

# Transform Production Systems Engineering to Realize the Smart Factory

## GLOBAL PRODUCT DATA INTEROPERABILITY **S U M M I T** 2017



ELYSIUM

Parker Aerospace

NORTHROP GRUMMAN

BOEING

ELYSIUM

Parker Aerospace

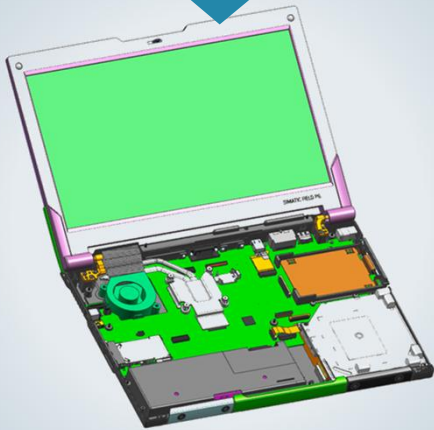
NORTHROP GRUMMAN

BOEING

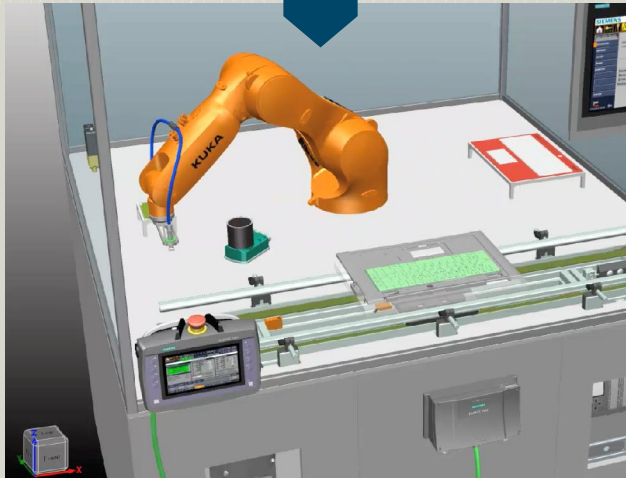


- **Christian Heck**
- **Solution Manager Production Systems Engineering**
- **Bachelor in Electrical Engineering and Automation**
- **15 years practical experience for Siemens**
  - Software integration for HMI systems
  - Engineering, construction and commissioning for production plants in the Oil & gas industry
  - Service development for data analytic services using IoT systems
  - Solution manager for production systems engineering
- **35 years old, married, 3 children (7,4,1)**

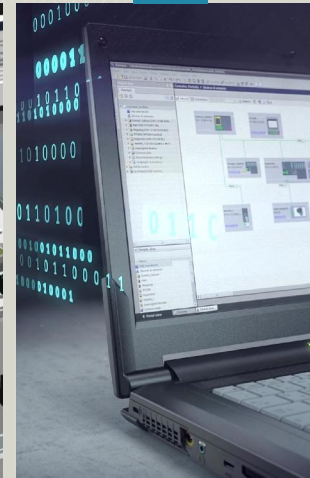
feed back insights to continuously optimize product and production



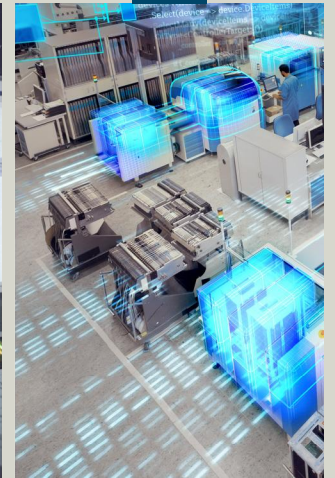
Digital  
Product  
Twin

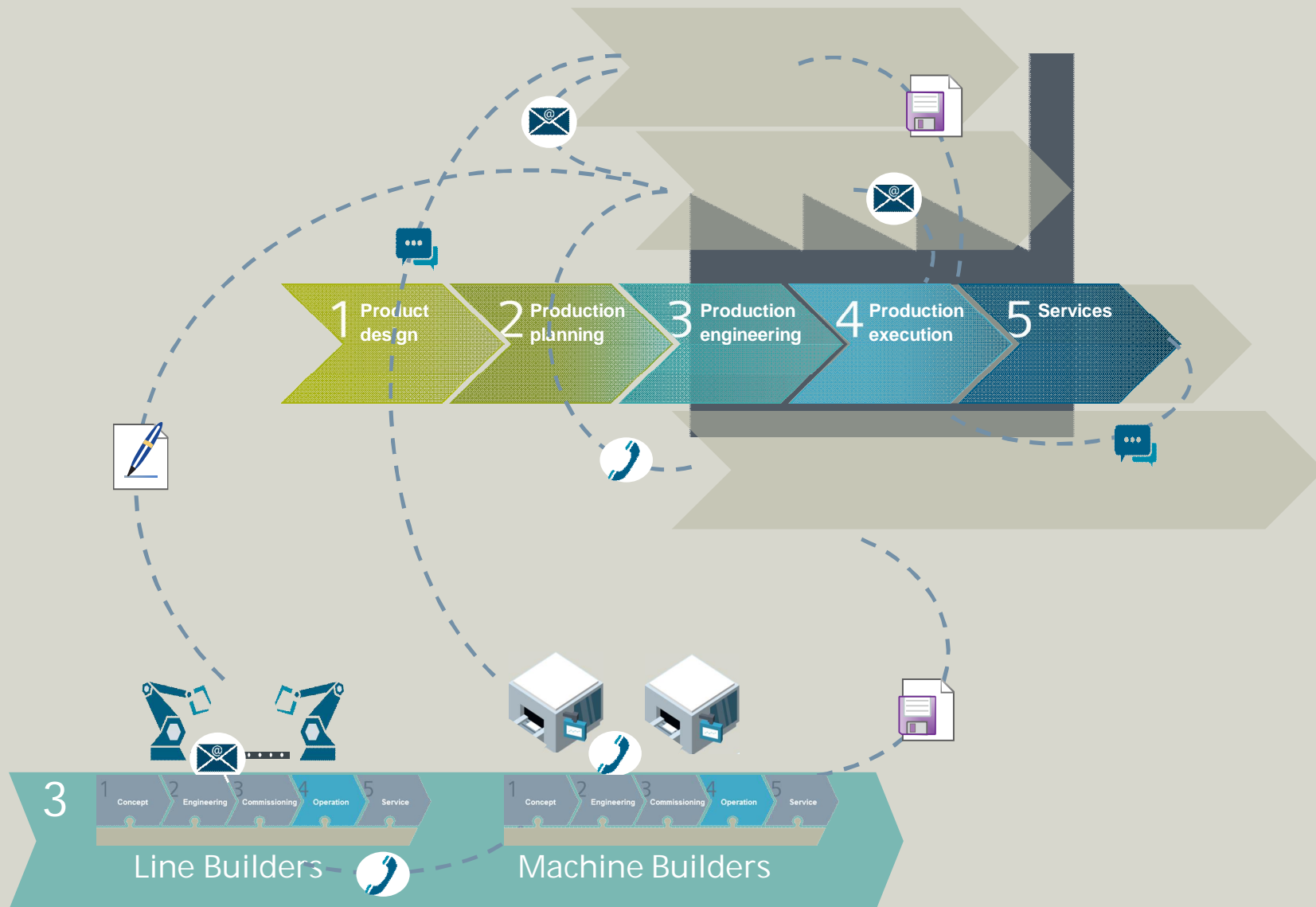


Digital  
Production  
Twin



Digital  
Performance  
Twin





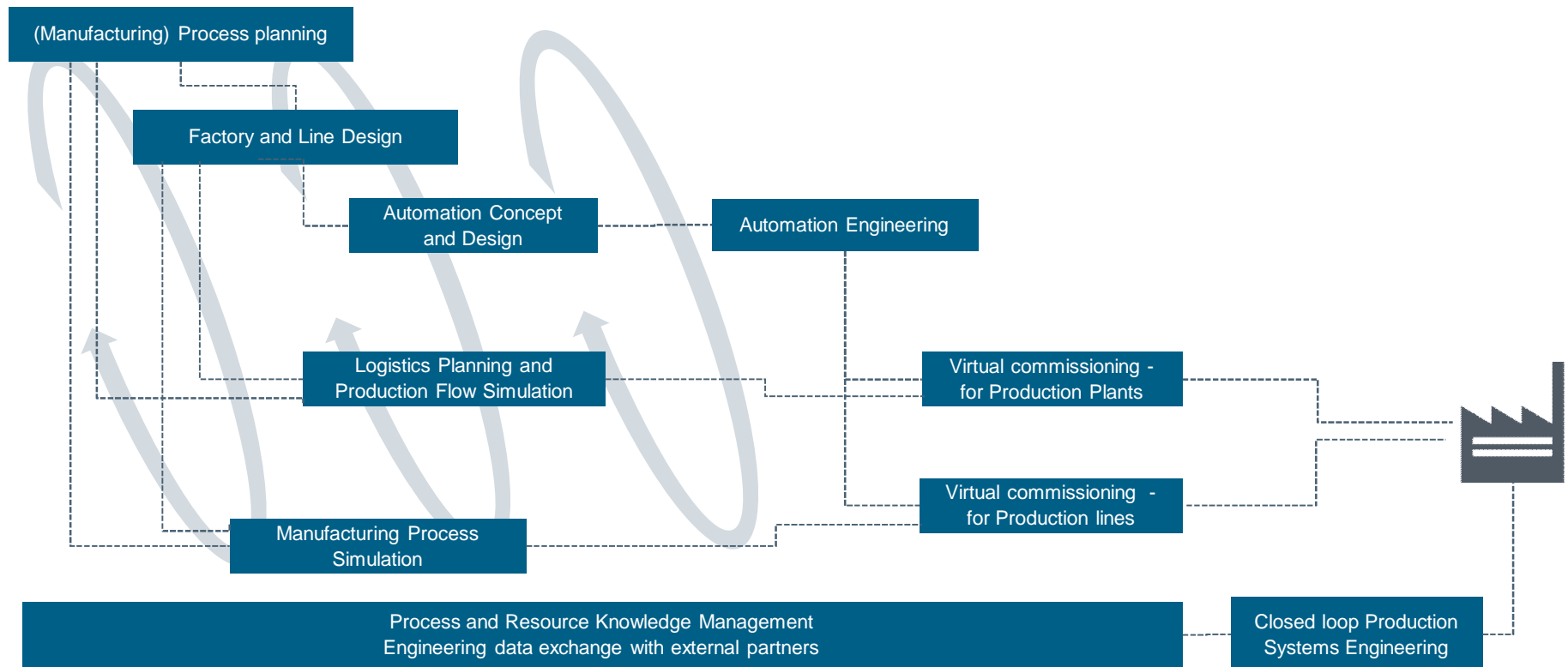
# Consequences

Inefficient Engineering  
because of **none**  
**value added**  
**activities**

**Higher product and**  
**production cost** by  
not optimized production  
solutions

**No utilization** of  
the **digital twin**  
**potential**

# Production Systems Engineering for the Smart Factory



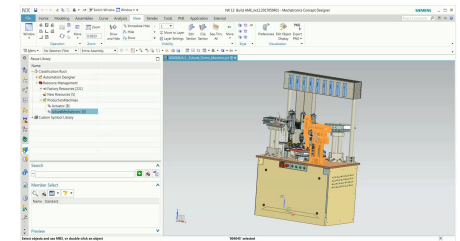
# Drive modularization and standardization across disciplines to enable the digital thread



Engineering

Process and Resource Knowledge management

- Reduce project cost and degree of component variants
- Reduce time to market through faster engineering with re-use components
- Improve maintenance, operations and repair with reduced spare parts and variants



Collaboration

Processes and Operation

Mechanical Resources and Components

Behavior models

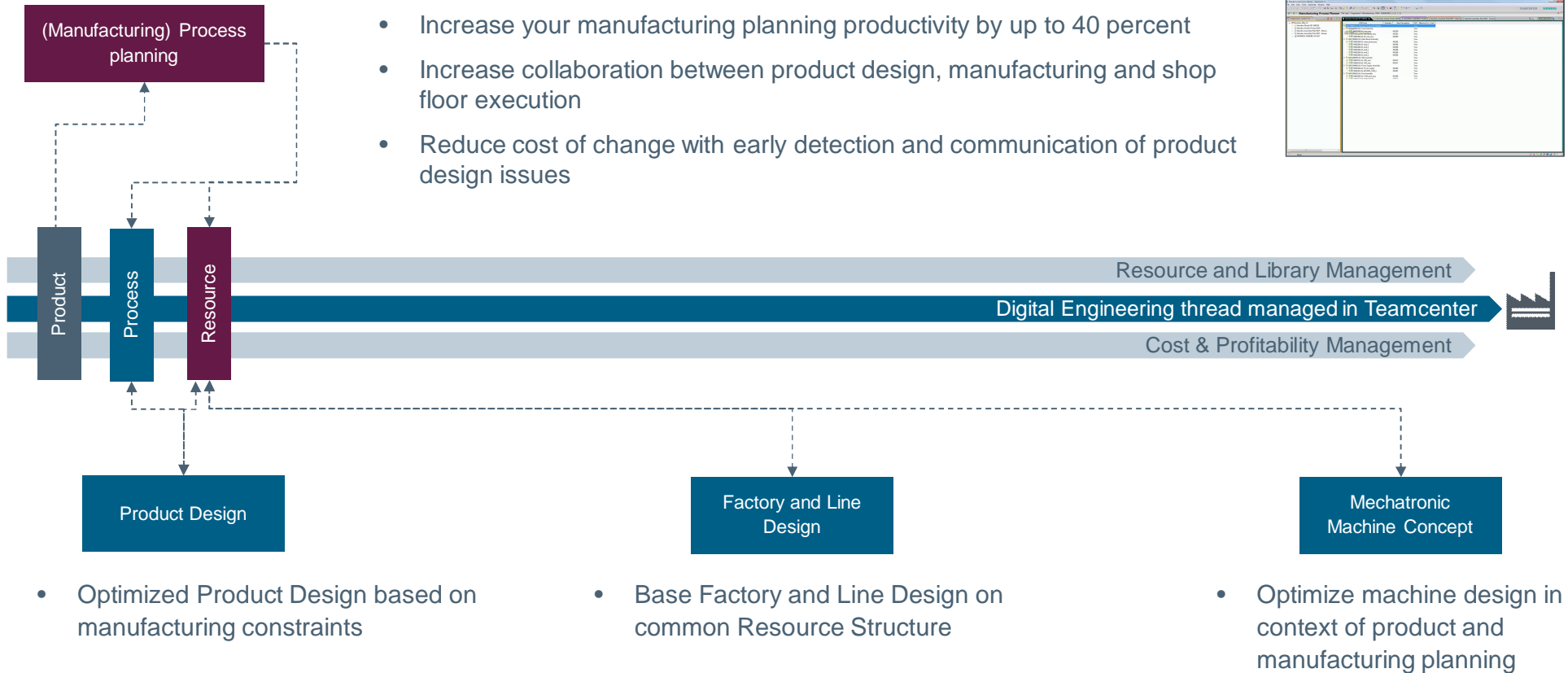
Electrical documentation  
PLC code  
Automation products

Data points and analytics

# Link the digital twin of the product and the digital twin of the production



Engineering





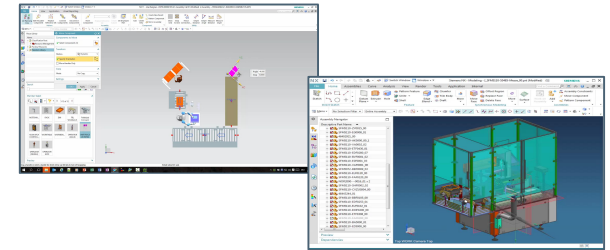
# Engineer a virtual representation of your production system



Engineering

Factory and Line Design  
/ Mechanical Design

- Efficient layout planning and machine design
- Point cloud integration to synchronize with plant context
- Early optimization through digital representation



Collaboration

Product

Process

Resource

Resource and Library Management

Digital Engineering thread managed in Teamcenter

Cost & Profitability Management

Manufacturing  
Process Planning

- Update Resource and Process structure with optimized Plant Design

Logistics Planning  
and Production  
Flow Simulation

- Load Factory Design, Process and Resource Information for Simulation

Manufacturing  
Process Simulation

- Load Factory Design, Process and Resource Information for Process Simulation

Mechatronic  
Machine Concept

- Integrate mechatronic design, mechanical engineering and simulation

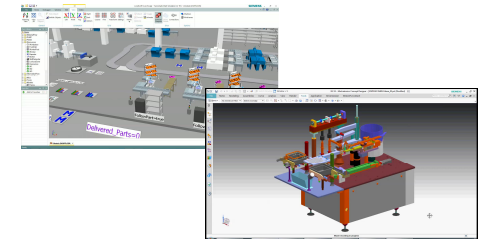
# Predict and optimize the overall manufacturing performance of your production system

**SIEMENS**  
*Ingenuity for life*

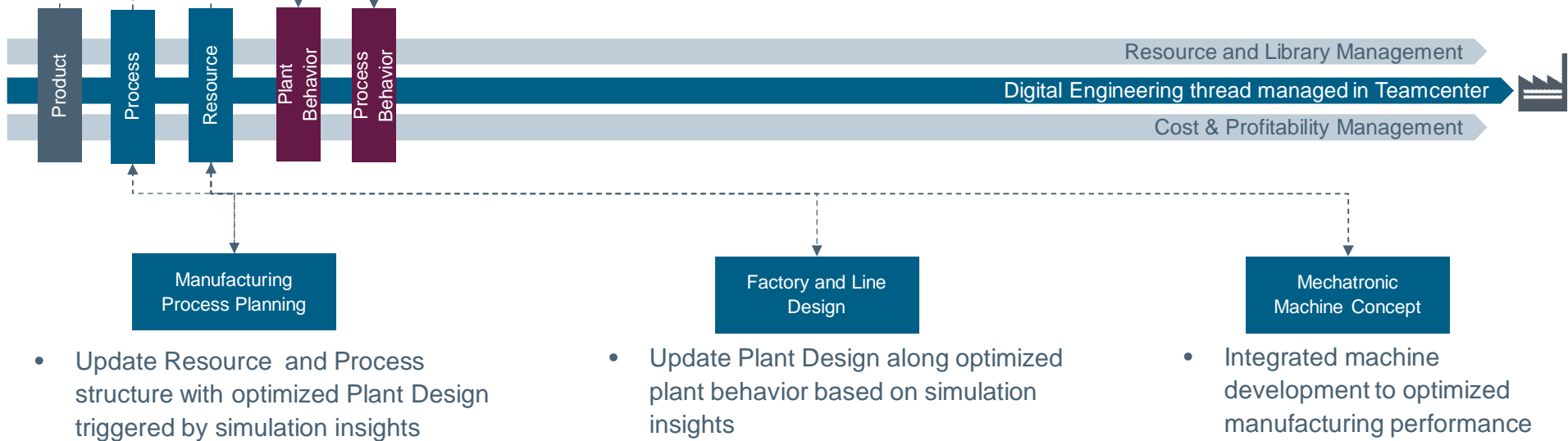
Engineering

- Logistics Planning and Production Flow Simulation
- Manufacturing Process Simulation

- Reduce new system costs by as much as 20 percent
- Reduce inventories by as much as 60 percent
- Reduce throughput time by as much as 60 percent
- Optimize systems for reduced energy consumption

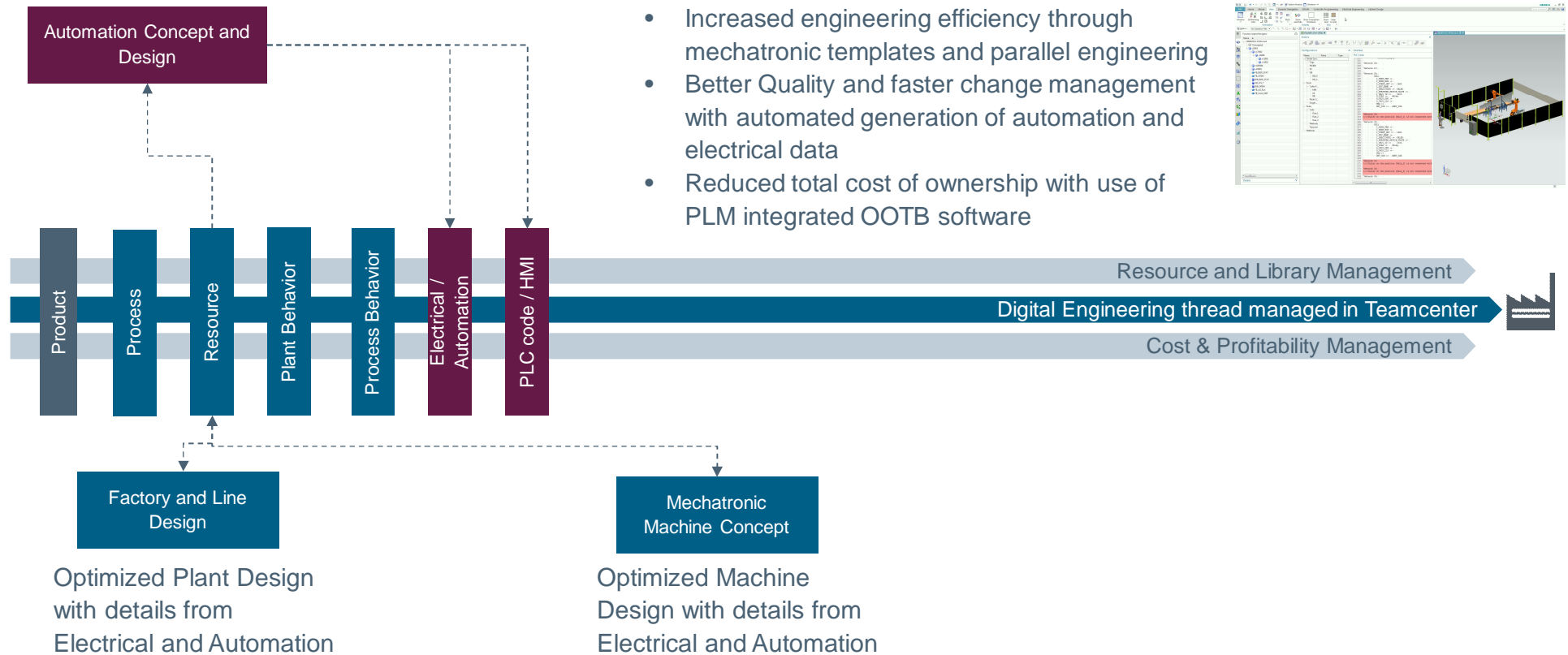


Collaboration



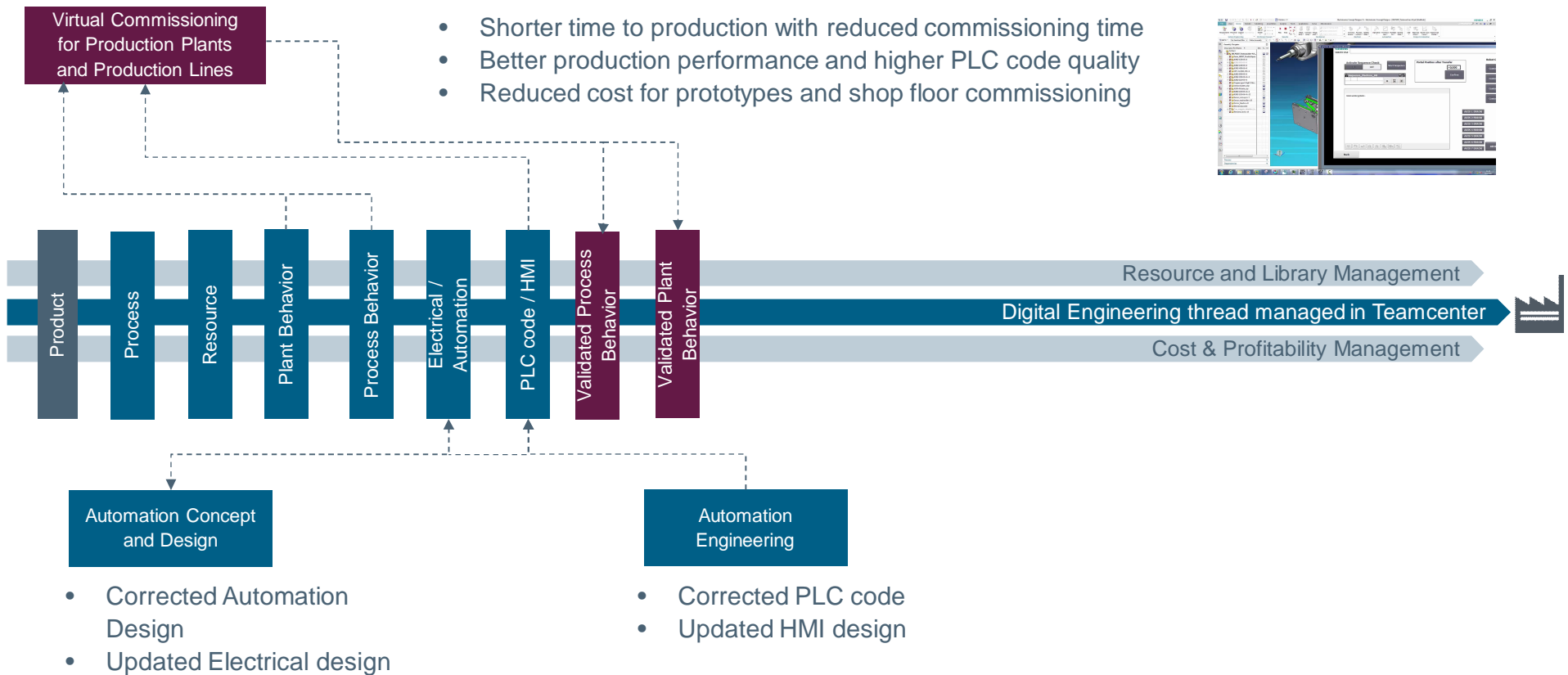
## Automatically generate electrical and automation projects

Engineering



## Virtually validate the behavior of your production system

Engineering



Collaboration

## Commission the physical production system

Engineering

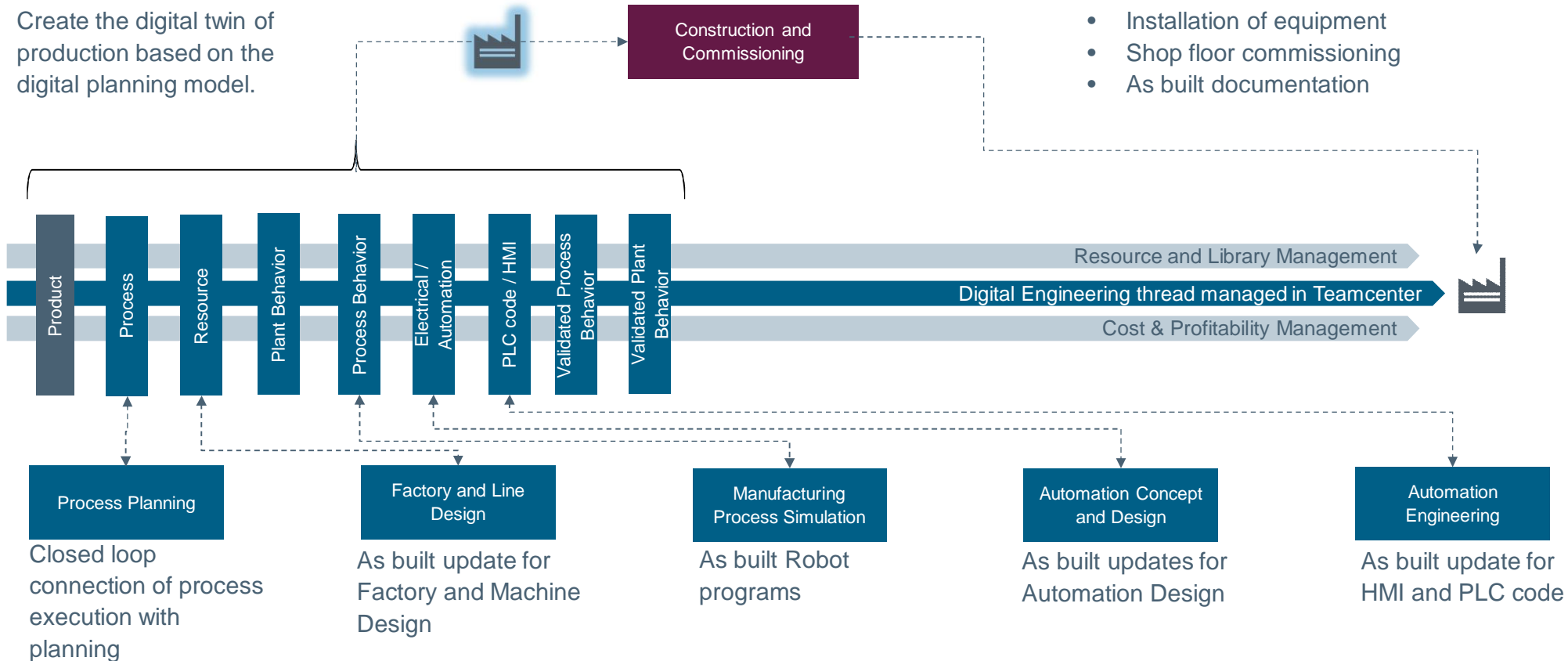
Create the digital twin of production based on the digital planning model.



Construction and Commissioning

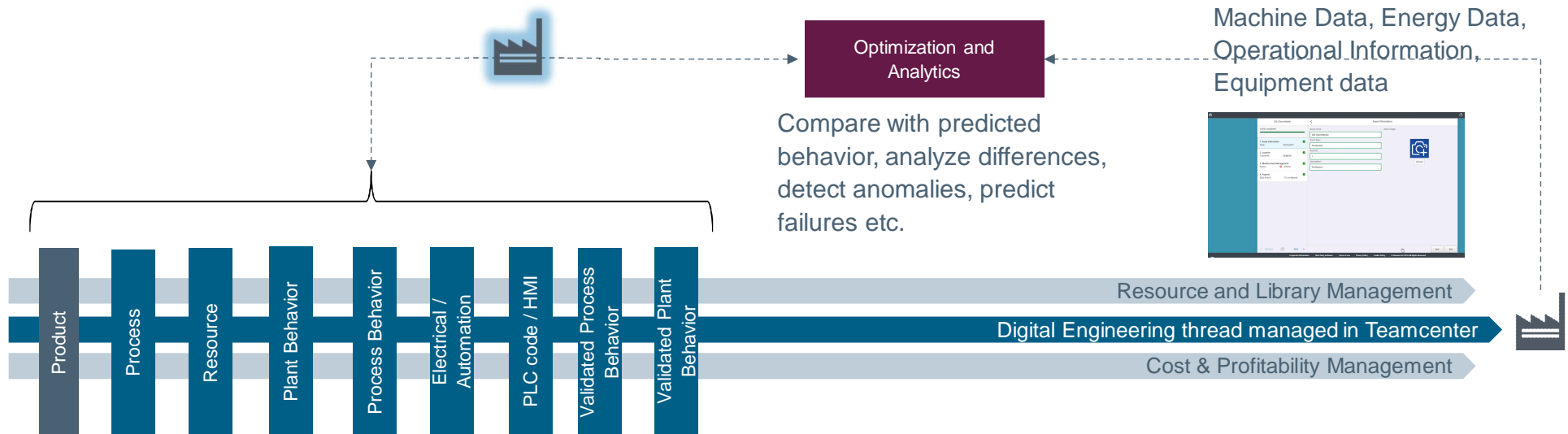
- Installation of equipment
- Shop floor commissioning
- As built documentation

Collaboration



## Optimize production based on the digital performance twin

Operation



Collaboration

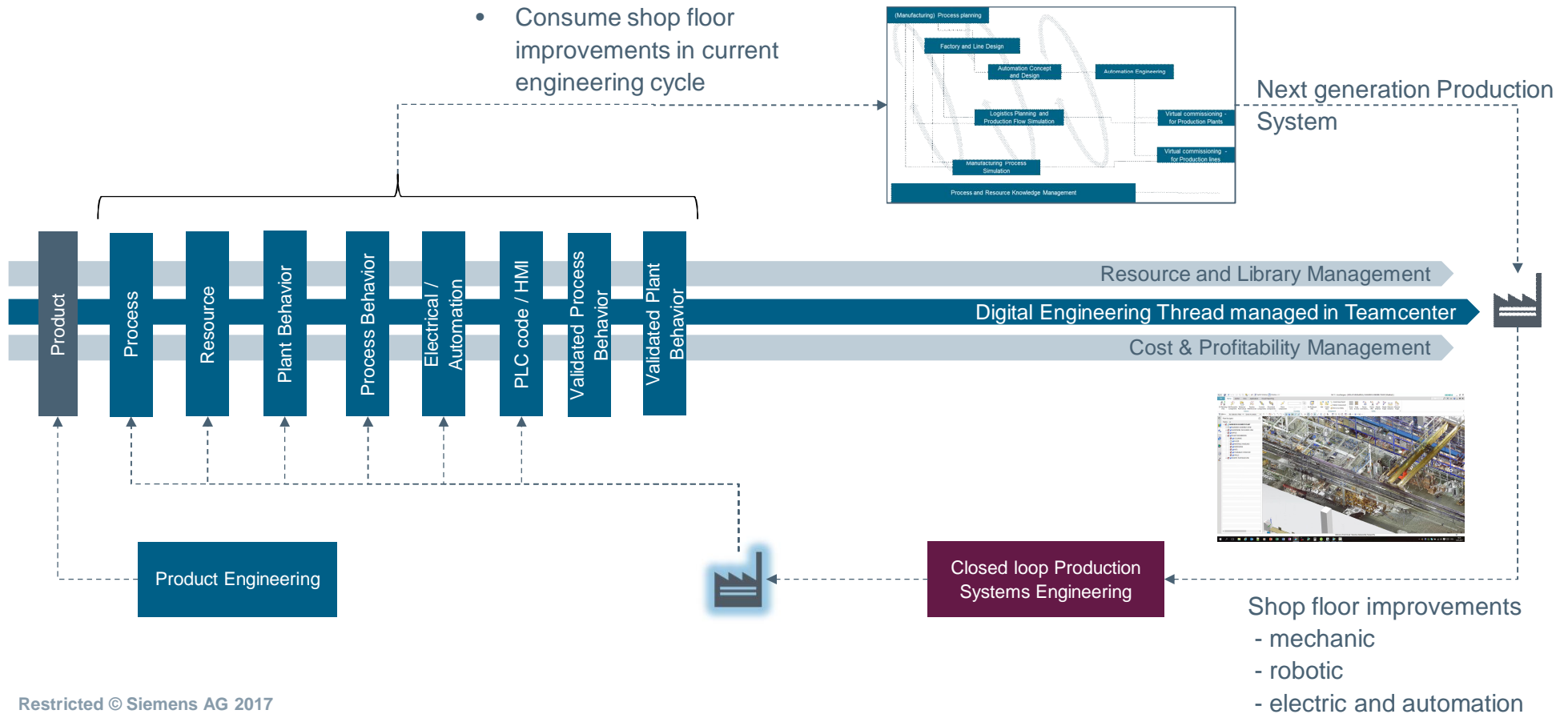
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|---|---|--|
| <div data-bbox="132 1052 380 1146" data-label="Section-Header"> <p><b>Manufacturing Process Planning</b></p> </div> <div data-bbox="109 1149 581 1284" data-label="List-Group"> <ul style="list-style-type: none"> <li>Analyze process steps, process parameters with real manufacturing operations (Closed loop manufacturing)</li> </ul> </div> | <div data-bbox="911 1052 1159 1146" data-label="Section-Header"> <p><b>Manufacturing Process Simulation</b></p> </div> <div data-bbox="861 1149 1358 1284" data-label="List-Group"> <ul style="list-style-type: none"> <li>Analyze cell / line operations with real performance.</li> <li>Compare energy estimation and real consumption.</li> </ul> </div> | <div data-bbox="1568 1052 1816 1146" data-label="Section-Header"> <p><b>Logistics Planning and Production Flow Simulation</b></p> </div> <div data-bbox="1518 1149 1995 1250" data-label="List-Group"> <ul style="list-style-type: none"> <li>Verify overall energy consumption</li> <li>Buffer / logistics estimation with operational data</li> </ul> </div> |
|---|---|--|

# Synchronize the digital production twin

Engineering

Collaboration

- Consume shop floor improvements in current engineering cycle



# The real benefit

**Increased efficiency  
in engineering to  
shorten time to  
market and stay  
ahead of competition**

**Improved  
manufacturing  
productivity through  
better and more  
flexible solutions**

**Enabling the digital  
twin of performance to  
drive engineering and  
operational excellence**