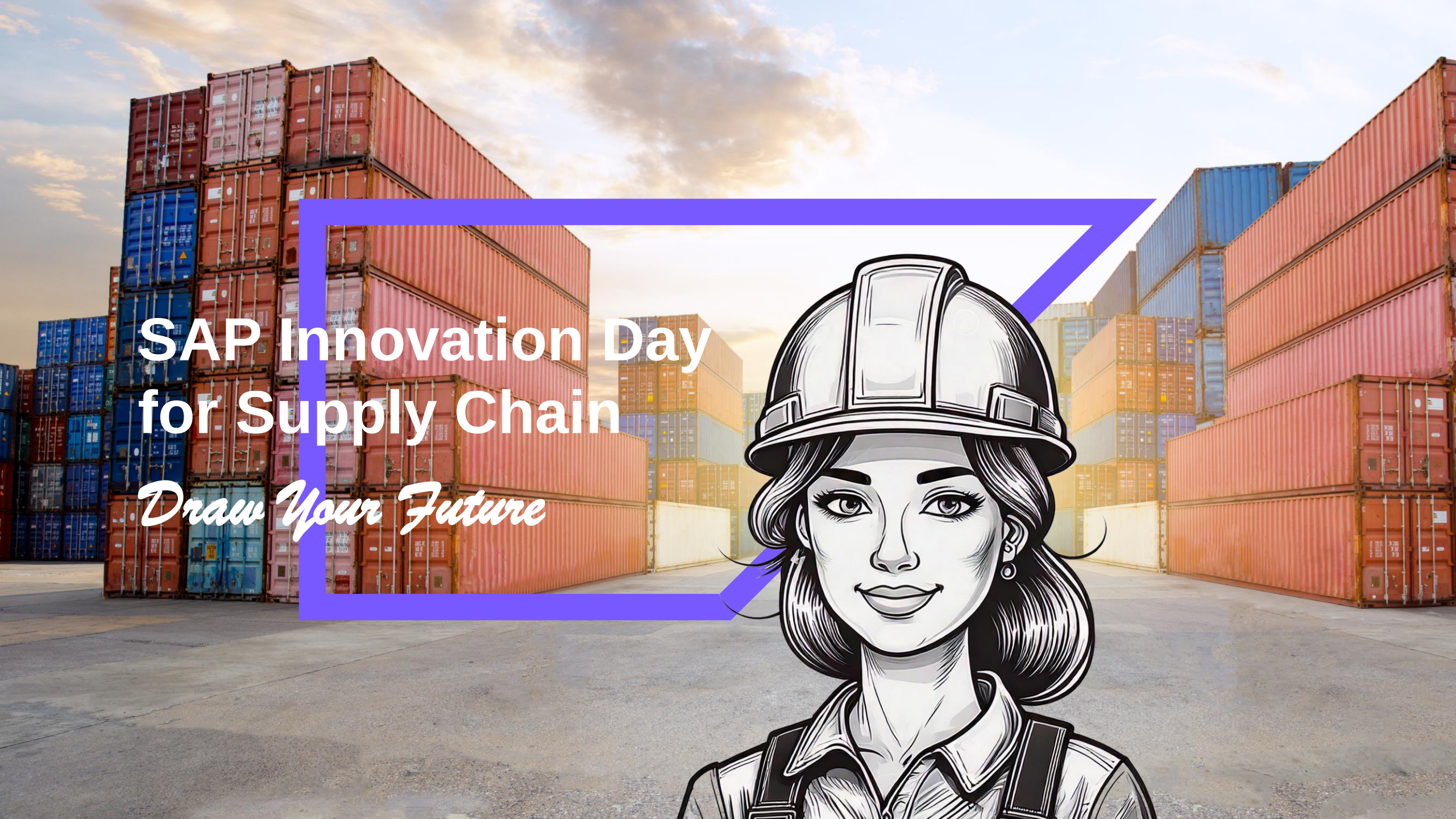

SAP Innovation Day
for Supply Chain
Draw Your Future

Digital Manufacturing

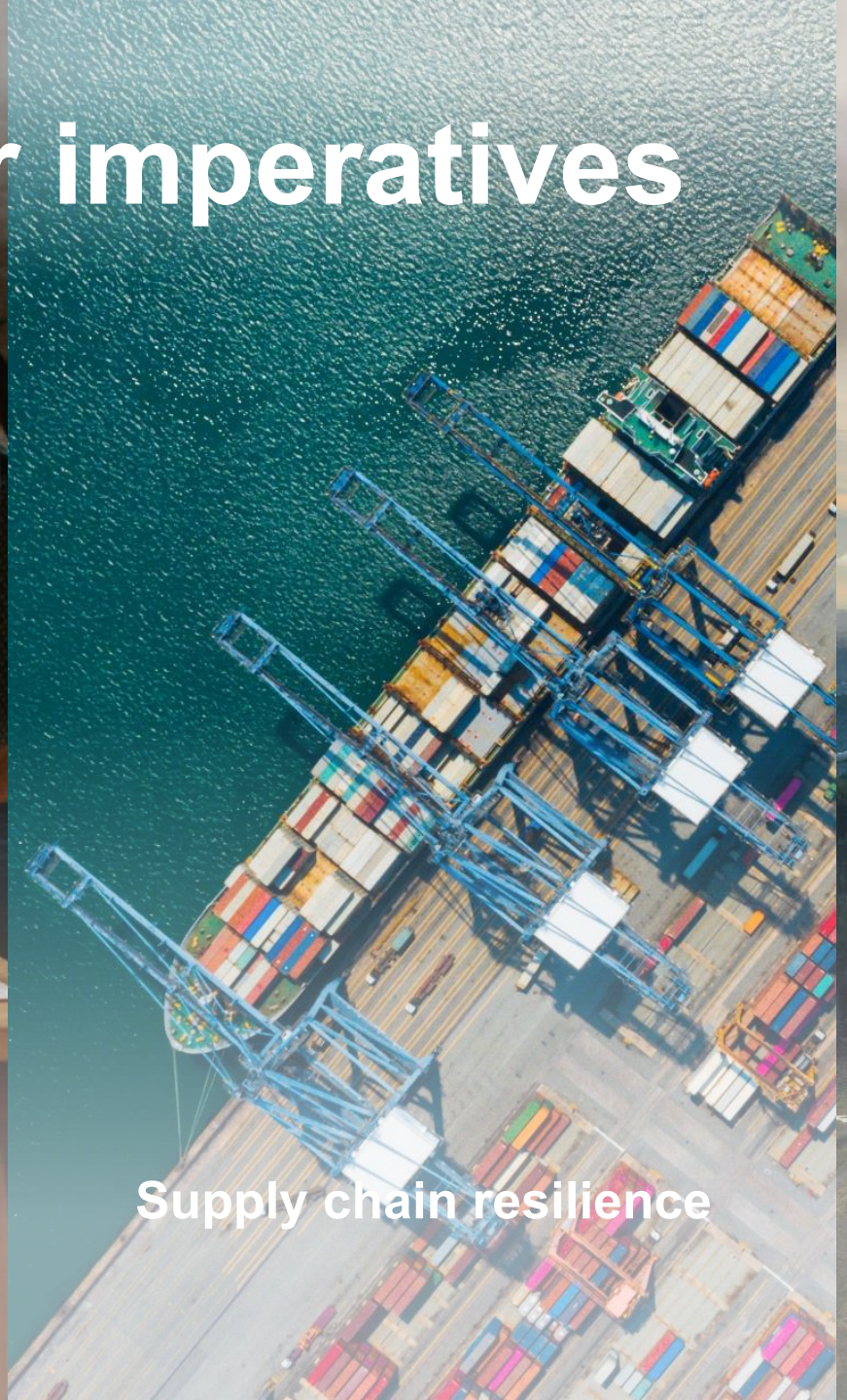
Be the Master of your Future

“Manufacturing is difficult, the difficulty and value of manufacturing is underappreciated.”

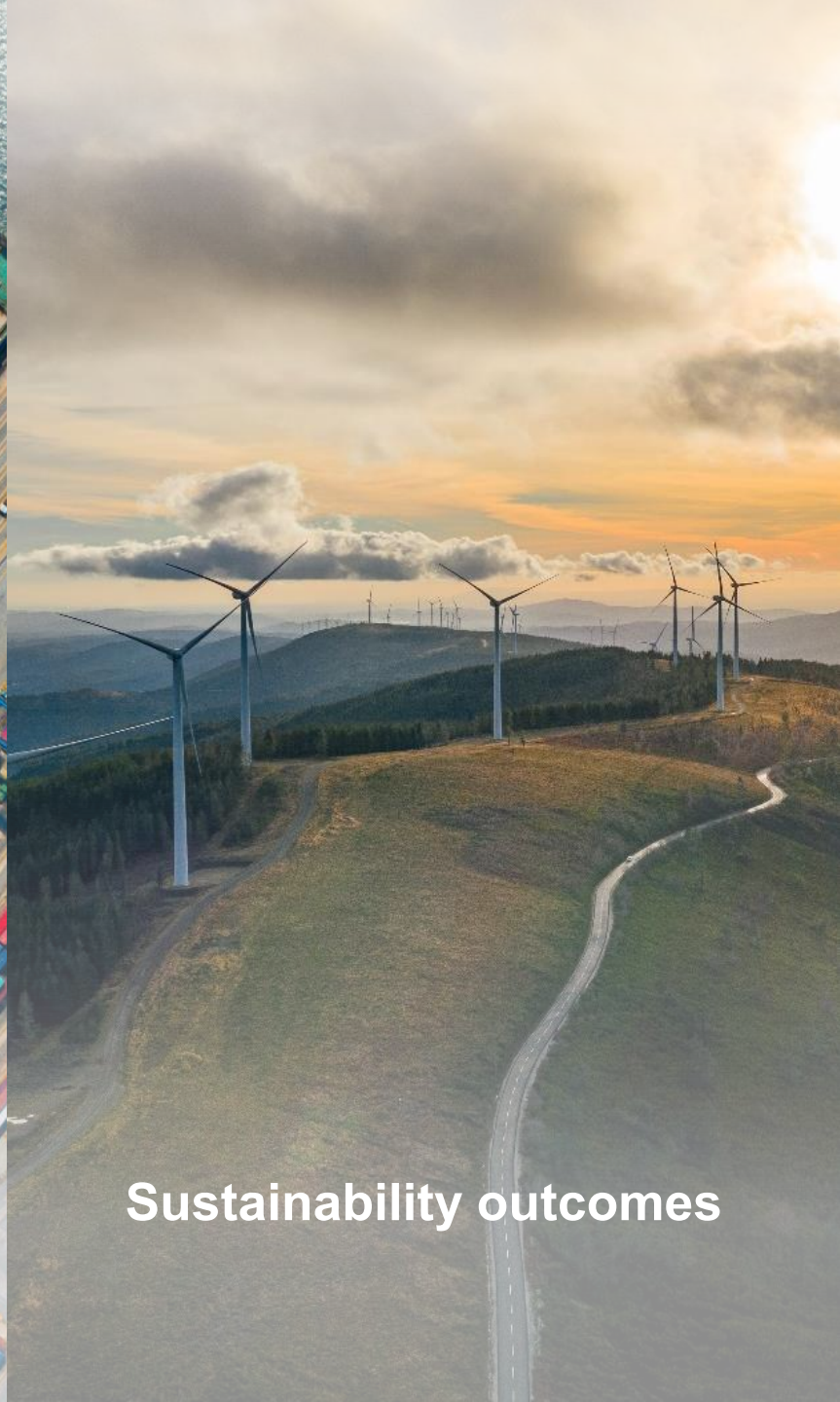
Elon Musk

Customer imperatives

Business transformation



Supply chain resilience



Sustainability outcomes

Resilient businesses need digital operations and supply chains built for speed and flexibility

Agility is required to survive in an ever changing world

Manufacturers need to become agile and dynamic

Responsive

ability to respond dynamically to changes in customer demand, market conditions, supply chain or production issues

Flexibility

in terms of product design, production processes, and supply chain management

Scalability

ability to scale operations up or down quickly and efficiently in response to changes in demand

Collaboration

manufacturing relies on effective collaboration and communication across different departments, teams, and stakeholders

Improvement

culture of continuous improvement, constantly seeking ways to enhance processes, reduce waste, and increase efficiency

Resilience in Manufacturing

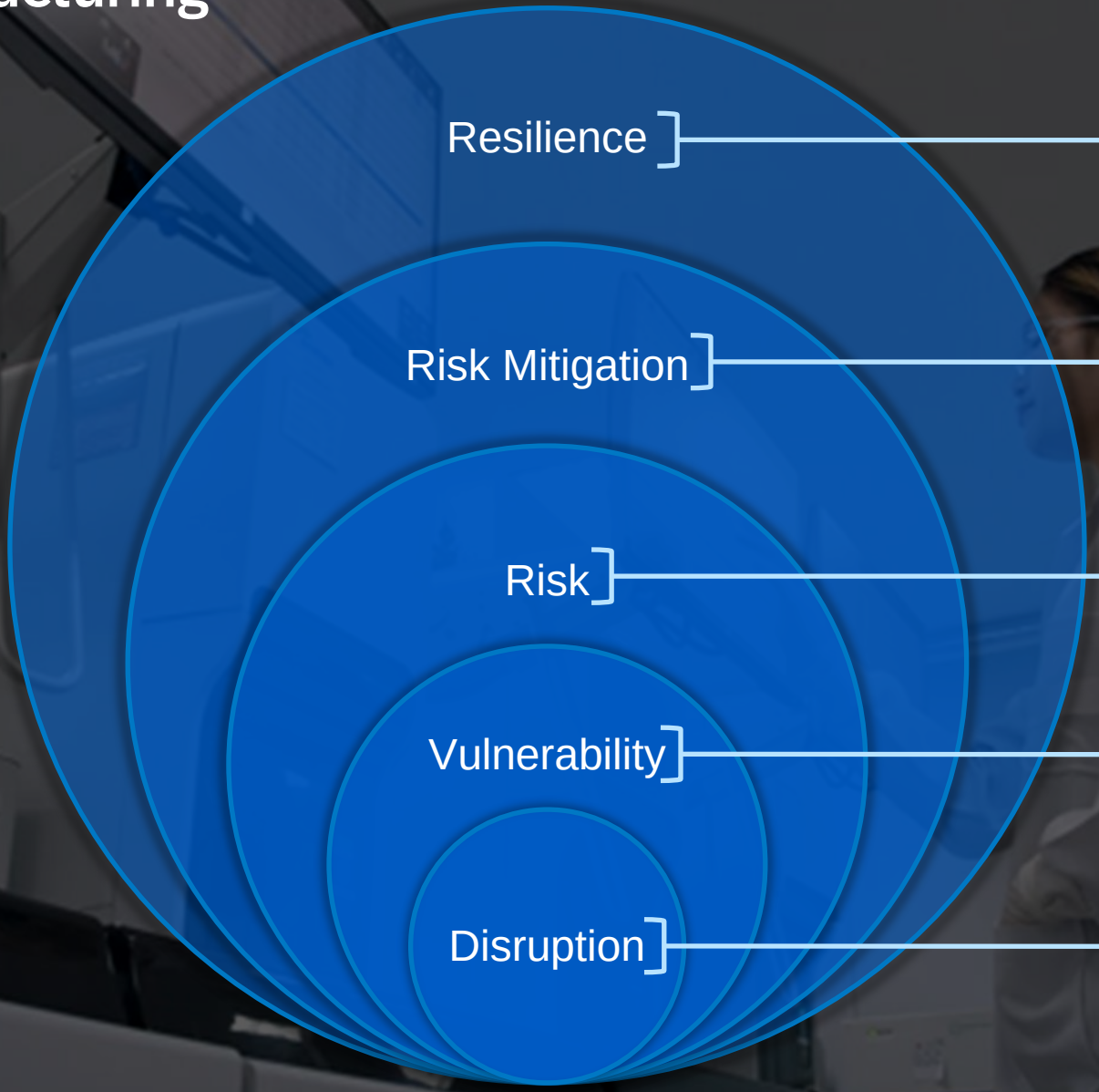
Agility

Dynamic process

Sense & Respond

Anomaly Detection

Connected Enterprise



Agility in Manufacturing

Sense

Respond

Adapt

Productivity is the focus for manufacturers

Innovation and Automation driven gains

Efficient Processes

streamlined and optimized production processes can significantly enhance productivity in manufacturing

Automation & Integration

automation and integrated technology, such as robotics, artificial intelligence, and Internet of Things, can greatly improve productivity

Continuous Improvement

adopting lean manufacturing and continuous improvement initiatives drives productivity

Effective supply chain management

optimizing inventory, improving supplier relationships, and implementing just-in-time manufacturing practices, reduces lead times and risk

Skilled & safe workforce

skills gap and labour availability impacts performance. Investing in re-skilling, automation & training improves safety, performance, skill attraction and retention

Sustainability – Efficiency

OEE

Overall Equipment Efficiency

=

Availability

The Process's Actual operating time as a percentage of Scheduled operating time. This is often referred to as Uptime or Runtime

x

Performance

Based on Process throughput, Performance is a measure of expected time to produce throughput (Process Capability) compared to Availability time

x

Quality

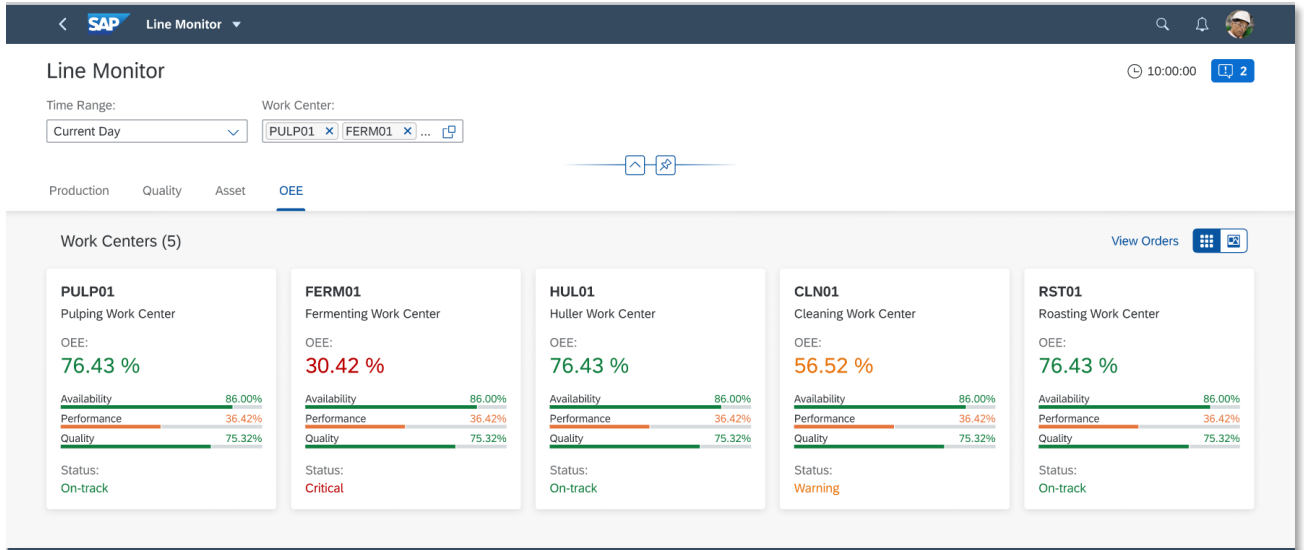
The total Good Units produced as a percentage of the Throughput. Also referred to as First Pass Yield (FPY)

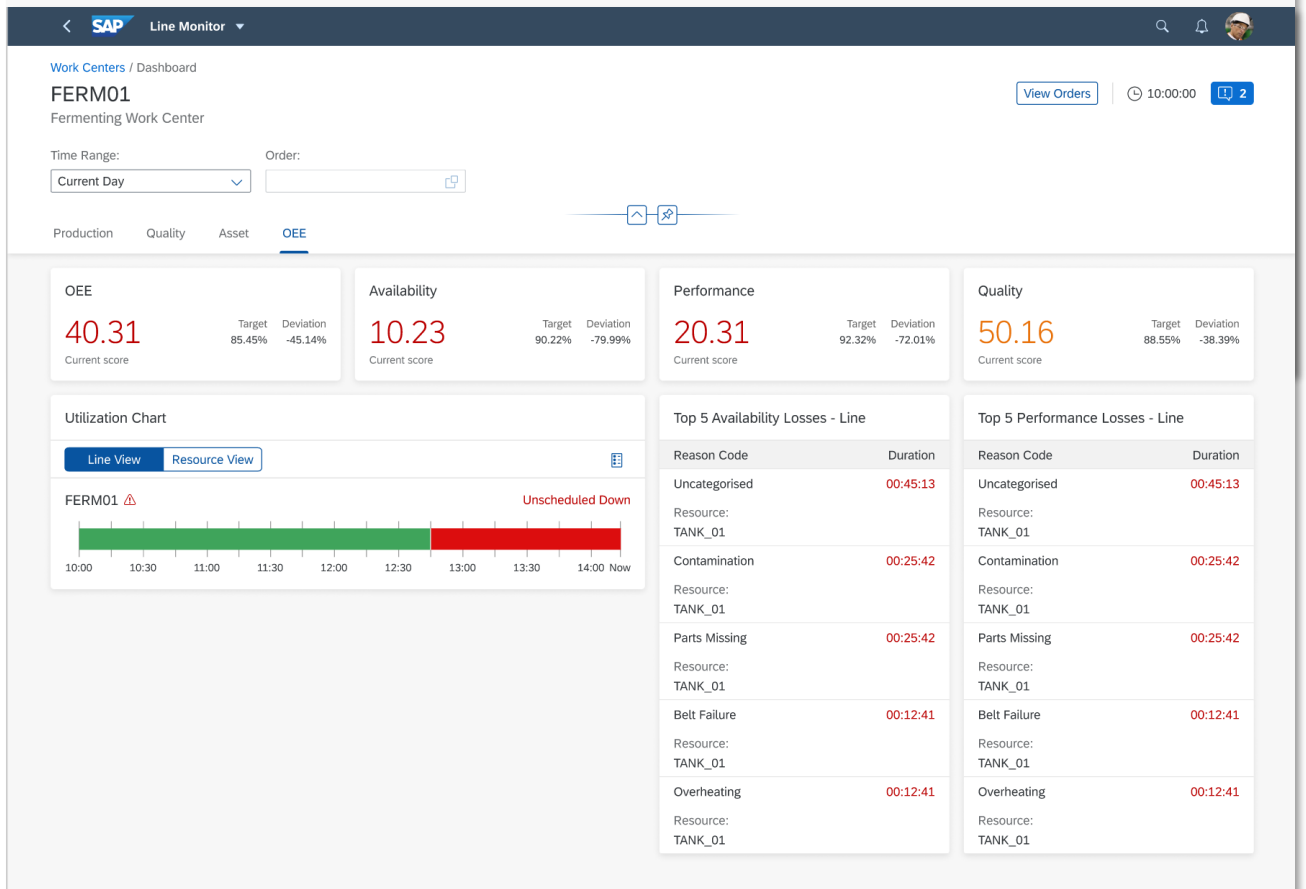
Production Line Monitor

Real-time Performance Indicators

USE CASES

- SAP Digital Manufacturing provides live operations views of production attainment.
- Production operations centric views to ensure a tactical and prioritized response to the situation is highlighted and coordinated around the root cause.
- These same tactical views that operations has rolls up to the strategic level views to ensure that the daily headaches that operations experiences are properly represented to the enterprise.



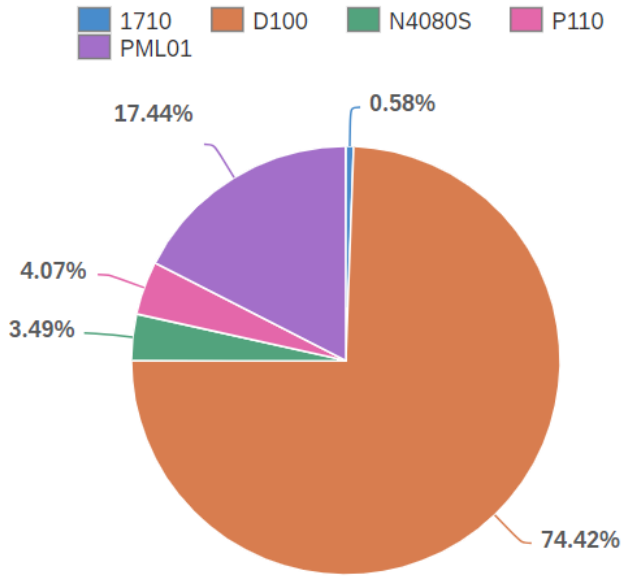


Production Downtime Analysis

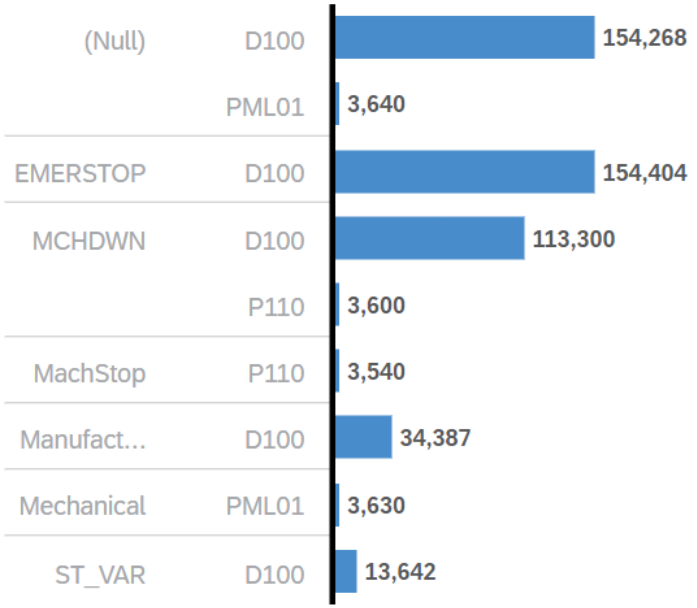
this DownTime Analysis report summarised the production losses and short stoppages affecting production performance.

Plant
(All)

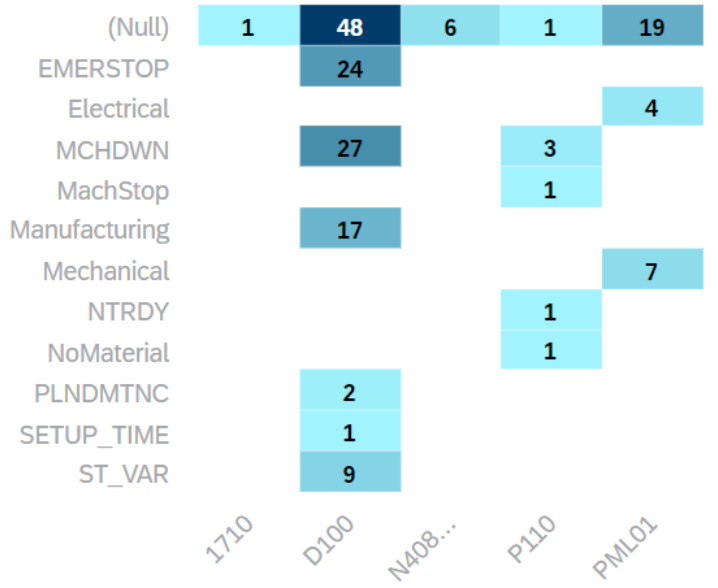
Count per Plant



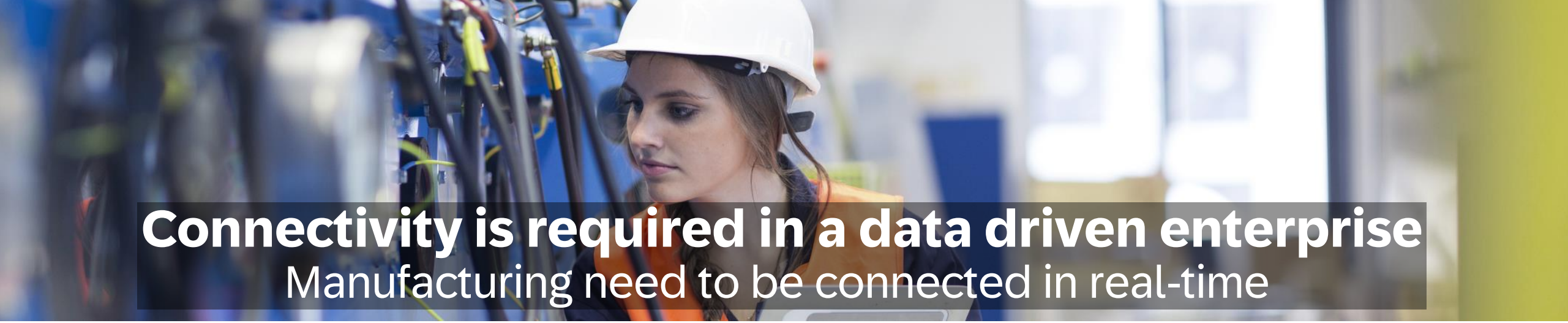
DurationSeconds per Plant, ReasonCode1



Count per Plant, ReasonCode1



DowntimeStartDateTime	DowntimeEndDateTime	Plant	Resource	ReasonCode1	ReasonCode2	TimeElement	DurationSeconds
Apr 8, 2024 2:55:01 AM	Apr 8, 2024 3:41:55 AM	D100	G_RESOURCE	–	–	–	–
Apr 7, 2024 12:07:54 PM	Apr 7, 2024 12:08:16 PM	1710	CRUSHING	–	–	–	–
Mar 28, 2024 9:57:16 AM	Mar 28, 2024 10:07:16 AM	D100	VAL_ASSY	Manufacturing	SAF-Mtg	DWNT_LOSS	–
Mar 27, 2024 7:52:00 PM	Mar 27, 2024 7:56:58 PM	D100	VAL_ASSY2	–	–	–	–
Mar 27, 2024 5:46:00 PM	Mar 27, 2024 7:46:32 PM	D100	VAL_ASSY2	MCHDWN	–	DWNT_LOSS	–
Mar 27, 2024 1:53:26 PM	Mar 27, 2024 3:35:35 PM	PML01	WC005INSP01	–	–	–	–
Mar 19, 2024 2:08:35 PM	Mar 19, 2024 4:06:27 PM	PML01	WC005ASSY002	–	–	–	–



Connectivity is required in a data driven enterprise

Manufacturing need to be connected in real-time

Enterprise

single source of truth, driving everyone in the same direction is delivered by integrated processes, real-time & accurate data, automation and elimination of data silos

Customer

bi-directional collaboration to understand requirements and deliver on commitments and expectations

Supply Chain

synchronized with fluctuations in demand, changes in requirements, sourcing, disruptions & unexpected events

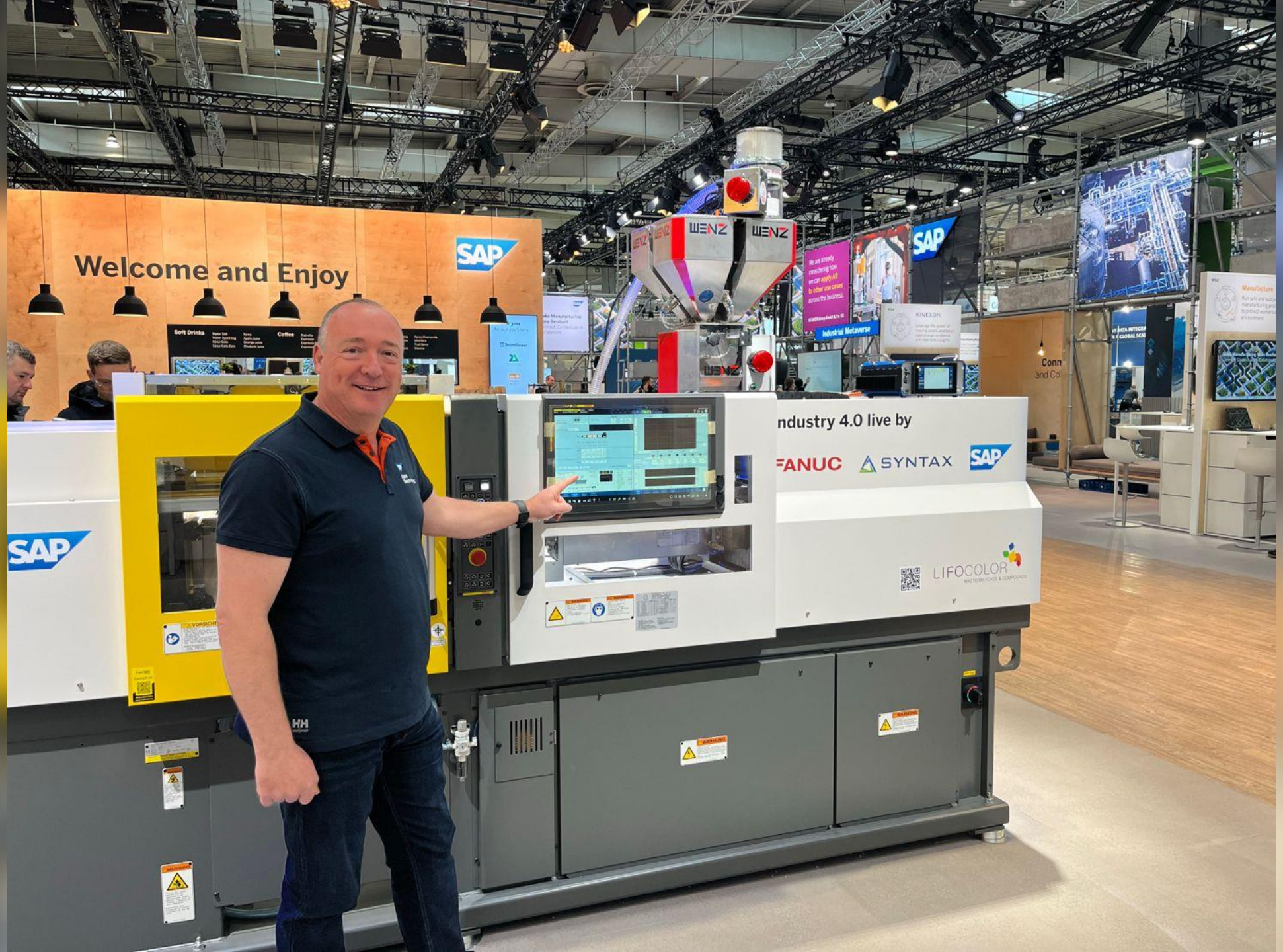
Automation

increase data availability, visibility and accuracy, reduce data entry and latency by communicating with processes and equipment

Circular economy

support new business models, in service support, repair, re-manufacturing, recycling & reuse. Increase life span, durability and repair through design

Sources in notes


Welcome and Enjoy
SAP
WENZ
Industrial Metaverse
ndustry 4.0 live by
FANUC
SYNTAX
SAP
LIFOCOLOR

DM Manufacturing Automation | Vision

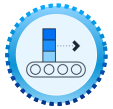
IT/OT convergency

Manufacturing Automation helps customers adapt **business dynamics** with an **Industrial IoT** solution.

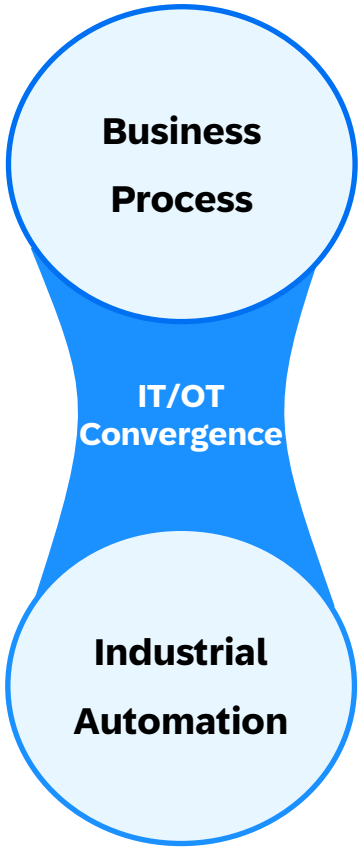
Converge Business and Automation

Connect the world
Integrate **asset information** between various sources and consumers.

Automate your execution
Production processes to orchestrate services from various systems.



It brings **Business Processes (IT)** and **Automation Systems (OT)** together to support customer **mission critical manufacturing operations and agile innovation**.



Innovate Business

Business objects

- Resources, work centers
- Materials, orders, ...

End to end **Business Process** lifecycle management:

- Reflecting manufacturing processes from logistics perspective (MRP, production planning, scheduling)
- Process transparency
- Flexible process change to fulfil business dynamics

Automate Execution

Data and service connectivity

- PLC, DCS, SCADA, ...
- OPC, MQTT, REST, ...

Automation sequences to integrate and support fully automatic manufacturing operation:

- Reflecting manufacturing processes from technological perspective
- High speed high volume production
- Modular production
- Legacy hard wired operations

Manufacturing Automation | Digital Twin Use Cases

From the application's point of view, the production connectivity model with its digital twins replicates the physical world.

Read indicators of the digital twin object

(or measurements/ sensor values on the physical objects)
in order to:

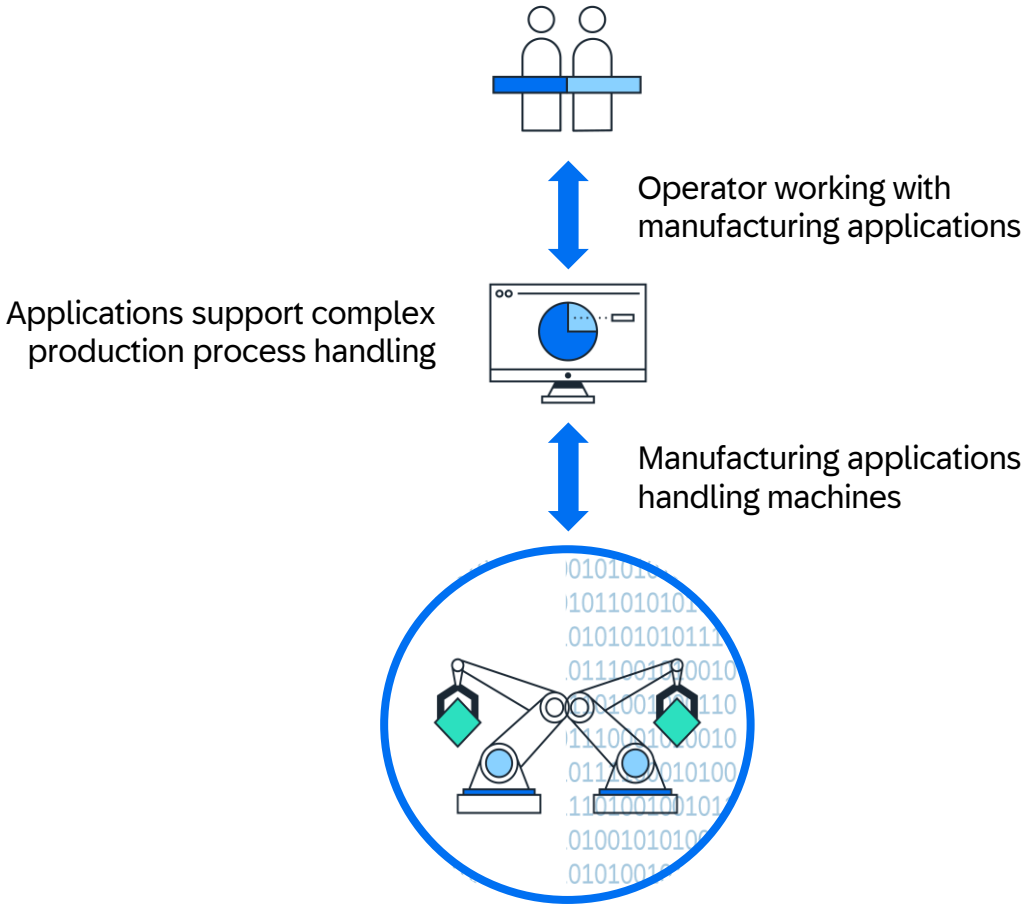
- Visualize them on the application UI.
  (e.g. a dashboard or an interactive work instruction on the operator's UI)
- Store them in the database
  (e.g. DMC product genealogy or the production log)
- Aggregate and evaluate them
  (e.g. calculate a moving average, OEE, or any other KPI)
- Observe them and take action if any condition becomes true
  (e.g. run a non-conformance check if the temperature was too long too high)

Write indicators to the digital twin object

- Write a set point
  (e.g. the target temperature of an oven)

Call services on shop floor systems

- Call services that are related to an asset
  (e.g. orchestrate a sequence of service executions; see production process design)



Digital Twin, reflecting physical reality

Sustainability is more relevant than ever

Companies need to act on sustainability now

Customers

79%

of buyers are changing preferences based on sustainability

Investors

50%

of all professionally managed assets will be ESG-mandated by 2025

Employees

71%

of job seekers want to work for environmentally friendly employers

Regulators

>600

there are currently over 600 ESG reporting provisions globally

Companies

70%

of EBITDA could be at stake from sustainability challenges

Sources in notes

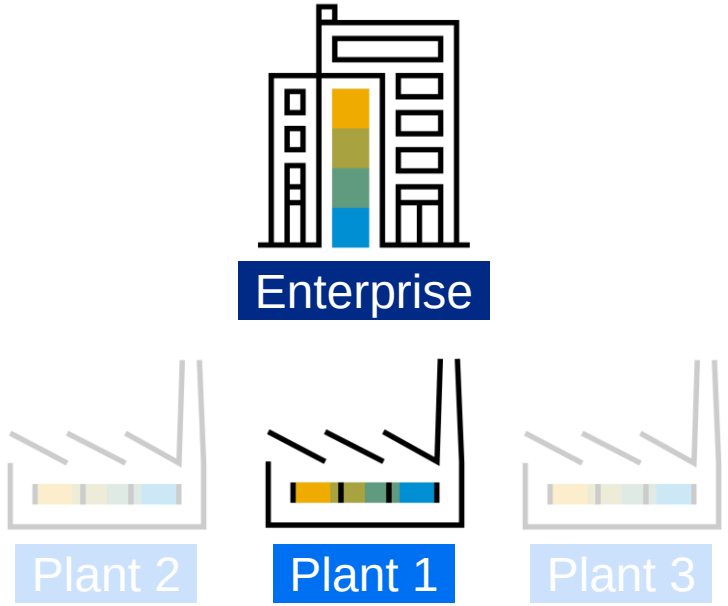
SAP Digital Manufacturing

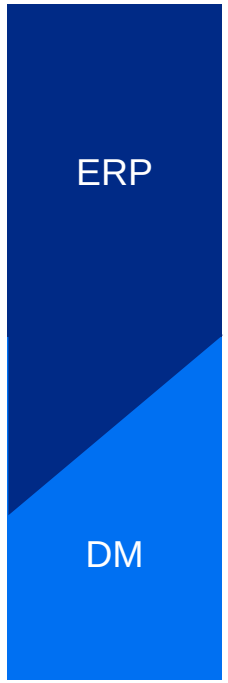
SAP Manufacturing Organisation

ERP

SAP Digital Manufacturing

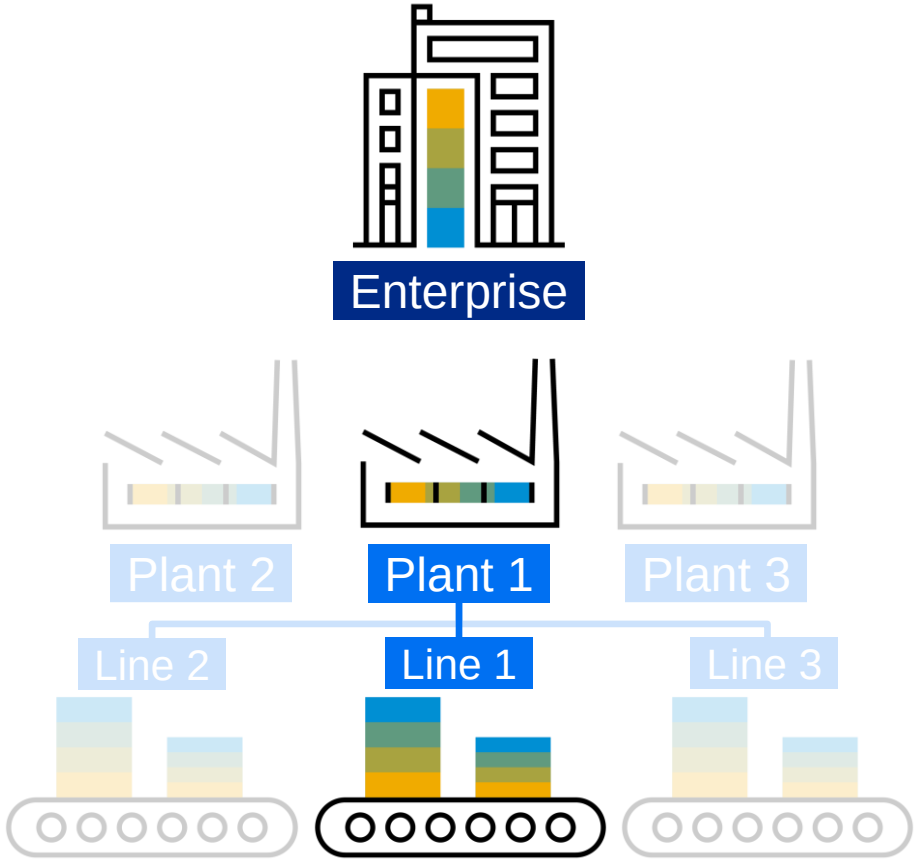
SAP Manufacturing Organisation

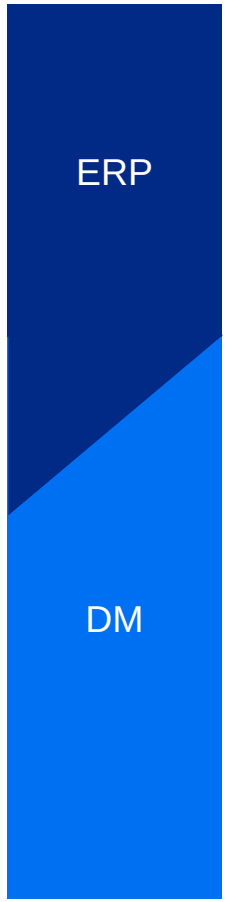




SAP Digital Manufacturing

SAP Manufacturing Organisation





SAP Digital Manufacturing

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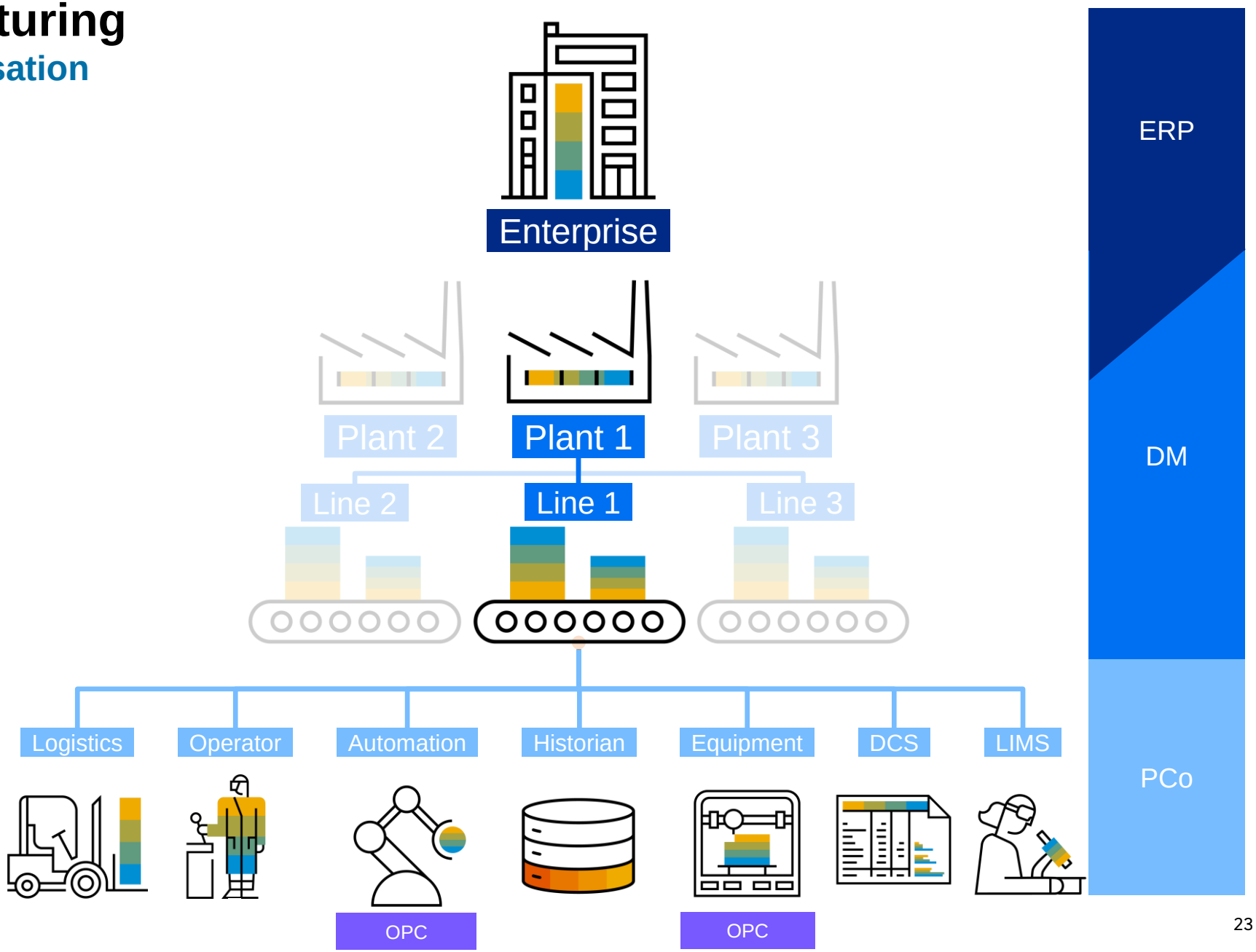
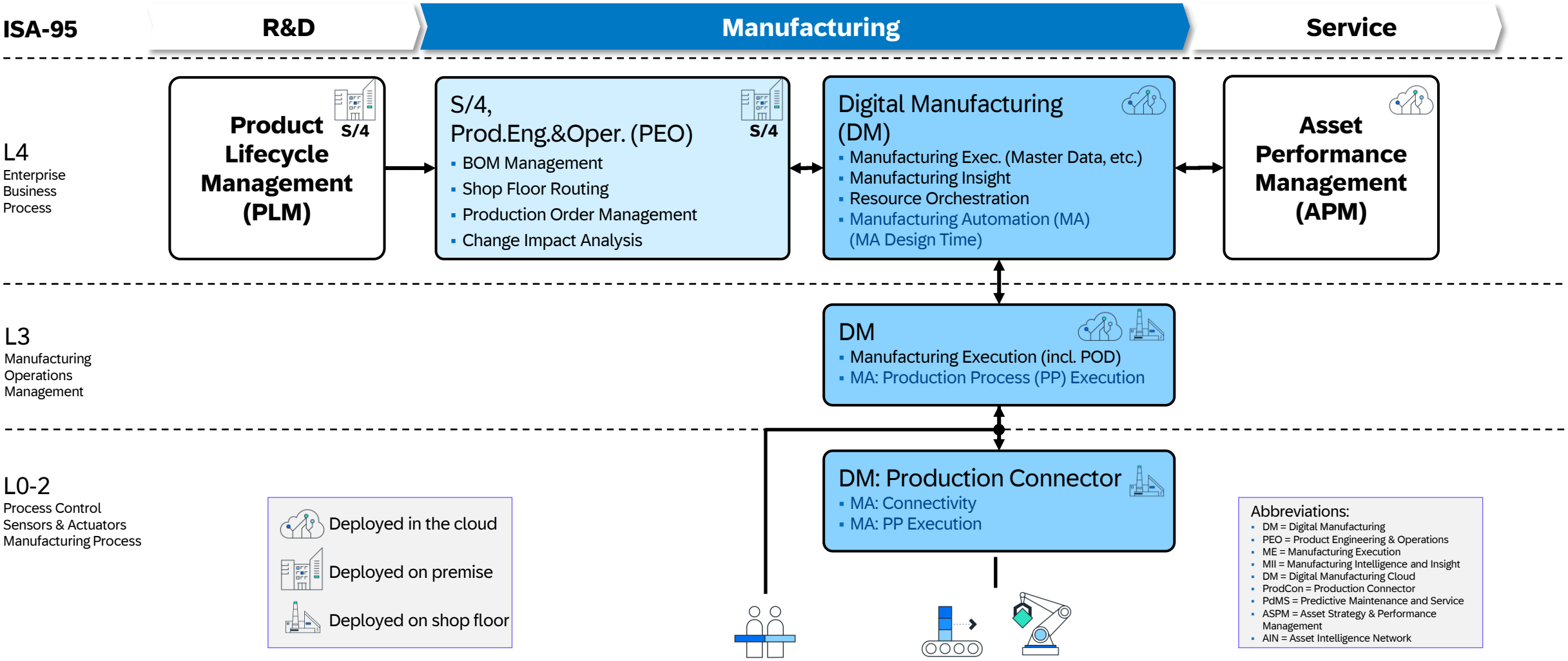


SAP's Manufacturing Architecture along ISA-95



The Industry 4.0 Revolution

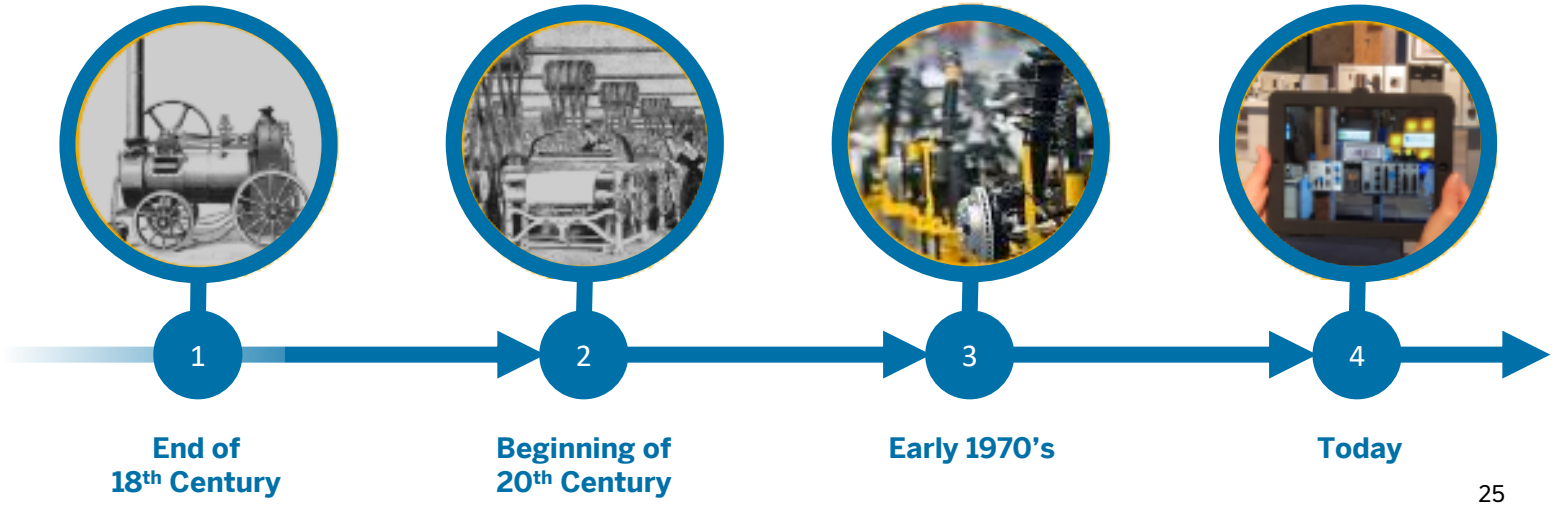
Design Principles

- Interoperability
- Information transparency
- Technical assistance
- Decentralized decisions

Disruptive innovations applied in manufacturing promise to trigger a new industrial revolution

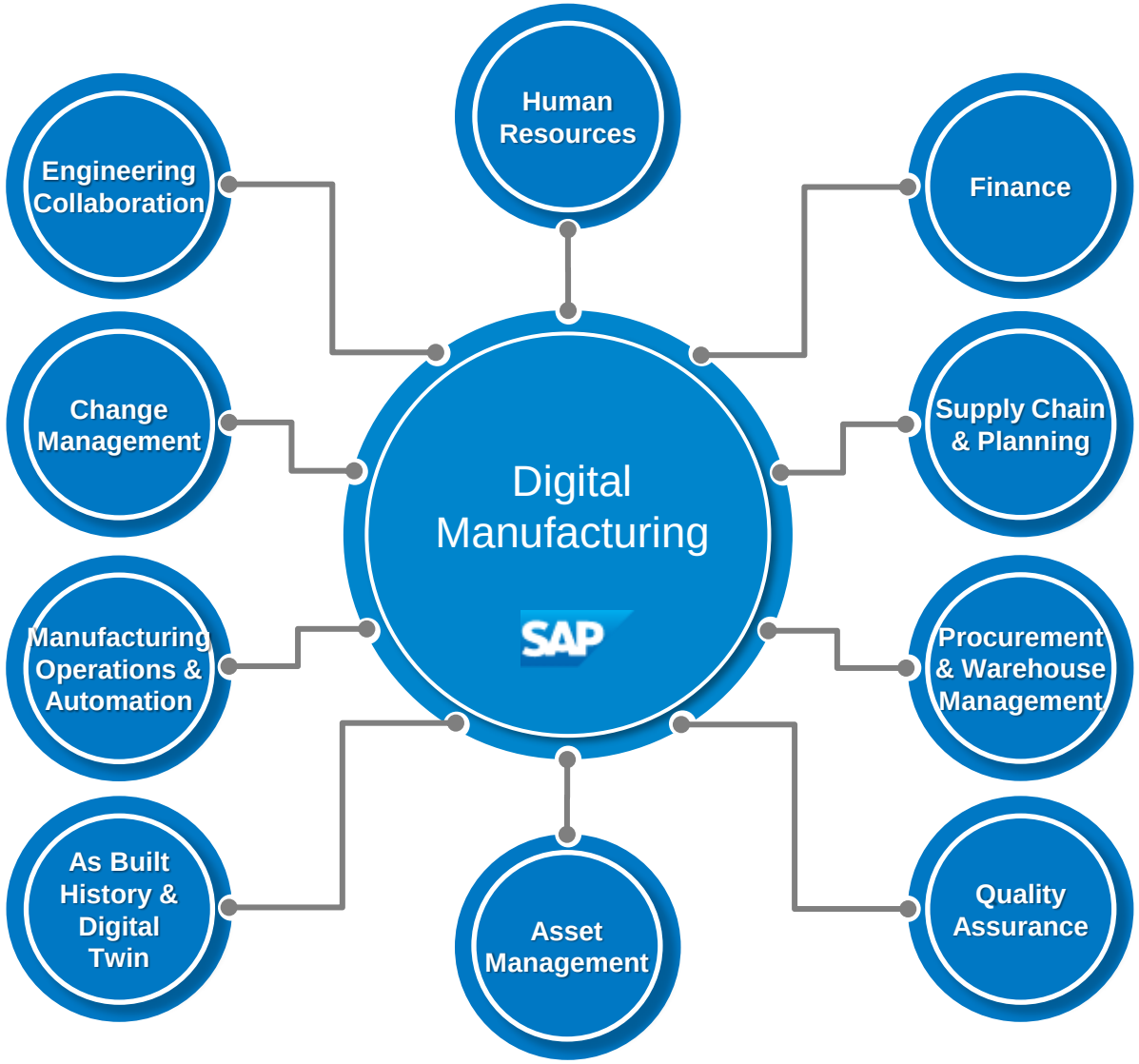
While the theme of Industry 4.0 revolves around **connectivity** through cyber-physical systems, Industry 5.0—while also aligned with platforms made possible by Industry 4.0—also addresses the relationship between "People and machines"

ref: ISA.org



Solution Overview

SAP Digital Manufacturing is a Game Changer



Improve Operational Efficiency by eliminating data silos, enabling end-to-end process orchestration from design to delivery

Increase Agility with stream lined and automated processes

Reduce Manufacturing Costs with unobstructed visibility to relevant business information

Innovate and Automate with Industry 4.0, extending the digital thread end-to-end across the digital supply chain

Drive Operation Excellence driven by Manufacturing Insights and Process Governance

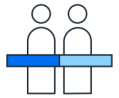
SAP Digital Manufacturing

SAP Digital Manufacturing is a solution optimizing manufacturing operations using state of the art technologies, for discrete and process industries.
It integrates seamlessly with enterprise and shop floor systems to provide real-time visibility, control, and orchestrate the manufacturing process end to end.

Dispatch & Scheduling

Orchestrate labor, resource, tools in shop floor to achieve maximum availability

React quickly to production events using the built-in intelligence



Labor Management

Benefit from detailed planning, scheduling, availability, tracking & execution

Improve tools and labor operations

Work In Process Management

Benefit from fully configurable operator dashboards and production process designs

Realizes manufacturing execution by managing shop orders

Shop Floor Logistics

Orchestrate intra-logistics between manufacturing line and warehouse

Enable dynamic production operations

Quality Management

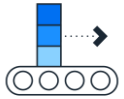
Support a closed-loop integrated quality management with quality collaboration

Use business networks and enable customers to produce and deliver high-quality products

Insights & Performance Management

Gain deep production insights for significant process improvements using embedded intelligence

Optimize manufacturing productivity by measuring Overall Equipment Effectiveness



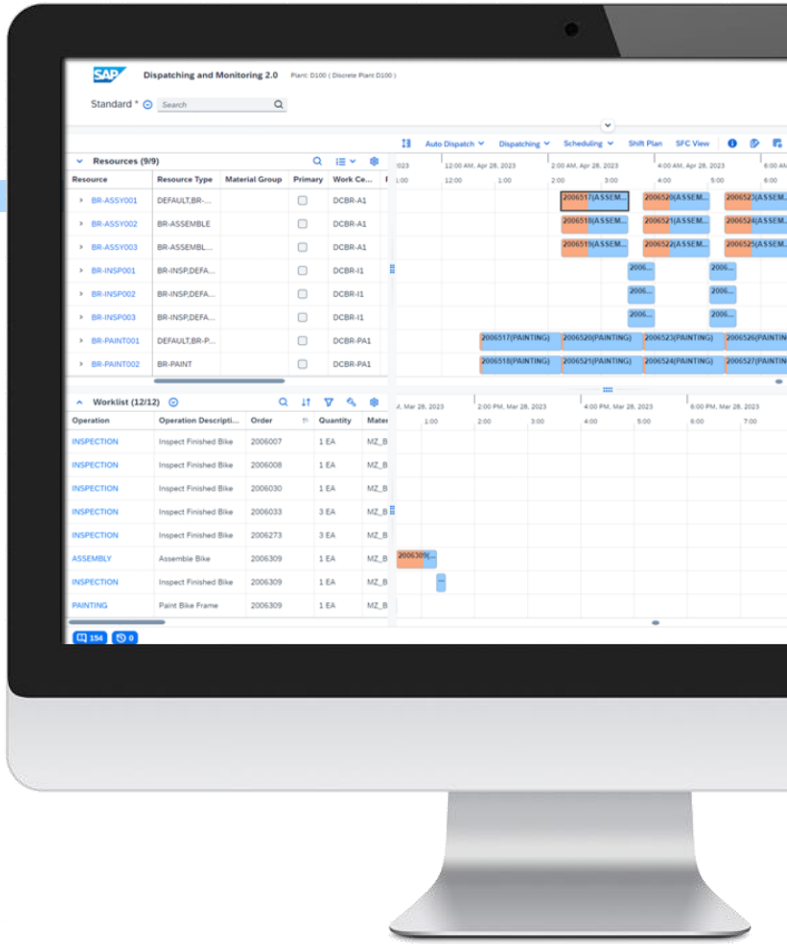
Industrial Automation

Ensure full data and process connectivity between the shop floor and business applications

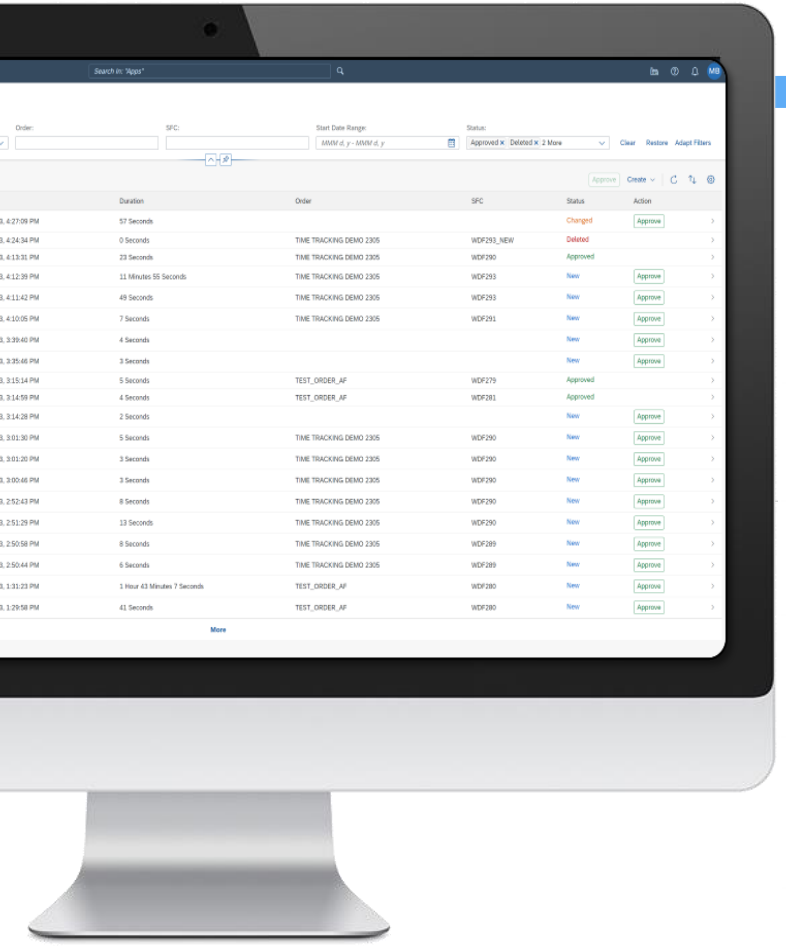
Create production processes that link shop floor and business systems

Dispatching and Monitoring

Business Challenges	Solutions
Gap between **enterprise-level** production planning & scheduling and **shop floor execution**	**Interactive scheduling/dispatching tool** for plant managers and supervisors at MES layer
Lack of real time visibility into shop floor capacity, assets, usage, downtimes etc.	**Business process integration** with real time planning, execution and logistics systems
Ineffective capacity utilization of machines, workforce & tools	**Automated scheduling** and **recommendation** increasing capacity utilization
Highly manual dispatching process without data driven system support for supervisors	**Robust & intelligent algorithms** to reduce lead time, load balance, minimize set up time etc.
Siloed labor planning & management	**Workforce management** and integration with HRMS unified data across systems

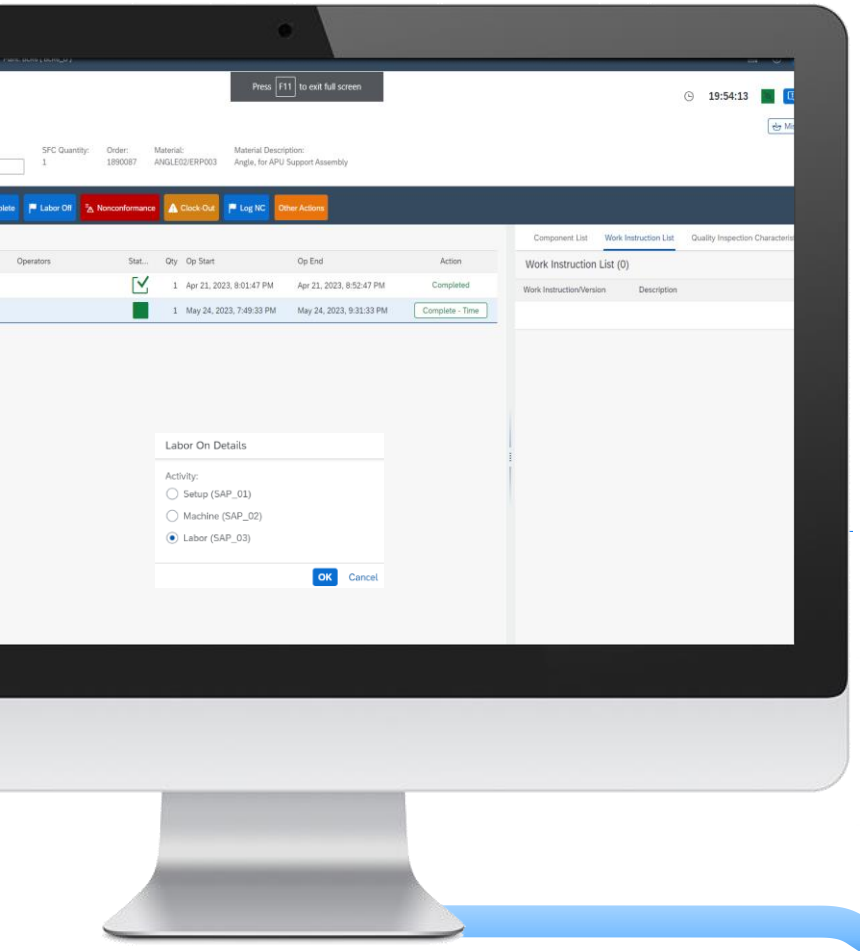


Scheduling and Time Tracking



Business Challenges	Solutions
Inefficient workforce scheduling due to lack of information such as availability, skills	Holistic and integrated management of workforce
Lack of **accurate time** data to determine real product cost	**Accurate order costing** based on actual times recorded
Absence of **labor transparency** for both direct and indirect times	Increased **visibility** of non-value added time
Lack of **operator performance** transparency causing inefficiencies.	Efficient scheduling based on actual shop floor data and detailed workforce information
Scarcity or fragmented time data across different **systems**	Ability to provide time data to 3rd party applications such as billing or time & attendance systems

Labor Management



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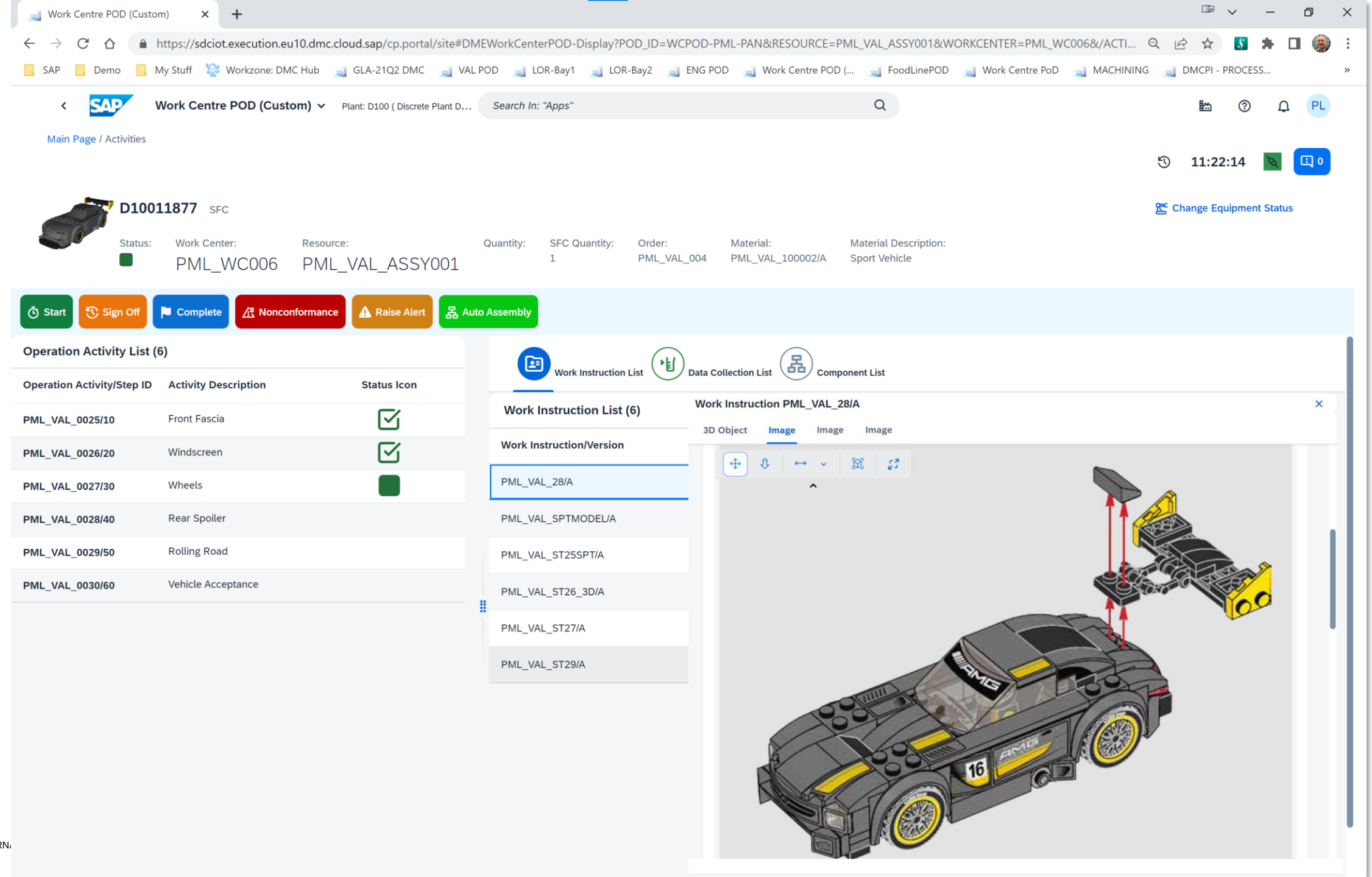
Work Centre POD (Custom)
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Workzone: DMC Hub
GLA-21Q2 DMC
VAL POD
LOR-Bay1
LOR-Bay2
ENG POD
Work Centre POD (...
FoodLinePOD
Work Centre PoD
MACHINING
DMCPI - PROCESS...
Work Centre POD (Custom)
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PML_WC006
Resource:
PML_VAL_ASSY001
Quantity:
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Material:
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Sign Off
Complete
Nonconformance
Raise Alert
Auto Assembly
Operation Activity List (6)
Operation Activity/Step ID
Activity Description
Status Icon
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Windscreen
PML_VAL_0027/30
Wheels
PML_VAL_0028/40
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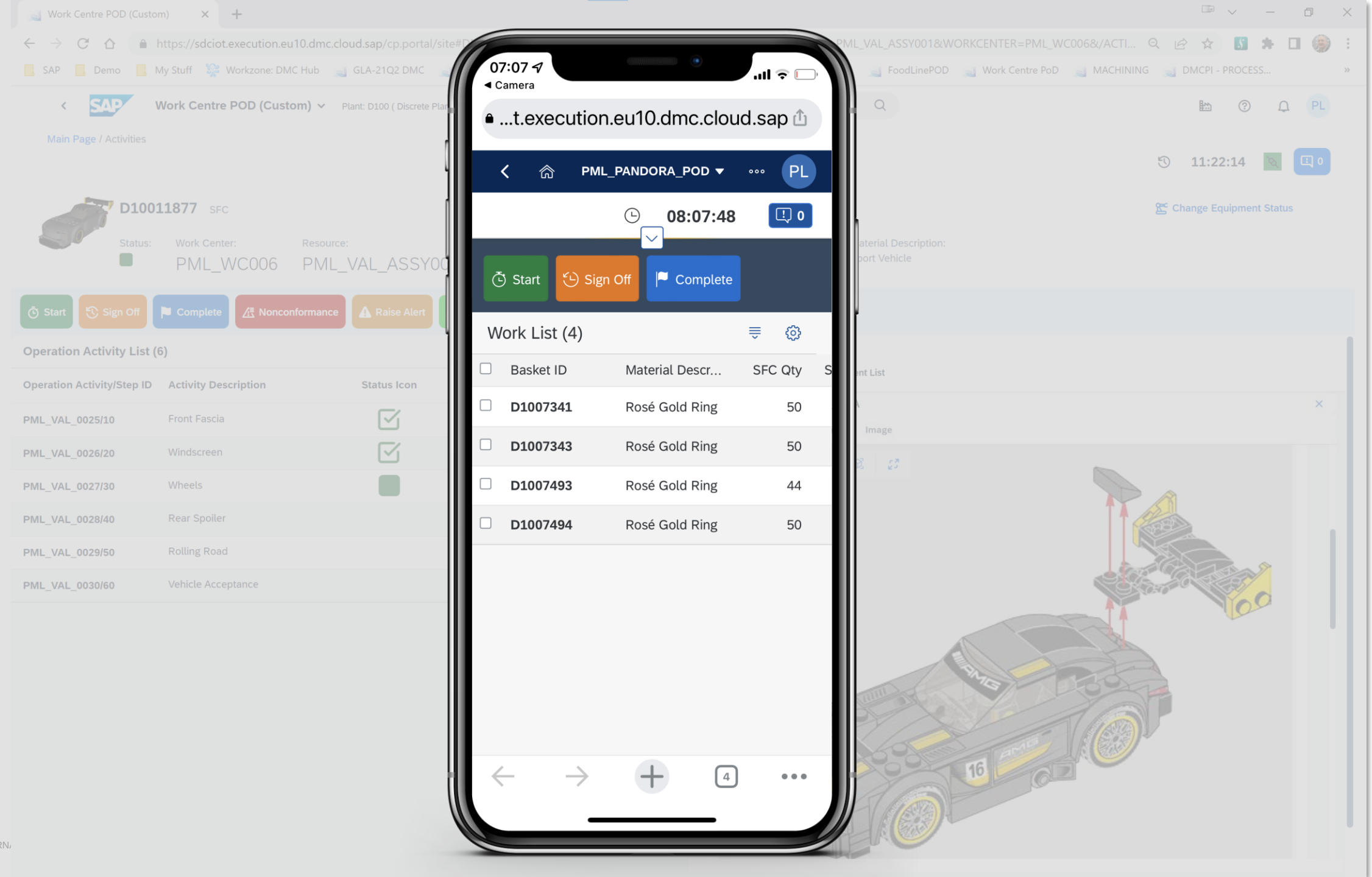
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Sign Off
Complete
Work List (4)
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Material Descr...
SFC Qty
D1007341
Rosé Gold Ring
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D1007343
Rosé Gold Ring
50
D1007493
Rosé Gold Ring
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D1007494
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Work Centre POD (Custom)
Main Page / Activities
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SFC
Status:
Work Center:
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Resource:
Start
Sign Off
Complete
Nonconformance
Raise Alert
Operation Activity List (6)
Operation Activity/Step ID
Activity Description
Status Icon
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Front Fascia
PML_VAL_0026/20
Windscreen
PML_VAL_0027/30
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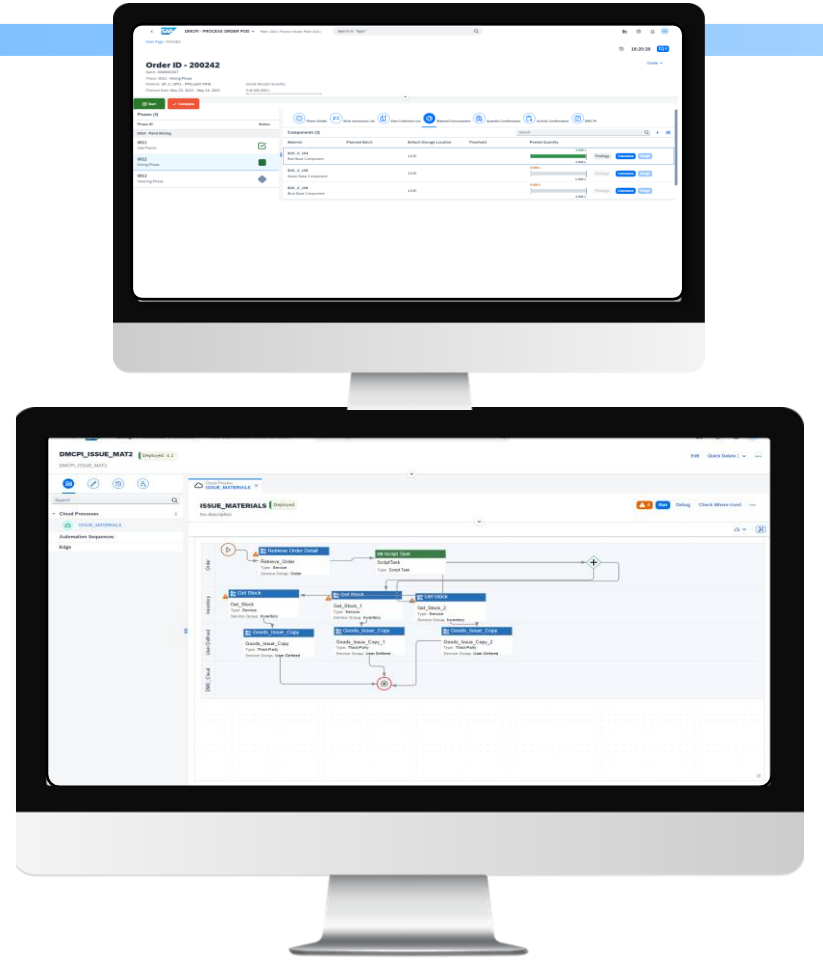
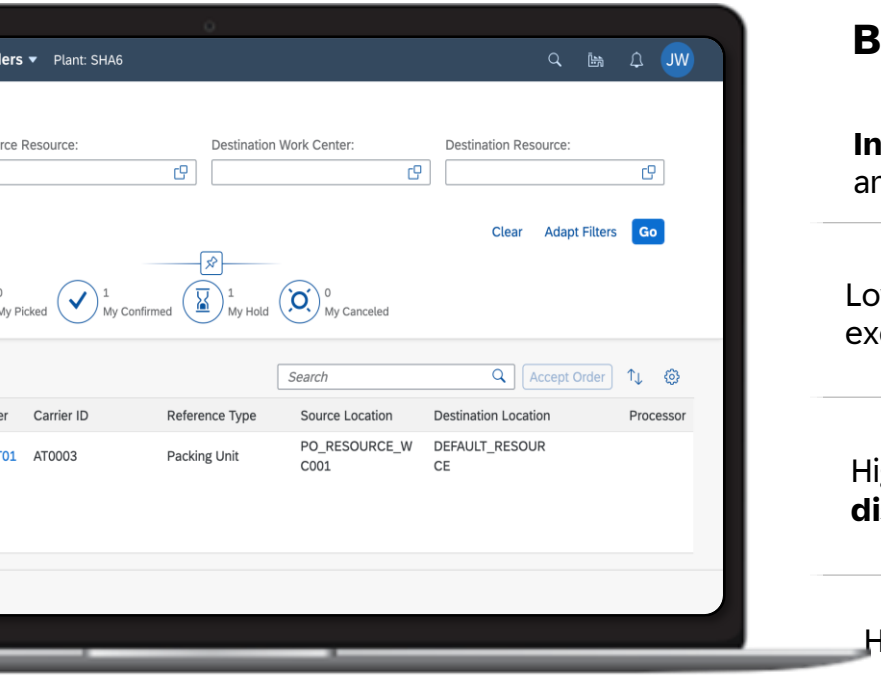
PML_VAL_0028/40
Rear Spoiler
PML_VAL_0029/50
Rolling Road
PML_VAL_0030/60
Vehicle Acceptance
11:22:14
Change Equipment Status
Image

Process Orchestration

Business Challenges	Solutions
High operational costs due to **inefficiencies** and **excess waste**	**Fully configurable** Production Operator Dashboard (POD) optimizing the operator user experience
Product **quality losses**	**Early detection/capturing** of quality defects reducing scrap/repair costs
Lack of production transparency outside the shop floor	**Comprehensive WIP tracking** throughout the production process, ensuring complete transparency and enabling precise process control
Logging and **controlling** critical activities during production	**Seamless integration with SAP ERP** for comprehensive end-to-end visibility
Running 24/7 operations	Enables 24/7 operations through **high availability and edge services**



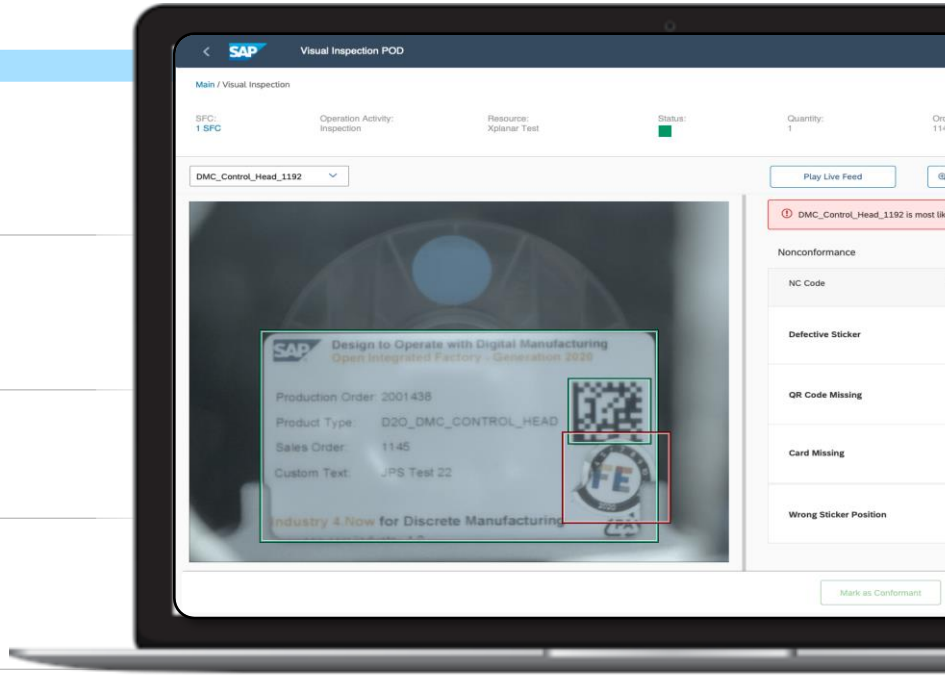
Inventory



Business Challenges	Solutions
Inventory inconsistency between ERP/EWM and shop floor	Improved inventory accuracy by **real time integration** posting with SAP ERP/EWM
Low **transparency** of production supply and execution	With **Manage Floor Stock** app, for local and ERP/EWM integrated materials, providing higher transparency on the materials supply and consumption
High cost and low efficiency of **material distribution** in shop floor	With **staging** capability, shop floor can trigger exact material requests to warehouse in precise time line and storage location which lower the cost with high distribution efficiency
Hard to track and manage **WIP transport**	With **Logistics Order** capability, would be easy to manage and execute WIP transport, increasing flexibility and WIP processing
Lack system integration with different types of inventory management	Out of box integration capability to SAP ERP and EWM system

Quality Management

Business Challenges	Solutions
Manual inspections leading to **late detection of issues**	**Automated** and **intelligent** digital **quality operations**
Unsustainable analysis and **documentation** of quality issues increase the risk of re-occurring and higher quality costs (CoQ)	**Record deviations** and **trigger follow-up process** at the time of detection
Information silos **prevent** data-driven **root cause analysis**	**Fast**, **reliable** and **collaborative** identification of root causes supported with data
Case-by-case **compliant handling**	Learning organization with **continuous improvement**
Staying compliant with global and standardized **QA guidelines**	**Global compliance** with industry standards



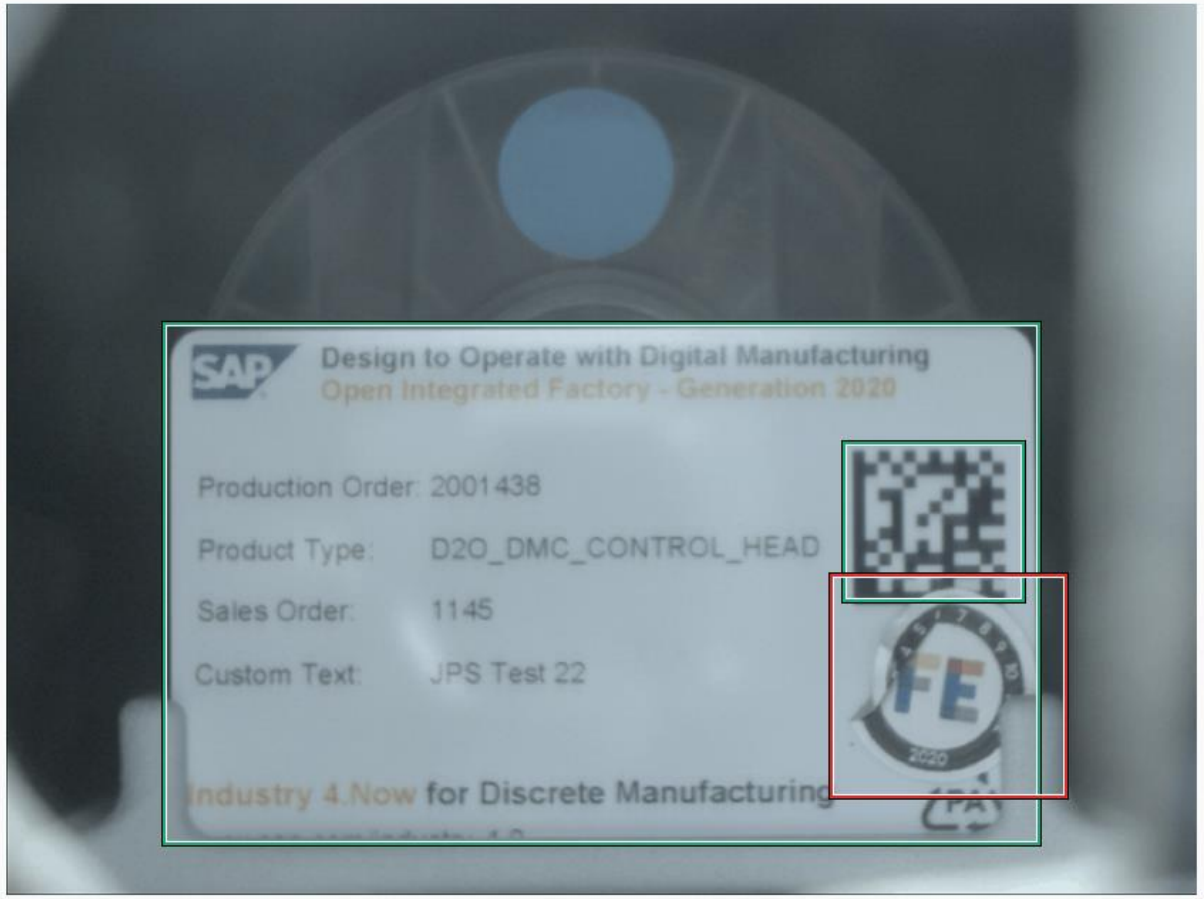
Visual Inspection POD

Main / Visual Inspection

SFC:	Operation Activity:	Resource:	Status:	Quantity:	Order:	Material:
1 SFC	Inspection	Xplanar Test		1	1145	CONTROL_HEAD__KIT

DMC_Control_Head_1192

Play Live Feed | 100% | Source



DMC_Control_Head_1192 is most likely 'Non-conformant'.

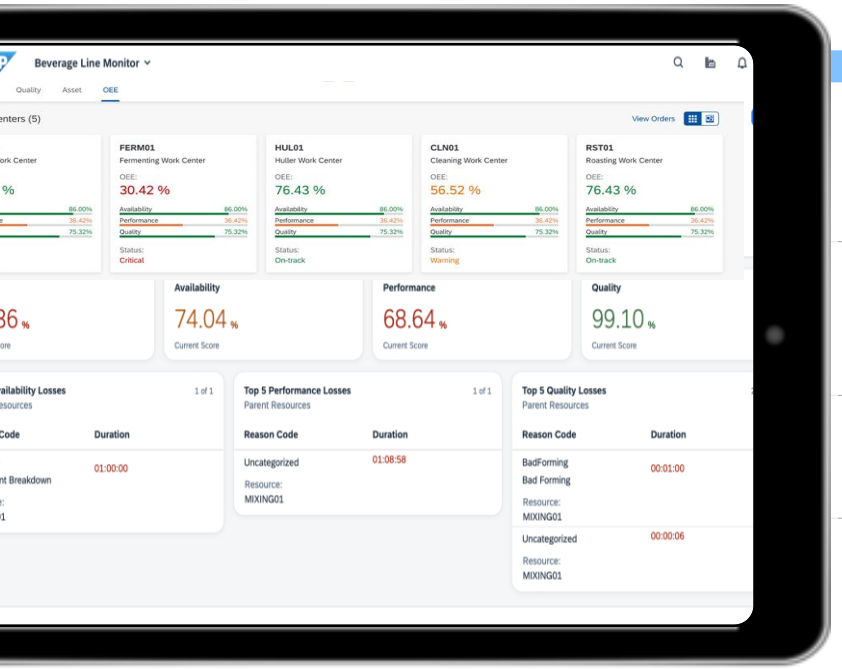
Nonconformance

Search all NC Codes

NC Code	Probability	Action
Defective Sticker	99.3%	Log NC
QR Code Missing	0.3%	Log NC
Card Missing	0.2%	Log NC
Wrong Sticker Position	0.2%	Log NC

Mark as Conformant | Mark Nonconformance | Cancel

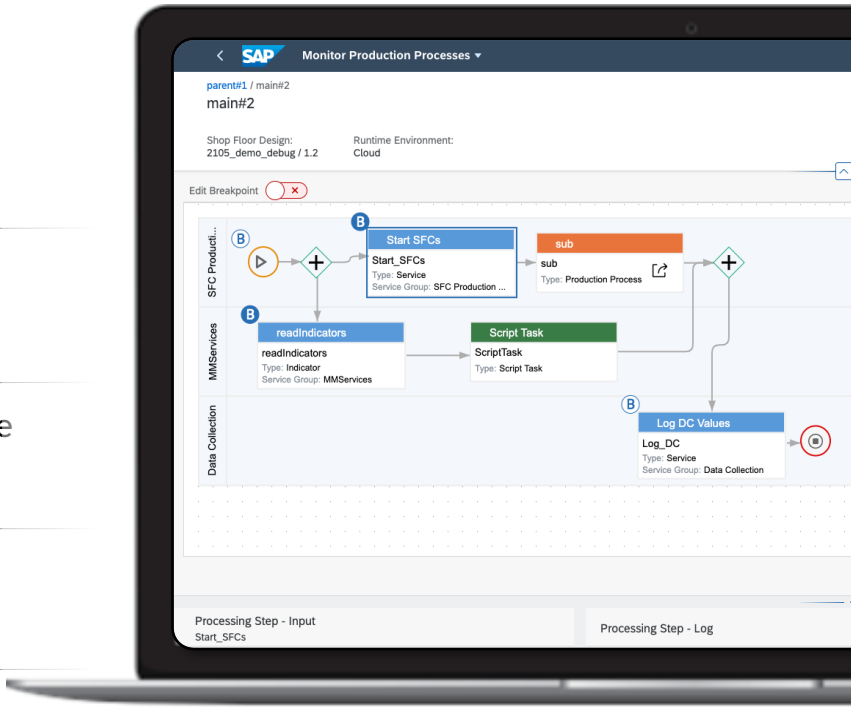
Insights and Performance Management



Business Challenges	Solutions
Unforeseen disruptions and **no transparency** on root cause	**Critical information** is available **in real-time**
Distributed systems and non-harmonized data causing **information latency**	**Capturing** of all **master data and events** occurring during production processes
Insufficient data for decision making	**Providing harmonized view** on shop floor data from multiple sources enabling holistic analysis
Lack of transparency on production process and operational performance	Enabling business users to **derive reports** and **KPIs**, and **identify root cause**
Lack system integration with different types of inventory management	**Transparency on the shop floor** reducing inefficiencies and opportunity costs

Industrial Automation

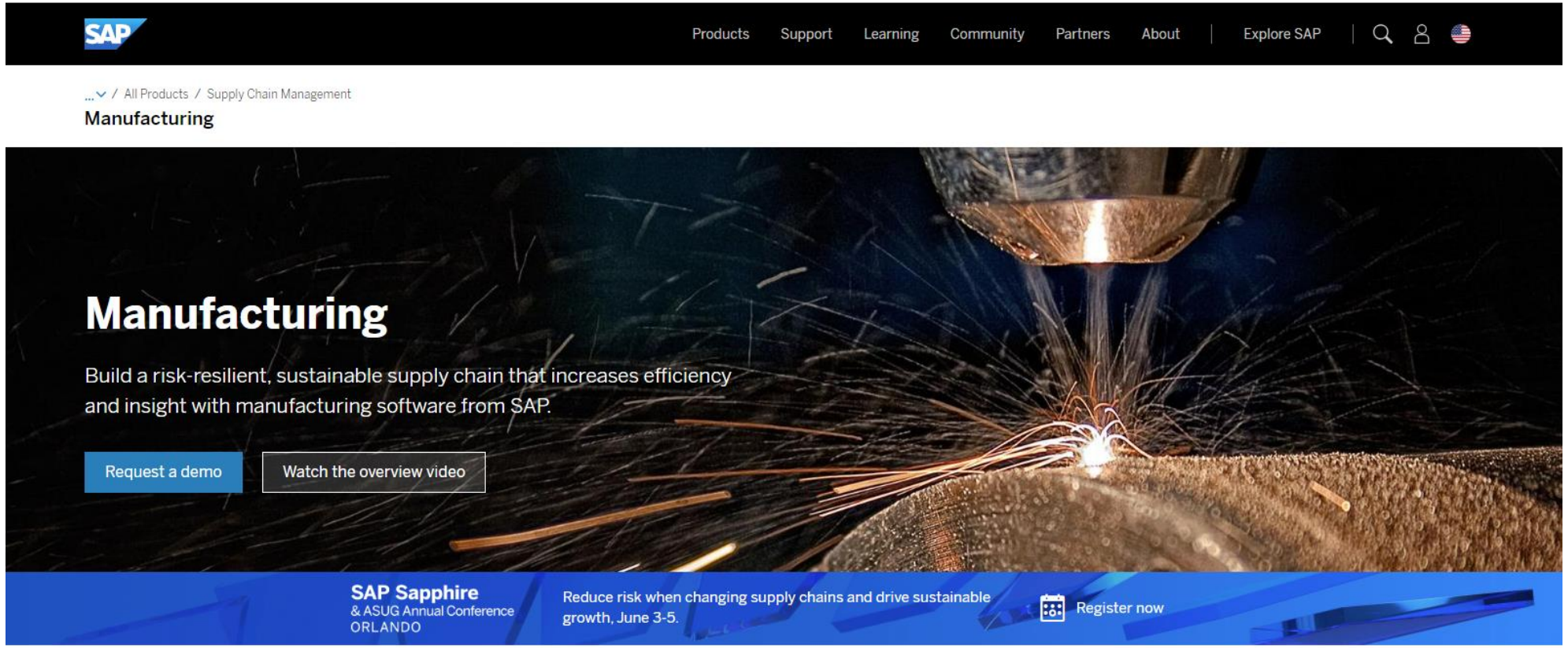
Business Challenges	Solutions
Shop floors are made of a world of many **different heterogeneous systems**	DM implements the network of all systems and their interoperability **in one model**.
There is **no full integration** between all the shop floor systems and their leading business app.	**Production Connectivity Model** controls the overall network of all systems on shop floor and in the cloud.
Production execution on shop floor is **complex** and not fully manageable by one system end-to-end.	**Processes**, be they on shop floor or top floor, are **modeled in the same way** and **interact** with each other.
Processes are **disruptive**, not fully integrated with each other.	**Create**, **manage** and **visualize** the processes in one **graphical tool** to keep the overview.
The current **actual status of production** is **not transparent** end-to-end in one system.	DM keeps centrally the **full overview** on all activities and resource states on shop floor



SAP Digital Manufacturing

Vision Demo

www.sap.com/manufacturing



Drive productivity with manufacturing software solutions from SAP

To meet demand in a challenging market, you need automated, flexible manufacturing processes that support risk-resilient and sustainable operations. We can help you deliver.

Thank you.

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