Machinaide – Virtual validation of a Smart Factory

April 7th, 2022

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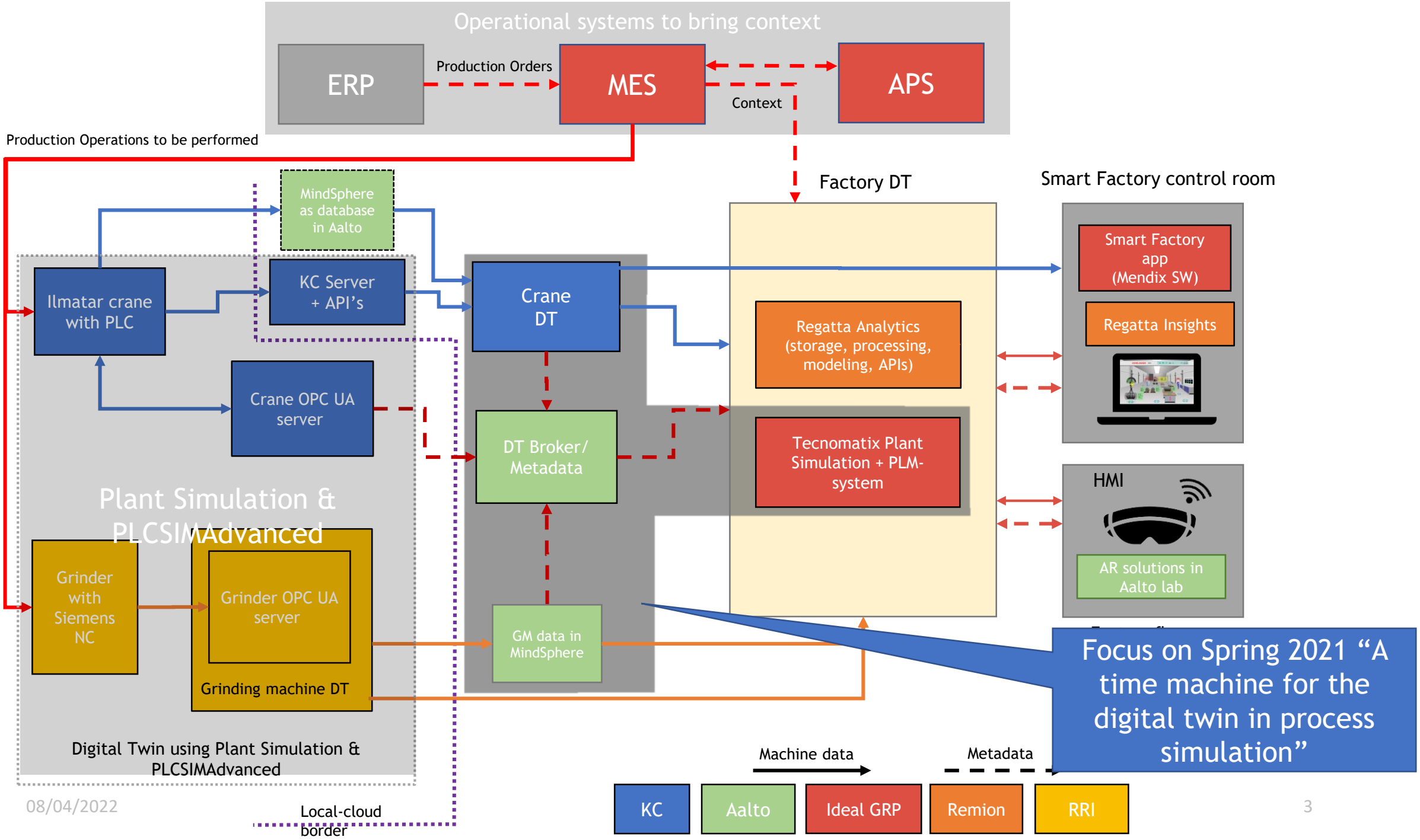
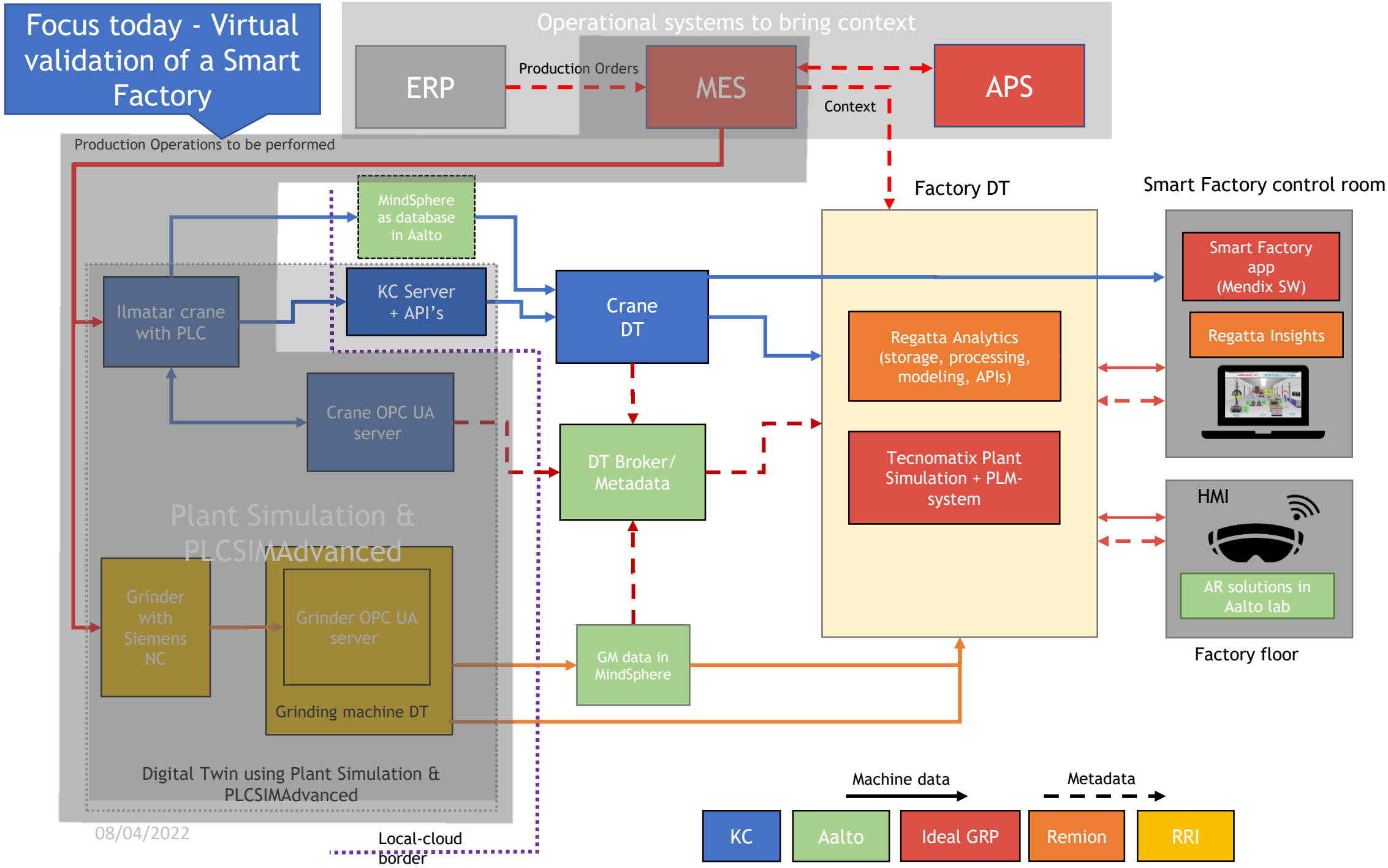
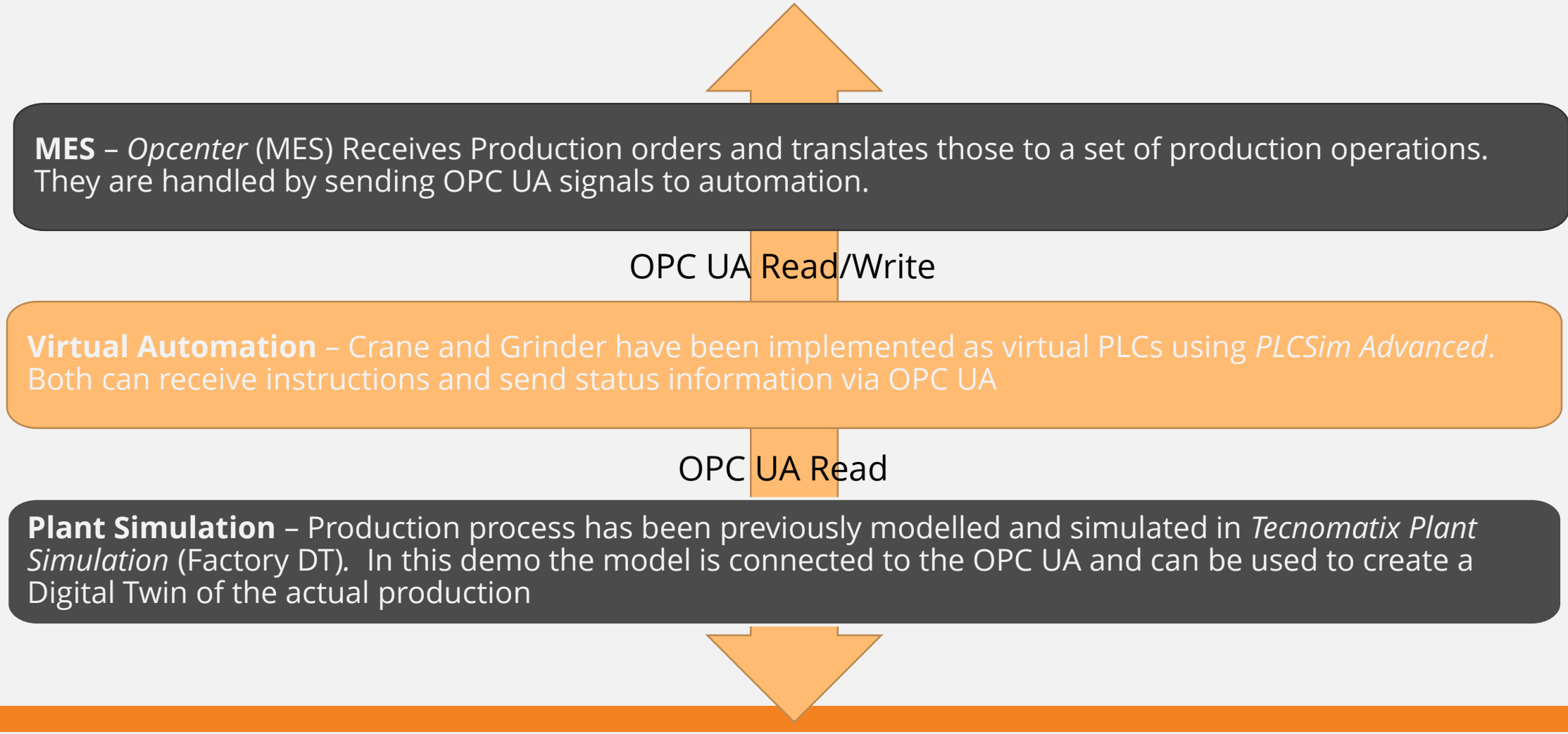

Operational systems to bring context
ERP
Production Orders
MES
Context
APS
Production Operations to be performed
Factory DT
Smart Factory control room
MindSphere as database in Aalto
Ilmatar crane with PLC
KC Server + API's
Crane DT
Crane OPC UA server
DT Broker/ Metadata
Regatta Analytics (storage, processing, modeling, APIs)
Tecnomatix Plant Simulation + PLM-system
Smart Factory app (Mendix SW)
Regatta Insights
HMI
AR solutions in Aalto lab
Plant Simulation & PLCSIMAdvanced
Grinder with Siemens NC
Grinder OPC UA server
Grinding machine DT
GM data in MindSphere
Digital Twin using Plant Simulation & PLCSIMAdvanced
Local-cloud border
Focus on Spring 2021 "A time machine for the digital twin in process simulation"
Machine data
Metadata
KC
Aalto
Ideal GRP
Remion
RRI

Focus today - Virtual validation of a Smart Factory



Main topics for the focus areas for today



Driving automation based on Production Orders using a MES solution

Juha Lunkka

MES - Opcenter Execution for shop floor operators & management

Siemens Opcenter Execution
Discrete or Process
Manufacturing Execution System

- Order & quality execution with visual tasks guidance
- Individual product tracing & closed-loop feedback
- Production situational visibility
- Automation & system integration for production data

- Designed for easy integration – ERP, PLM, APS, PLC…
- OOTB configurable functions & possible to customize
- State-of-the-start UX, scalable & modular solution
- Device independent HTML5 on-premises or cloud

Current situation visibility

Full production & product tracing

Productivity improvement

Operational visibility & transparency

- Closed-loop data – Engineering, planning & execution
- Full tracing of operations, materials, tools & transfers
- Build record AS-BUILT for audit-, trace- & verifiability
- Maintenance visibility into resources & history

Paperless shop floor processes

- Tasks, data collection & instructions from bill-of-process
- Quality measuring, defect reporting & rework process
- Management of complex & detailed production recipes
- Configuration controlled CAM & DNC integration

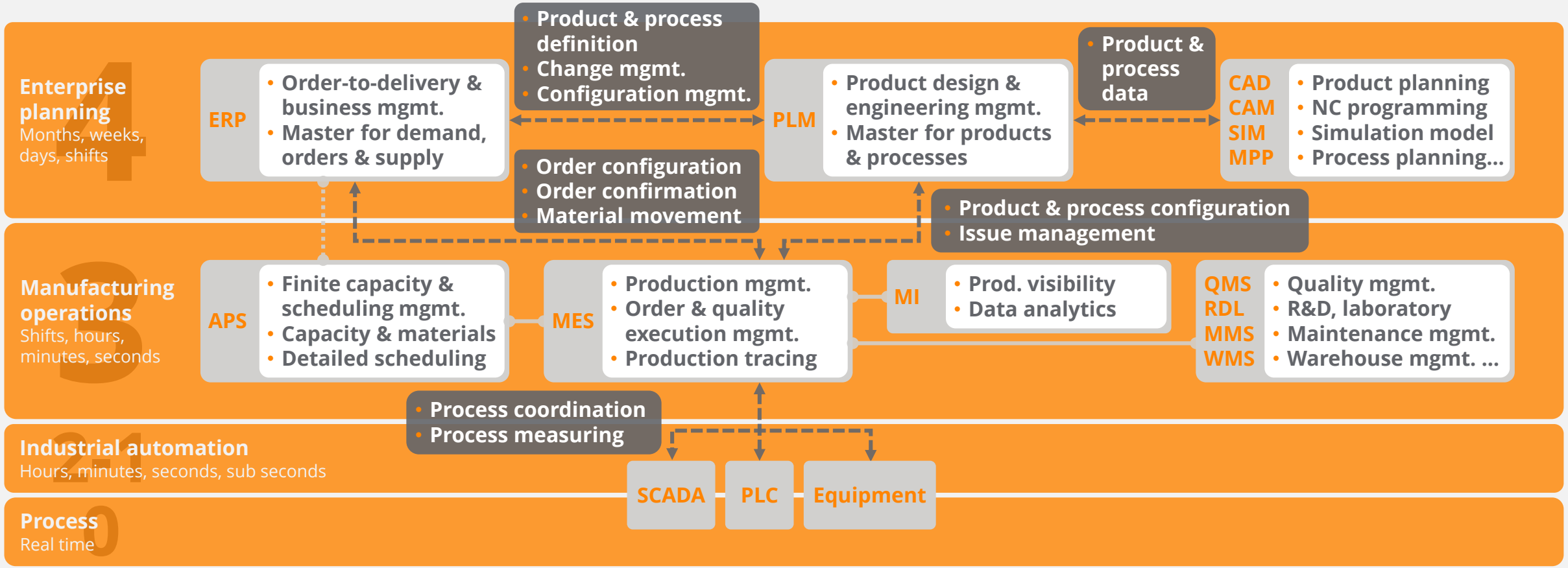
Digitize operational control & transparency for increased efficiency – Savings from non-value add activities & waste

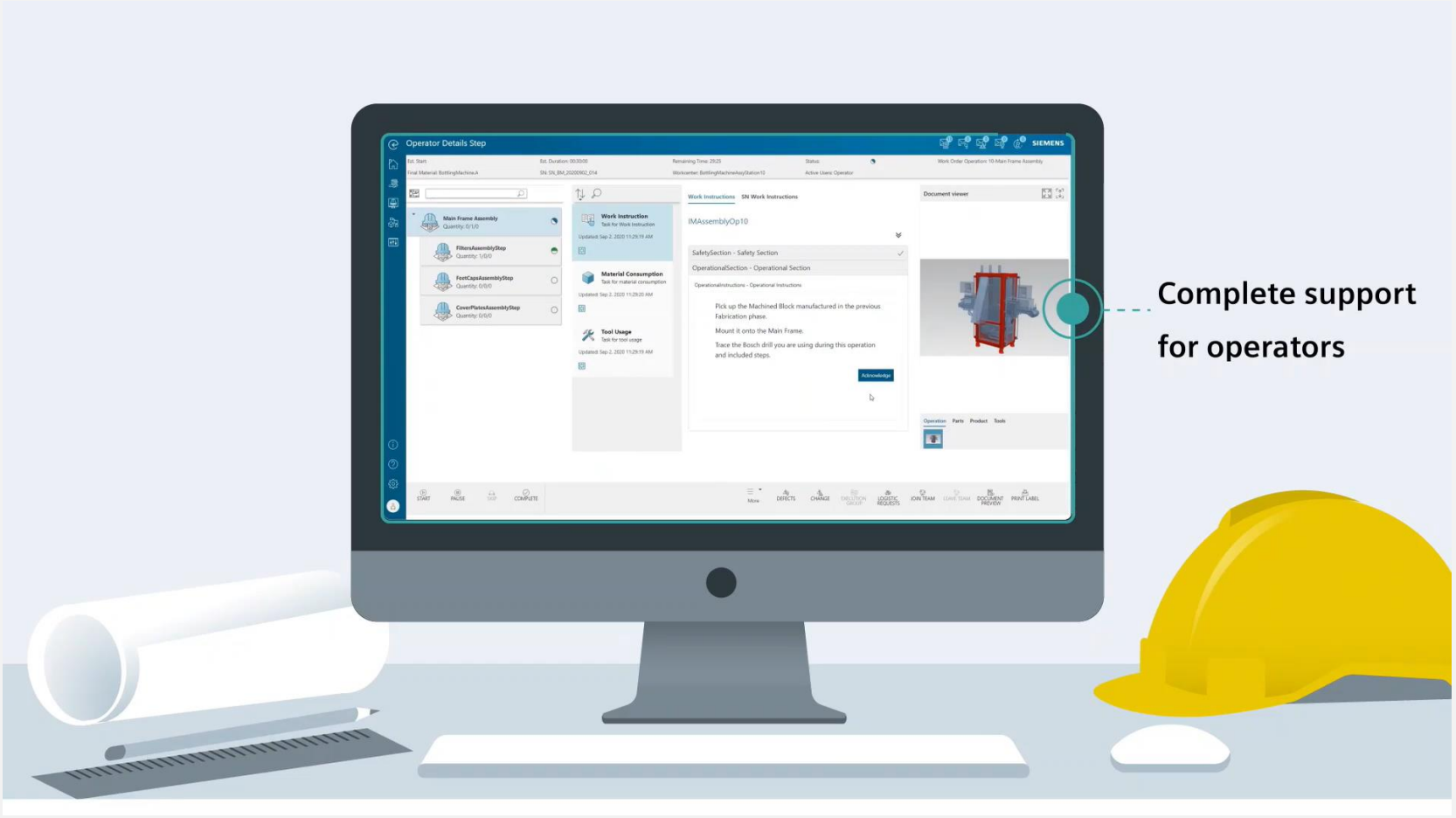
Error-proofing & standardization

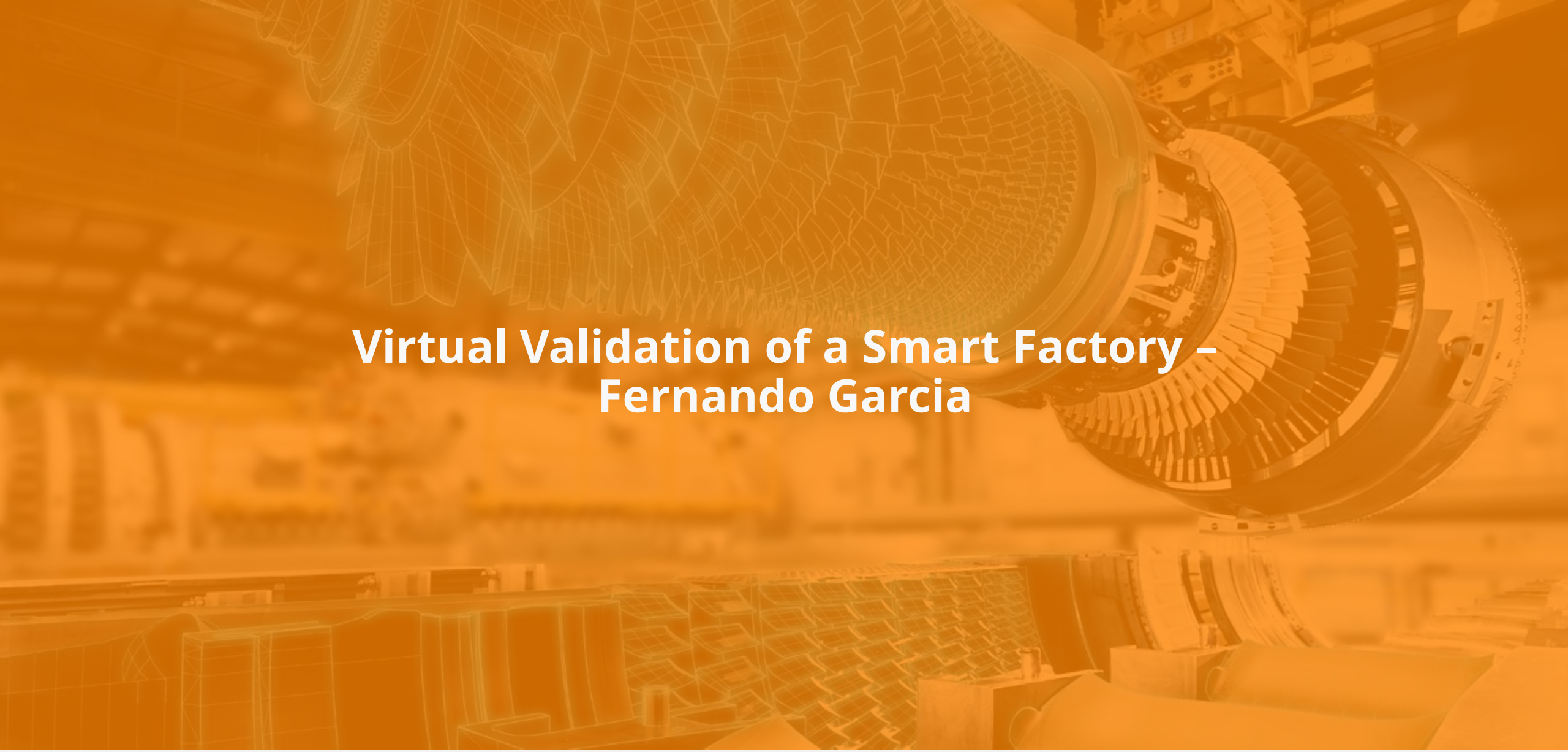
Right first time (RFT)

Production defect & rework mgmt.

ISA-95 framework Functional hierarchy overview in operations




Operator Details Step
SIEMENS
Work Instructions
SN Work Instructions
IMAssemblyOp10
SafetySection - Safety Section
OperationalSection - Operational Section
Pick up the Machined Block manufactured in the previous Fabrication phase.
Mount it onto the Main Frame.
Trace the Bosch drill you are using during this operation and included steps.
Acknowledge
Document viewer
Complete support
for operators



Virtual Validation of a Smart Factory – Fernando Garcia

Tecnomatix Plant Simulation - Production simulation answers many critical questions

Where are the bottlenecks?

What are the process interdependencies?

What is the optimal batch size?

Can I produce more with less?

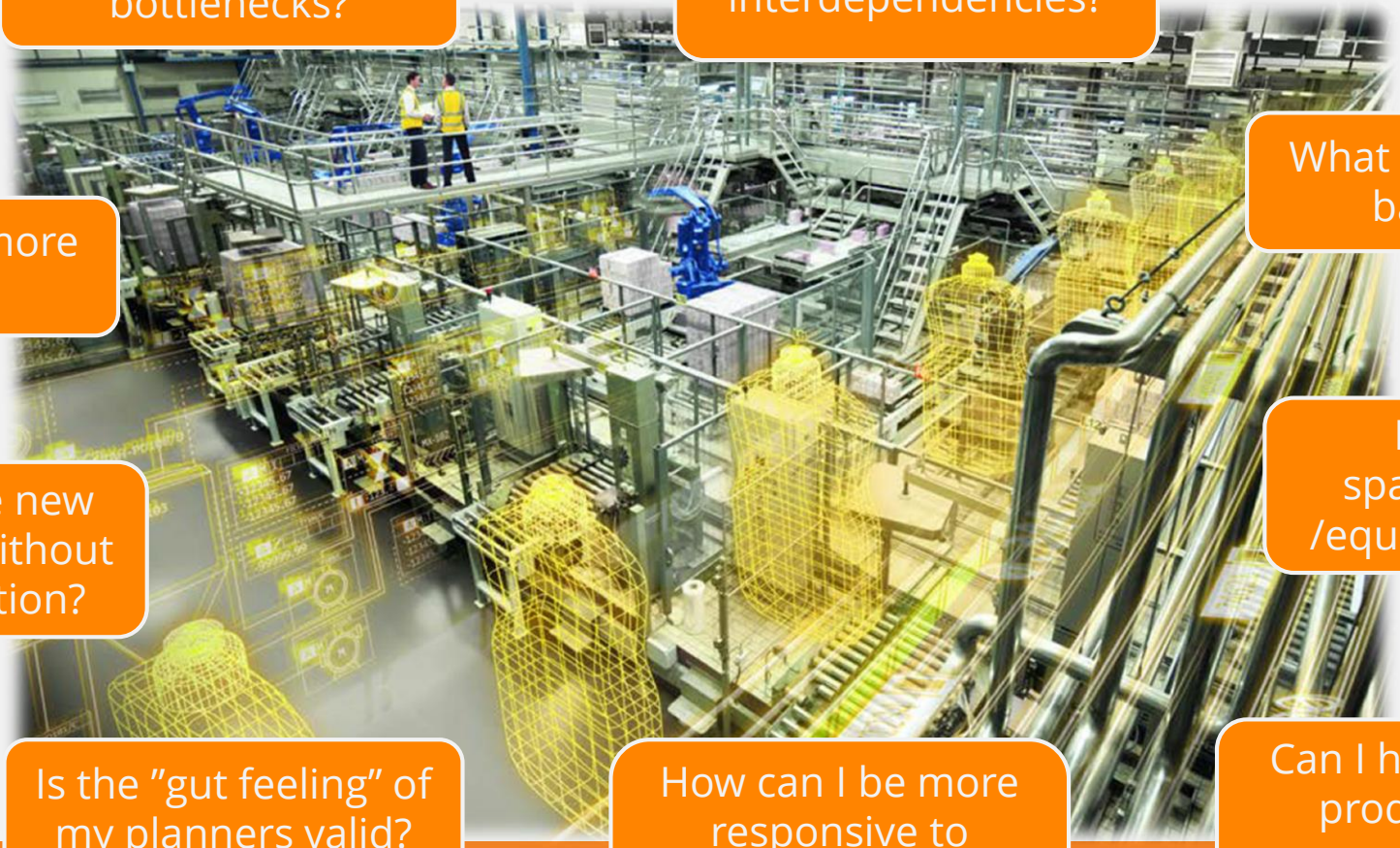
How much space/inventory /equipment I need?

How can I evaluate new control strategies without disrupting production?

Is the ”gut feeling” of my planners valid?

How can I be more responsive to changing customer demands?

Can I handle more products and variants?



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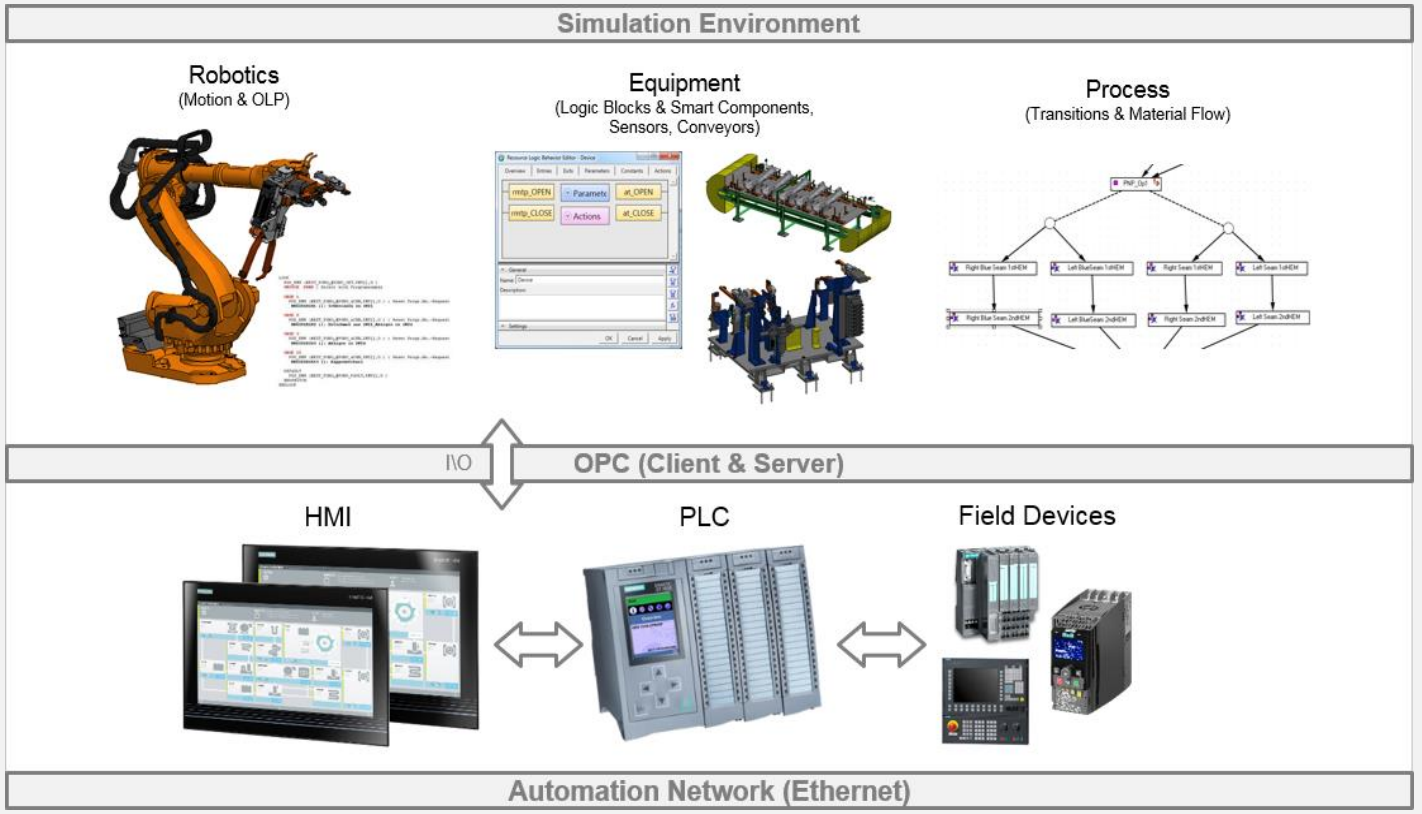
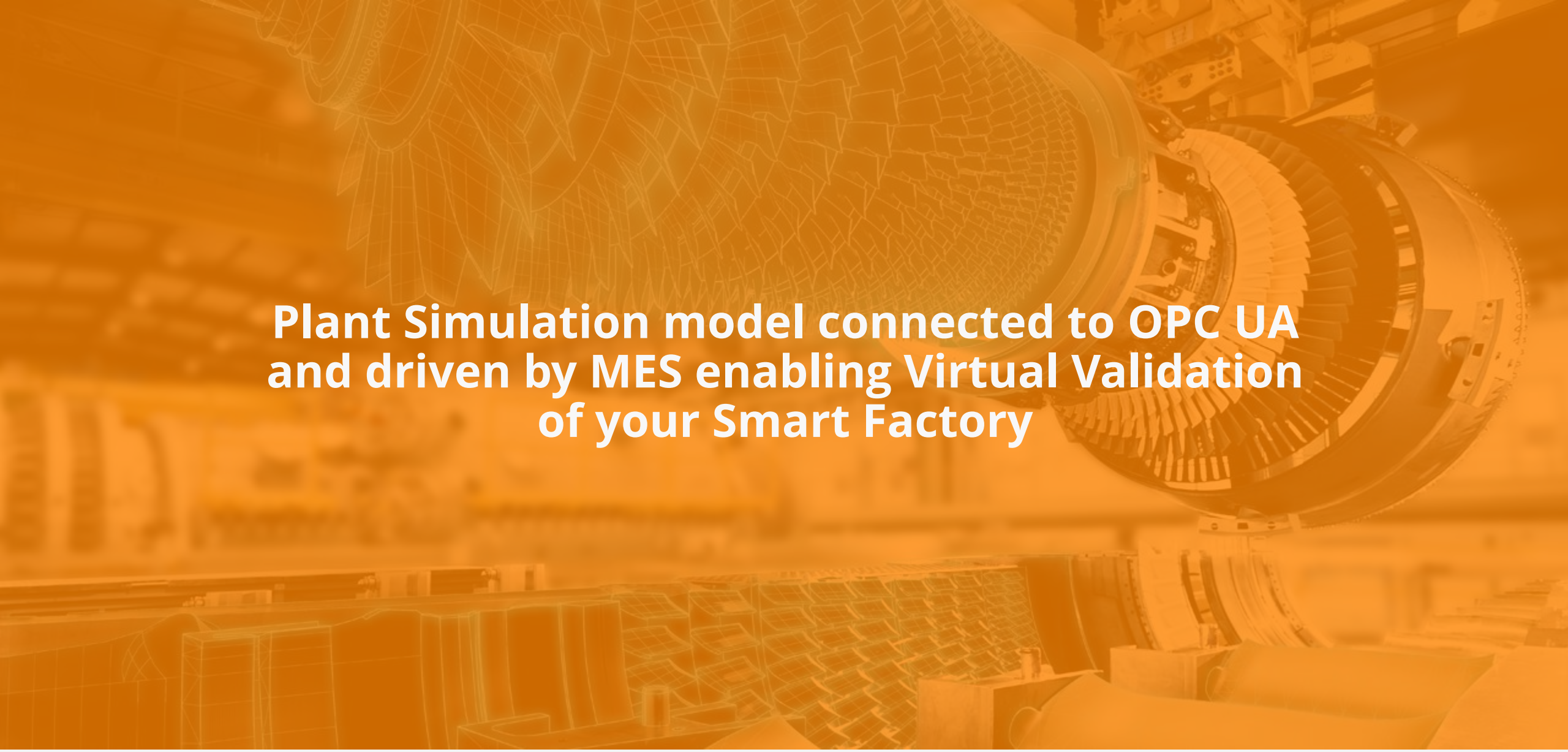
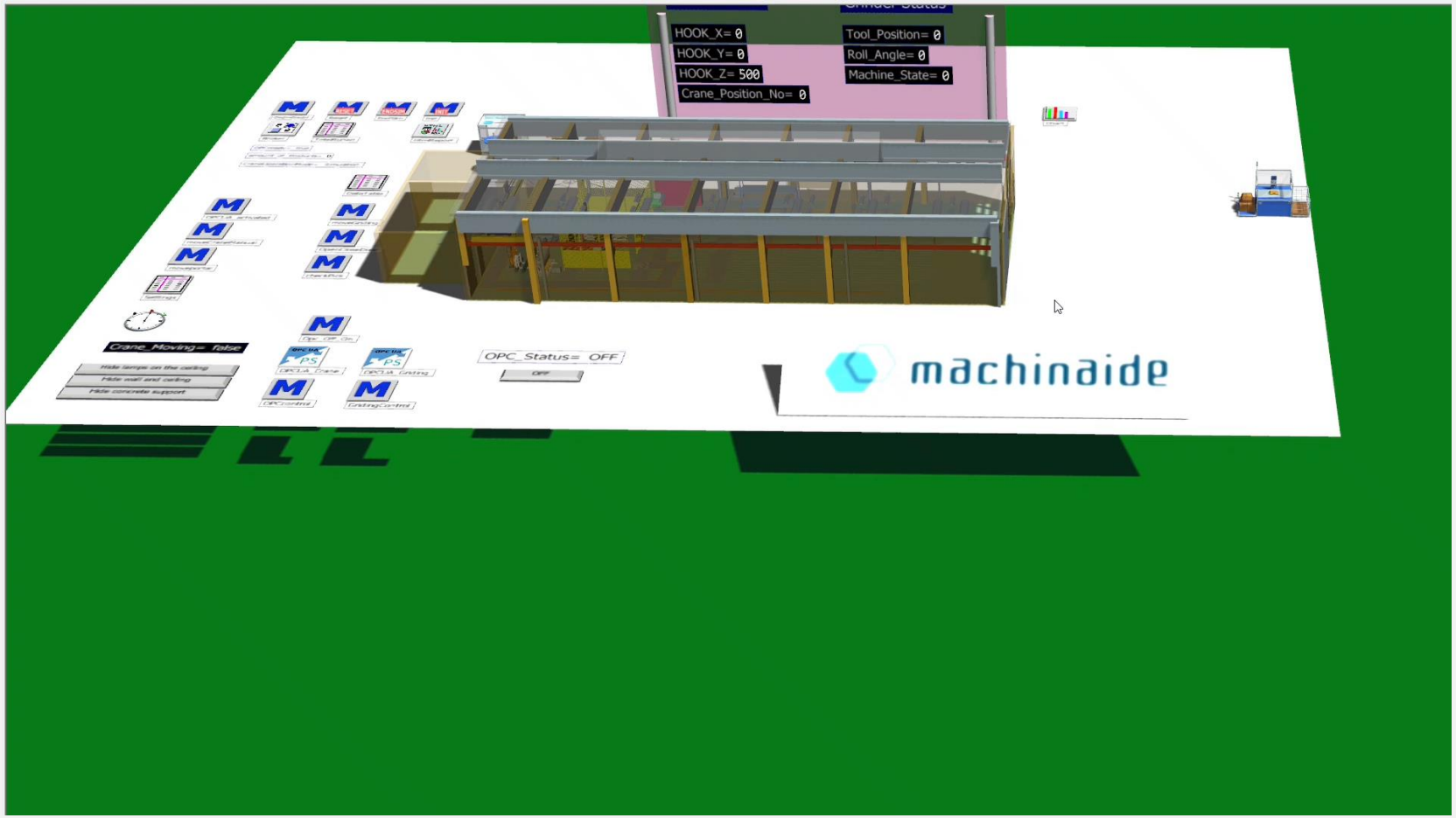
Plant Simulation Connected using UPC UA



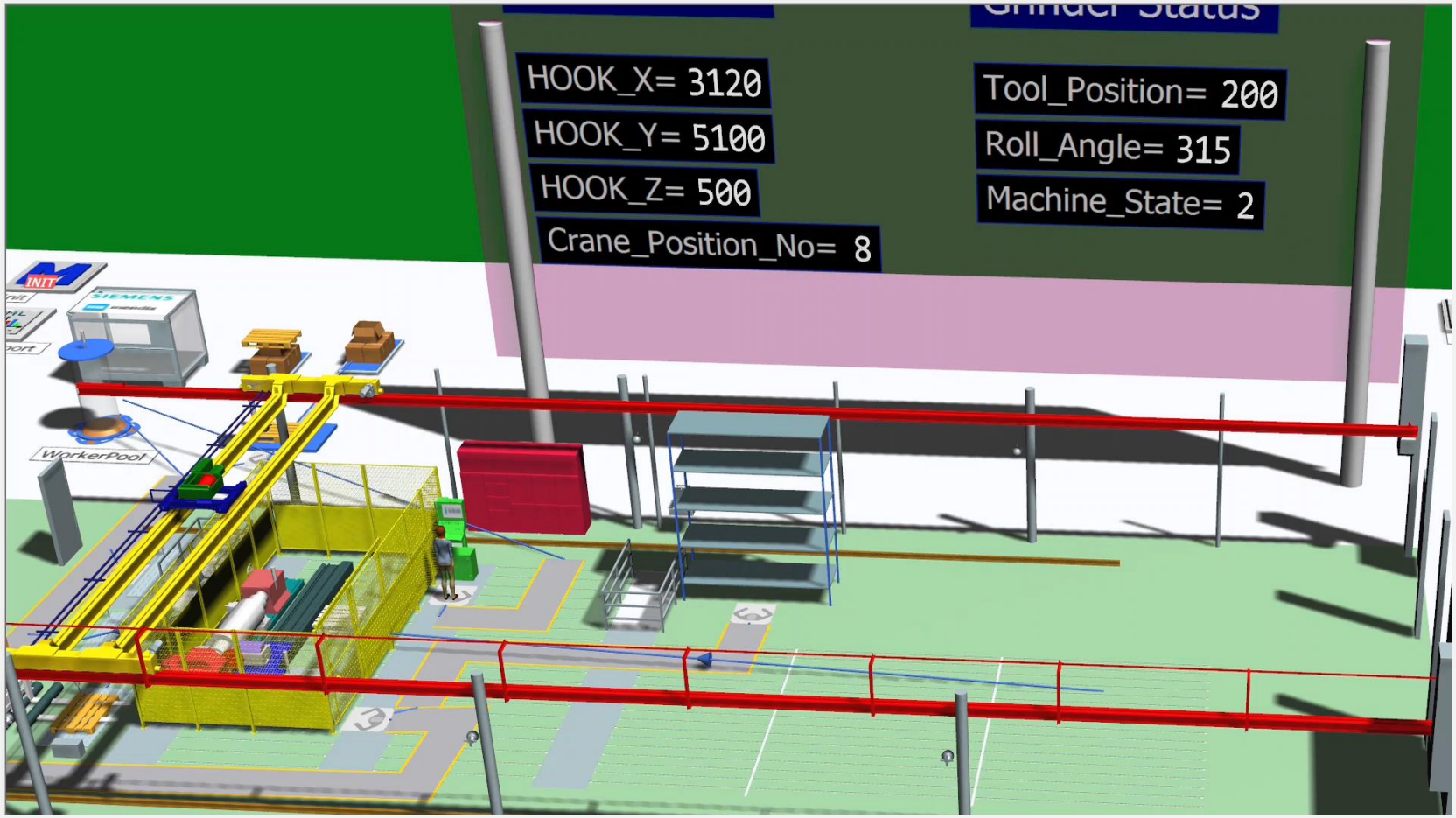


Plant Simulation model connected to OPC UA and driven by MES enabling Virtual Validation of your Smart Factory

Taking the roll to the grinder and start grinding process



Finishing the grinding process and taking the roll away



Questions?

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Interested? Please contact us via email or meet with us later during the day at the demo stands!

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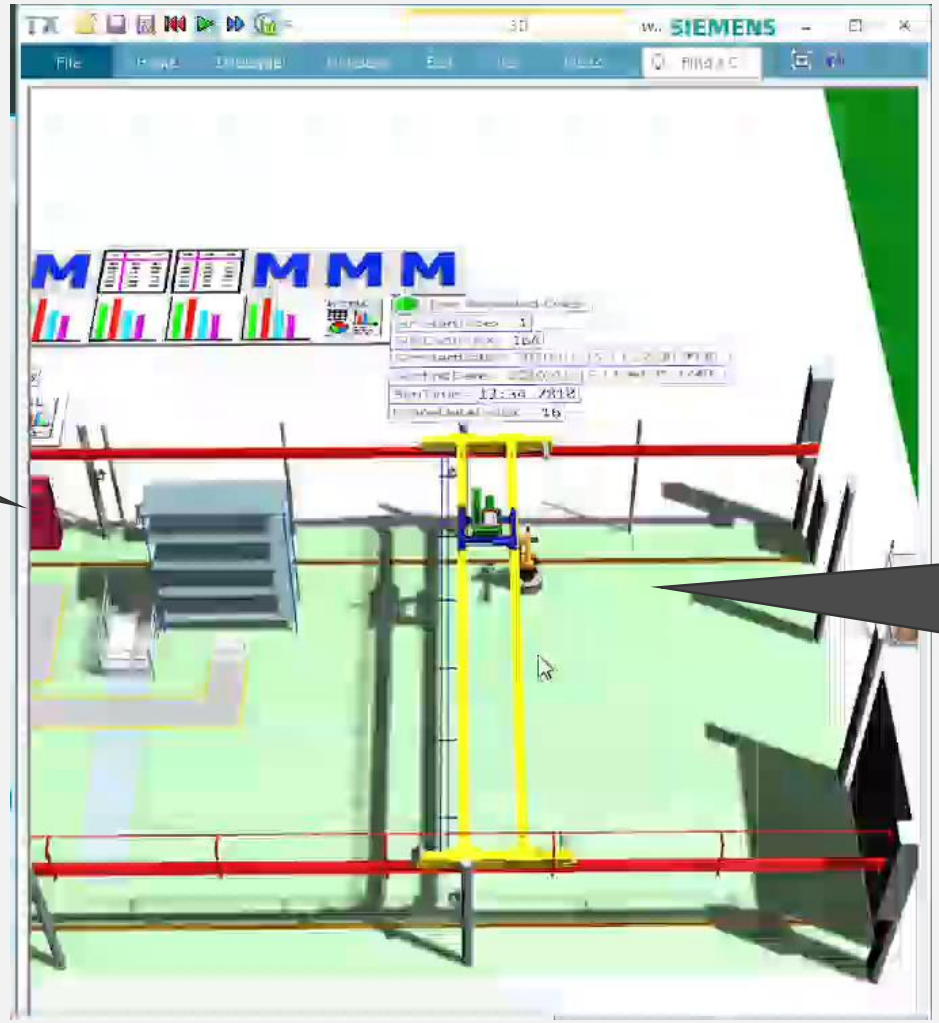
What we showed last year…

Replaying crane movements from January 2020



Placed a robot in the simulation model to show what would have happened if it had been there