



SAP Digital Manufacturing

Level 2 Presentation

Release 2302

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THE BEST RUN 

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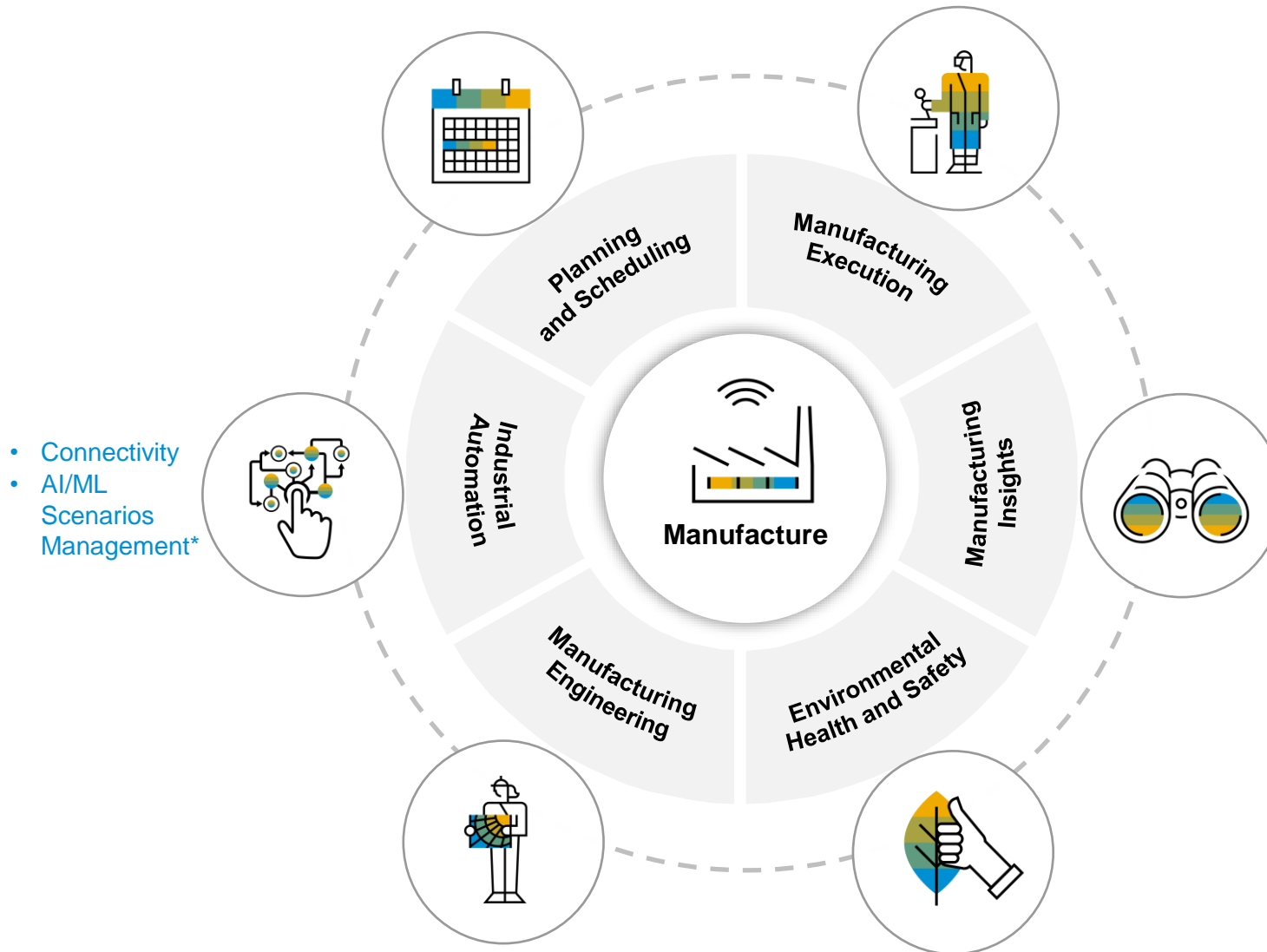
SAP Digital Manufacturing

Solution Overview



SAP Digital Manufacturing Solutions

A complete portfolio of manufacturing solutions to support digitalization and Industry 4.0



SAP Digital Manufacturing

- Manufacturing Execution
- Manufacturing Insights
- SAP Plant Connectivity



SAP S/4HANA Manufacturing

- for Production Engineering and Operations
- for Planning and Scheduling
- Environmental, Health & Safety



SAP Manufacturing Suite

- SAP Manufacturing Integration and Intelligence
- SAP Manufacturing Execution

* Artificial Intelligence / Machine Learning

SAP Digital Manufacturing

Automate processes and resources to improve manufacturing efficiency, quality and productivity



Paperless production with intuitive user interfaces for production operators, automatic data collections and set machine parameters, thereby lowering cost, increasing productivity and quality.



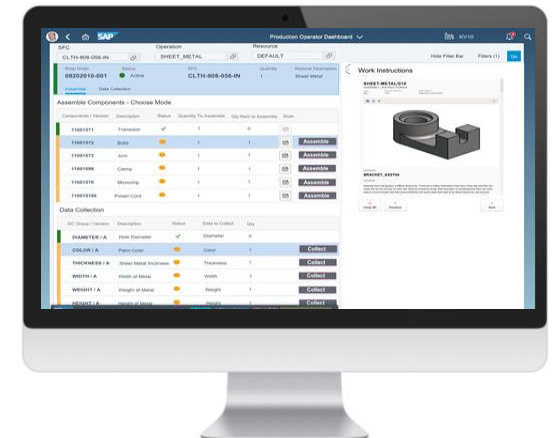
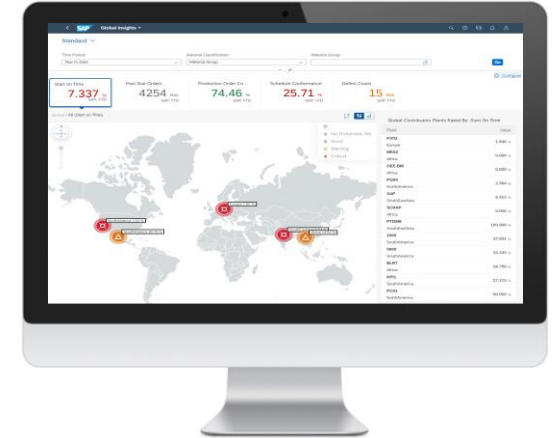
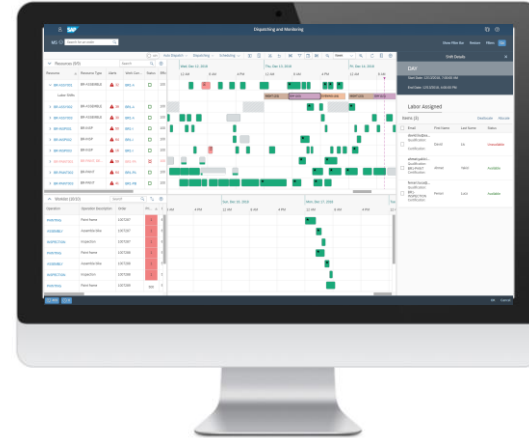
Design, distribute and dynamically control manufacturing shop floor activities enabling a smart factory.



Shift and Labor planning to ensure business operations with right qualifications. Production Order scheduling and dispatching considering labor, resource and maintenance constraints to plan operations and adopt to short term changes.



Cross plant real-time analytics for manufacturing performance e.g. perfect order fulfillment, Overall Equipment Effectiveness, loss analysis along with machine data to identify improvement opportunities.



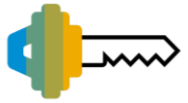
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Execution



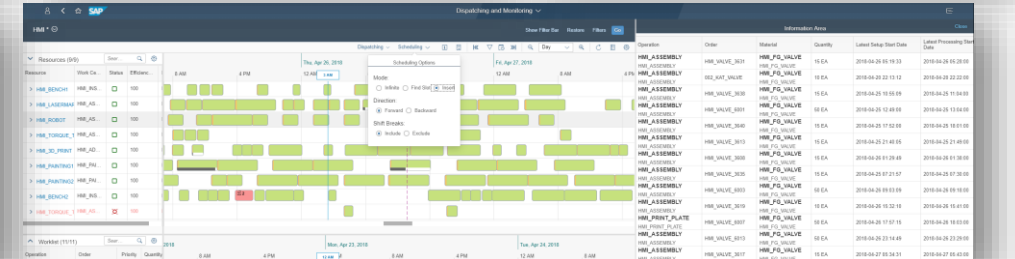
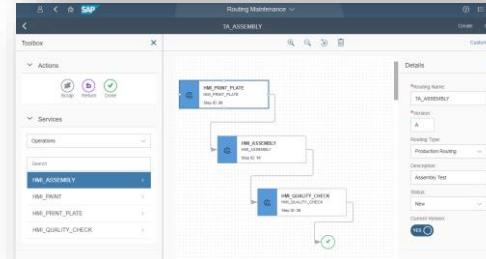
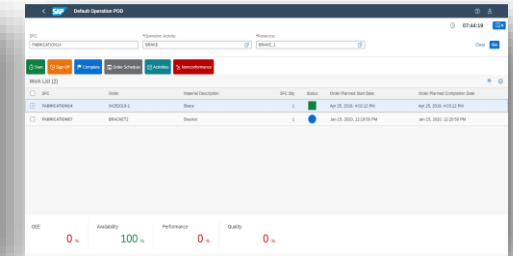
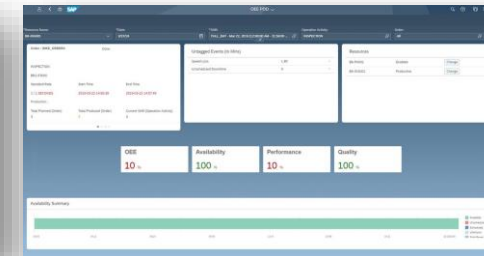
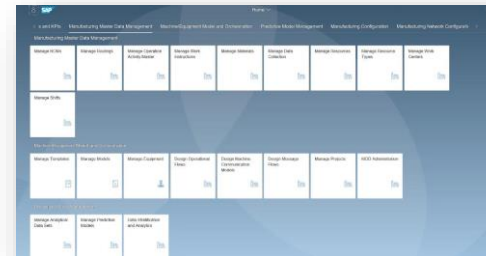
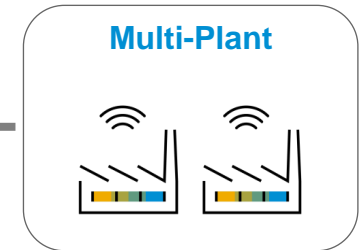
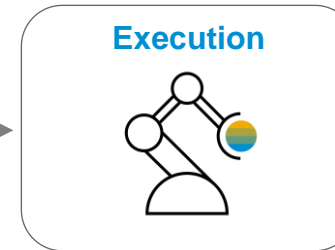
SAP Digital Manufacturing for Execution

Orchestrate and control the shop floor



Key capabilities

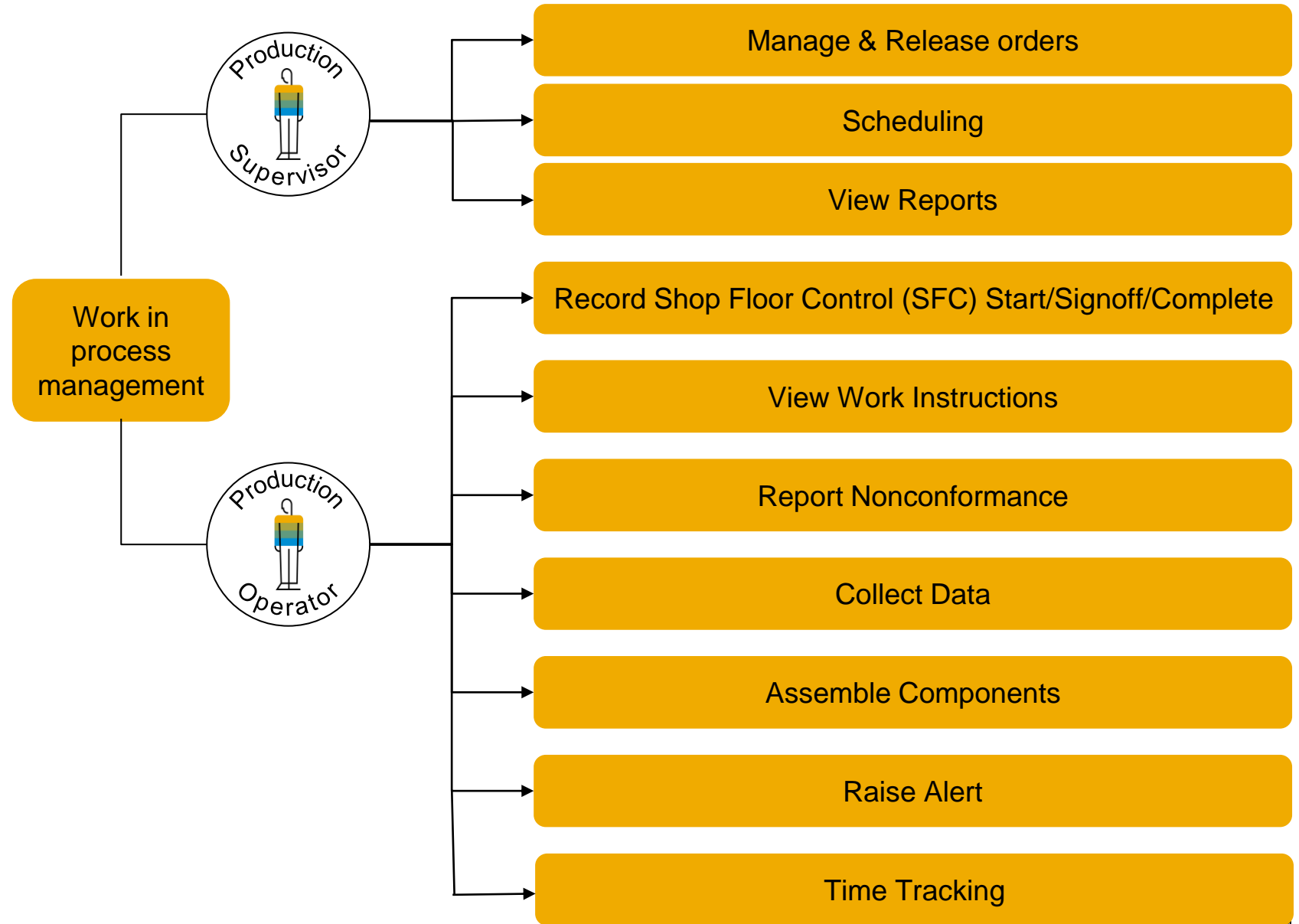
- Monitor the entire manufacturing process to optimize resources and execution
- Role-specific Fiori and operator dashboards
- Fully configurable Production Operator Dashboard (POD) that supports drag & drop and preview
- Monitor OEE and manage downtime events
- Resource Orchestration to manage shop floor workflow and labor assignments
- Automation interfaces to provide for shop-floor-driven manufacturing events and data collection



SAP Digital Manufacturing for Execution

Work in process management and reporting

- Manage and release orders for execution on the shop floor
- Production operators use the configurable PODs (Production Operator Dashboards) that were created in the POD Designer to capture and report execution data
- An SFC is a unique WIP identifier representing a specific instance of the material being built during the manufacturing process and allows for full traceability of the product.
- The SFC represents a quantity of the product to be produced, depending on the lot size of its material. An SFC can be a serialized or non-serialized (lot).



SAP Digital Manufacturing for Execution

Capabilities for Discrete Industries

- **Extend Master Data** integrated from S/4HANA with Work Instructions, Data Collections and Process Parameters. Locally created Master Data is supported.
- **Execute and Split Production Orders** in the Production Order Dashboard (POD)
- **Full WIP tracking** at the SFC level for non-serialized and serialized materials.
 - An SFC is a unique WIP identifier representing a specific instance of the material being built during the manufacturing process and allows for full traceability of the product
- **Confirm production order operations** with Yield, Scrap and Activities integrated with S/4HANA
- **View work instructions** including 3-D Visual Enterprise models
- **Perform component assembly and post goods movements** for goods issues seamlessly integrated with S/4HANA
- **Record and track nonconformances including rework and repair processes**
- **Inventory management** with integration to EWM/S4
- **Record inspection results with Inspection Points** integrated with S/4HANA QM
- **Integrate with the Shop Floor** in a **bi-directional** way using Equipment Connectivity (Production Process Designer*) and Plant Connectivity (PCo)
- **Customize operator user interface** with the POD Designer
- **Print** customized Labels and other shop floor documents
- **Record and Manage Time** logged against SFCs
- **View product history report and product (component) genealogy report** for produced SFCs



SAP Digital Manufacturing for Execution

Capabilities for Consumer and Process Industries

- **Extend Master Recipes** integrated from S/4HANA with Work Instructions, Data Collections and Process Parameters.
- **Execute and Split Batch related Process Orders** in the Production Order Dashboard (POD)
- **Create and Value Batches** for Main-Products as well as for **Co-Products and By-Products** during Production and search and **Consume batches** based on characteristics
- **Confirm process order phases** with Yield, Scrap and Activities integrated with S/4HANA
- **Post goods movements** for goods issues and receipts seamlessly integrated with S/4HANA
- **Record inspection results with Inspection Points** integrated with S/4HANA QM
- **Integrate with the Shop Floor** in a **bi-directional** way using Equipment Connectivity (Production Process Designer*) and Plant Connectivity (PCo)
- Enable **Post Production Reporting**
- **Customize** your application with the POD Designer
- Print customized **Labels**
- **View product history report** for produced batches



SAP Digital Manufacturing

GxP Management



SAP DM Regulatory Compliance

Functional Working Model

Regulatory Compliance		
Operational Scope Development Operations and Quality Assurance	Technical Scope Products Qualification	Functional Scope Functional Requirements in DM
<i>„How do SAP BTP and SAP DM develop new features, document and test them and how do they ensure quality?“</i>	<i>„How are SAP BTP as a platform and DM as a product on it operated in the cloud“</i>	<i>What is needed in DM as a MES system in order to enable a GMP compliant manufacturing process?</i>
<ul style="list-style-type: none">• Implement an over-arching content and quality management system (processes, documents, training of our teams)• Regular enforcing of process compliance.• Being ready for Customer audits for Data Integrity and compliance.• Conducting GxP audits (Self Inspections)• Implement required control and practices to harmonise the documentation, training, software development, software testing etc.	<ul style="list-style-type: none">• SAP DM Product Qualification• SAP BTP Platform Qualification• SAP BTP supplied services Qualification• SAP DM Supplier Qualification• Release process harmonisation• Maintenance practice enforcement of Qualification status of the product .	<ul style="list-style-type: none">• Define functional requirements for DM and BTP services• Handover of requirements to BTP units for t-shirt sizing and to get commitment• Master Data Change & Approval Management• Electronic Records + Printing• Audit Trail• Worker Guidance• Digital Signature• Electronic Batch Record + Deviation Analysis

SAP Digital Manufacturing

Modular Production



SAP Digital Manufacturing

Modular Production

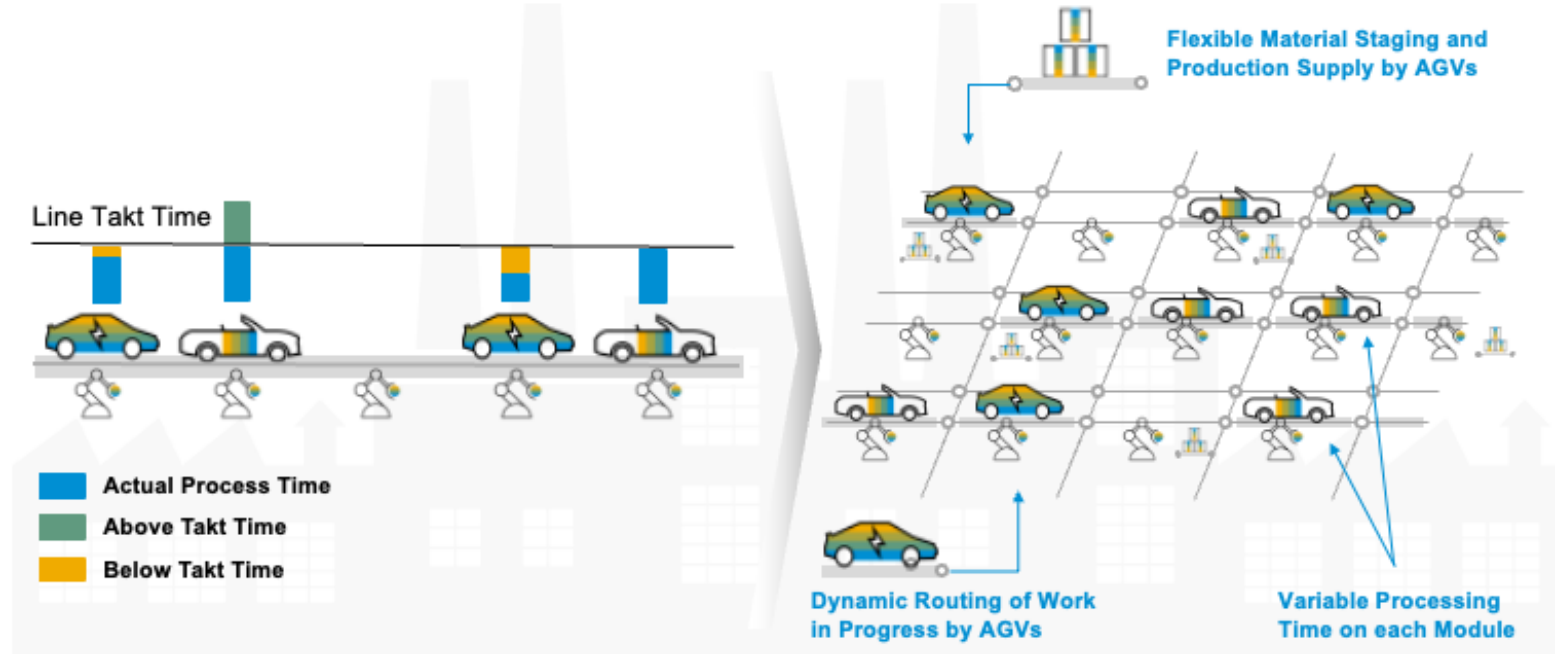
Innovation Highlights

- **Dynamic Routing**
 - Enable modelling of flexible routings
 - Take Dynamic Production Dispatching on an optimal routing path
- **WIP Transport**
 - Integrate WIP logistics to warehousing logistics
 - Enable tracking of WIP between production operations
- **Supply to Cell**
 - Enable dynamic staging of components
 - Reduce stock-based restrictions
- **Visualization**
 - Provide real-time insights on production, logistics, quality and maintenance
- **Analytics**
 - Identify resource bottlenecks
 - Analyze and improve past decisions

Value Proposition

- Produce heterogeneous model mixes efficiently at scale
- Handle variant-dependent takt times efficiently
- Provide a quick and flexible reaction to changing customer demand
- Permanently optimize in accelerating cycles
- Reduce investment costs and the risk of bottleneck situations

From Assembly Lines to Assembly Cells



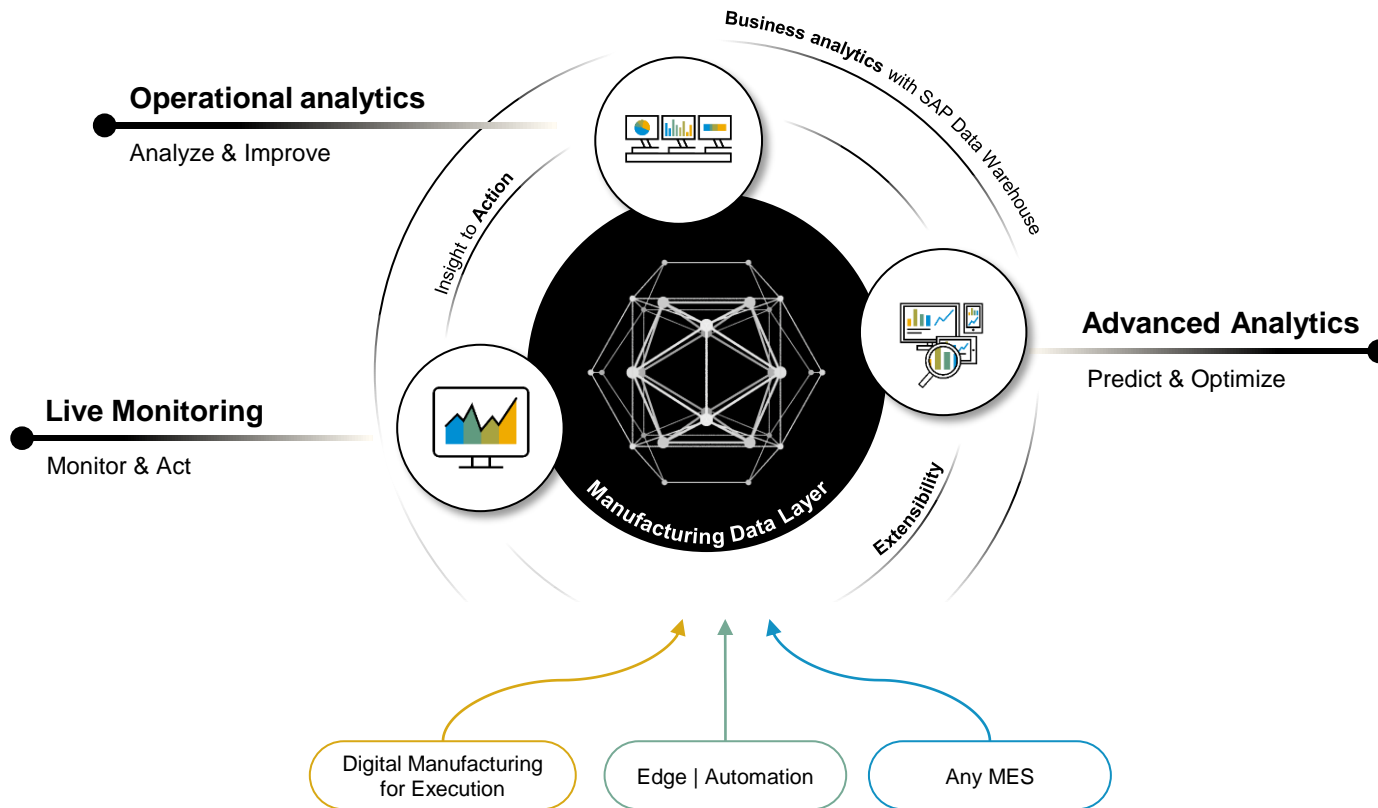
SAP Digital Manufacturing

Insights



Analyze & Optimize your digital operations

partially available only in
future release – subject to changes



Self-service manufacturing analytics with **harmonized access for better visibility and extensibility**

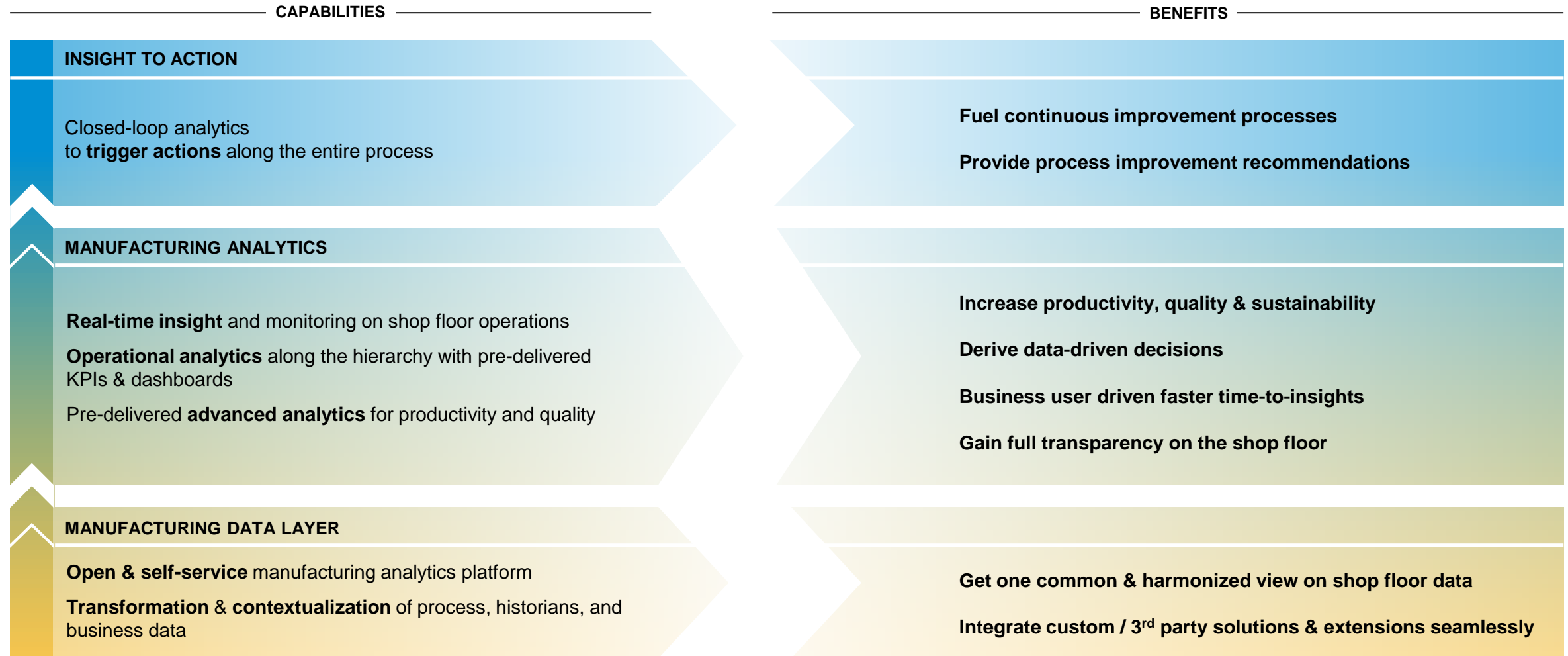
Live production monitoring along the plant hierarchy and across multiple dimensions in real-time

Operational analytics using KPIs & dashboards to drive **data-driven decisions**

Pre-delivered advanced analytics to **increase productivity, quality and sustainability**

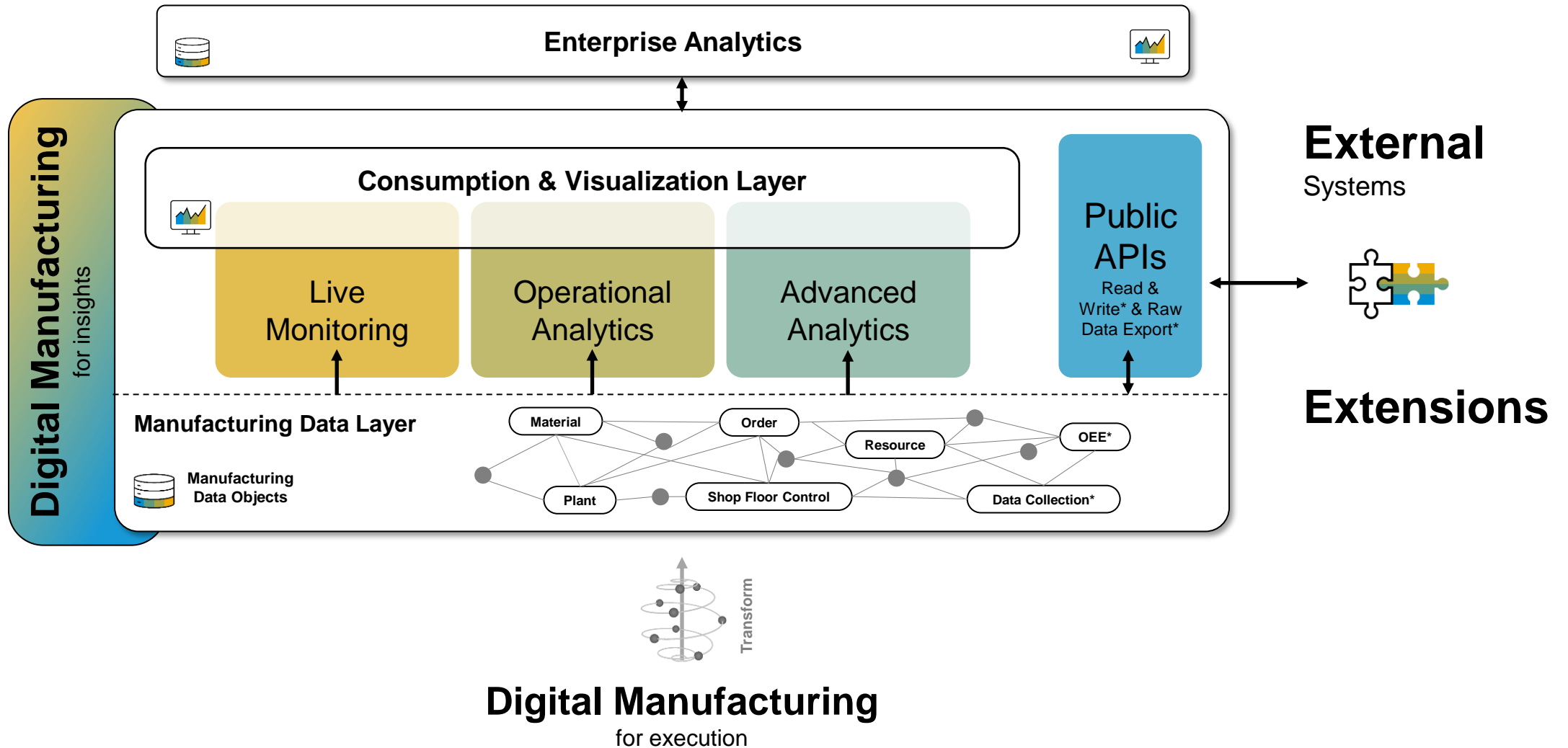
Closed-loop analytics to trigger actions **fueling a continuous improvement process**

Benefit from data-driven operational excellence



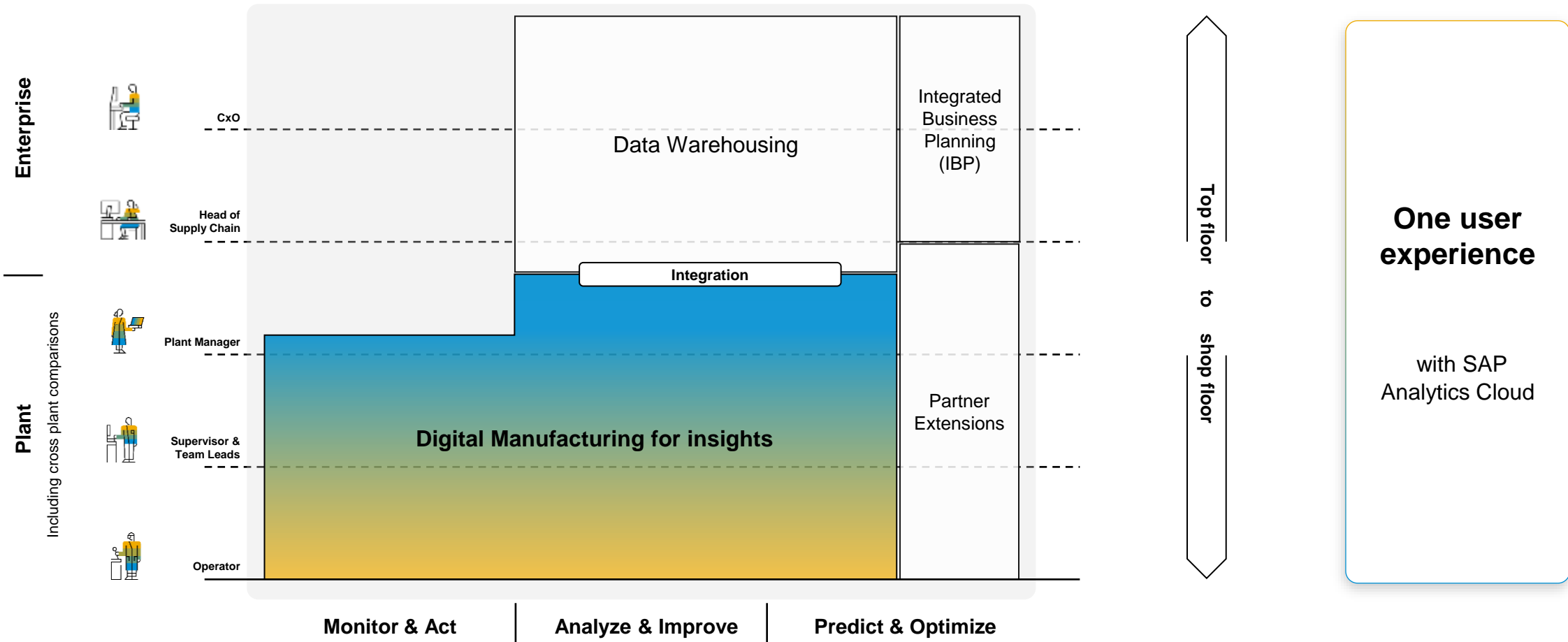
Foundation

Future-proof Manufacturing Analytics



* Planned for future release

Holistic analytics from Shop Floor to Top Floor



SAP Digital Manufacturing

Resource Orchestration

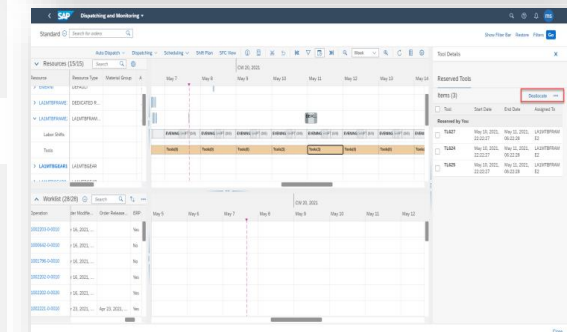
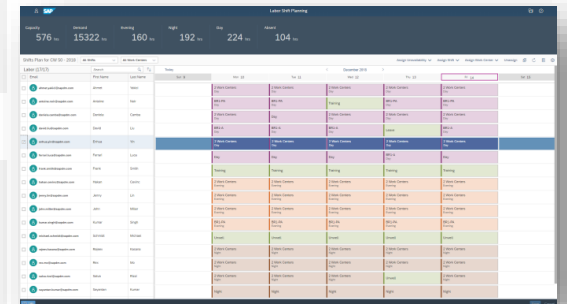
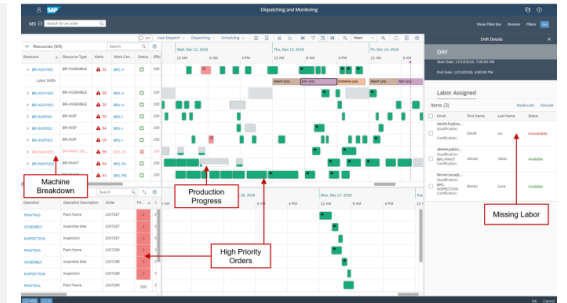


SAP Digital Manufacturing for Execution

Resource Orchestration

Dispatching and Monitoring

- Orchestrate labor and resources on the shop floor to achieve maximum availability
- Dispatch and sequence operations to reflect the “real world” on the shop floor
- Monitor the entire manufacturing process to optimize resources and execution
- Reflect the reality on the shop floor by visualizing high priority orders, machine breakdowns, missing labor and production progress
- React quickly to unexpected events utilizing built-in intelligence



Labor Scheduling

- Assign labor to work centers and if required to time intervals
- Manage shifts and labor considering labor qualification and certification
- KPIs visualize the status for selected week (Supply and demand of labor capacity)
- Share the shift plan with the corresponding labor using email function in the Schedule Labor app

Tool Scheduling

- Based on availability a tool or set of tools can be reserved
- Tools can be allocated or deallocated to operations

Resource Orchestration

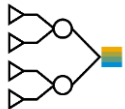
Optimally execute your digital operations



Adaption to short term or ad hoc changes in shop floor. Heuristics to support active, backlog orders and automatically propose scheduled plans based on shop floor situation



Manage Labor, Tools planning in shop floor



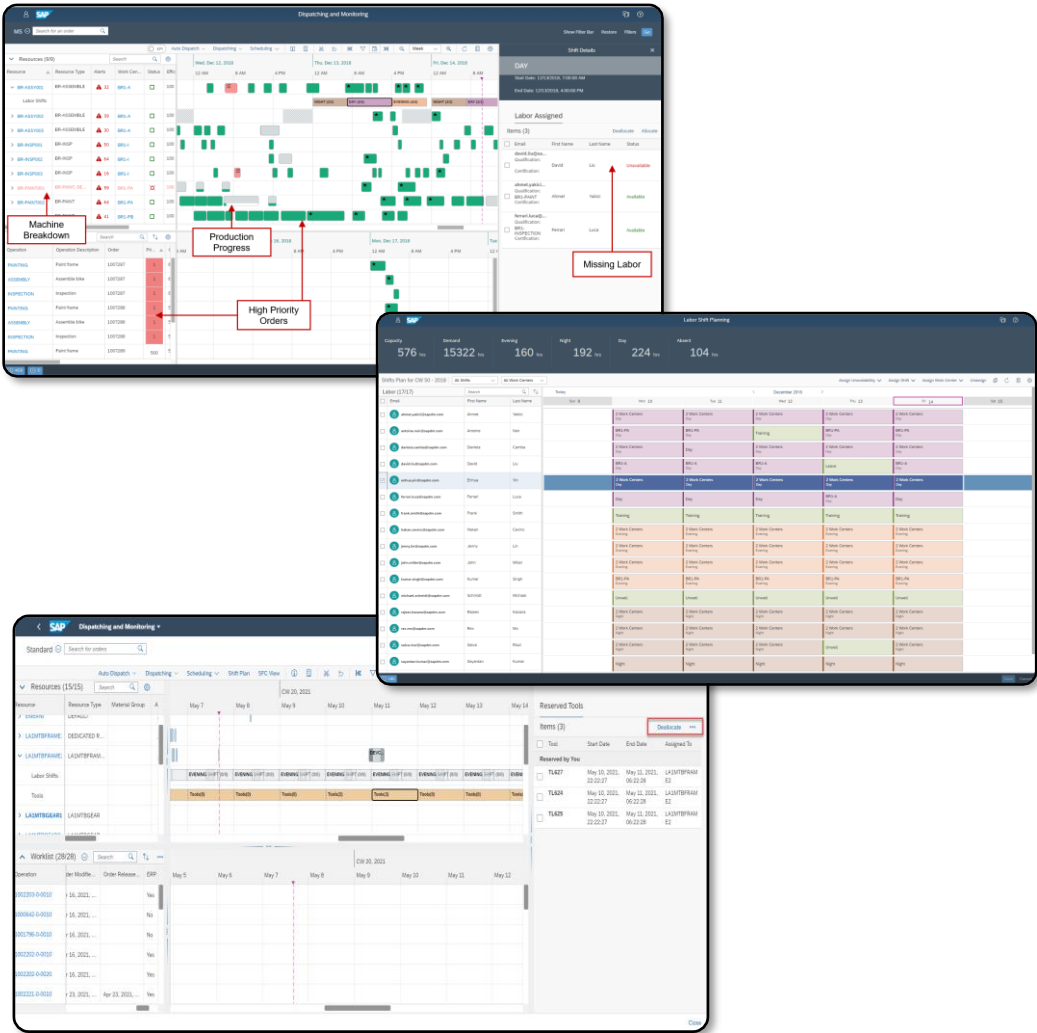
Visualize planned downtimes of machines and quickly respond to unplanned downtimes via rescheduling options



Monitor production progress and adapt to any changes in the execution of shop floor activities



Create labor shift plans and publish to operators



SAP Digital Manufacturing

Manufacturing Automation



Manufacturing Automation: IT/OT Convergency – Connecting the World

Model the **network of all production-relevant systems** in your landscape

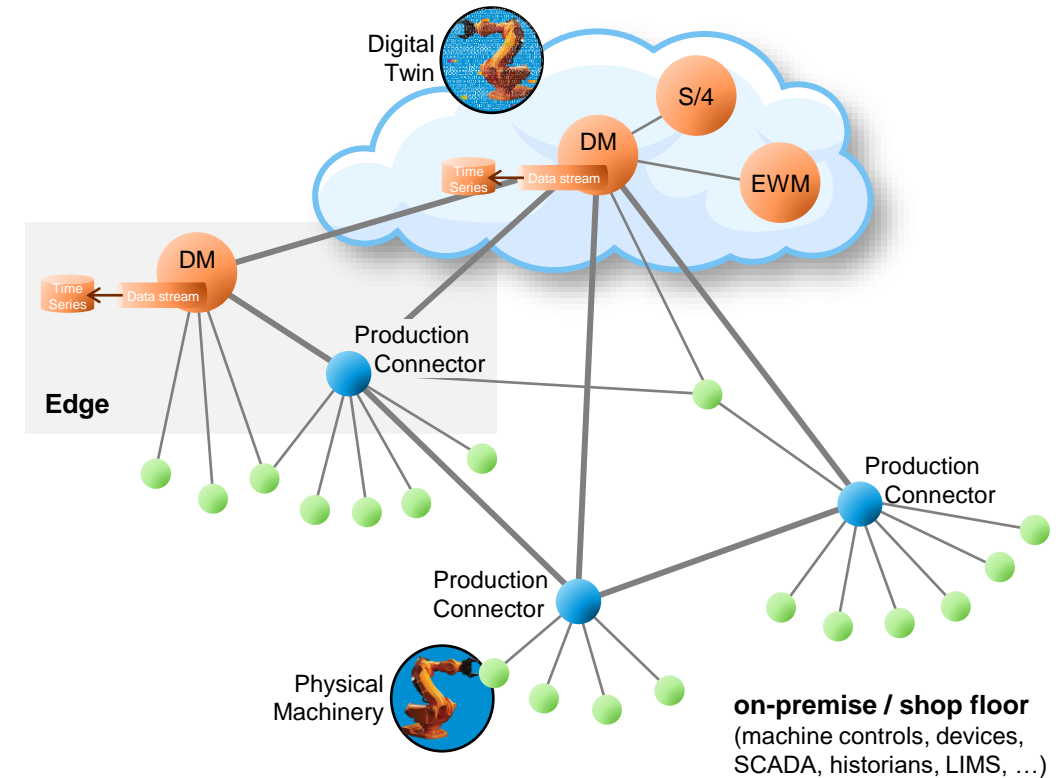
- From IT systems to OT systems
- From top floor to shop floor
- From cloud to edge and on-premise

Model “**Digital Twins**” in the cloud (IT) for a vertical connection with local on-premise systems and the physical machinery on shop floor (OT).

Let “**Production Connectivity**” do all data exchange between IT and OT to

- Read data from shop floor systems for any kind of data collection or decision making (DM Execution).
- Push data actively up to Cloud or Edge to analyse and give insights (DM Insights, leveraged by IIoT).
- Write data (set points) to shop floor systems for production control.

Observe measurements on shop floor to take action if a condition on them is fulfilled (e.g. if a measurement raises a threshold).



Manufacturing Automation: IT/OT Convergency – Run Production End-2-End

Designing production processes means orchestrating service calls from the own system and from connected systems. These processes can be executed on different runtimes in SAP DM cloud, SAP DM edge or next to the machines on the SAP Production Connector.

Integrate vertically by converging IT services from top floor systems with OT services from shop floor systems.

Integrate horizontally realizing the entire production process from the raw material to its finished good. Processes can call each other on the same or on connected runtimes (→).

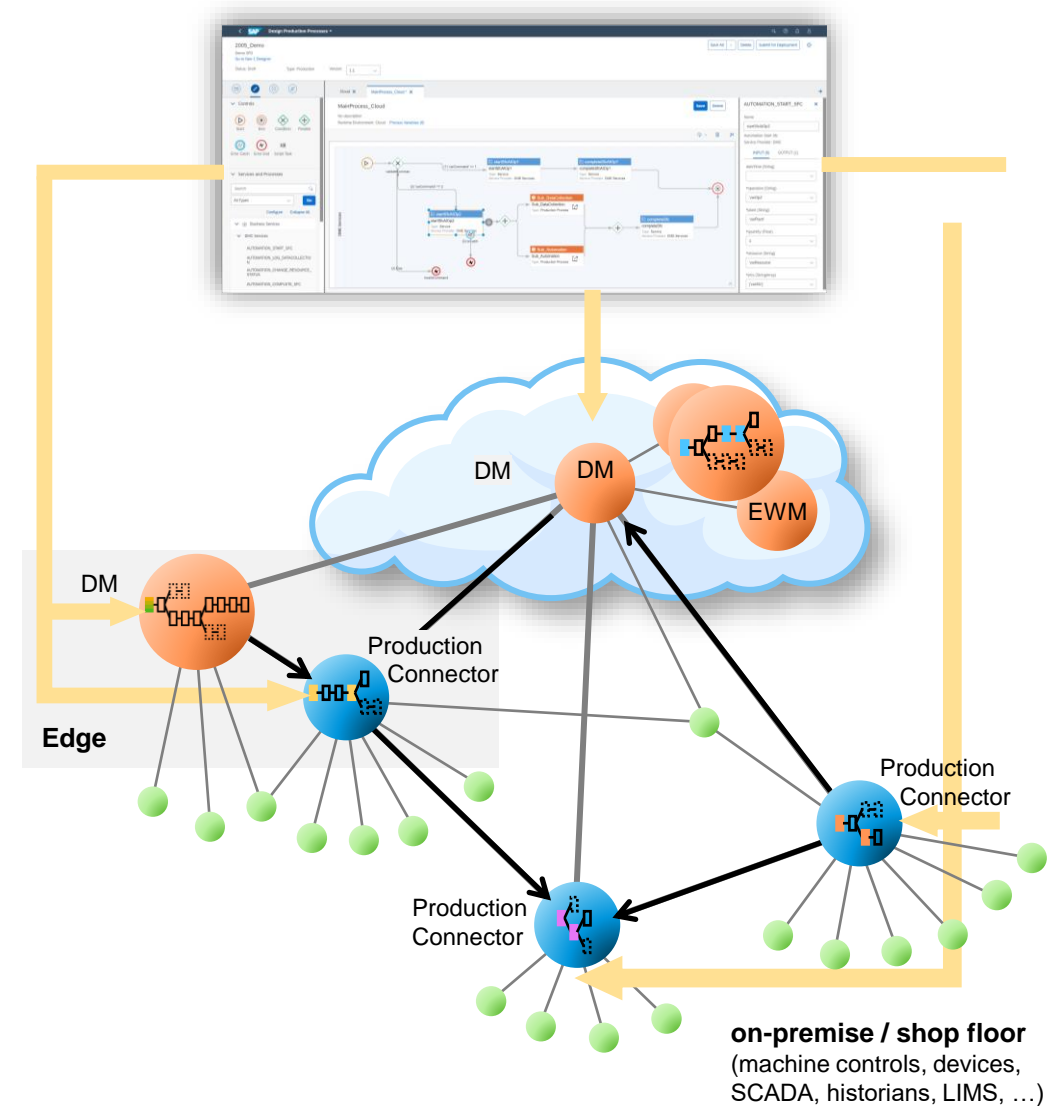
Deploy processes (➡) from the DM design time in the cloud (Production Process Designer, PPD) to their related runtimes for which they are designed (SAP DM cloud, SAP DM edge or SAP Production Connector).

Start deployed processes

- either automatically, by a scheduler, with events on top floor (e.g. “shop order created”) or when conditions on shop floor system tags become true (e.g. “temperature>500”),
- or manually, that is by the operator pressing a button on the production operator dashboard (POD) or the supervisor handling an alert in the alert inbox (alert management).

Monitor the process execution and **debug** it to find errors.

Optimize production by feeding back any findings from operation into the process designs.



SAP Digital Manufacturing

Edge Computing



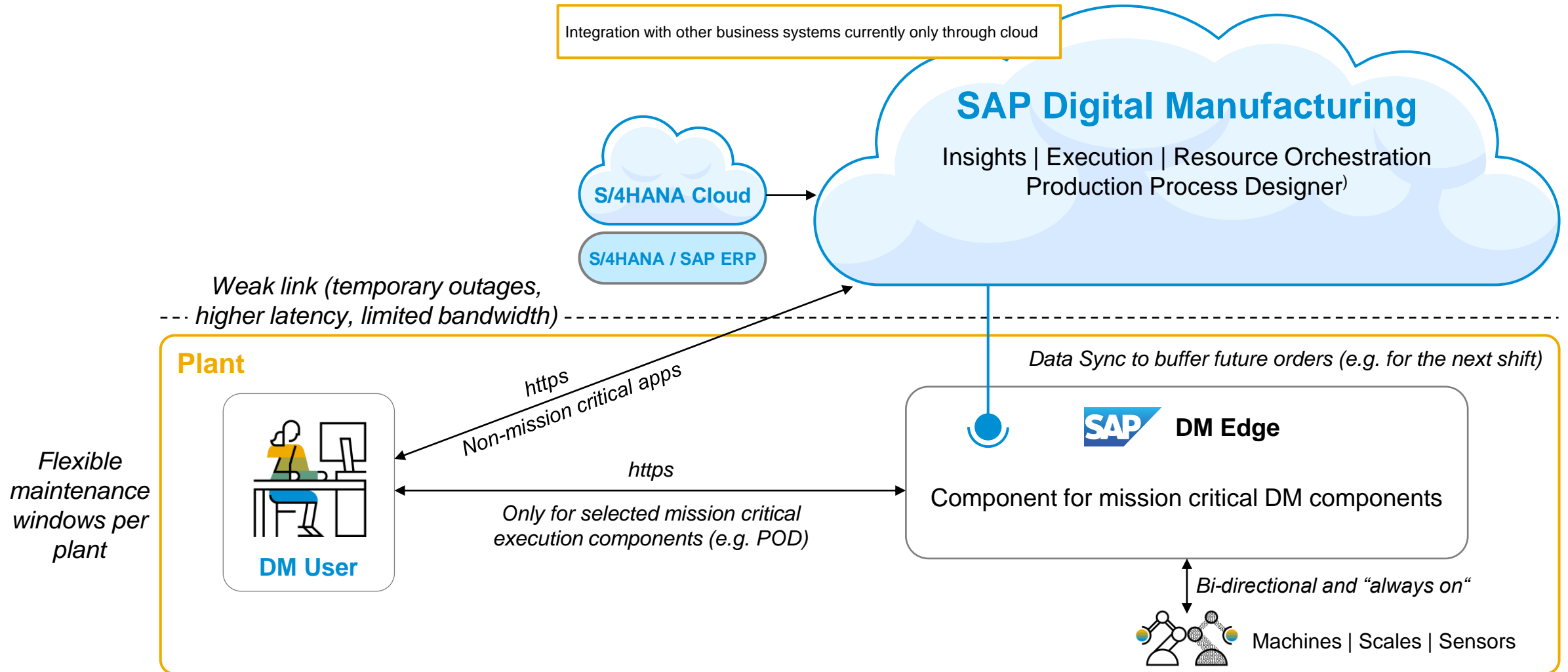
What is Manufacturing **Edge Computing**?

Manufacturing Edge Computing describes the capability of **connecting, processing, storing and analyzing machine data**, and thereby supporting production processes (incl. user interaction), closer to the source of data and in the shop floor, to **enable faster decision-making and to operate with intermittent connectivity to the cloud.**



SAP Digital Manufacturing for edge computing

Provides maximum business continuity for mission critical applications in manufacturing



SAP Digital Manufacturing

Additional Information



Secure Practices



DM adheres to the Secure Software Development and Operations Lifecycle processes of SAP wherein security is built into the product from design phase (Risk assessment of the Architecture) and actively managed in development (security code scans, open source vulnerability management, tests, etc.) and later in the operational phases (by security patches and secure operations).



DM has secure operation processes in place Ex: Change management process, Separate environment for Development, Testing and Production with developer access management in place.



In SAP, all customer data is classified as “confidential”. DM maintains Data Isolation between customers and is available on AWS (Frankfurt in EU and Virginia in USA), Azure (Netherlands in EU and Quincy in USA) and Alibaba Cloud (Shanghai in China) Data Centers. Data security is maintained at various levels (Ex: Datacenters, in transit and at rest)



Master data changes and relevant security events on DM are Audit logged



DM provides features and functions to support Data Protection and Privacy requirements

Certifications

[Compliance Document Finder | SAP Trust Center](#)

ISO 27001 / 27017/ 27018	<p>ISO 27001: Specifies a management system that is intended to bring information security under management control</p> <p>ISO 27017: Provides guidelines for information security controls applicable to the provision and use of cloud services</p> <p>ISO 27018 : Establishes controls and guidelines for implementing measures to protect Personally Identifiable Information (PII) in accordance with the privacy principles in ISO/IEC 29100 for the public cloud computing environment.</p>
ISO 22301	<p>Standard for business continuity management. It's designed to protect business operations from potential disruption. This includes extreme weather, fire, flood, natural disaster, theft, IT outage, staff illness, and terror attacks.</p>
SOC1 Type 2	<p>SOC 1 is focused on financial reporting controls.</p>
SOC2 Type 2	<p>SOC 2 focuses on security, availability, processing integrity, confidentiality, and privacy of a system.</p>
CSA STAR registry / CSA STAR Certificate	<p>Is a rigorous third party independent assessment of the security of a cloud service provider.</p>
C5 Type 2	<p>C5 (Cloud Computing Compliance Controls Catalogue) intended primarily for professional cloud service providers, their auditors and customers of the cloud service providers. It defines requirements/controls the cloud providers have to comply with or which minimum requirements the cloud providers should be obliged to meet.</p>
EU Cloud CoC	<p>Defines a set of requirements that enable CSPs to demonstrate their capability to comply with GDPR</p>
ISO9001	<p>This certificate is for development following Innovation Cycle, also all LABs are listed via Appendix</p>

Digital Manufacturing – Language Support & Available Data Centers

The SAP Digital Manufacturing user interfaces support the following languages:

- Simplified & Traditional Chinese
- Czech
- English
- French
- German
- Hungarian
- Japanese
- Korean
- Polish
- Portuguese (Brazilian)
- Russian
- Slovak
- Spanish (Other variations of Spanish are not supported)
- Turkish
 - SAP Asset Intelligence Network (SAP AIN) doesn't support Turkish. SAP AIN apps use English as display language

The application help on SAP Help Portal supports the following languages:

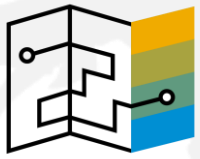
- English
- German
- Japanese

Digital Manufacturing is currently available with:

- **Amazon Web Services (AWS)** at the below data centers
 - Europe – Frankfurt, Germany
 - United States – East Coast (Virginia)
- **Microsoft Azure** at the below data center
 - Europe – Amsterdam, Netherlands
 - US West
- **Alibaba** at the below data center
 - China- Shanghai

Further Information

Key Links:



[SAP Road Maps](#)



[SAP Manufacturing Community](#)



[SAP Support](#)



[SAP Partner Portal](#)



[SAP Innovation Discovery](#)



[SAP Help Portal](#)

Where to go to Provide Product Feedback and Ideas:



[SAP Idea Place](#)



[Influence Programs](#)



[SAP User Groups](#)

Glossary

Term	Definition
DM	SAP Digital Manufacturing
IT/OT Data	Information Technology (IT) and Operation Technology (OT) data
SFC	Shop Floor Control (SFC): a unique WIP identifier representing a specific instance of the material being built during the manufacturing process. SFCs enable the full traceability of the product.
POD	Production Operator Dashboard
NC	Nonconformance
OEE	Overall Equipment Effectiveness
REO	Resource Orchestration
PCo	SAP Plant Connectivity
PPAP	Production Part Approval Process

For more definitions, please check the SAP Terminology Database [SAPterm](#).

Thank you.

Contact information:

