Transform Manufacturing with SAP

The Business Value for Manufacturing with SAP S/4HANA, Cloud/Line-of-Business Applications and SAP Leonardo
Jabil Goes Digital with SAP

Jabil is one of the largest and most technologically advanced manufacturers, working with more than 250 of the best-known global brands. Now they’re going digital with SAP Leonardo, using 3D printing to create personalized products, closer to where consumers live.
White Paper Background and Key Definitions

The information outlined below will help you understand the contents of this value proposition white paper. It gives details on the objectives and scope of the paper. Key definitions are also provided.

DELIVERABLE OBJECTIVE
Provides information on the value in moving from an ERP on a traditional database to SAP S/4HANA, Cloud/Line-of-Business (LoB) applications and SAP Leonardo solutions.

KEY DEFINITIONS
Within the process and subprocess deep dives, there is detailed content in table format articulating the following:

Typical Pain Points
Major customer business and IT challenges

Current State with ERP on Traditional Database
ERP capabilities that are available on a traditional database.

SAP S/4HANA (including standard SAP Leonardo capabilities)
Capabilities shipped with the latest release of SAP S/4HANA, including apps that are optimized for SAP Leonardo, such as an app for contract consumption.

Cloud/LoB and SAP Leonardo Solution Capabilities
Solutions that can be integrated with SAP S/4HANA and provide business value – for example, the SAP Manufacturing Execution solution or SAP Connected Goods software. These solutions are not embedded in SAP S/4HANA but they can be integrated.

Business Benefits
Key value drivers that are impacted by the adoption of SAP S/4HANA, Cloud and LoB applications, and SAP Leonardo solutions.

With the value proposition section, all quantified benefits are conservative, estimated improvement ranges tied to the top value drivers. They are based on early adopters or new developments and enhancements of SAP S/4HANA, Cloud/LoB applications, and SAP Leonardo capabilities that can drive value. Keep in mind that these benefits should be used as a guide. We recommend working together to assess your current maturity and the value of moving to SAP S/4HANA, Cloud/LoB applications and SAP Leonardo solutions to develop a personalized business case.

Last Update
SAP S/4HANA 1709 release. All Leonardo capabilities are highlighted in bold.

*Detailed road map available on SAP.com (customer login required)
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# Agenda

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Manufacturing in a Digital Economy

TRANSFORM MANUFACTURING WITH SAP

The market is experiencing a disruptive shift in customer demand for new, extensive, smart, and personalized products. Sellers are constantly reducing buffer inventory with obsolescence risk in mind. Manufacturers are competing to meet this challenge and provide individualized products in similar lead times and cost as off-the-shelf products. This creates tremendous complexity for the manufacturing operations team, yet at the same time, companies are looking for growth and profitability while maintaining high quality and sustainability.

To meet these demands, manufacturing is being used as a strategic pillar, becoming more collaborative, localized, automated, integrated, and highly adaptive. Companies are adopting digital manufacturing strategies and solutions to seamlessly connect relevant business stakeholders, information and operational processes in real time. Digital manufacturing simultaneously improves responsiveness and efficiency which drives growth, while decreasing cycle time and cost. Leveraging technologies like 3D printing, cloud, machine learning, and the Internet of Things (IoT) is increasing agility and extending the manufacturing network. Digital manufacturing has become a strategic differentiator.

Constraint-Based Planning – Enabling Live MRP
- Enable constraint-based planning (capacity and resource) with SAP S/4HANA, using various heuristics and optimizers to generate precise production plans
- Schedule your production plan quickly using SAP Fiori mobile as a graphical scheduling tool

Manufacturing Execution – Enabling a Lot Size of One
- Visualize, control and execute shop floor processes, and manage Bill Of Materials (BOM) better with enhancements to SAP S/4HANA
- Deliver individualized customer requirements through real-time "lot size of one" production in high-volume production scenarios by leveraging the integrated SAP Manufacturing Execution application

Manufacturing Network
- Empower manufacturing leadership with intuitive and preconfigured analytics to analyze global and plant level manufacturing performance and associated causes
- Connect to manufacturing service providers in the manufacturing network using SAP Distributed Manufacturing
- Collaborate with suppliers on inventory planning, just-in-time deliveries and get visibility across multi-tier supplier network using SAP Ariba Collaborative Supply Chain

Quality Management
- Enable integrated, simplified, and real-time quality management capabilities with easy-to-use user experience (UX)
- Perform quality inspections, providing inspection results through SAP Fiori apps

Environment, Health, and Safety
- Identify and control EHS risks pro-actively to reduce likelihood and severity of incidents
- Detect and resolve safety issues and learn from incidents
- Leverage native integration of incident management, health and safety management, and environment management as part of SAP S/4HANA digital core

Overview | E to E | Process Deep Dive | Digital Priorities | Value Proposition Summary | Customer References | Appendix
SAP MANUFACTURING VALUE PROPOSITION SUMMARY

SAP solutions enable companies to integrate and embed intelligence in manufacturing processes facilitating Industry 4.0 principles with one source of live information. They provide an optimal coordination of planning and execution processes, covering all aspects of the manufacturing cycle from planning to shop floor and beyond.

**Reduce manufacturing cost by increasing output and gaining real-time visibility into quality and costs**

Increase plant output with improved planning and visibility into equipment utilization while also reducing the inventory held for manufacturing. Have a real-time and drillable view of the performance metrics of all the production facilities globally. This enables identifying and implementing global manufacturing best practices.

**Reduce revenue loss due to plant fulfillment issues by agile planning and production orchestration**

Gain the ability to respond to demand and confirmed order changes. Live inventory data and drastically reduced material requirements planning (MRP) processing time improve transparency and responsiveness. The planning system simplifies constraint based capacity planning by bringing together material and capacity constraints. Improve production tracking, labor shortage, first pass yield, and equipment availability to ensure on-time delivery.

**Increase revenue growth by mass manufacturing of individualized products and 3D printing**

Produce personalized products ordered by customers with minimal human intervention. Product genealogy for every unit is maintained in the system for service and compliance needs. Collaboration with Origin Equipment Manufacturer (OEM) and contract service providers enables fulfilment of custom orders faster, while reducing inventory levels, time to market, and waste.

**Reduce scrap and rework cost by empowering the workforce to take informed decisions**

Gain immediate insights on planning, execution, quality, with analysis at the finest level of granularity available on mobile devices. Supervisors can analyze and take immediate actions on their mobile devices.

**Protect people and the environment and reduce manufacturing downtime by proactively managing operational risk**

Provide critical safety information to all employees – top floor to shop floor – to create an effective safety culture. Establish a holistic approach to embed safety and operational risk management into all of your operations.

**Reduce manufacturing-related IT cost by using an integrated set of solutions**

With SAP S/4HANA as the digital core, integrate seamlessly with the manufacturing execution suite and manufacturing network solutions (digital manufacturing insights, distributed manufacturing). This reduces the cost to develop and maintain digital manufacturing capabilities.
SAP’s Digital Business Framework for Manufacturing

SAP solutions enable organizations to drive business value across their end-to-end digital value chain.
End-to-End Business Scenarios

Outlined below are the end-to-end processes that are important to a manufacturing organization that wants to win in the digital age.

- **Demand to Production Plan** is an end-to-end manufacturing planning scenario where an optimal and executable production plan and schedule is generated based on multiple constraints (demand, capacity, inventory, etc.) and preferences (cost, quality, priority, etc.).

- One MRP with S/4HANA simplifies planning and responding to changes: create finite production plan according to the available capacity situation, schedule available resources with precision.

- This enables manufacturers to drive production on ‘actual demand’ rather than ‘forecasts’: increases production throughput, reduces production costs, reduces order cycle time, increases on-time deliveries and reduces shortages.

- **Personalized Order to Production (Industry 4.0)** is an end-to-end manufacturing execution scenario where personalized “lot size of one” orders are produced with minimal human intervention.

- SAP Leonardo capabilities enhance automation with machine-to-machine communications, industry 4.0 frameworks, and IoT capabilities across global manufacturing facilities. This enables seamless manufacturing with digital collaboration of manufacturing master data, design structure handovers, process planning, and intelligent change management.

- This enables manufacturers to increase revenue growth, lower costs, and collaborate across global manufacturing and supply chain networks.

- **Global Manufacturing Network – Insights to Action** is an end-to-end scenario for analysis and improvement of manufacturing processes.


- Proactively identify and resolve issues in the manufacturing network, increase fulfillment of delivery commitments and lower total manufacturing costs with scalable, flexible, cost-effective deployment options.

* The collaboration extends to 3D printing and other manufacturing processes
Reimagine Demand to Production Plan

SAP S/4HANA provides next-generation production planning (MRP live) optimized on the SAP HANA platform for faster planning cycles and synchronization to demand changes, resulting in fewer material shortages and delays, and less safety stock.

**Demand-to-Production Plan**

**Traditional SAP ERP**

- Manage master data in SAP ERP
- Manage master data in SAP APO
- Run finite planning in SAP APO production planning
- Manage conflicts in SAP APO
- Monitor capacity in SAP APO
- Run MRP in SAP ERP for noncritical components
- Manage conflicts in SAP ERP
- List scheduled planned orders for release

**SAP S/4HANA**

- One MRP run for finite and infinite material planning with harmonized master data and one SAP Fiori launchpad for material flow and capacity

**More than smarter and faster . . . a reimagined process**

- Harmonized master data and one process for finite and infinite material planning
- Optimized capacity utilization
- Optimally scheduled planned orders
- Real-time inventory management
- Appropriate purchase orders created

**TOP VALUE DRIVERS**

- Increase production planning FTE productivity
- Improve order-to-delivery and production cycle times
- Reduce Inventory

**Increase**

- User productivity and efficiency by harmonized master data and one process for finite and infinite material planning

**Increase**

- Order-to-delivery and production cycle times

**Reduce**

- Inventory and planning cost
Reimagine Personalized Order to Production (Industry 4.0)

Personalized customer order is transferred to manufacturing with minimal manual intervention through the integration of SAP S/4HANA with SAP e-commerce solutions. Integration with suppliers enables optimized scheduling and getting the required raw materials at the right production line. There is complete traceability and serialization for the finished goods. A personalized order is executed as seamlessly as mass production.

**Personalized Order to Production (Industry 4.0)**

**Traditional SAP ERP**
- Customer can select only from defined product variants
- Additional personalization requires engineering effort. It is delivered with high cost, long lead time, and varying quality
- Significant investment of labor and resources to fulfill the order
- Low customer satisfaction and inability to scale personalized offerings

**New World with SAP Software**
- Personalized order from customer through e-commerce; real-time feedback on feasibility
- Confirmation of commitment and lead time based on manufacturing/ supplier network guidance
- Advanced variant configuration enables real-time product and production engineering
- Scheduling production in a single system
- Traceability and serialization enabled by integration of SAP Manufacturing Execution with digital core
- Fulfillment of personalized order with short lead time, low cost and high customer satisfaction

**Upgrade to seamless manufacturing of personalized products from defined variants**

**TOP VALUE DRIVERS**

- Reduce Order Fulfillment Lead time
- Reduce Manufacturing Cost
- Improve Quality
- Improve On-time Delivery
**Reimagine Global Manufacturing Networks - Insights to Action**

The SAP Digital Manufacturing Insights solution provides the global view of manufacturing operations. SAP Distributed Manufacturing enables digital collaboration with manufacturing service providers. The partners are aligned with the manufacturing process through Ariba Network for forecast, quality, and inventory.

### Global Manufacturing Networks: Insights to Action
#### Traditional SAP ERP
- No single view of global manufacturing
- Collect data rather than assess and make decisions in meetings
- Outdated data collated in Microsoft Excel makes it difficult to drill into root cause of issues
- Unable to identify and drive global best practices
- Unable to refine alignment with suppliers and contractors
- Network unable to generate external and internal synergies

### New World with SAP Software
and global view of manufacturing operations
- Decision making and tracking on OEE, quality, and so on.
- Digital collaboration with external contractors and suppliers
- Real-time insights to actions
- View standardized and live manufacturing metrics
- Analyze and act on production operations data
- Digital collaboration with manufacturing service providers on material, design, quality, and cost
- Optimized network and aligned processes

### TOP VALUE DRIVERS
- Reduce Procurement Lead Time
- Reduce Manufacturing Cost
- Improve Quality
MANUFACTURING CAPABILITIES

Outlined below are the primary capabilities for manufacturing where value can be achieved through SAP S/4HANA, Cloud/ LoB applications and SAP Leonardo solutions.

Manufacturing Operations and Safety
- Constraint-based production planning
- Production scheduling
- Extended production operations
- Production warehouse
- Quality management and compliance
- Enterprise performance management
- Incident management
- Environment management
- Health and safety management

Manufacturing Execution (Industry 4.0)
- Manufacturing engineering
- Digital manufacturing insights
- Overall equipment effectiveness
- Paperless factory
- Product genealogy
- Nonconformance management
- Predictive maintenance
- Kanban
- Enterprise performance management
- Shop floor control
- Manufacturing automation
- Machine connectivity and orchestration

Manufacturing Networks
- Distributed manufacturing
- Digital manufacturing insights
- Demand and supply collaboration
- Digital inventory
- Manufacturing as a service
TYPICAL PAIN POINTS

Current State with ERP on Traditional Database

- Planning runs at predefined times with data that first must be consolidated from various systems
- Separate manufacturing planning processes available in planning and ERP systems
- Inventory management and planning systems need integration with ERP for MRP

SAP S/4HANA (including standard SAP Leonardo capabilities)

- Single run supports both detailed scheduling and MRP; no coordination of runs required between finite and infinite planning
- Seamless integration of master data and transactional data in planning
- Optimized material flows by harmonizing requirements to the production schedule together with the supplier – for example, grouping of POs to ensure only full truckload shipments
- Constraint-based planning (capacity and resource) using various heuristics and optimizers to generate a precise production plan by bringing production planning and detailed scheduling on SAP S/4HANA
- Web-based graphical scheduling tool to optimize and plan the resource schedule, order dates, and times as well as to plan critical products and monitor capacity utilization

Cloud/ LoB and SAP Leonardo Solution Capabilities

- Align with demand-driven planning through integration with SAP Integrated Business Planning

2018 Planned Innovations

- Interactive production planning and simulations (SAP Fiori apps)

Business Benefits

- Reduced manufacturing cycle time
- Improved manufacturing planning function efficiency
- Reduced revenue loss due to fulfillment issues
- Reduced total manufacturing costs
- Increased on-time delivery performance

• Long and overnight batch runs result in planning inefficiencies
• Cumbersome and time-consuming analysis of planning situation
• Disparate planning and transactional systems lead to data integration latency and errors
• Inflexibility to include real-time, changing demands in the planning run leads to outdated and inaccurate planning
# Manufacturing Operations and Safety Quality Management Deep Dive

## Typical Pain Points

- Difficulty getting an end-to-end view of quality
- Changing a local or departmental quality management (QM) focus to a company-wide (and later to a supply chain) focus
- Preventing nonconformance within all stages of design to production to delivery

## Current State with ERP on Traditional Database

- Quality management-relevant functions are integrated with supply chain, covering the areas of quality engineering, quality inspection, and quality improvement

## SAP S/4HANA (including standard SAP Leonardo capabilities)

- Integrated and simplified solution utilizing quality management capabilities
- Simplified user interface and new user setup: core QM processes supported by new roles in SAP Fiori user experience for quality technician, quality engineer, quality planner, quality manager, quality auditor, and calibration technician
- New SAP Fiori transactional app for monitoring inspection lots and making usage decisions
- Overview pages for different roles in QM to have one central place to view all the inspection lots that require action
- While simultaneously presenting the big picture in a glance, business users can focus on the most important tasks, enabling faster decision-making as well as immediate action

## Cloud/LoB and SAP Leonardo Solution Capabilities

- Enhanced quality technician and engineering overview pages with analytical information
- Enabling of stock transfers and quantity splits during usage decision-making
- Ability to view inspection lots that are ready for completion and make a preconfigured usage decision

## 2018 Planned Innovations

- Management of settings in quality information record for procurement
- Management of quality tasks
- Manual recording and monitoring of defects
- Enhanced analytical information on the existing overview page

## Business Benefits

- Reduced revenue loss due to quality and compliance issues
- Reduced scrap and rework
- Transparency on items and domain-specific insight on what needs attention
- Simple and user-friendly option to make usage decisions
- Easy-to-handle user interface

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Manufacturing Operations and Safety
Quality Management Deep Dive

TYPICAL PAIN POINTS

Current State with ERP on Traditional Database

• Time-consuming and inefficient process for recording quality inspection results
• Different generic UIs are available for recording quality inspections

SAP S/4HANA

• Ability to perform quality inspections, providing inspection results to enable timely, informed release decisions and therefore support product compliance and quality requirements
• Easy-to-use, but comprehensive, user interfaces for recording the results of different types of inspection characteristics
• Simplified inspection process and goods receipt in SAP Extended Warehouse Management within SAP S/4HANA

Cloud/ LoB and SAP Leonardo Solution Capabilities

• Point-of-detection recording with SAP Fiori app (also mobile-enabled) for faster and more efficient recording by quality technicians (role-based)
• Defect recording and automatic display of defects found during quality inspection
• Flexible worklists and graphical representation
• New SAP Fiori transactional app for monitoring inspection lots and making usage decisions
• Search and contextual navigation in SAP Fiori object pages for important QM objects
• Overview pages for quality technicians to provide one central place to view all the inspection lots that require action
• Released integration scenarios to enable extensions for customers and partners

2018 Planned Innovations

• Recording of results during production on a regular basis
• Management of quality level in order to tighten or reduce inspection scope
• Enhanced overview pages containing analytical information as entry points
• Statistical process control to monitor and manage controlled production processes
• Overview page that presents information in a way that is easily read and understood
• Ability to see all important data in QM at a glance, including navigation targets

Business Benefits

• Reduced revenue loss due to quality and compliance issues
• Reduced scrap and rework
• Reduced manufacturing quality labor cost
• Reduced manufacturing quality labor cost

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Manufacturing Operations and Safety
Quality Management Deep Dive

TYPICAL PAIN POINTS

• Analysis based on past performance instead of proactive measures based on asset and production performance
• Lack of real-time simulations or predictive capability to detect quality issues

Current State with ERP on Traditional Database

• Different tools are available for analyzing data in quality management

SAP S/4HANA (including standard SAP Leonardo capabilities)

• New analytics for quantitative results with graphical and statistical parameters
• SAP Fiori apps to improve quality control by monitoring and adjusting processes
• Search and contextual navigation in SAP Fiori object pages for important QM objects.
• Worklist for managing usage decision with information about usage decision, valuation, and quality score

Cloud/LoB and SAP Leonardo Solution Capabilities

• SAP Fiori apps to improve quality control by monitoring and adjusting processes
• Newly designed object pages with charts to display results history and single values in graphical form
• New SAP Fiori apps for capturing and monitoring defects
• Enhancements to the overview pages for quality technicians and quality engineers with analytical information, such as deviations that can be used as entry points
• Real-time monitoring and exception management of quality deviations
• While simultaneously presenting the big picture in a glance, business users can focus on the most important tasks, enabling faster decision-making as well as immediate action

2018 Planned Innovations

• Evaluate and analyze key figures for quality management data
• Statistical process control to monitor and manage controlled production processes
• Cloud analytics for predictive quality management

Business Benefits

• Reduction in revenue loss resulting from quality and compliance issues
• Reduced scrap and rework
• Flexibility to analyze different values and quantitative characteristics
• Faster decision-making and immediate action

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Manufacturing Operations and Safety
Quality Management Deep Dive

**TYPICAL PAIN POINTS**

- Difficulty getting an end-to-end view of quality due to distributed systems
- Changing a local or departmental quality management focus to a company-wide (and later to a supply chain) focus
- Preventing nonconformance within all stages of design to production to delivery

**Current State with ERP on Traditional Database**

- Quality management-relevant functions are integrated with supply chain, covering the areas of quality engineering, quality inspection, and quality improvement

**SAP S/4HANA (including standard SAP Leonardo) capabilities**

- Simplified quality processes utilizing QM and quality issue management capabilities
- Simplified user interface and new user setup; core QM processes supported by new roles in SAP Fiori user experience for quality technician, quality engineer, quality planner, quality manager, quality auditor, and calibration technician
- Enhanced and simpler user experience for the quality technician to improve productivity
- Ability to run in a mobile environment with significant reduction in the number of clicks required

**Cloud/LoB and SAP Leonardo Solution Capabilities**

- SAP Distributed Manufacturing allows collaboration on quality criteria and inspection results with suppliers

**2018 Planned Innovations**

- SAP Distributed Manufacturing to allow integration of supplier part data like QM and genealogy
- Additional object pages in SAP Fiori for a wide range of quality objects

**Business Benefits**

- Reduced revenue loss due to quality and compliance issues
- Reduced scrap and rework
### TYPICAL PAIN POINTS

<table>
<thead>
<tr>
<th>Current State with ERP on Traditional Database</th>
<th>SAP S/4HANA (including standard SAP Leonardo) capabilities</th>
<th>Cloud/LoB and SAP Leonardo Solution Capabilities</th>
<th>2018 Planned Innovations</th>
<th>Business Benefits</th>
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<tbody>
<tr>
<td>• Difficulty in developing one common view of process risks related to workers, assets, or the environment results in high cost for environment, health, and safety compliance</td>
<td>• Multi-tiered landscape consisting of ERP, ERP component extension, and business intelligence makes it challenging to access single source of truth for all EHS-related information</td>
<td>• Native integration of incident management, health and safety management, and environment management are available as part of SAP S/4HANA digital core</td>
<td>• Live data on EHS risks including a real time status tracking of the control implementations to CxOs via Digital Boardroom</td>
<td>• Reduced EHS management cost</td>
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<tr>
<td>• Multi-tiered landscape consisting of ERP, ERP component extension, and business intelligence makes it challenging to access single source of truth for all EHS-related information</td>
<td>• Native integration of incident management, health and safety management, and environment management are available as part of SAP S/4HANA digital core</td>
<td></td>
<td>• Management of change functionality based on SAP S/4HANA</td>
<td>• Improvements in operational efficiency</td>
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<td>• New app to create risks, perform a quick assessment of risk levels, define needed controls, and specify impacts</td>
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<td></td>
<td>• Integrations with EHS content providers</td>
<td>• Ensure Compliance at all times</td>
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<td>• Analysis is based on past performance, which limits the scope of proactively driving EHS risk reduction</td>
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<td>• EHS as part of SAP S/4HANA Cloud suite</td>
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<td>• Data is processed in batches, which increases the time required to analyze EHS-related information</td>
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<td>• Lean risk assessment process</td>
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<td>• SAP Connected Worker Safety - real-time monitoring of worker exposure and health condition</td>
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<td>• Embedded analytics based on live data that help EHS practitioners act in the moment</td>
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<td>• Live data on incident, environment, risk, energy to CxOs via Digital Boardroom</td>
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<td>• Additional in-memory analytics and enhanced task management</td>
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<td>• Overall improved efficiency of EHS operations</td>
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<td>• Reduced EHS management cost</td>
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## Manufacturing Operations and Safety Environment, Health, and Safety (EHS) Deep Dive

### TYPICAL PAIN POINTS

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<tbody>
<tr>
<td>• Limited ability to investigate and follow-up on incidents in an effective manner, which leads to a reduced understanding of root causes, deficit of learning from incidents / near misses and an overall lack of insights to leading safety indicators</td>
<td>• The incidents can be recorded and reported to compliance regulators</td>
<td>• Gain role-based access to the application to manage context-specific work and gain visibility into results</td>
<td>• Live data on incident, environment, risk, energy to CxOs via Digital Boardroom</td>
<td>• Gain insight into root causes of near misses, safety observations and incidents</td>
</tr>
<tr>
<td>• Difficulty in developing a real-time view of environmental impact of business operations hinders the process of complying with environmental regulations</td>
<td>• Data monitoring and data reporting followed by automated emissions calculations can be done</td>
<td>• SAP Fiori mobile app for recording incidents in an offline mode</td>
<td>• Determine location based on geo-position within the SAP Fiori mobile app</td>
<td>• Efficient management of corrective and preventive measurements</td>
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<td></td>
<td>• New app to monitor and perform analysis of environmental data stored in the system</td>
<td>• New analytics app to perform analysis of incident records by type (incidents, near misses, and safety observations), and by incident related cases (injury/illness, asset-related, release-related and notice of violation)</td>
<td>• Capture incident and deviation in a single record</td>
<td>• Reduced compliance penalties and fines</td>
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<td></td>
<td>• Simplified process to track substances that are subject to legal or industry specific regulations and manage operational exposure limits to such substances</td>
<td>• The SAP Connected Worker Safety solution allows to demonstrate compliance at all times by giving real time insights on workplace exposure information</td>
<td>• Additional analytics represented as Smart Business app to illustrate the further incident rates and KPIs</td>
<td>• Additional business process support for water and wastewater management</td>
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<td>• Live data on environmental incidents, emissions and energy to CxOs within the report incident app</td>
<td>• EHS content provider integration</td>
<td>• Reduced emissions</td>
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<td></td>
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<td>• Capture environmental releases (materials)</td>
<td>• Reduced EH&amp;S compliance penalties and fines</td>
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# Manufacturing Execution (Industry 4.0) Deep Dive

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</table>
| • Inability to manage “lot size of one” in a cost-effective manner | • SAP Business Suite software provides solutions for variant configuration and make-to-order and assemble-to-order scenarios | • Change impact analysis and change record apps allow for more efficient integration between engineering and manufacturing | • In combination with SAP S/4HANA, the SAP Manufacturing Execution allows for end-to-end process integration from sales order to shop floor  
  - Process enforcement  
  - Machine orchestration  
  - Data collection  
  - Nonconformance management  
  - Touch and mobile UI | • New revenue potential through individualized products or new business models | • Limited system flexibility and automation available to cater to the mass customization demands in a cost-effective manner | • Limited integrated mechanism to support mass customization efficiently | • Further enhancements to the integration between SAP Manufacturing Execution and SAP S/4HANA | • More streamlined and efficient handover process |
| • Limited system flexibility and automation available to cater to the mass customization demands in a cost-effective manner | • Limited integrated mechanism to support mass customization efficiently | • SAP Manufacturing Execution and SAP Plant Connectivity extend S/4HANA with more than 900 Web services to connect shop floor equipment and IoT devices to SAP software  
  • Activity hook points in SAP Manufacturing Execution increase the flexibility of execution while SAP Plant Connectivity facilitates machine orchestration for unprecedented flexibility of manufacturing processes | • Simplified configuration of machine integration scenarios using SAP Plant Connectivity | • Improved process agility | • Interrupted material flows result in inefficient operations | • Support for just-in-time production with Kanban as well as JIT inbound and outbound material flows | • Support for just-in-time production with embedded Kanban as well as JIT inbound and outbound material flows | • Reduced inventory cost |

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# Manufacturing Execution (Industry 4.0) Deep Dive

## Typical Pain Points

<table>
<thead>
<tr>
<th>Current State with ERP on Traditional Database</th>
<th>SAP S/4HANA (including standard SAP Leonardo capabilities)</th>
<th>Cloud/LoB and SAP Leonardo Solution Capabilities</th>
<th>2018 Planned Innovations</th>
<th>Business Benefits</th>
</tr>
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<tbody>
<tr>
<td>• Inefficient or ad hoc handover of bill-of-material information and design changes from engineering to manufacturing</td>
<td>• Visual manufacturing planner for leveraging 3D CAD information, thereby simplifying the handover process</td>
<td>• Manufacturing engineering provides new user experience to create manufacturing-relevant master data and efficiently handle handover to manufacturing</td>
<td>• Enhancements for managing complex assembly structures</td>
<td>• Reduction in unnecessary costs through enhanced engineering change management</td>
</tr>
<tr>
<td>• Inability to handle engineering or manufacturing-driven changes on manufacturing master data and production orders efficiently and consistently</td>
<td>• Manual process to go into list of production orders and run multiple reports</td>
<td>• Comprehensive change impact analysis which extends to the shop floor with possibility to hold production orders in addition to assessing stock quantities prior to change implementation</td>
<td>• Enhanced capabilities of the change impact analysis to include more detailed information on impacted objects</td>
<td>• Reduced manufacturing production costs by reducing scrap</td>
</tr>
<tr>
<td>• Inefficient application proximity to shop floor workers to make entries results in delays and errors</td>
<td>• Shop floor workers go to the central terminal to make required entries</td>
<td>• SAP Fiori apps for production supervisor and production operator also on mobile devices</td>
<td>• Enhancements to the SAP Fiori apps</td>
<td>• Reduced manufacturing direct labor cost</td>
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<tr>
<td>• Complex and expensive system landscapes with multiple shop floor systems in distributed plants, resulting in high total cost of ownership (TCO)</td>
<td>• SAP Business Suite software provides an integrated solution from enterprise planning to shop floor execution</td>
<td>• Fundamentally new data models and functions reduce the number of systems required, for example, single material master for ERP and supply-chain management-relevant materials</td>
<td>• Simplified IT landscape and lower TCO</td>
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### Manufacturing Networks Deep Dive

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<td>• Complicated manufacturing partner ecosystem; collaboration requires every manufacturer, service provider, or equipment operator to link up with each business partner separately to exchange data on equipment and components</td>
<td>• Manual effort to collaborate with business partners</td>
<td>• Manage the subcontracting process from planning to execution; monitor and integrate your business network</td>
<td>• SAP Distributed Manufacturing is a cloud-based collaborative platform that connects customers with (additive) manufacturing service providers – for example, suppliers of 3D printing services, material providers, original equipment manufacturers, and technical certification companies</td>
<td>• Reduced manufacturing technology cost</td>
<td>• Reduced unplanned downtime or outages</td>
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<td>• Integrate the external workforce into production execution; manage time and material handovers</td>
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<td>• Higher visibility into asset use</td>
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<td>• SAP Distributed Manufacturing extends the network and collaboration scenarios to:</td>
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<td>• Include further supplier types like CNC or injection molding</td>
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<td>• Exchange further information like QM and product genealogy</td>
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<td>• Manage the product lifecycle as a “digital twin” from “as-designed” in SAP Product Lifecycle Management to “as-built” in SAP Manufacturing Execution to “as-maintained” in SAP Asset Intelligence Network</td>
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# Manufacturing Networks Deep Dive

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<td>• Lack of visibility into production processes, status, and performance in enterprise systems, leads to inaccurate decision making</td>
<td>• Manufacturing insights available with support from IT department using analytical tools such as SAP BusinessObjects business intelligence solutions</td>
<td>• Real-time alerts based on bottlenecks in production, such as time or component delays, and in resources</td>
<td>• Overall equipment effectiveness in SAP Manufacturing Execution and SAP Digital Manufacturing Insights</td>
<td>• Reduced total manufacturing costs</td>
</tr>
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<td>• Plant performance analytics</td>
<td>• SAP Digital Manufacturing Insights allows for the combination of business information and shop floor data in analytics to analyze performance of machines</td>
<td>• Ability to drive manufacturing performance according to organizational goals with possibility of intracompany benchmarking</td>
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<td>• SAP Fiori apps for the production supervisors and operators to provide live production visibility, orchestration, and confirmation capabilities</td>
<td>• SAP Digital Manufacturing Insights is a centralized, cloud-based, data-driven manufacturing performance management solution that enables key stakeholders of manufacturing operations to take tactical and strategic decisions to achieve best-in-class manufacturing performance</td>
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<td>• In combination with SAP S/4HANA, SAP Manufacturing Execution empowers the customer to create dashboard without coding to gain real-time insights into all shop floor operations</td>
<td>• Further enhancements to provide insights and predictive quality analytics based on Big Data coming from the shop floor</td>
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Reimagine Distributed Manufacturing

Manufacturers can efficiently handle variable customer demands and compress manufacturing cycles using SAP Distributed Manufacturing solution. Manufacturers identify which components of their products are best suited for 3D printing* and help find the right partners for printing. The result is a new level of supply chain agility to meet fast-changing customer needs.

Traditional ERP

Manufacturers

Don’t know who to reach out to!

Multiple iterations of offline interactions

Inefficient and unoptimized design, cost, quality, and timelines!

Manufacturing service providers

New World with SAP Software

Identify the parts to be manufactured through partners; export parts from SAP S/4HANA into SAP Distributed Manufacturing

Select the manufacturing service provider from the network based on detailed profile

Finalize quality characteristics; Complete first article inspection and design optimization

Plan pricing; manage procurement through support for quotations and approvals

Fulfill personalized order with short lead time, low cost, and high customer satisfaction

TOP VALUE DRIVERS

Increase revenue growth

Reduce time market for new products

Reduce order fulfillment lead time

Reduce logistics cost

* The collaboration extends to 3D printing and other manufacturing processes
Digital Priorities in Manufacturing

Live Planning

To fulfill customer orders in time, demand needs to be prioritized over forecast in real time. Optimal planning and faster response to demand changes based on live visibility of constraints enables higher production (lowers manufacturing costs) while increasing on-time delivery performance.

Live planning enabled by SAP S/4HANA provides constraint-based planning (capacity and material flow) in one system that addresses requirements of all major manufacturing industries. Manufacturers can manage advanced planning and scheduling scenarios directly integrated with SAP S/4HANA material and order management environment.

Distribution Manufacturing

To leverage the global manufacturing and logistics partner network, manufacturers need to quickly and efficiently connect them through supply chain and manufacturing solutions with the 3D printing and other manufacturing capabilities. Manufacturers can improve on-time delivery performance by effectively planning inventory replenishment and optimizing trade-offs between inventory.

SAP Distributed Manufacturing solution enables digital collaboration with manufacturing service providers. End-to-end process from design, costing, approvals, quality checks to production status is supported. This increases local and central operational visibility, and flexibility in production of components/products with personalized/complex designs, and variable/low demand (e.g., new launches, spare parts etc.).

Production Engineering and Operations (PEO)

To manufacture personalized products ordered by customer, the need to efficiently and accurately synchronize data across designing/formulating, manufacturing engineering, and production execution processes is required.

SAP S/4HANA Manufacturing for production engineering and operations expands core SAP S/4HANA manufacturing capabilities, delivering enhanced visualization with newly developed and enriched BOM management, process planning, change management, and shop floor execution feature sets. New digital manufacturing capabilities streamline production planning and shop floor operations within global production environments utilizing the power of SAP S/4HANA with proven integrations.

Digital Manufacturing Insights

For manufacturing leaders to drive insights to action, access is required into live information about global production operations based on a common definition to drive continuous improvement across the organization.

SAP Digital Manufacturing Insights solution provides standardized manufacturing process view for the SAP S/4HANA software environment and is future-proof in design by running analytics directly from the digital core. SAP delivers a unique perspective of analytics that is tied to core business processes and functions. This enables tracking of efficiency and ties dollar figures to variances of these processes.
SAP’s Value Proposition for Digital Manufacturing

**STRATEGY ENABLEMENT**
- Run Simple (master complexity) – Simplified and efficient production engineering, production planning, and execution processes
- Run live – Decision-making with automated transfer of production results and real-time updates on performance
- Automation that enables business process transformation

**BUSINESS BENEFITS**
- Reduction in total manufacturing costs up to 10%
- Reduction in manufacturing cycle time up to 10%
- Reduction in scrap value up to 25%
- Reduction in order fulfillment lead time by 10% - 15%
- Increased material posting throughput from 5x - 25x
- Improved labor utilization with “live” production monitoring by 5% - 10%
- Reduced environment, health, and safety management cost by 1% - 5%
- Distinct systems consolidation effort reduced by 20% - 30%

**RISK MANAGEMENT**
- Distributed manufacturing that enables reduction of inventory and risk of revenue loss due to stock-outs
- Integration of execution and planning systems that reduces risk of revenue loss due to cancelled orders
- Reduced accident and incident rate
- Lower cost of risk mitigation
- Reduced compliance penalties and fines by 5% - 10%*

**EMPLOYEE ENGAGEMENT**
- Increase in productivity through tailored UX
- Higher throughput
- Easier-to-use interface and simplified workflow
- Improved technician productivity
- Reduced lost-time accidents by 1% - 5%*
- Reduced training costs

*Benefits are based on early adopters of SAP S/4HANA or conservative outside-in benefits due to moving from a traditional ERP to enhanced SAP S/4HANA, Cloud/LoB applications and SAP Leonardo solutions. As each enterprise is at a different level of maturity, our recommendation is to work with you to determine the value proposition for your enterprise.
Customers Are Achieving Value from SAP Software

**BRP-Rotax**

- Production design, measured data, and services are seamlessly connected
- Throughout the process material movements are recorded in real time

BRP-Rotax produces unique, customized engines for its customers. Using Industry 4.0 technologies and SAP Connected Manufacturing software, its manufacturing machinery automatically adapts to the production workload and sequencing, using marked parts arriving at each workstation.

*Click here for BRP-Rotax source reference*

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**Landis+Gyr**

- >15% improvement in product throughput
- 2% improvement in first-pass yield

Landis+Gyr is a Swiss producer of energy management solutions, including smart meter products, for utilities. The company reimagined its manufacturing processes to automate production steps and improve product quality.

Leveraging SAP ERP and SAP Connected Manufacturing software, the company enabled full product genealogy and process controls. With the engineering team’s ability to monitor shop floor processes through a real-time analytical dashboard, the team was quick to sense, analyze, and respond to product quality issues.

*Click here for Landis+Gyr source reference*
Customers Are Achieving Value from SAP Software

**ebm-papst**

- Control and documentation of complete production process through permanent component identification
- Real-time detection of deviations through active process control
- Continuous traceability from the final product to the batch of each recorded component

ebm-papst, a German ventilation and drive engineering firm, reimagined its production processes to meet Industry 4.0 requirements, focusing on process optimization, process control, and transparency.

The company uses SAP Connected Manufacturing software and Industry 4.0 technologies to automate production and ensure complete traceability of products from order to shipment.

[Click here for ebm-papst source reference](http://www.ebmpapst.in)

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**Lukoil**

- 90 seconds needed for the examination of one miner, down from 5 minutes
- Reduced risk and costs associated with basing a team of medical staff at each location

Lukoil, one of the world’s largest oil companies, uses automated medical terminals that examine and monitor the health of its miners who work in very hard conditions to prevent accidents and human error.

Lukoil uses a prototype examination system developed by SAP and based on SAP Cloud Platform, which can perform analysis of the data in real time and integrate with HR business processes. As soon as an employee passes the examination, medical data is sent to the doctor’s workstation and to other SAP business processes, helping the doctor to decide if the employee is allowed to work that day.

[Click here for Lukoil source reference](http://www.lukoil.com/)
Customers Are Achieving Value from SAP Software

**Faurecia**

- Potential savings of millions of euros in working capital
- 20x faster MRP
- More streamlined and timely profit analysis

Manufacturing is a 24x7 process with real-time insight and decisions necessary for planning inside and outside the enterprise. In some plants a large variety of products has to be managed under strict time constraints on production and procurement.

Faurecia transformed work by eliminating manual processes, accelerating manufacturing resource planning (MRP), and delivering planning insight in real time with SAP HANA platform.

[Click here for Faurecia source reference](#)

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**Moritz J. Weig GmbH & Co. KG**

Moritz J. Weig GmbH & Co. KG chose EHS functionality in SAP S/4HANA to manage its business when it comes to health and safety. Key to this choice were criteria such as the user experience in SAP software and the desire to empower EHS practitioners with live data to act in the moment. The solution will help move the company beyond automation to predictive suggestions.

[Click here for Moritz J. Weig source reference](#)
Your Path to Digital Transformation

Every enterprise is unique, with different starting points and end points. Whether you are starting a net-new implementation or undergoing a digital transformation in an existing SAP landscape, SAP can help. We have been working with enterprises of all sizes and in all industries. Based on the depth of this experience, we offer a robust portfolio of services.

Customer Engagement Methodology

No matter which path applies to your enterprise, SAP has a structured four-phased approach to ensure success – executive alignment, value discovery, validation and executive readiness, and value delivery.

For more details, please see the brochure Driving Value in a Digital Economy.

SAP Value Assurance Service Packages

Take advantage of SAP Value Assurance service packages for SAP S/4HANA to quickly and safely harness the power of next-generation software and in-memory processing.

For all value assurance packages and for the successful and seamless transition to SAP S/4HANA, please visit the link Transition to SAP S/4HANA.

Manufacturing Road Maps

SAP gives customers the transparency to accelerate their transition to an SAP S/4HANA landscape with a three-year detailed road map – SAP S/4 HANA Manufacturing Roadmap.

SAP gives transparency to our cloud products with a quarterly view in product road maps:

- SAP Digital Manufacturing Insights
- SAP Distributed Manufacturing

Start today with a Trial – SAP S/4HANA Trials

Key assets for next steps on SAP S/4HANA

www.sap.com/s4next

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Get started today with SAP Leonardo

Explore SAP Leonardo Capabilities

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For more details, please see the e-book Leonardo customer stories

Get an Expert take on Digital Transformation

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Get answers from experts and analysts in this e-book

Assess Your Manufacturing Digital Maturity

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Lay the Foundation for an In-depth Digital Transformation Engagement

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