SAP Mining and Metals Forum 2014
Manufacturing Innovation Strategy at SAP

Veronika Schmid-Lutz, Chief Product Owner Manufacturing, SAP AG
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Public

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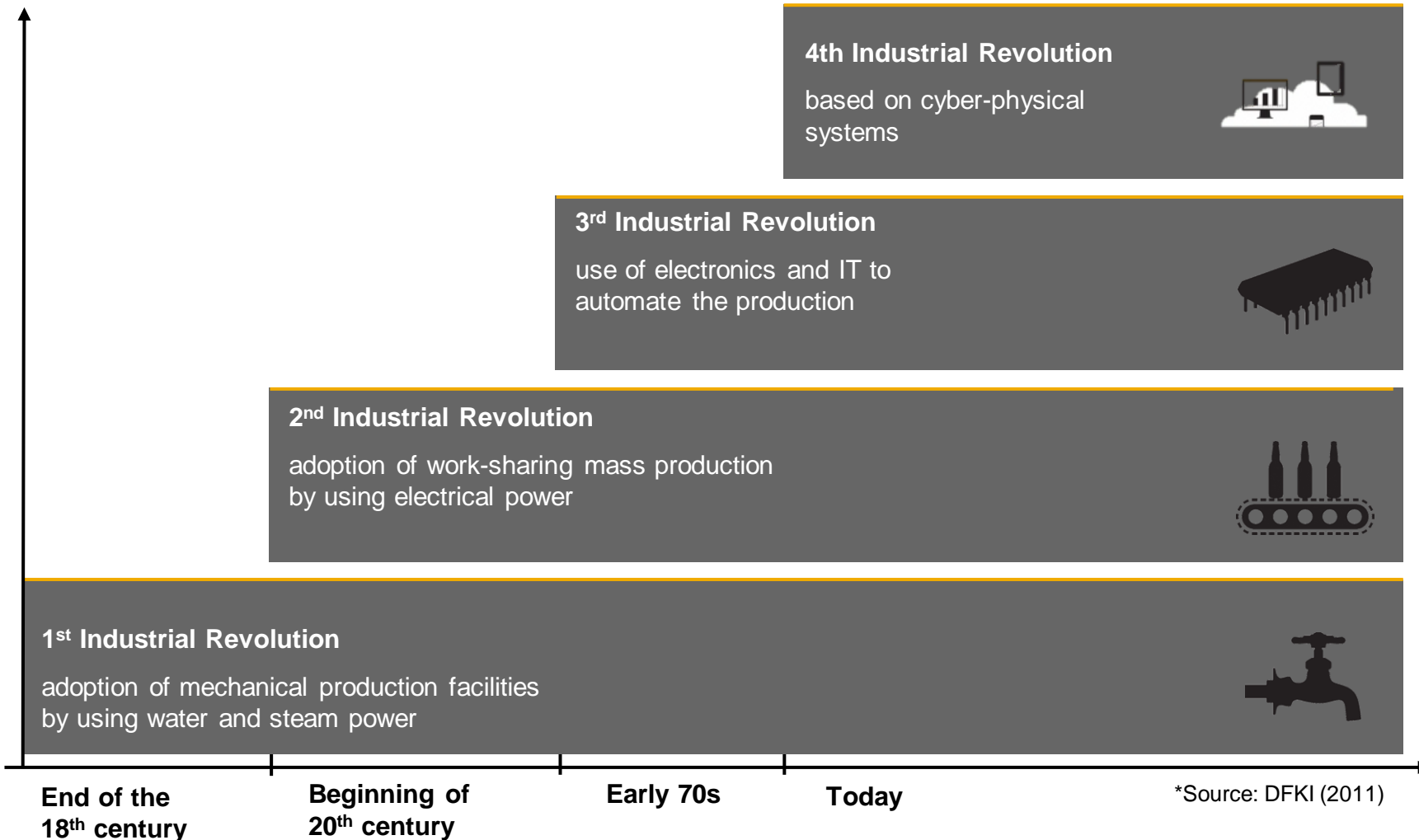
Agenda

Industry 4.0 / Internet of Things – What does this mean for SAP Manufacturing?

SAP's Manufacturing Execution Suite – The foundation to run Industry 4.0 in the shop floor

SAP's new and planned innovations in Manufacturing

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SAP's new and planned innovations in Manufacturing

The world of manufacturing continues to change
The fourth industrial revolution

4th Industrial Revolution

based on cyber-physical systems

3rd Industrial Revolution

use of electronics and IT to automate the production

2nd Industrial Revolution

adoption of work-sharing mass production by using electrical power

1st Industrial Revolution

adoption of mechanical production facilities by using water and steam power

End of the 18th century | Beginning of 20th century | Early 70s | Today

*Source: DFKI (2011)

Key Enablers

Mobile networked Computing
Affordable access to information

Social Media
Knowledge shared in communities

Internet of Things
Connected via one protocol
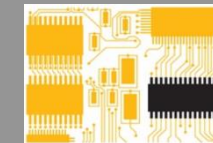
Machine 2 Machine
Self regulation

Big Data & Predictive Analytics
Understanding and extrapolation

Industry 4.0
It is about new business opportunities

Optimize your own product

- Predictive maintenance and service
- Usage based business models

Create additional value beyond your product

- Downstream data and services
- Connected vehicle / location based services
- Leverage Internet of Things

Increase Flexibility of your Production Processes

- Smart Factory
- Lot size / batch of one
- Product individualization with mass costs

Optimize Logistic Processes across the Value Chain

- Smart Logistics
- Connected Warehouse

"We are convinced that manufacturing in the digital world requires a completely new approach how to run the shop floor. Therefore our solution is much more connected and intelligent in order to empower production workers, re-invent flexibly manufacturing processes and to increase responsiveness. We build Industry 4.0."

Bernd Leukert
Member of the Executive Board SAP SE

Industry 4.0 reflected in SAP's Roadmap for Manufacturing

Provide **END-TO-END DIGITAL ENGINEERING** to allow preplanning for more active, autonomous, and self-organizing production

Enable **BATCH SIZE 1** via vertical and horizontal integration allowing very low production volumes whilst still making a profit.

Provide state of the art **PRODUCTION PLANNING & EXECUTION** with simulation capabilities as well as insights to action in real time

Provide **BIG DATA** Applications and Analysis of Business and Sensor Information in HANA & Cloud

[SAP powered by SAP HANA]

User-Driven Experience

SAP Business Suite

Powered by SAP HANA

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SAP Manufacturing Execution Suite for the Shop Floor

SAP ME

SAP Business Suite

Enterprise

SAP MII

SAP ME

Shop Floor

SAP PCo

ME POD   **Machine Entry**

Range of use
- Manufacturing Execution System

Target Industries
- Discrete Industries

Highlights

- Tracking & Tracing on SFC / Serial Number
- Non Conformance Handling
- Interlocking
- Production Data Acq.
- KPIs, Reporting & SPC
- Highly Extensible

SAP MII

SAP Business Suite

SAP MII

SAP PCo

Worker UI   **Machine Entry**

Range of use
- Integration & Intelligence
- Reporting & Analytics
- Individual Scenarios and Use Cases
- Worker UI Data Collection for less complex scenarios

Target Industries
- All Manufacturing Industries
- Mining Industries
- Utilities

Highlights
- Highly Extensible

SAP Manufacturing Execution (SAP ME)
Main Differentiators

SAP ME – What is it?

- Manufacturing Execution System for the **discrete industries**

SAP ME – Main Differentiators

- **ERP Integration** "out of the box"

- **Controls Production** as shown on Hannover Fair 2014

- **Unit Level Tracking & Tracing / Genealogy**
  What operation, tool or machine was used, where parts came from, etc.

- Comprehensive **nonconformance management** including in-line sampling and ability for visual test and repair

- **Process Interlocking**

- **High Flexibility and Extensibility**

- **Role specific** access and personalized **dashboards for operators**

- Provides **flexible production process modeling** without additional programming

- **Active Community** of partners and customers

- **High Usability with pure Browser Based UIs**
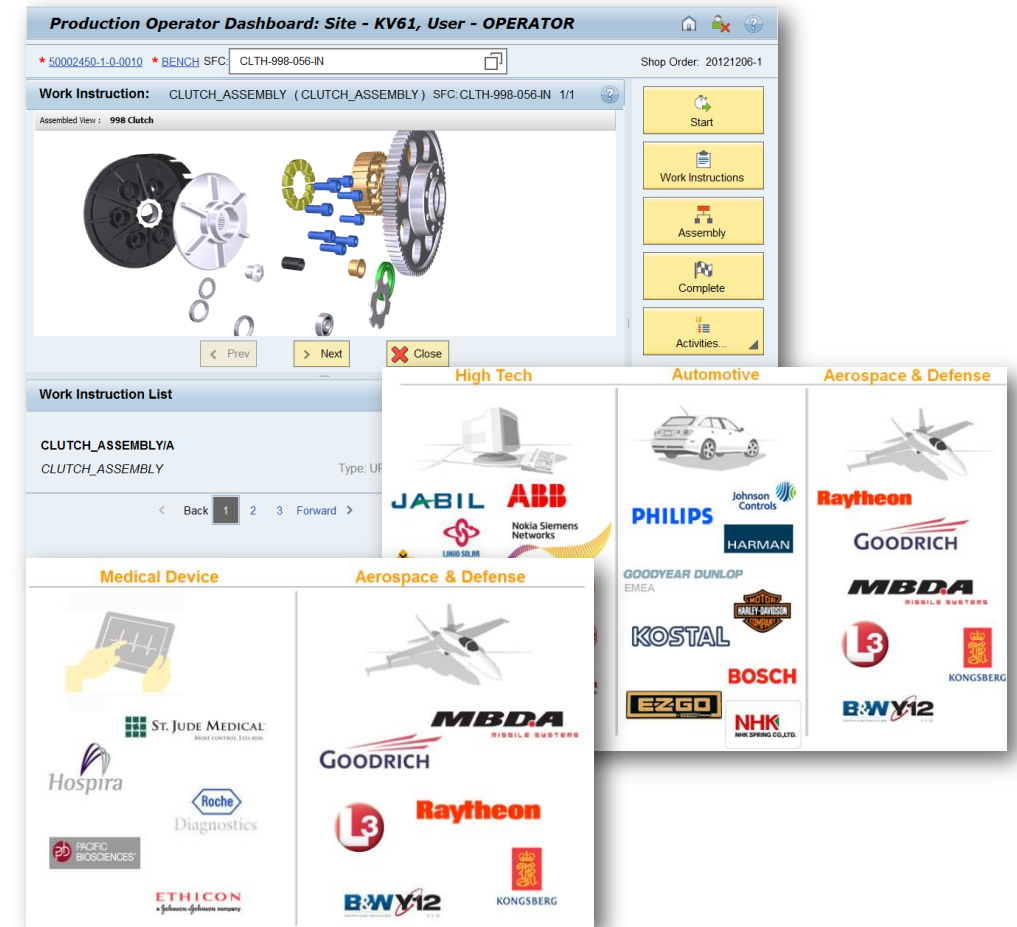
SAP Manufacturing Integration and Intelligence (SAP MII)

SAP MII – What is it?

- **Extensible** manufacturing platform allowing **rapid adaption** to any manufacturing process

SAP MII – Main Differentiators

- Integration: Provide **interoperability** (in)between Shop Floor solutions and enterprise ERP (PP, PM, MM, QM)
- Intelligence: Visualize data from any of above sources to provide KPIs. Provide **simple** and **efficient local User Interface and Dashboards**
- Innovation: Powerful SOA-enabled **business logic** to cover for customer specific processes around **Planning, Execution, Maintenance and Quality** now including versioning of any Content
- Allows **Fast prototyping** to achieve fast ROI
- Broad and extensive **Partner Network**
- Applicable to **all Manufacturing Industries and Utilities**

SAP Manufacturing Integration and Intelligence (SAP MII)

Supplier/Contract Manufacturer

Distributor / Customers

ERP | **SCM** | **PLM**

PLAN | **MAKE** | **DELIVER**

INTEGRATION

Manufacturing Integration & Intelligence

- OEE Management
- Plant Information Catalog
- Quality Engine
- KPI & Alert Framework
- Manufacturing Data Objects
- Message Service
- Business Logic Services
- Visualization
- Data Services

SAP Netweaver JAVA

Performance Management

Worker UI's

Manufacturing Analytics

DCS / PLC via OPC

MES

Plant Connectivity

Plant Historian

SCADA / HMI

LIMS/ Inspection / Equipment Testing

Plant DB

Environmental Building Management

Plant Data Collection

Wireless Integration

ERP Business Process Simplification

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SAP's new and planned innovations in Manufacturing

Vertical Integration
Visual Manufacturing Planner for Handover Engineering to Production

Description

- Create and maintain Multi-level Material BOMs, Routings and Component Allocation in SAP ERP based on Engineering BOM
- Both Configurable and Non-Configurable Material BOM Maintenance.
- Enable easy rearranging of Engineering BOM structures for Manufacturing needs
- Visual Change Management based on 3D Product Model
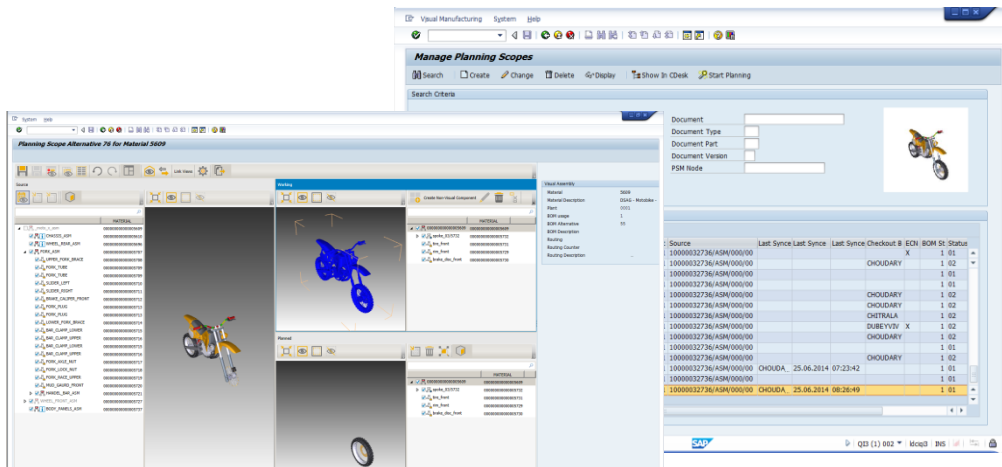
Key benefits

- Fast processing by visual supported drag & drop
- Support manufacturing planning via 3D visualization
- Fully integrated into SAP ERP
- No system boarder between Engineering and Manufacturing
- Process and Product at one place
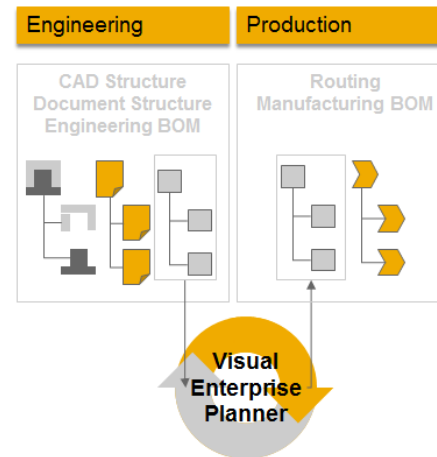
Prerequisites:

- SAP PLM CAD integration to create the document structure
- Visual Enterprise Generator to create the RH viewing files

New and Planned Innovations

SAP FIORI:
Release Production Order

Description

- Overview of production orders to be released based on individual variants
- Gives end users immediate overview of missing parts
- Easy to configure variants in order to provide greatest flexibility to the end user
- Detailed screen that provides end users with decision-critical information (date and time, system and user status, relevant work centers, missing part information for operations, etc)
- Search engine to identify and filter production orders

Key benefits

- Enables production supervisors to release production orders
- User-friendly and highly intuitive application
- Provides an unique user experience
- Seamlessly integrated into SAP ERP 6.0 EhP7 SP03, available also for EhP 0-6
- Application can be enhanced
- The browser-based application supports desktop, tablet (and mobile devices)
- Runs on HANA, as well as on any other DB

New Innovations

SAP FIORI:
Confirmation Production Orders

Description

- Allows production worker to view work released to their work centers
- Smart search by order-operation or confirmation number
- Allows to partially or finally confirm the selected operation
- Fast and simple confirmation procedures available on any type of devices (desktop, tablet, mobile devices)
- Use of graphical progress bar to view confirmed quantities
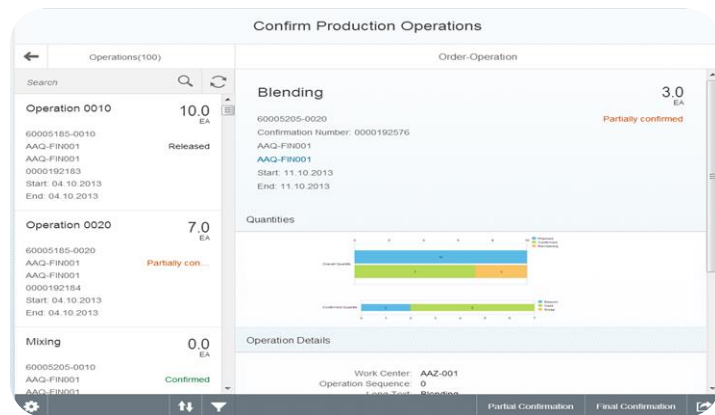
Key benefits

- Enables production workers to partially or finally confirm production operations
- Enables production workers to quickly find the next operation to confirm by using global search, various sorting and filtering options
- Allows to perform confirmations anytime, anyplace, and on any device (desktop, tablet , mobile devices) due to the responsive design
- Provides intuitive and user-friendly navigation
- Seamlessly integrated into SAP ERP 6.0 EhP7; available also for EhP 0-6
- Runs on HANA, as well as on any other DB
- Web-based application, that can be easily enhanced using HTML5

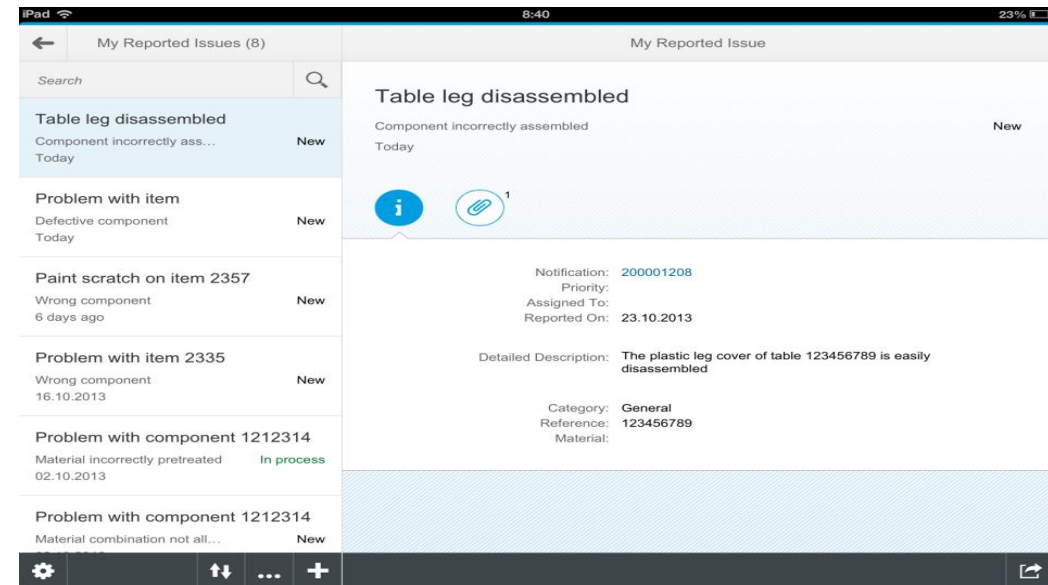**New Innovations**

SAP FIORI:
Report Quality Issue

Scope

- Detected issues can be reported easily.

- Photos can be assigned to each issue.

- A list can be displayed with issues created by the current user

- The list items can be filtered and sorted.

- Navigation to detailed information regarding each listed issue is available.

- Direct navigation to Quality Notification FactSheet is possible.

- The app can be executed on any device (mobile, tablet and desktop).

Key benefits

- Seamlessly integrated into SAP ERP 6.0 EhP7 SP02

- Runs on HANA, as well as on any other DB

- Web-based application, that can be easily enhanced using HTML5

New Innovations

SAP FIORI:
## MRP App for MRP Planner

Description

- MRP Cockpit – The new dashboard for the Material Planner.
- Monitor KPIs and alerts
- Identify most urgent and important issues, considering time to action and order values, priorities, and the like
- Choose from a set of pre-evaluated solution proposals
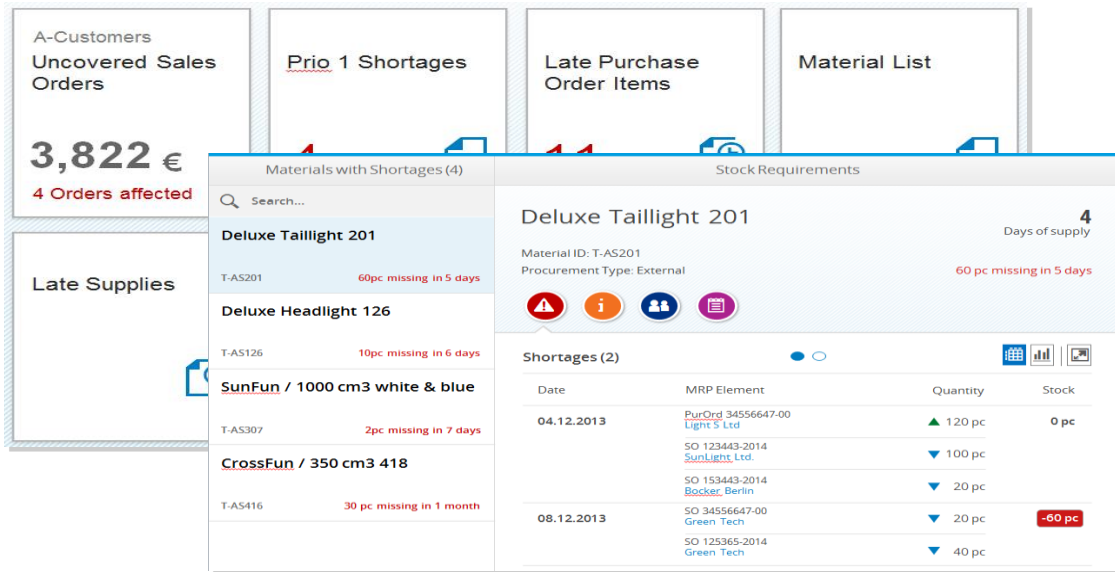
Key benefits

- Instant detection of critical situations in the material flow based on real time data
- Comprehensive impact analysis
- Evaluation of various solution proposals leading to well-founded decisions
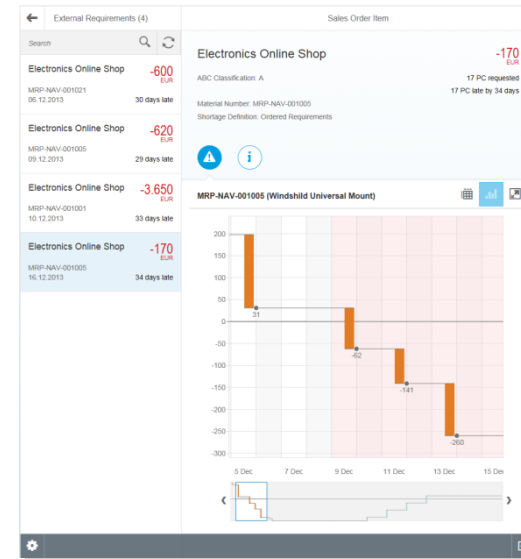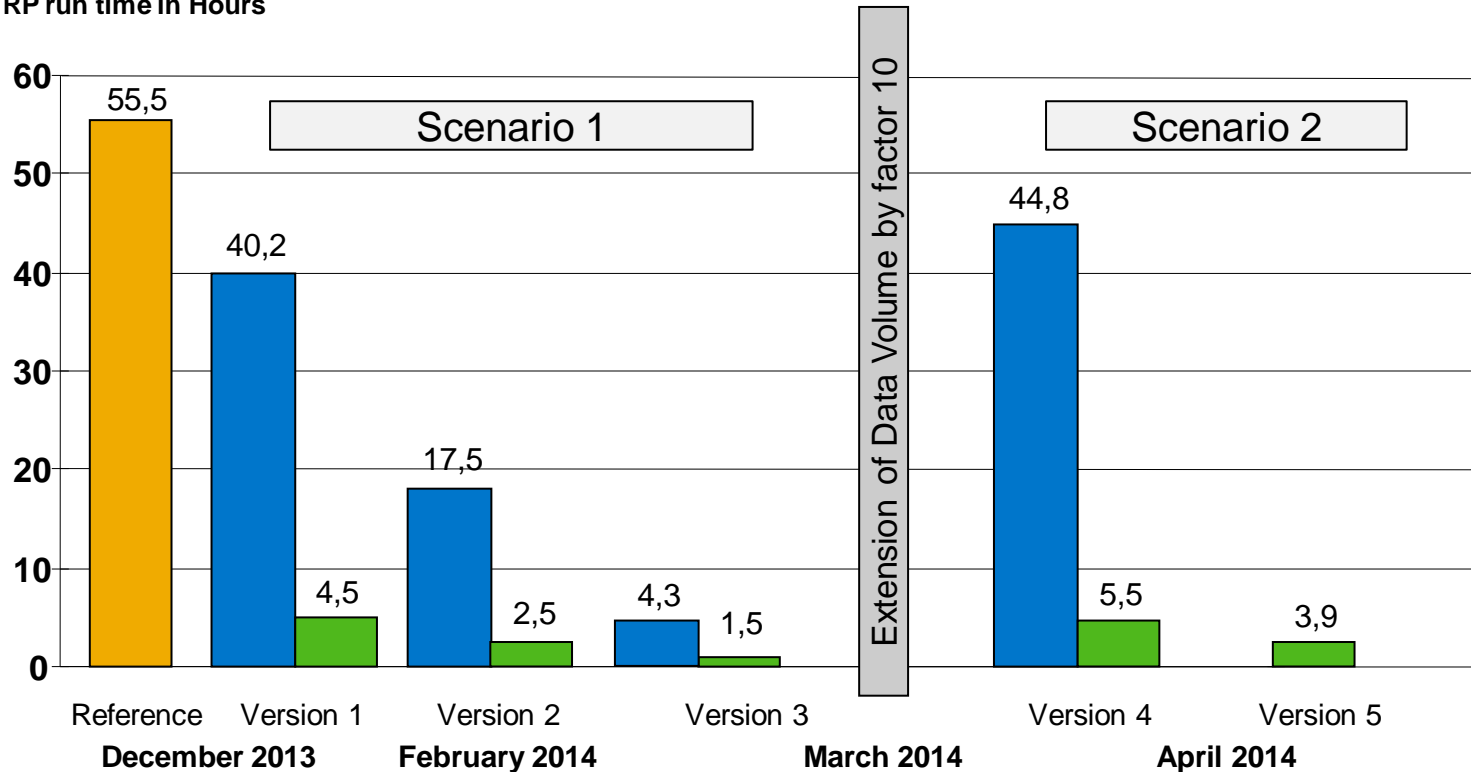
Shipments:

- Shipment Q1-2014 (EhP7-Sp3): SAP Smart Business for MRP for External Procurement
- Shipment Q3-2014 (EhP7-SP5): SAP Smart Business for MRP for monitor Inhouse Production
- Shipment Q1-2015 (EhP7-SP7) – *planned*
  Negotiation process with supplier
- Prerequisite: SAP HANA

New and Planned Innovations

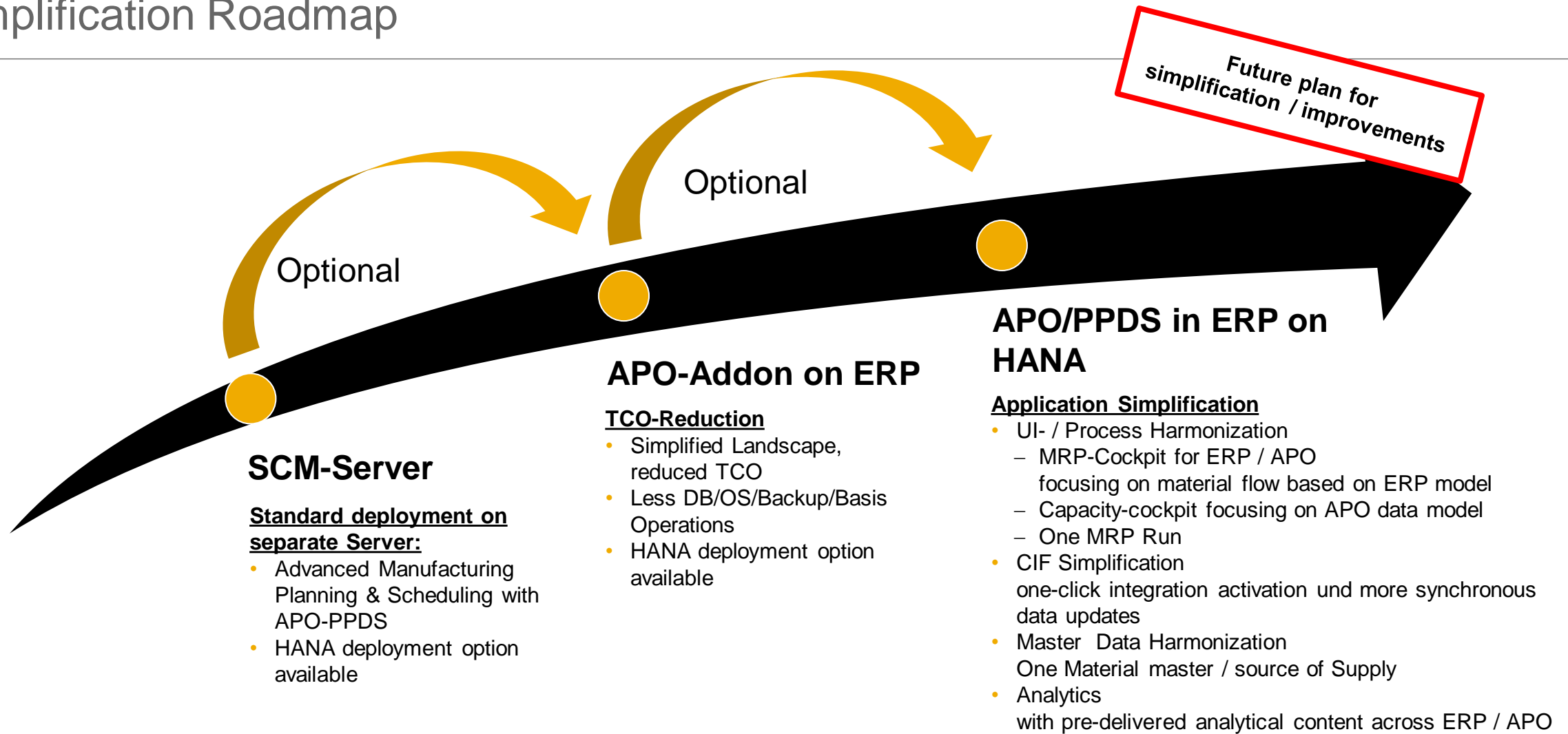# SAP MRP live
Significant Performance Improvements

MRP run time in Hours

Scenario 1

Scenario 2

Extension of Data Volume by factor 10

55,5	40,2	44,8	
	4,5	17,5	4,3
	2,5	1,5	5,5
			3,9

Reference — Version 1 — Version 2 — Version 3 — Version 4 — Version 5

December 2013   **February 2014**   **March 2014**   **April 2014**

Legend:

Classic MRP on usual relational DB (12-fold Parallelization)

Classic MRP on SAP HANA (12-fold Parallelization)

MRP Live in SAP HANA

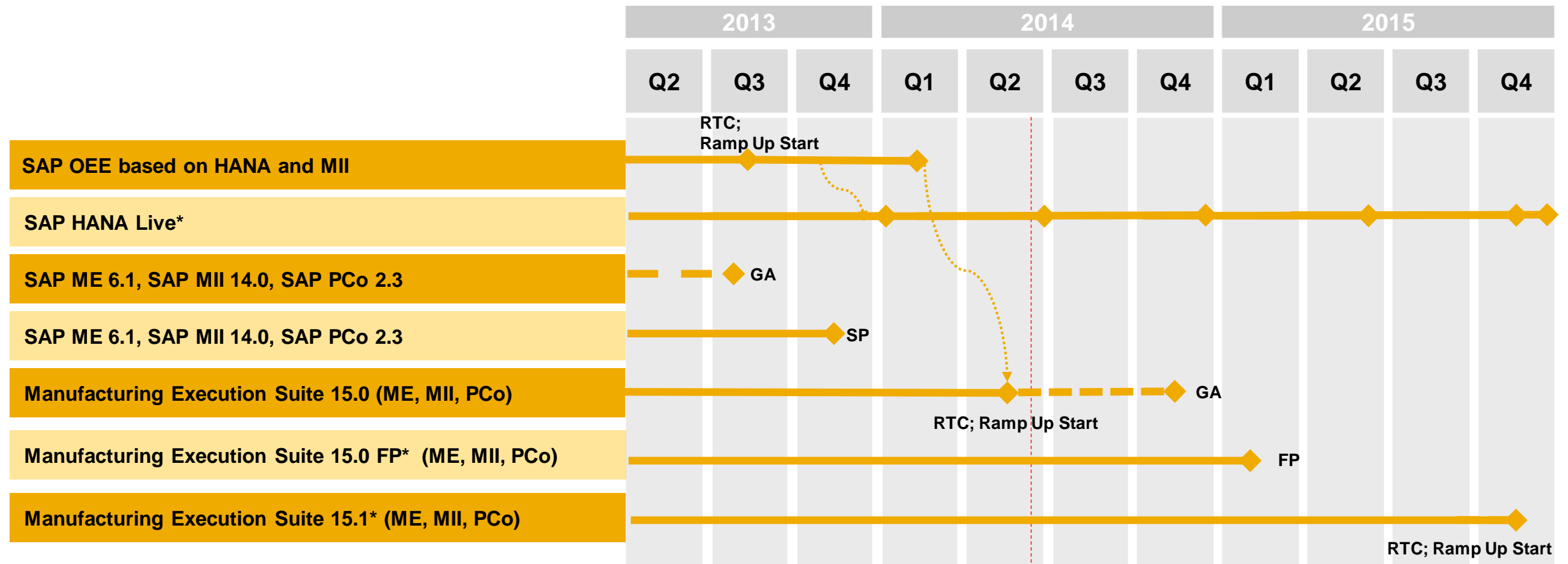# SAP Manufacturing Planning & Scheduling
Simplification Roadmap

Future plan for simplification / improvements

Optional

Optional

APO/PPDS in ERP on HANA

APO-Addon on ERP

SCM-Server

TCO-Reduction
- Simplified Landscape, reduced TCO
- Less DB/OS/Backup/Basis Operations
- HANA deployment option available

Standard deployment on separate Server:
- Advanced Manufacturing Planning & Scheduling with APO-PPDS
- HANA deployment option available

Application Simplification
- UI- / Process Harmonization
  - MRP-Cockpit for ERP / APO focusing on material flow based on ERP model
  - Capacity-cockpit focusing on APO data model
  - One MRP Run
- CIF Simplification
  one-click integration activation und more synchronous data updates
- Master Data Harmonization
  One Material master / source of Supply
- Analytics
  with pre-delivered analytical content across ERP / APO

New and Planned Innovations

SAP Manufacturing Execution Roadmap
2013-2014-2015 Product Release Timeline

New and planned developments
Roadmap shows the importance of production in the SAP portfolio

	2013			2014				2015			
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4

SAP OEE based on HANA and MII
RTC; Ramp Up Start

SAP HANA Live*

SAP ME 6.1, SAP MII 14.0, SAP PCo 2.3
GA

SAP ME 6.1, SAP MII 14.0, SAP PCo 2.3
SP

Manufacturing Execution Suite 15.0 (ME, MII, PCo)
GA
RTC; Ramp Up Start

Manufacturing Execution Suite 15.0 FP* (ME, MII, PCo)
FP

Manufacturing Execution Suite 15.1* (ME, MII, PCo)
RTC; Ramp Up Start

* Planned shipment; subject to change

MII Visualization – Browser Based, no Coding Needed Self Service Composition Environment

Description

- Browser (HTML5) based design tool for dashboard creation by consuming different MII objects
- WYSIWYG based design.
- Integrating tag value changes directly to browser using web socket interface.
- Source code generation for high sophisticated UIs
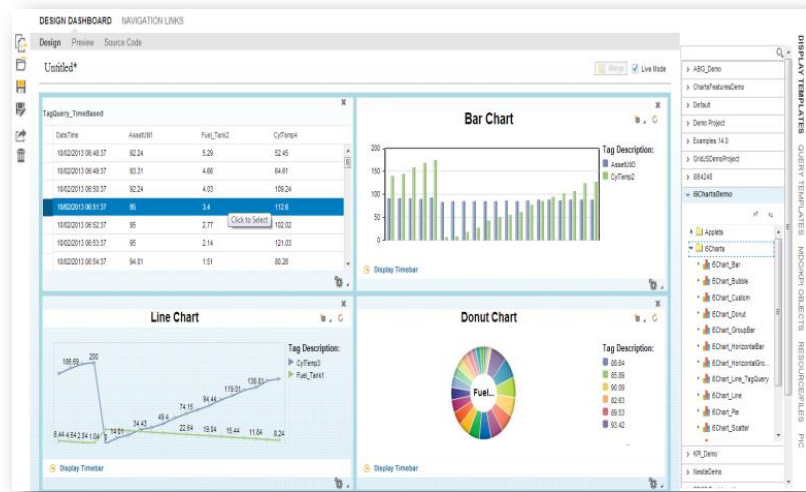
Key benefits

- Simplified interface for dashboard creation.
- A tool which can be used by business users also along with IT developers.
- Reduce the time required for dashboard creation
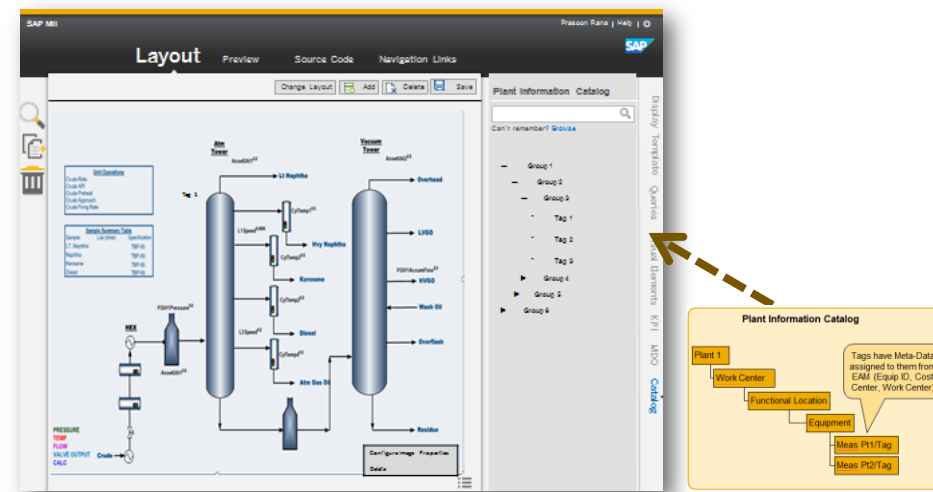
New Innovations (MII 15.0)

SAP MII on HANA

Description

- High performing In-Memory Analytics for large amount of Data ("Big Data")

- HANA provides the ability to store a significant and broader selection of manufacturing data for more thorough analysis and more complex comparison of data.

- HANA provides various statistical algorithms for deep analysis, clustering and prediction

- The ability to manage large volumes and multiple types of data provides ability to develop, train and utilize predictive techniques (e.g., regression and heuristic) for forward looking analysis.

- Run SAP MII on NW 7.40 stack with HANA as underlying database.

Key benefits

- New insights into the shop floor based on trends / prediction with HANA capabilities

- Enables near real time analysis of shop floor data to identify preventive actions
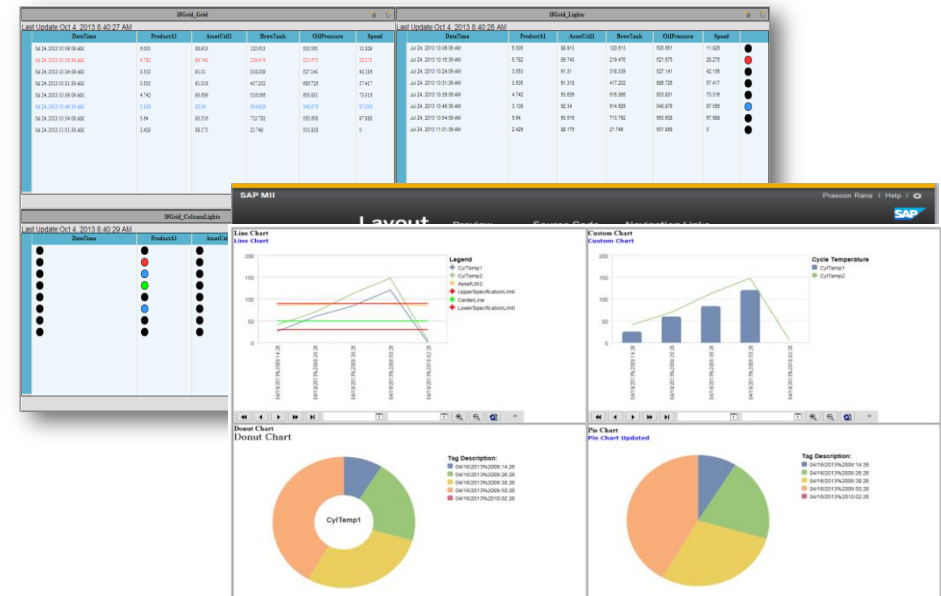
New Innovations (MII 15.0)

Overall Equipment Effectiveness
Global, Multi Site Analysis with SAP HANA

Description

- Analysis and Real Time information on OEE, Availability, Performance and Quality on various hierarchy levels
- Local Data Collection and Analysis in MII
- Global, multi site Analysis via SAP HANA
- Combination of shop floor data with enterprise information
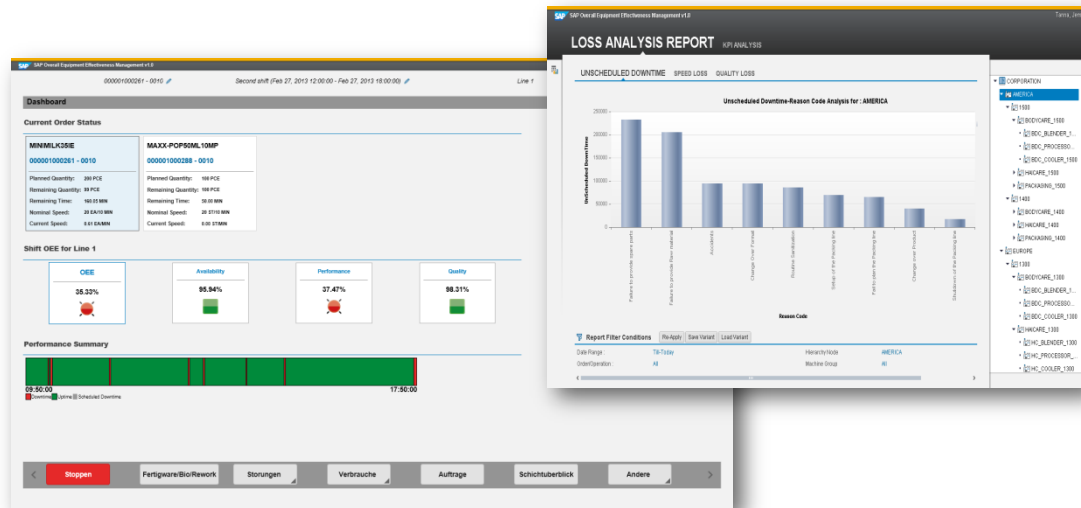
Key benefits

- Real time monitoring
- Cross plant analysis / Best Practice
- Analysis of Shop Floor with Top Floor Context
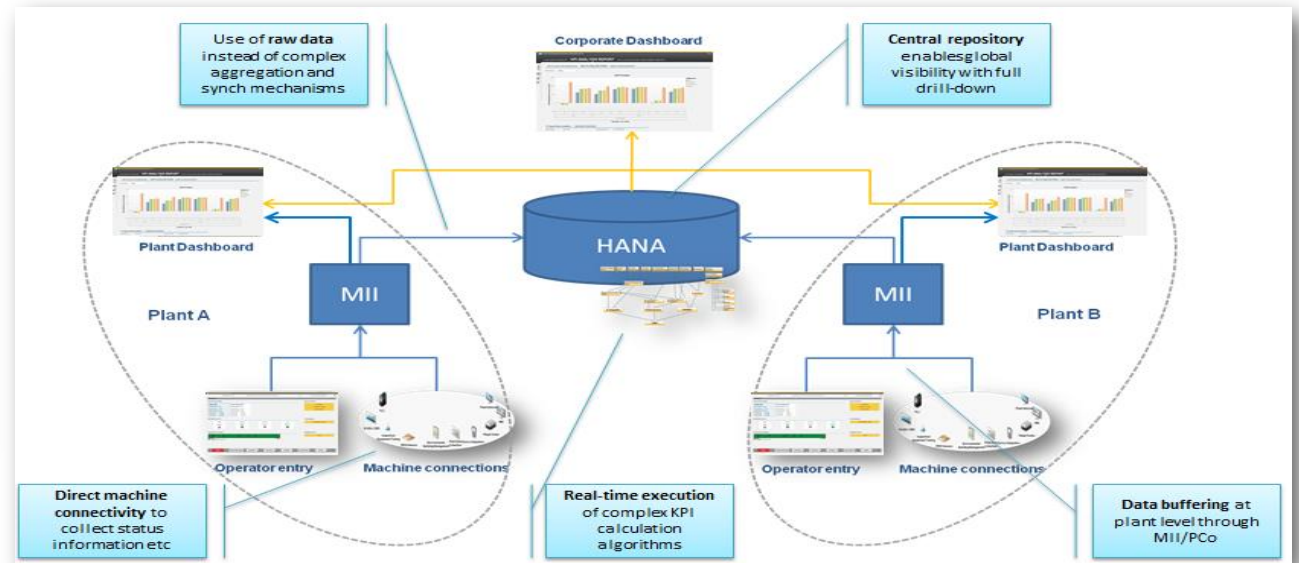
New Innovations (MII 15.0)

SAP Manufacturing Intelligence & Integration (SAP MII)
Planned Development Topics

Topic	Description
HANA / MII Integration	**Easy access to MII queries from central or cloud HANA system** • Expose MII queries to HANA Smart Data Access enabling to create virtual tables in HANA. • MII queries can be used in HANA like usual tables with selection, joins, etc.
UX	Additional **UI5 based charts** & features on SAP MII Self Service Composition Environment
Self Service Composition Environment	**Extensions** of functionality **of SSCE**; e.g. Support of dynamic reports and dashboards
Seamless Automation Integration	**Remote configuration** of PCo notification from MII • Context based rules and decisions can be modeled and executed • Ability to maintain notification even when Agent is running
E2E Monitoring, Diagnostic, and Safeguards	Better monitor system **performance** and message handling **end to end**
OEE / Worker UI	• Enhance the **look and feel** of OEE dashboard by moving to Fiori style • **Improved efficiency** of the Worker UI

Planned Innovations

Summary: SAP for Manufacturing

Smarter

SAP provides state of the art solutions for various types of manufacturing

Faster

Industry 4.0 is a major element of the SAP strategy

Simpler

SAP and partners have fundamental experience on shop floor processes and applications

Thank you

Contact information:

Veronika Schmid-Lutz
Chief Product Owner Manufacturing and Quality Management
Dietmar-Hopp-Allee, Walldorf, Germany
veronika.schmid-lutz@sap.com

What's next in the world of things?
"Real Things in Real Time"

Data Science driven Business

» Real-time visibility in relation to business

» Predictive aspects in Maintenance, Forecasting, Planning etc.

» Emerging Issues | New Optimizations | Etc.

Monitor | Analyze | Automate

"Internet of Things" ← Smart Devices, Personal Area Networks

Industrial Automation → "Industrial Internet" / Industry 4.0
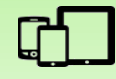
SMART FACTORY

Internet of Things (IoT)

Corporate

Plant (decentral)

SFAC

HANA

Mobile

Business Suite

Cloud for Service

SAP Manufacturing Execution Suite

SAP ME

SFD

SAP MII

PCo

Intelligence

Integration

Innovation

SCADA

DB

Historian

Maint-enance

PLC

DCS

PLC

DCS

PLC

...

» **Visualization Services**
» **Analytical Services**
» **Business Logic Services**

» **Message Services**
» **Data Services**

Internet of Things (IoT) Cloud

Consumer

Consumer

Consumer

Consumer

Thing

Thing

Thing

Thing

Thing

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