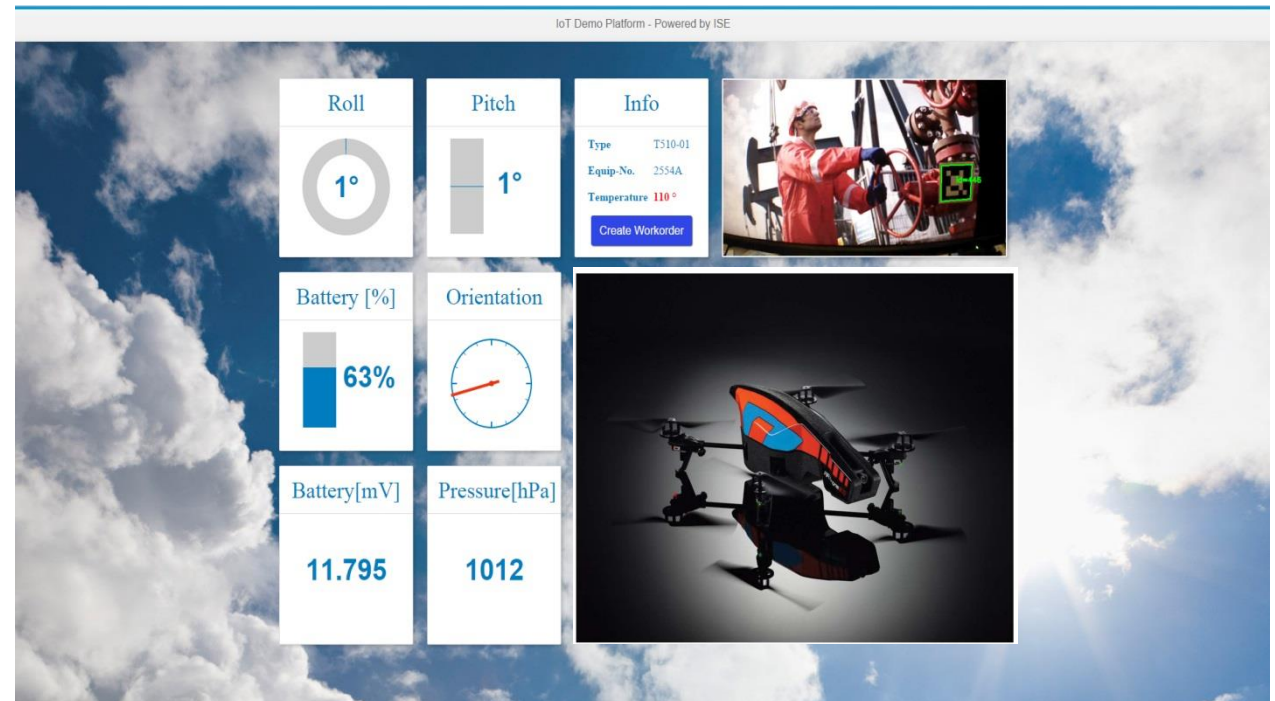
SAP Enterprise Asset Management
Key Points to Take Home

Master Data

Integration

Connecting to the Asset

UX

Collaboration

ISO

SAP Enterprise Asset Management
Information sources

http://service.sap.com/innovation-discovery

Information sources

http://www.sap.com/eam
http://service.sap.com/roadmap
http://www.sap.com/solutionexplorer
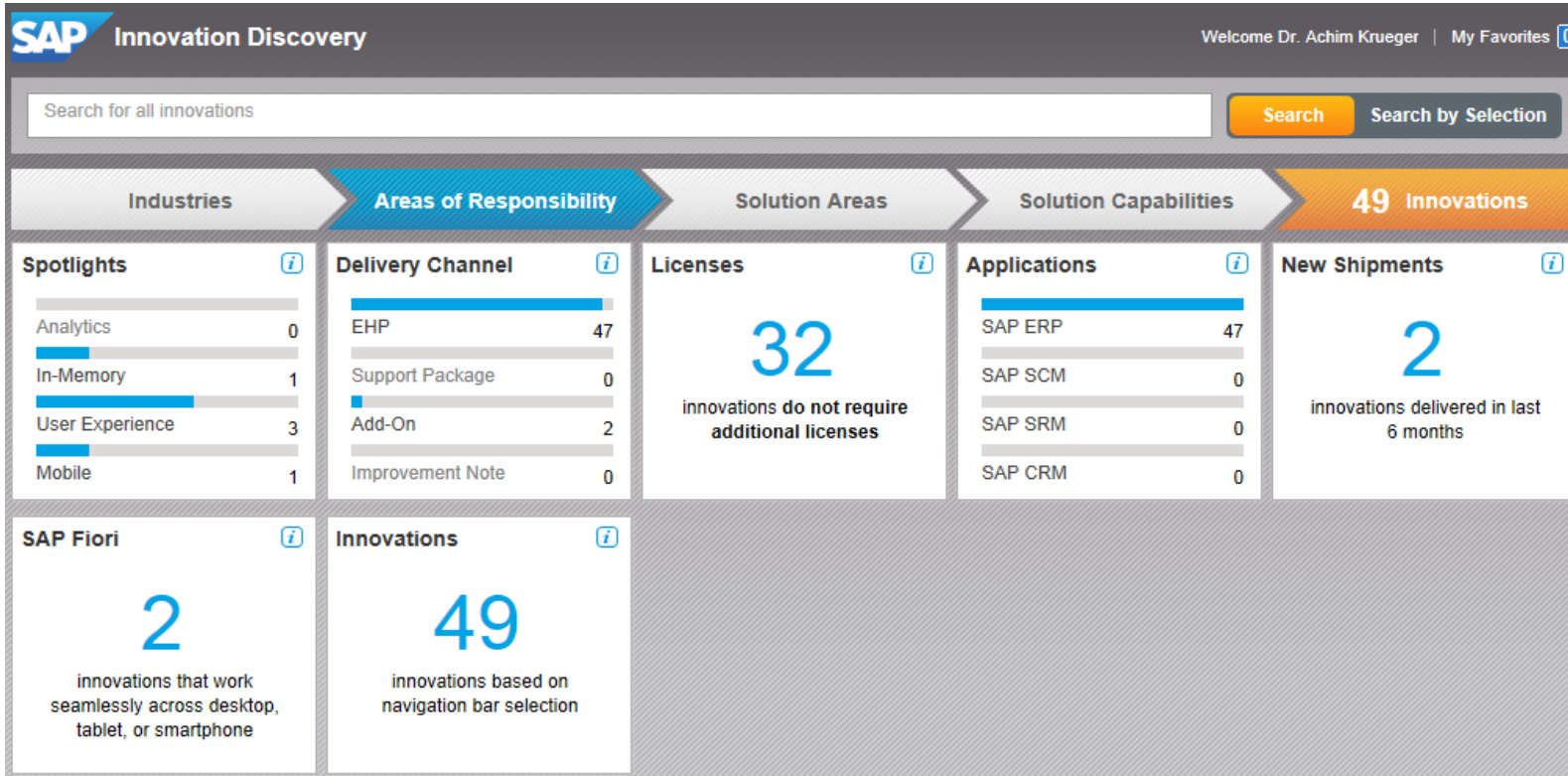
www.twitter.com/EAMatSAP
http://scn.sap.com/community/eam

https://apps.support.sap.com/innovation-discovery

Thank you!

Dean Fitt

Solution Manager

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