

**Closed-loop Industrial IoT: giving  
the model-based ecosystem a  
reality check**

GLOBAL PRODUCT DATA  
INTEROPERABILITY  
**S U M M I T**  
**2019**



# Industry Challenges

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How to avoid poor program performance and cope with increasing **product complexity**?



How to remain competitive within global competition while overcoming **cost & schedule** challenges?



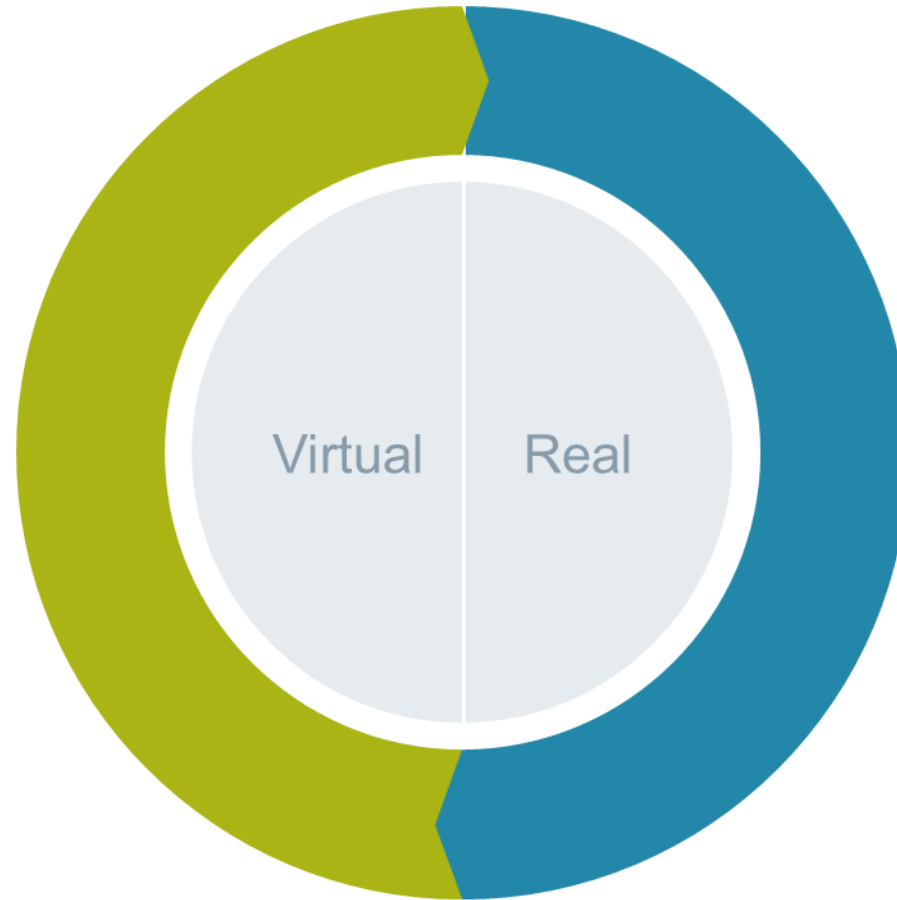
How to reduce the growing **backlog** but mitigate the increased risk throughout the supply chain?



# Combining the real world with the virtual world

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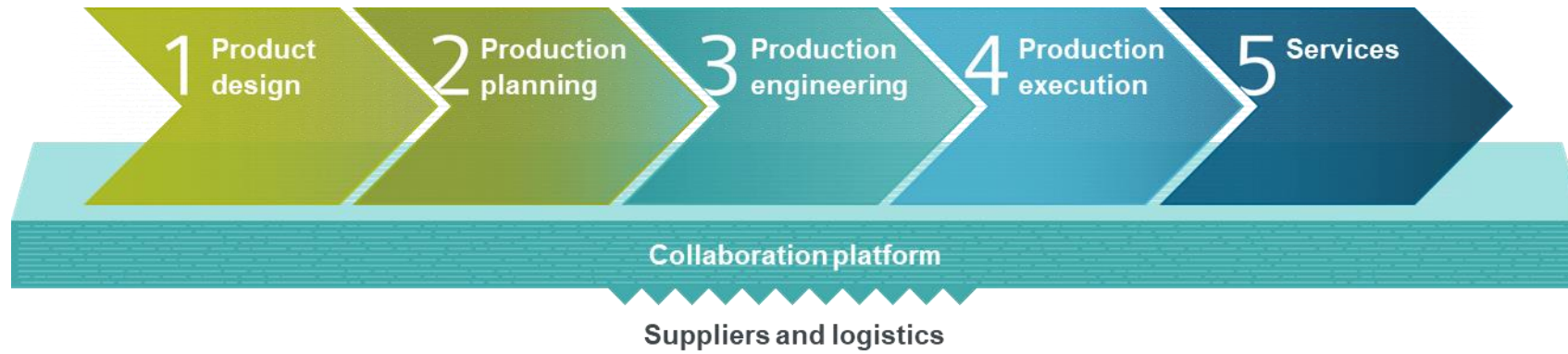
**Software**



**Automation**

# Integrating and digitalizing of the entire value chain

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# This is accomplished by creating a holistic virtual representation of the value chain: the Digital Twin

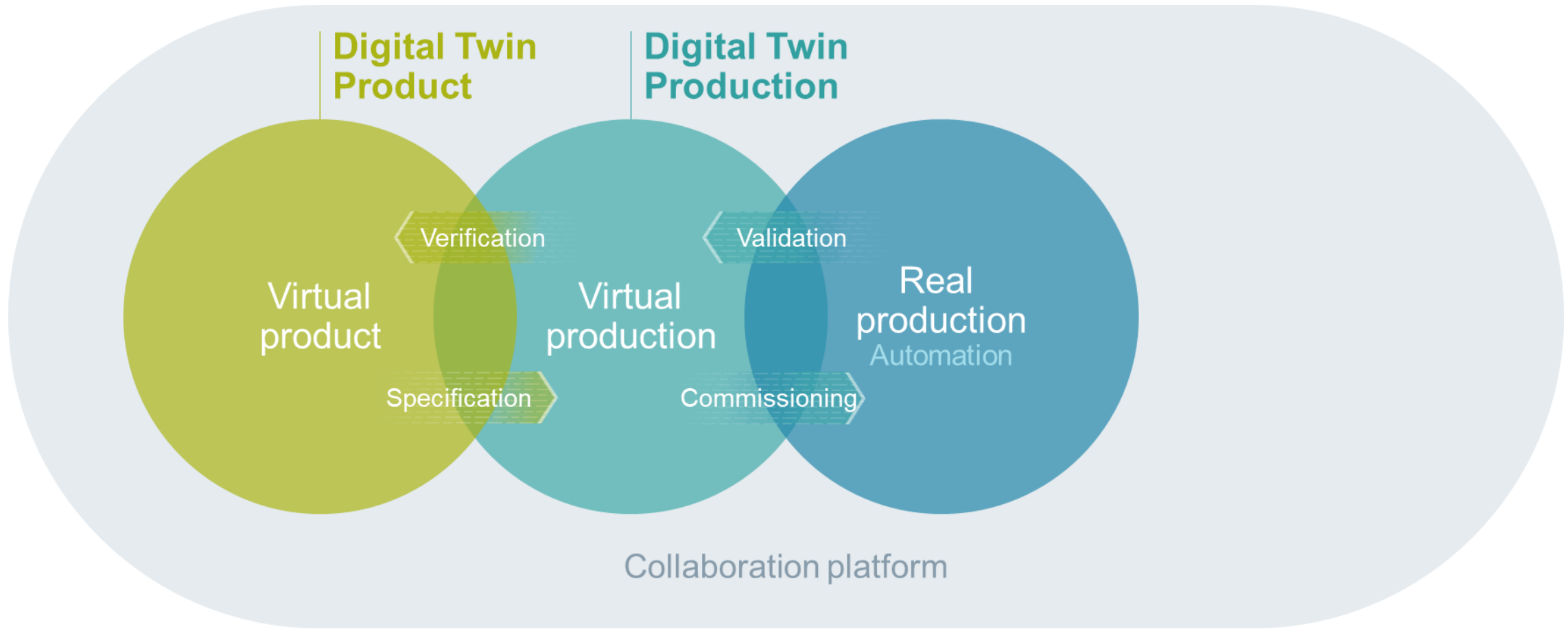
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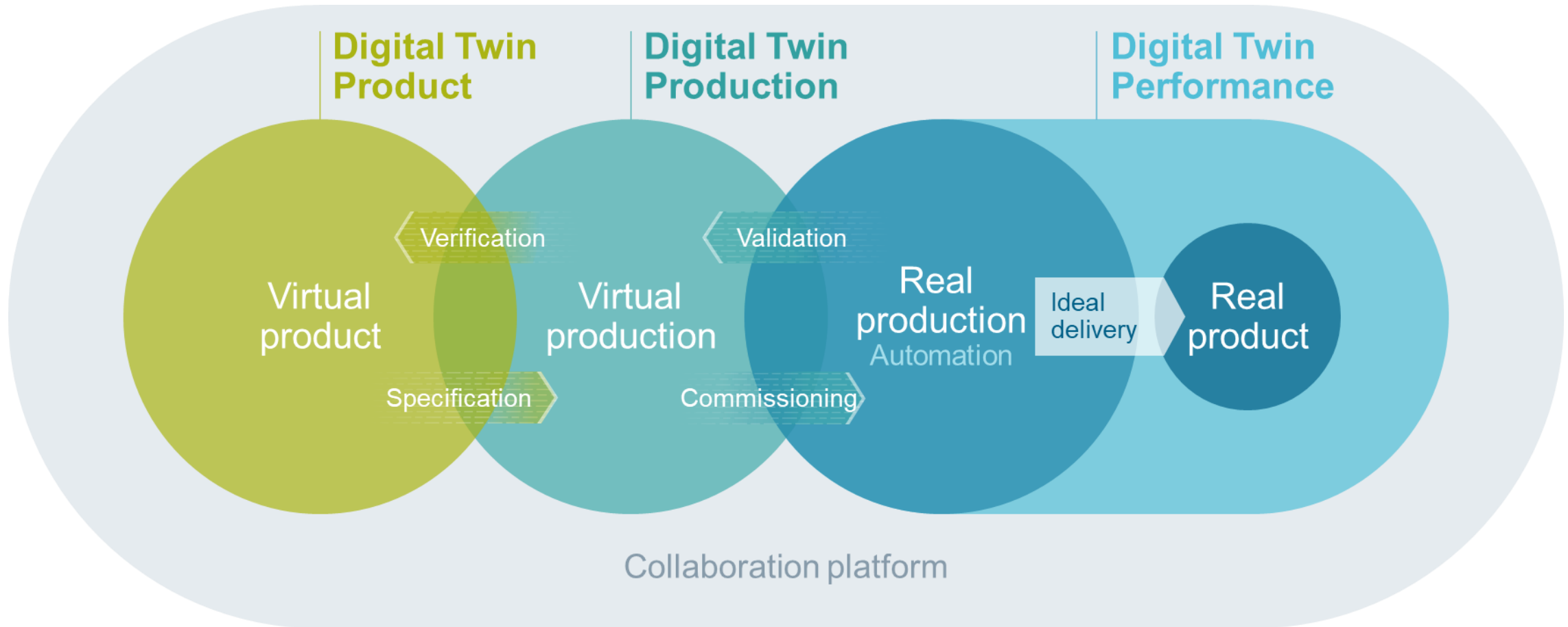
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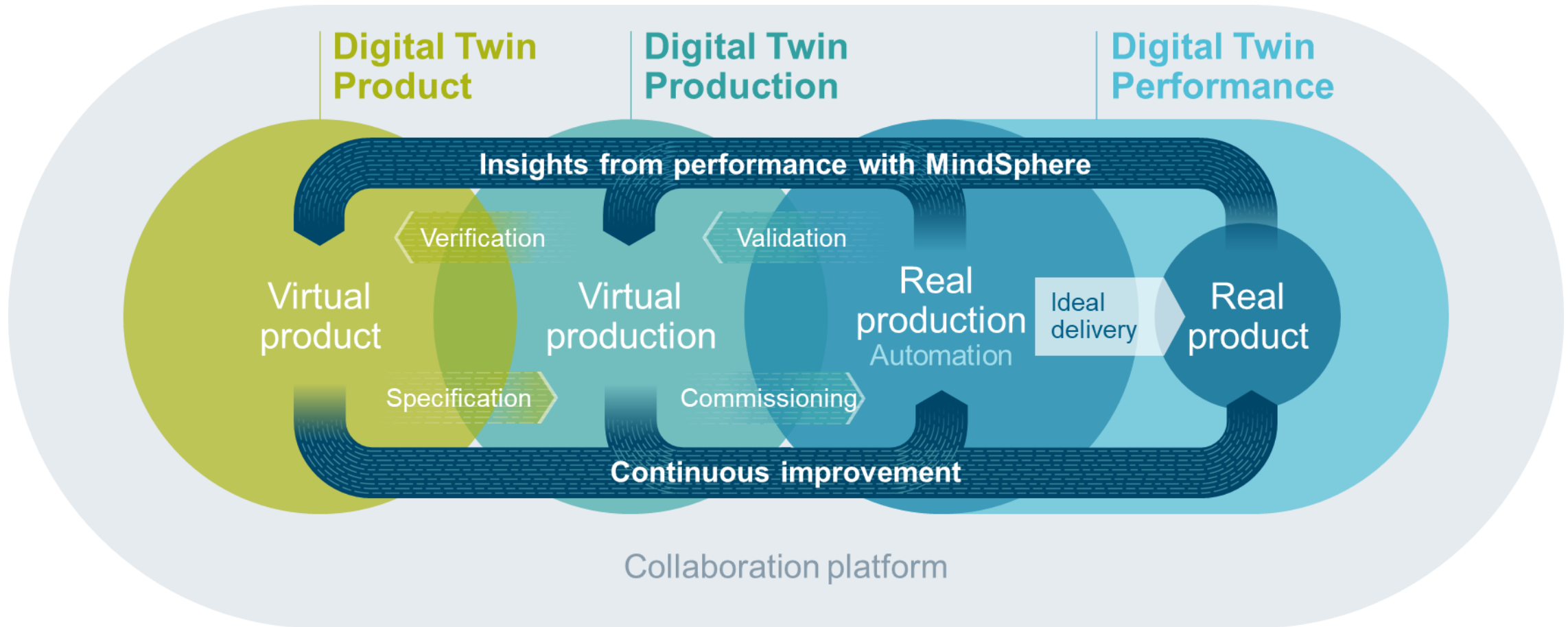
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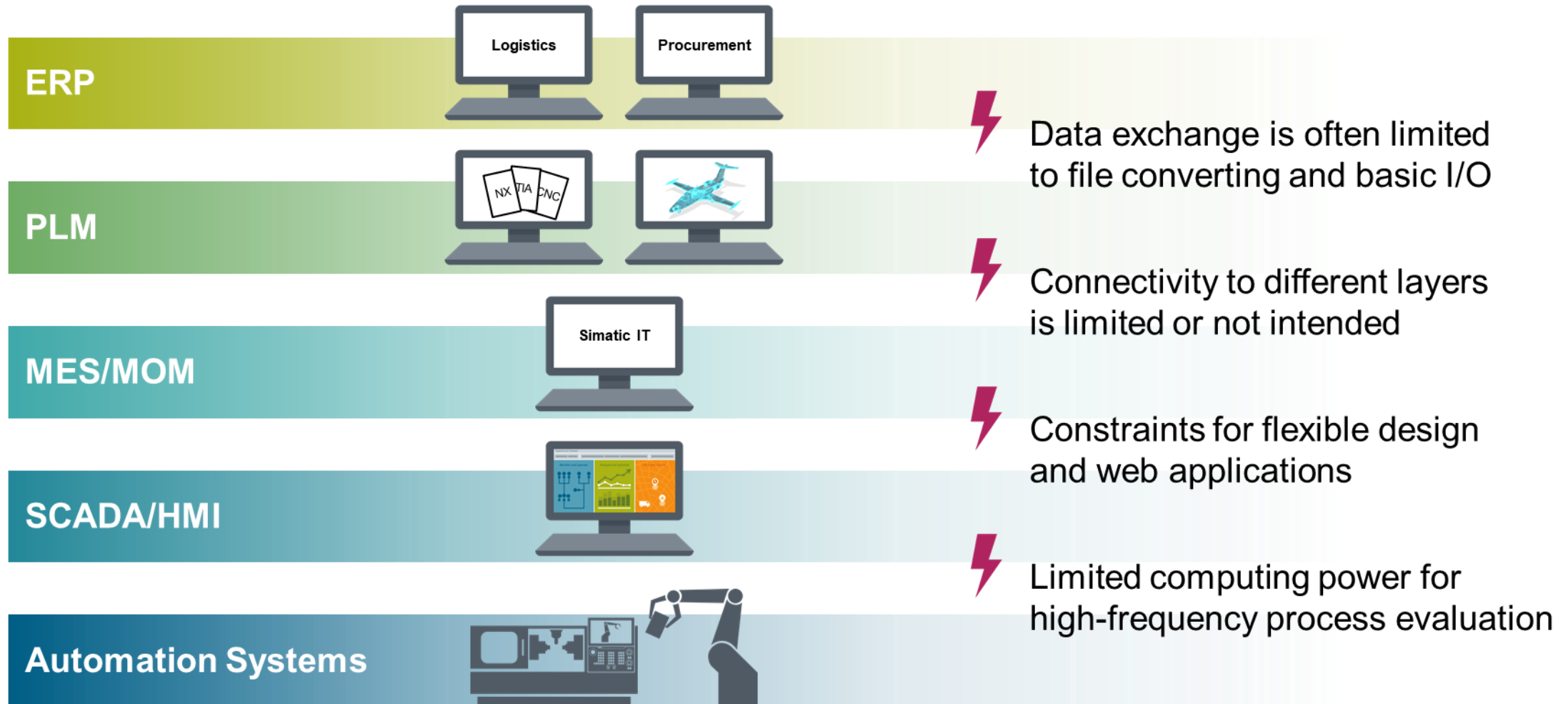
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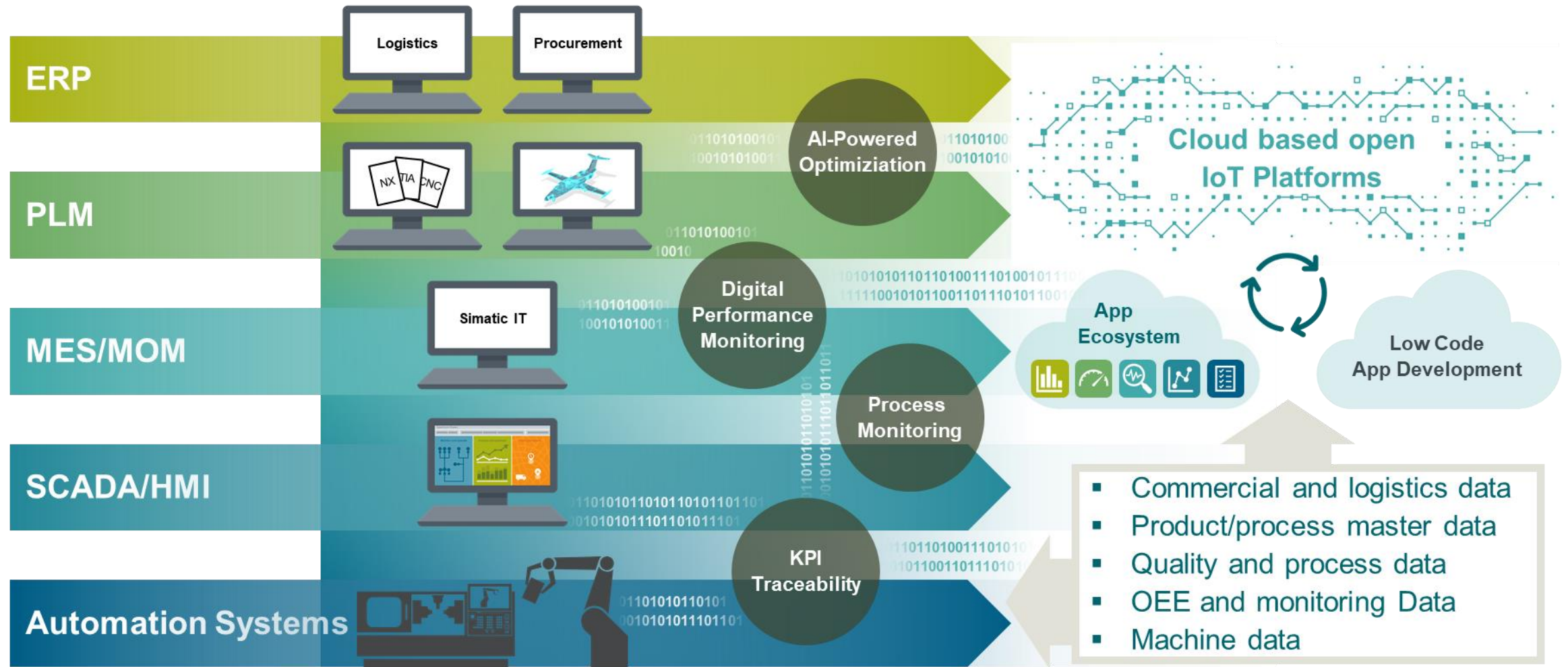
# Traditional hierarchical structures lack interconnectivity

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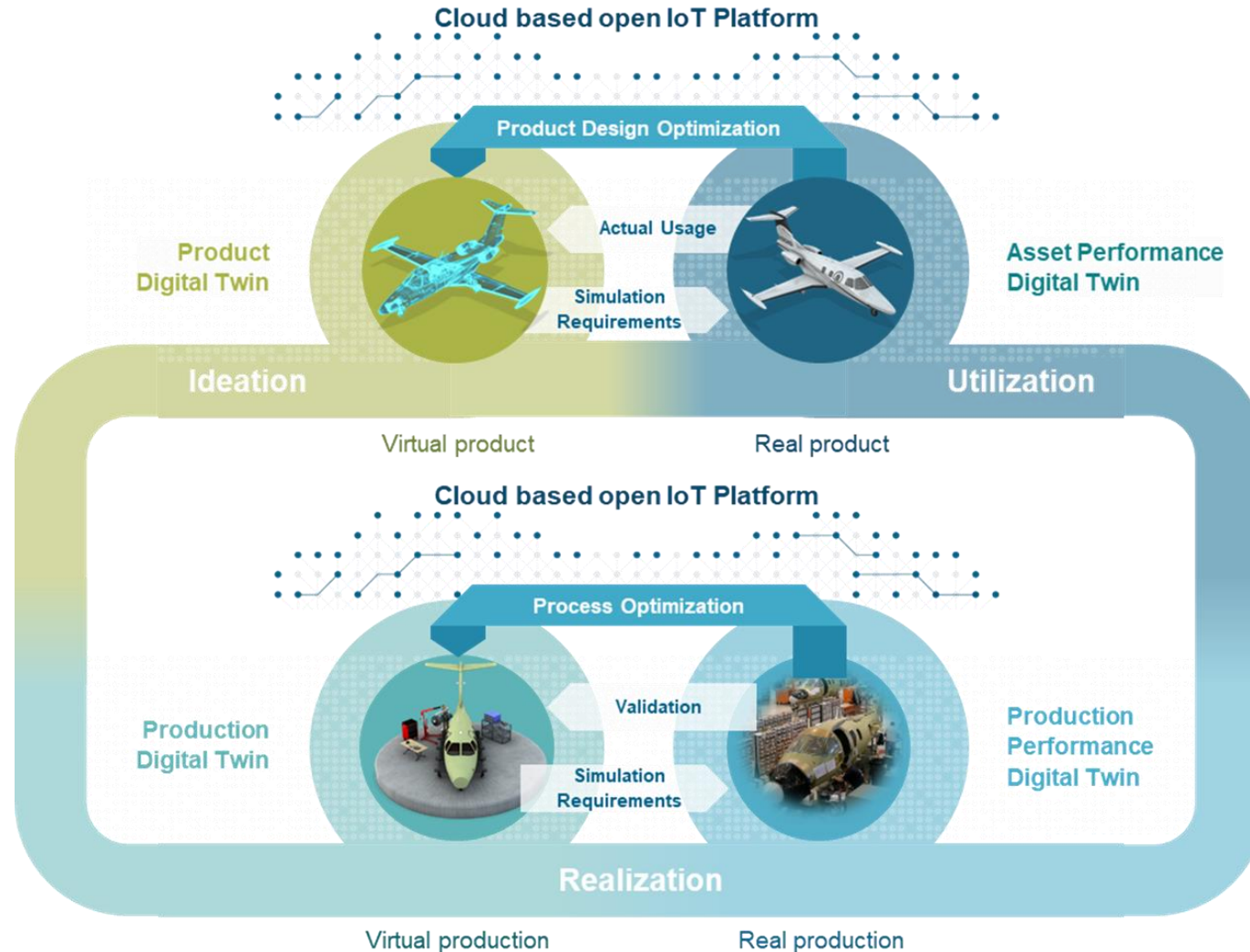
# Cloud based open IoT Platforms breaks silos, enables vertical and horizontal integration to generate smart data

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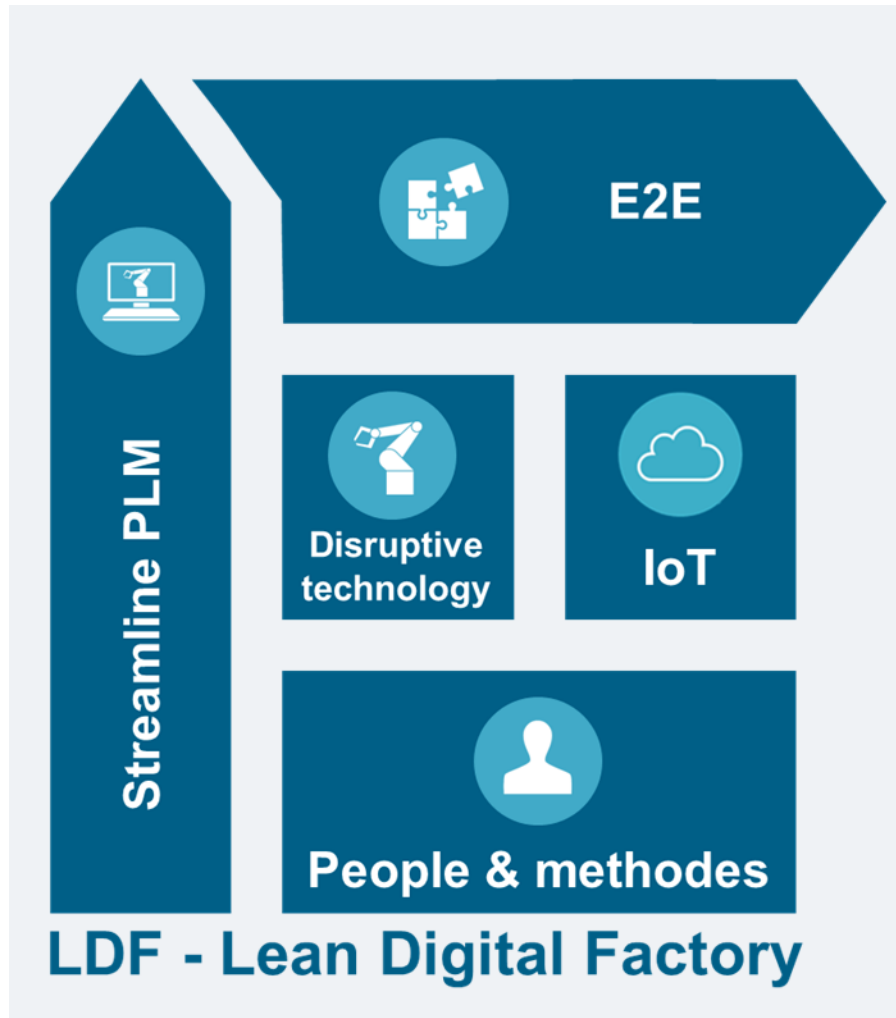
# Cloud based open IoT Platforms breaks silos, enables vertical and horizontal integration to generate smart data

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# Realizing the Vision: Siemens Lean Digital Factory Approach

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## Streamline PLM

Digital twin product, digital twin production, digital twin data



## End 2 End

Cyber-physical systems, self learning systems, digital consistency, flexibility



## IoT operating system

Cloud computing, tracking and tracing, analytics, artificial intelligence

enabler



## Disruptive technology

Additive manufacturing, automated guided vehicle, robotic, virtual reality, augmented reality

enabler



## People and methods

Digital mindset, flexible collaboration, digital guidance, automated administrative process

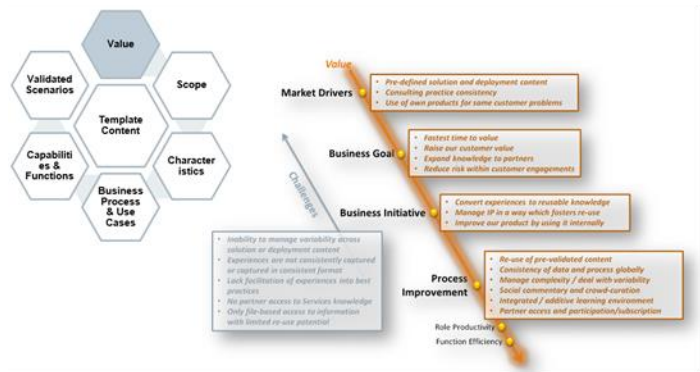
enabler



# Realizing the Vision: Siemens Lean Digital Factory Approach

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**Value:** Market-driven business value definitions



**Solution:** Process-centric solution definition



**Adoption:** Continuous monitoring and refinement



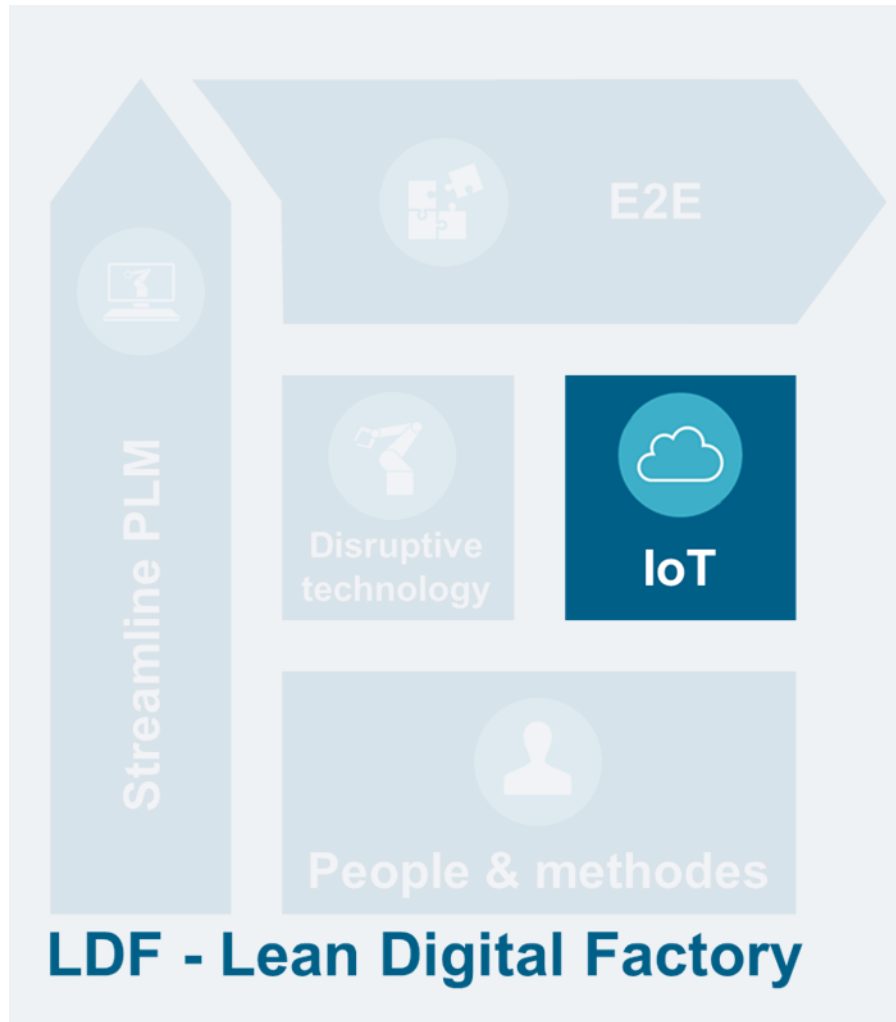
**Validation:** technology alignment, time-to-value prioritization, gap assessment/improvement





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# Holistic IIoT: Begin with a process-centric approach

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## Planning & Governance

Program Management

Product Cost Management

## Quality

Advanced Quality Planning

Inspections

## Product Development

Product Configuration Management

Electrical Design Data Management

Mechanical Design Management

PCB Design Management

Failure Mode Effects Criticality Analysis (FMECA)

## Industrial Engineering

Manufacturing Configuration Management

Manufacturing Resource Management

Part Fabrication & NC Program Mgt

Manufacturing Process Simulation

Manufacturing Concept Planning

Manufacturing Assembly Process Planning

PCB Manufacturing Assembly & Test

Robotics Planning & Simulation

## Production Engineering

Manufacturing Execution Concept Planning

Line Design

Collaborative Automation Design

Automation Engineering

Supplier Manufacturing Collaboration

Value Stream Analysis

Virtual Commissioning

Plant Simulation

Ergonomics Simulation

## Logistics

Logistics Planning & production Flow Simulation

Supplier Sourcing & Vendor Mgt

Incoming Goods & Supplier Quality Mgt

Plant Logistics Management

## Production Operations

Production Planning & Scheduling

Production Order Execution

Defect Tracking & Non-Conformance Mgt

Plant Operation & Maintenance

Plant Asset Management

Motion Control of Machining

Shop floor Quality Execution & Statistical Process Control

## Service Operations / Execution

Service Planning

Create Service Work Order and Schedule

Execute Work Order

In Service Asset Management / Tracking

Track Service Non-conformance and address local issue

Collect Service Execution Data

Escalate Non-Conformity

Raise Service Issues

View Service Performance

## Plant Engineering

Building Design Management

Construction Planning & Simulations

Plant Configuration Management

# Holistic IIoT: Identify starting points with near term, realizable value

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Motion Control of Machining

Shop floor Quality Execution & Statistical Process Control

Use case 1:  
Preventative, Predictive,  
Prescriptive Maintenance

## Service Operations / Execution

Service Planning

Create Service Work Order and Schedule

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Track Service Non-conformance and address local issue

Collect Service Execution Data

Escalate Non-Conformity

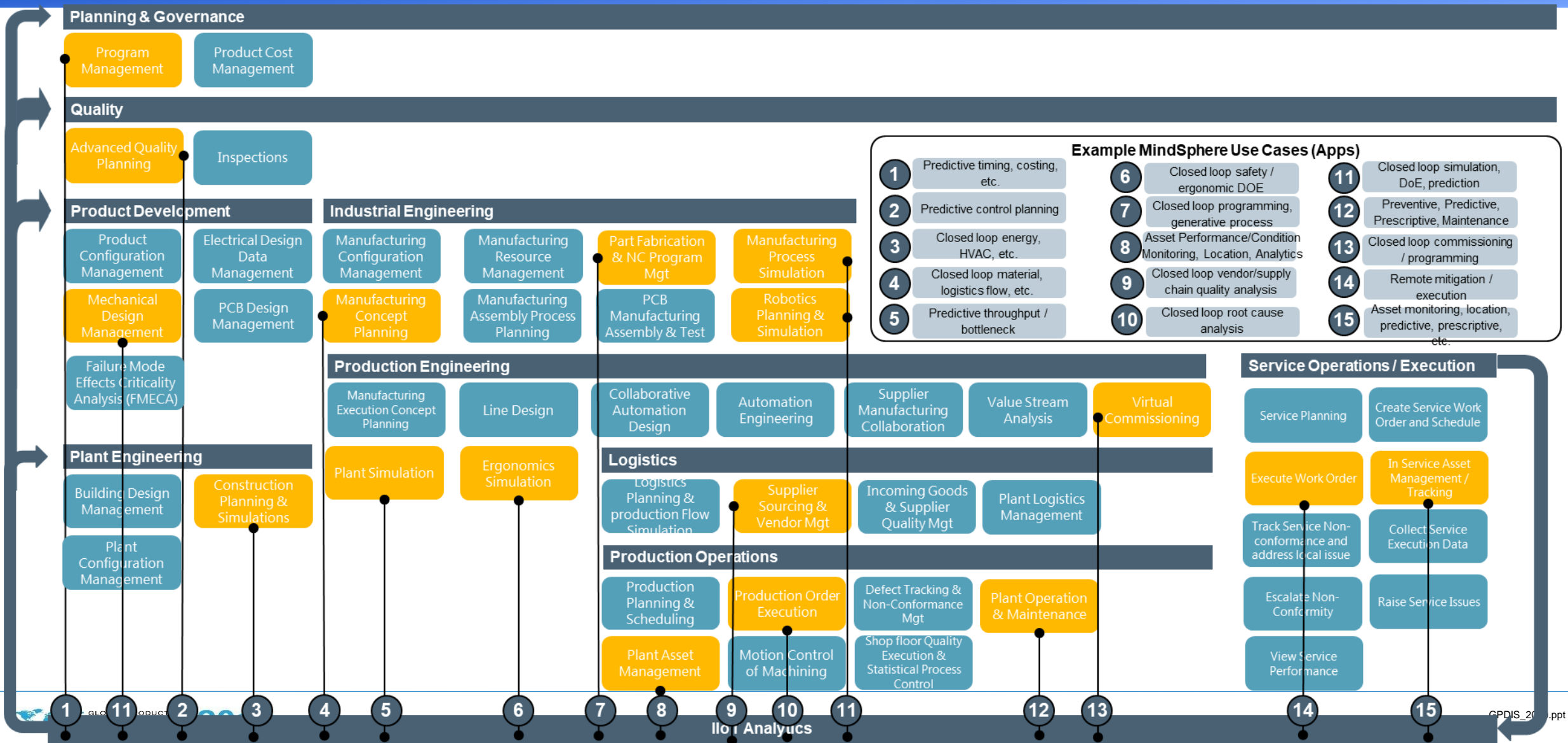
Raise Service Issues

View Service Performance

Use case 2:  
Asset monitoring,  
location, preventative,  
predictive, prescriptive  
services, etc.

# Holistic IIoT: Close the interoperability loop to maximize ecosystem value

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# Path to Closed Loop, Model Based Ecosystem

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