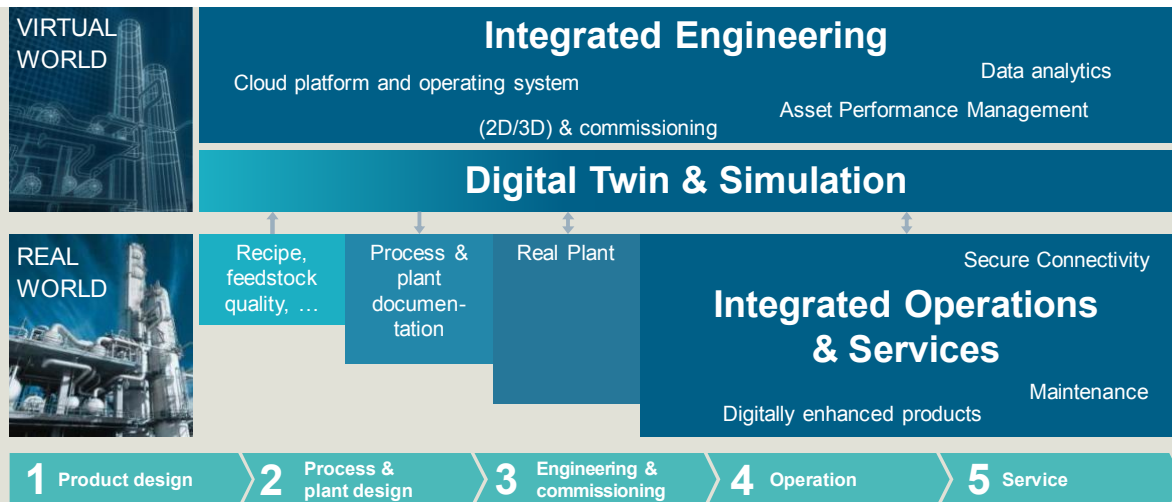




Siemens drives the Digital Enterprise for Process Industries

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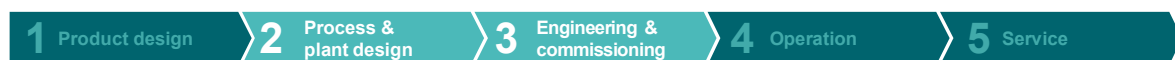
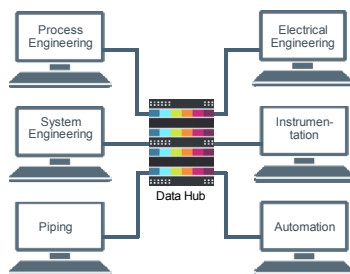
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Integrated Engineering for process plants: Common data model ensures consistency for all workflows along the lifecycle

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One data hub that completely integrates all disciplines into a globally consistent database ...

... and workflows can be executed in parallel, which saves valuable time and thus reduces costs

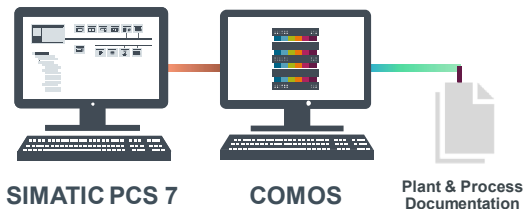


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Integrated Operations for process plants: Data exchange between automation and engineering system

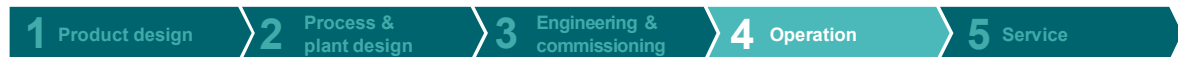
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Thanks to the bi-directional data exchange between engineering system and automation, the Digital Twin is continuously updated and shows the current status of the plant

Your benefits in operation

- Bi-directional interface
- Always as-is plant documentation
- More efficient maintenance management
- ✓ **30 % time savings**
- ✓ **20 % lower cost**
- ✓ **Optimized availability**

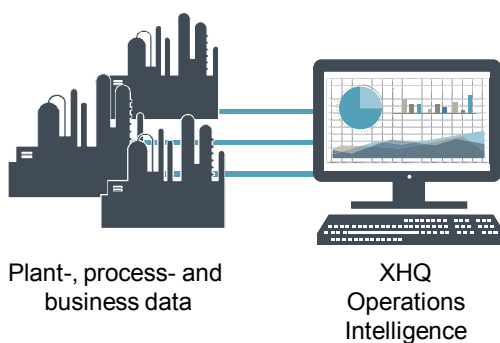


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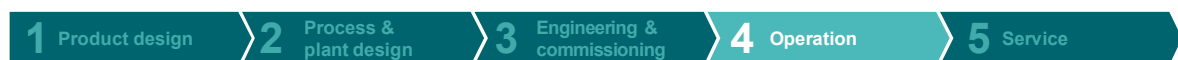
Integrated Operations for process plants: Operations Intelligence enables optimal decision-making in real-time

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Your benefits with XHQ Operations Intelligence

- Access operating data across the entire supply chain
- Compare plant and asset data of your plants worldwide
- Visualize cost factors to identify saving potential
- Monitor HSE information
- ✓ **Improved asset transparency**
- ✓ **Up to 8% reduction in operating costs**
- ✓ **Up to 10,5% increase in production**

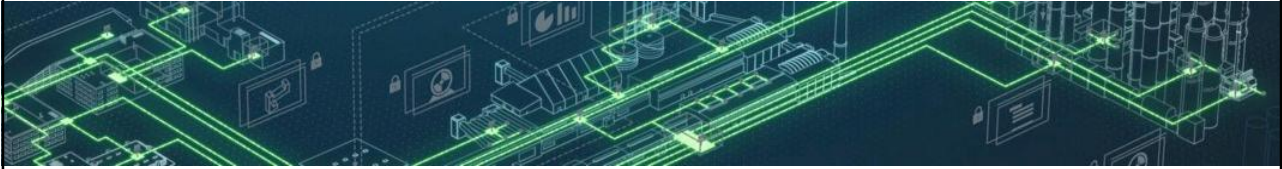


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Driving the Digital Enterprise – Industrial Communication

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Industrial Communication

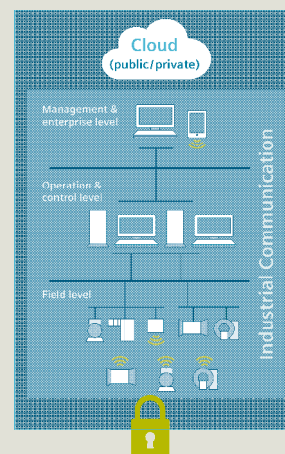
- Connecting all elements of the value chain through efficient networks based on proven standards
- Ensuring a fast and reliable horizontal and vertical data transfer
- Meeting the growing demands in production and logistics management through industrial identification

Connectivity is key to enable Digitalization of Process Industries

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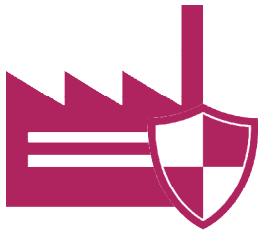
Vertical integration and remote operations enabled by **industrial identification** and **high performance, reliable communication**

- IP based communication
- Profinet / OPC UA with various diagnostic functions
- Ubiquitous connectivity (WAN, WLAN, LAN, wireless fieldbuses, RFID)



Driving the Digital Enterprise – Industrial Security

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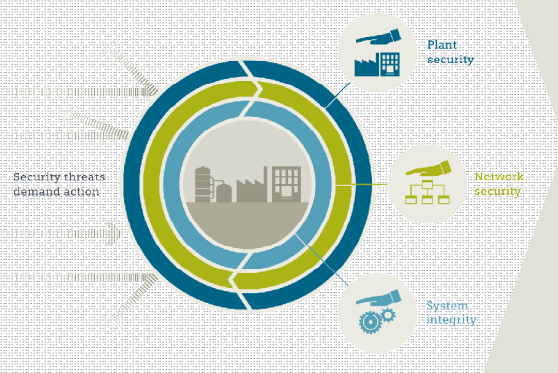
Industrial Security

- Protection of industrial plants from cyber attacks
- Productivity through in-depth defense concepts
- Network security and system integrity for plants

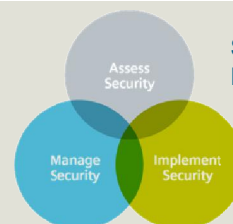
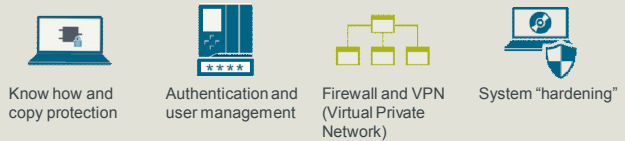
The Siemens security concept: “Defense in Depth”

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The Siemens security concept – “Defense in Depth”



Siemens products and systems offer integrated security



Siemens Plant Security Services



Driving the Digital Enterprise – Industrial Services

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Industrial Services

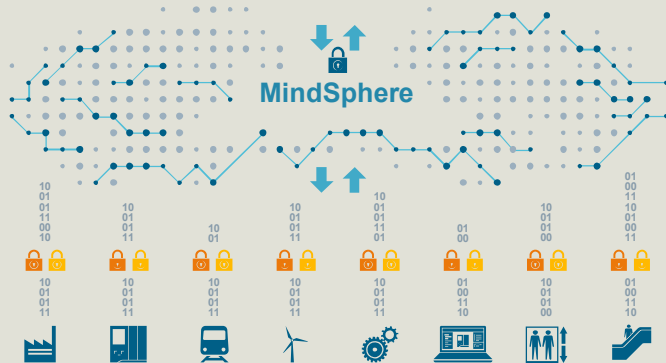
- Optimizing plant and machinery as well as energy and resource consumption
- Implementing smart service and support concepts
- Providing the basis for new, data-based service business models with MindSphere – the cloud-based, open operating system for the Internet of Things – from Siemens

MindSphere – the cloud-based, open IoT operating system offers a solid foundation for new, data-based business models

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Developed by Siemens, OEMs, end customers and App developers



MindApps

- Asset transparency and analytical insights, e.g. predictive maintenance
- Subscription based pricing model
- Fleet management

MindSphere

- Open interface for development of customer specific apps (MindApps)
- Various cloud infrastructures: Public, private or on-premise

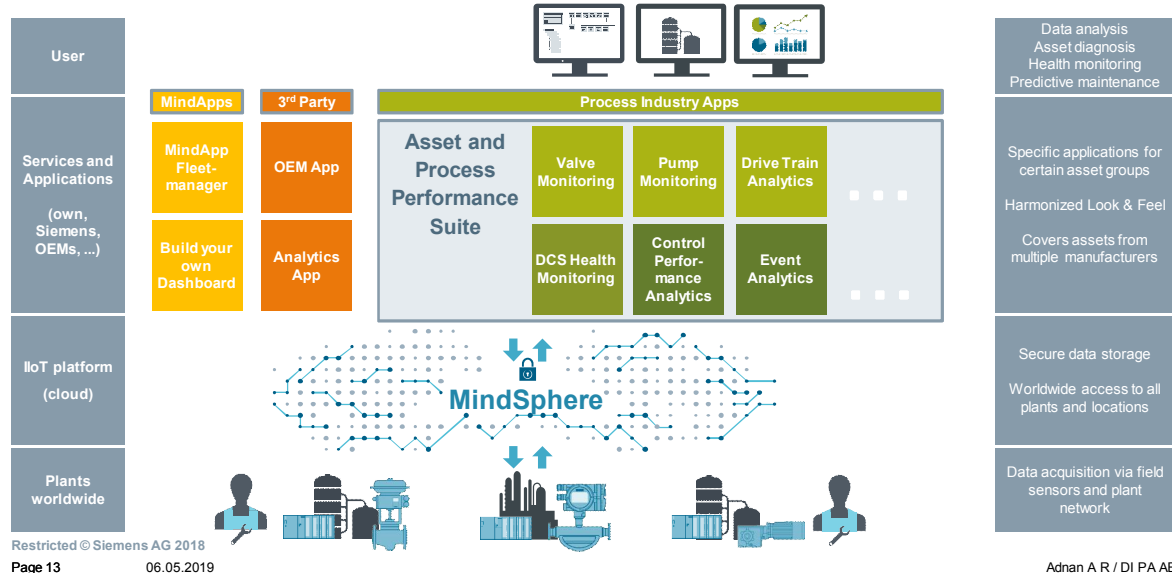
MindConnect

- Open standards (e.g. OPC UA) for connectivity (also to 3rd party products)
- Plug and play connection of Siemens products



The Siemens Vision: A cloud based, vendor independent Asset and Process Performance Suite –Innovation In Chemical

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Take advantage by the wealth of your plant data to increase plant uptime and lower operating costs

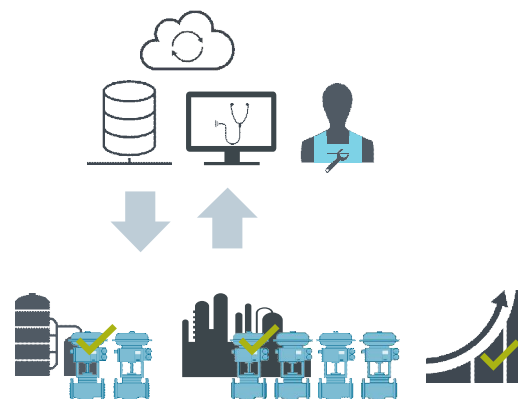
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Control valves are important for the operation and safety of every chemical plant.

- **Unexpected valve failures** can lead to plant downtimes, process upsets and safety risks
- **Unnecessary maintenance** leads to high operating costs

The solution: Valve Monitoring from Siemens

- Provides comprehensive information on the health of your control valves
- Supports optimized maintenance of your valve fleet



Value Proposition

What advantages does the customer get through the App?

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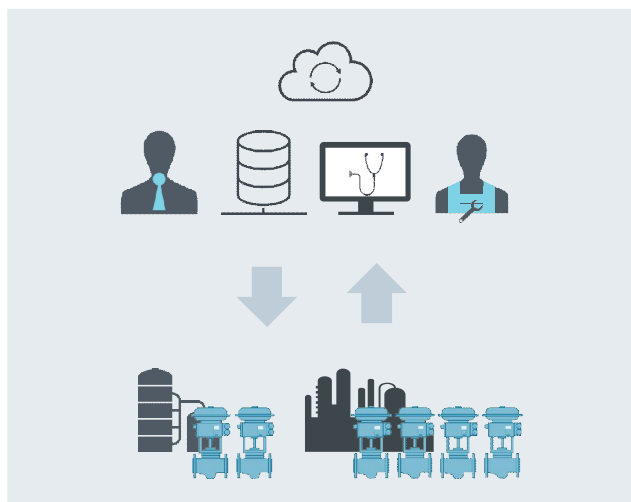
Valve Monitoring Overview

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Valve Monitoring

is a software application that

- runs locally on a PC (or a VMware)
(or in later versions alternatively as a cloud application)
- periodically receives diagnostic data from intelligent valve positioners in a plant (via PDM MS V2.0)
- presents and analyzes these data over time to detect anomalies
- calculates trends and predicts recommended maintenance dates, thereby enabling predictive maintenance
- creates schedules for optimized maintenance of valves

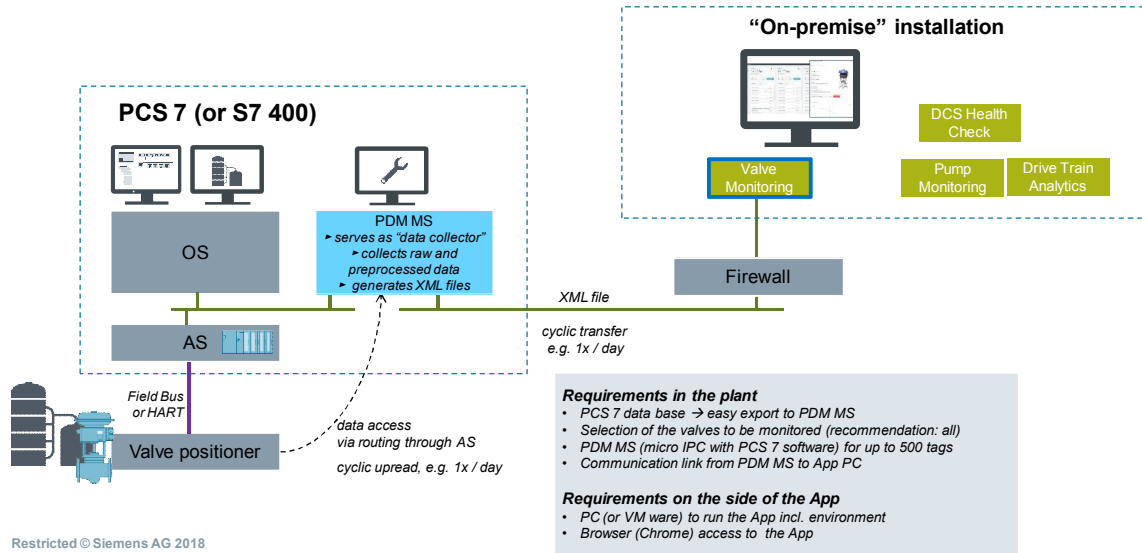


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Valve Monitoring – System Integration with PCS 7 V1 of App as an “on premise” installation

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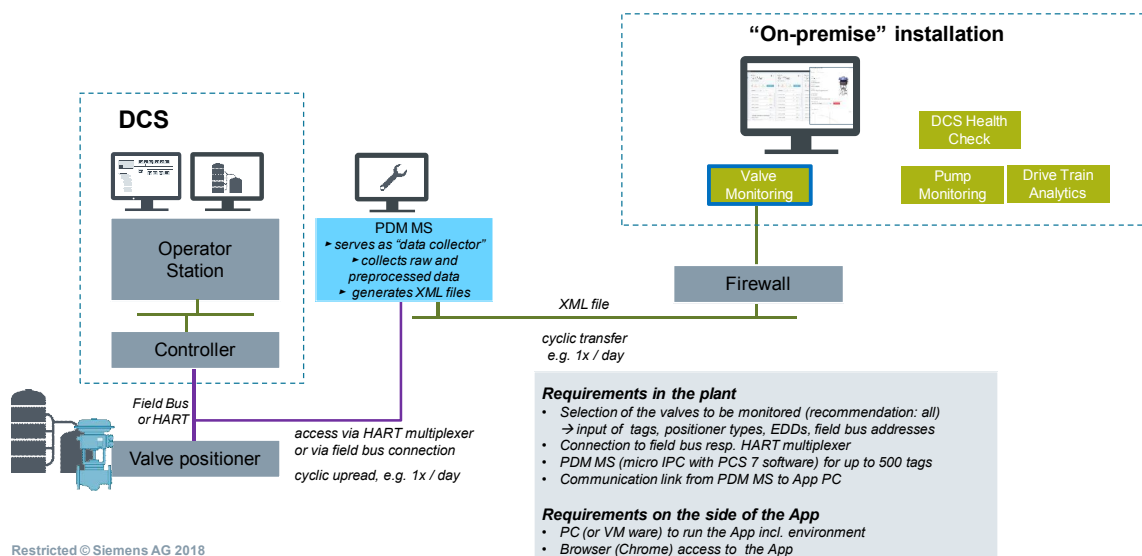


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Valve Monitoring – System Integration with third-party DCS V1 of App as an “on premise” installation

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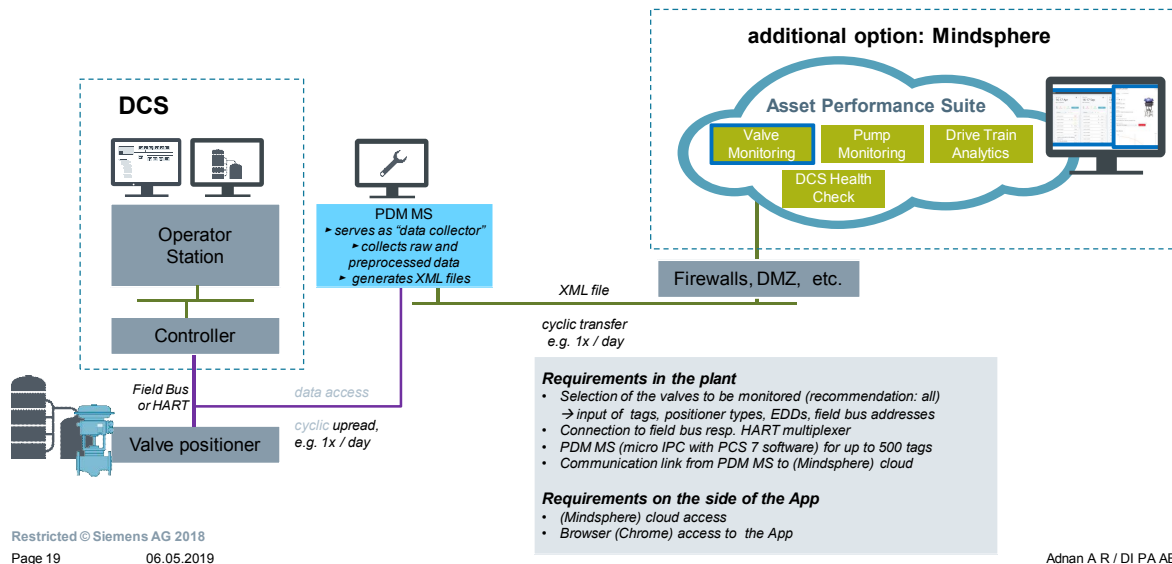


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Valve Monitoring – Options with later versions of App Choice between “On-premise” and Mindsphere installation

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Valve Monitoring Features Display and analysis of KPIs, flagging of “anomalies”

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Calculation and analysis of KPIs such as

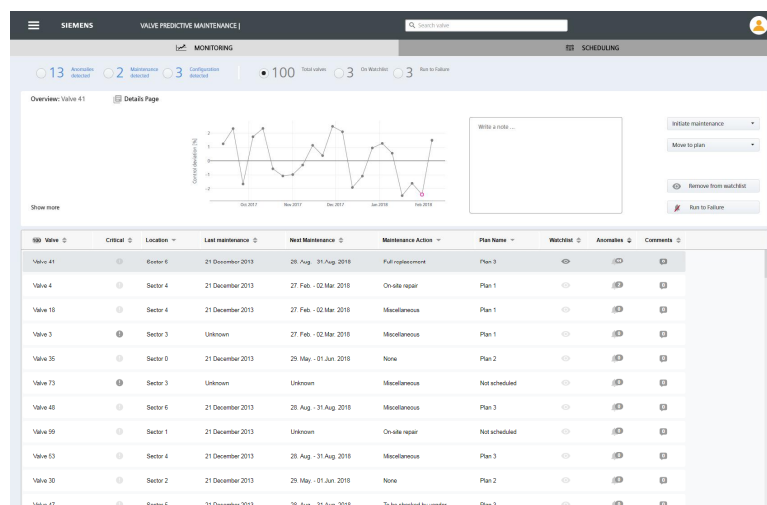
- Total travel, number of direct. changes
- Operating hours
- Change of end positions
- Slip stick, Control deviation
- Electronics temperature
- Air consumption
- ...

Diagnostics

- Generation of maintenance messages
 - before (!) thresholds are reached
 - if anomalies are detected

Service Recommendations

- today as an optional service
- in later versions automatically

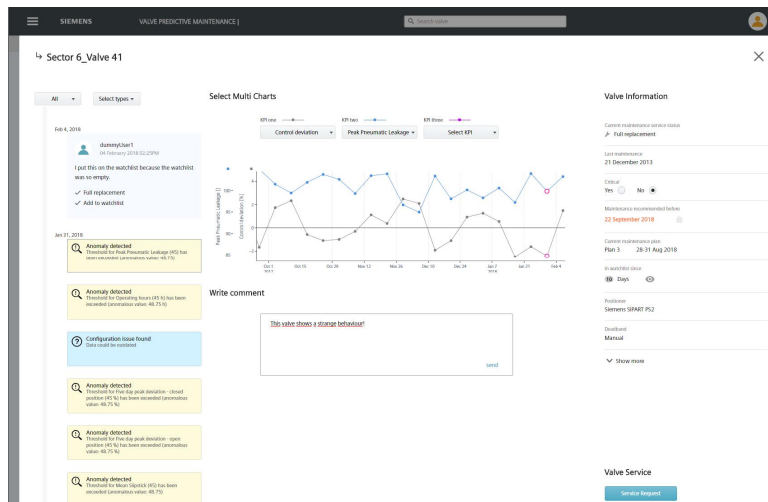


Valve Monitoring Features Show valve details

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shows

- Valve detailed information
- Multiple KPI comparison
- User comments
- Log of events incl. comments and maintenance events and notes
- Tracking of peculiar valves in "Watchlist"
- Tracking of all maintenance actions



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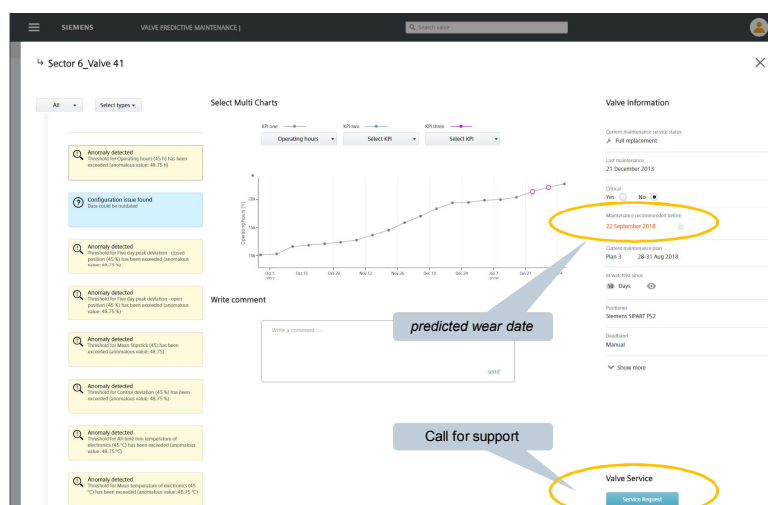
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Valve Monitoring Features Maintenance Support

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Estimation of a recommended maintenance date per valve

- Extrapolation of several "Wear KPIs" and comparison with set threshold
- Derivation of recommended maintenance date
- Call for support by Siemens Valve Specialists



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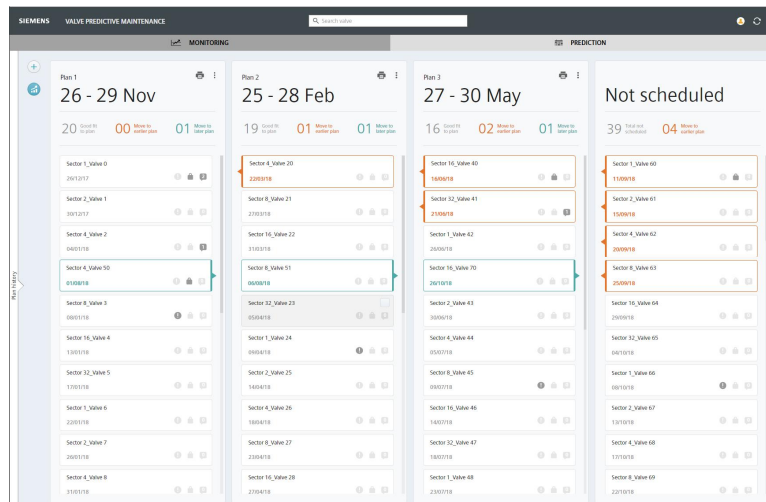
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Valve Monitoring Features Maintenance Support

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Generation of optimized valve maintenance plans

- Automatic generation of maintenance plans with recommended maintenance dates for each valve
- based on a (externally specified) maintenance schedule and the expected wear date
- Continuous updates of plans through near-real-time maintenance data
- User-controlled modification of maintenance plans via drag and drop
- Freezing of plans, locking of valve to a certain plan
- Transfer of maintenance information to superordinate Maintenance System (e.g. Siemens COMOS MRO or SAP PM or IBM Maximo)



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Drive Train Analytics for increased availability, predictability of downtime and improved maintenance

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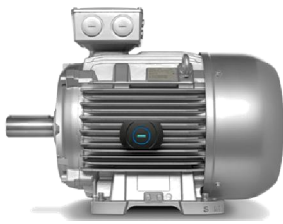
- Remote Automated Monitoring & Managed Diagnostics Services supporting condition-based and predictive maintenance for drive systems (HV-motors, MV-drives and application gear units)
- Promotes increased availability of the drive train, predictability of downtime and improved maintenance
- Certified experts provide cloud-based monitoring and data evaluation services

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Smart Motor Concept is an example for digitally enhanced Electrification and Automation

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Smart Motors – connected to MindSphere

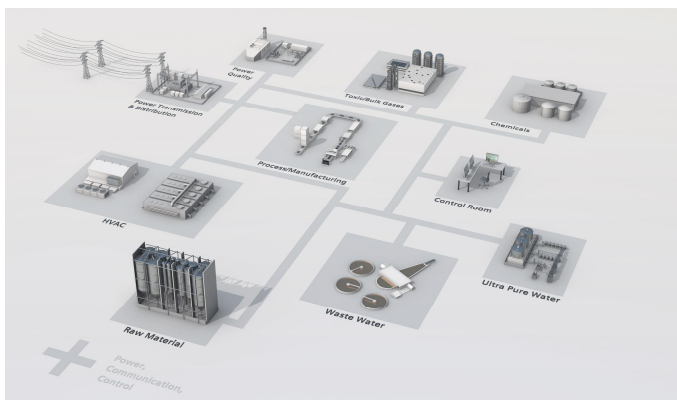
- Integrated vibration, magnetic flux and temperature sensors
- Reduce down times to increase fleet and plant availability and reliability
- Optimize operation efficiency
- Maintenance and servicing activities for early planning and optimization

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Innovation In FMCS – Facility Monitoring and Control System Definition and Scope

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The FMCS supports the plant infrastructure such as HVAC systems and utilities.

- Ultra Pure Water (UPW)
- Waste Water Treatment (WWT)
- Gases and Chemicals
- Medium-voltage distribution
- Low-voltage distribution
- Building technology
 - Fire / Safety
 - Security

Highly automated Facility Monitoring and Control Systems provide for consistent operating conditions, minimal downtime and low maintenance cost.

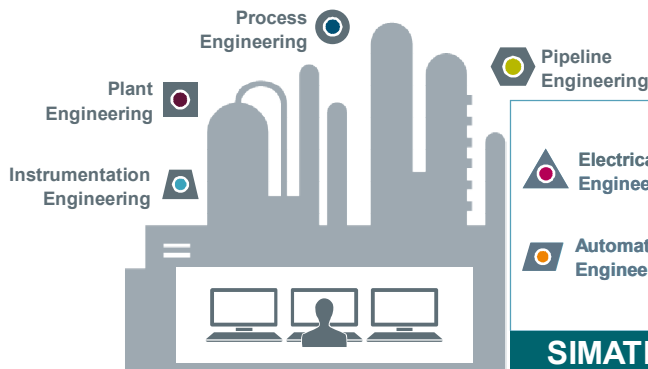
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VSS C&G Verical Glass & Scham 1.5.2019 DI PA AE

Our solution: SIMATIC PCS 7 Plant Automation Accelerator

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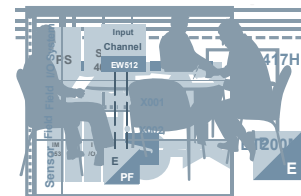
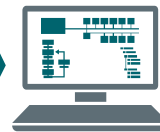
Plant Engineering with COMOS



Automation Engineering with SIMATIC PCS 7

Electrical Engineering

Automation Engineering



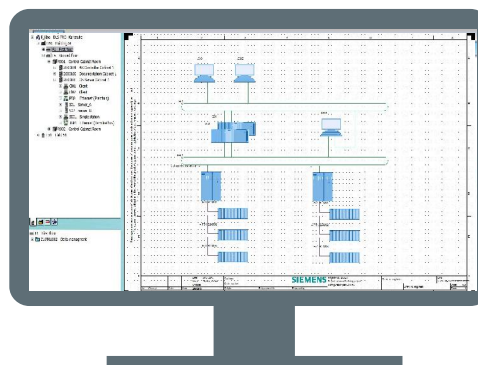
SIMATIC PCS 7 Plant Automation Accelerator

Less customizing through high standardization

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**Standard
templates &
configuration
for the engineering
with SIMATIC PCS 7**

SIMATIC PCS 7 Plant Automation Accelerator



Higher plant availability

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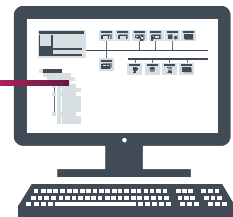
Continuous
update of changes

Always up-to-date
documentation

Improved decisions



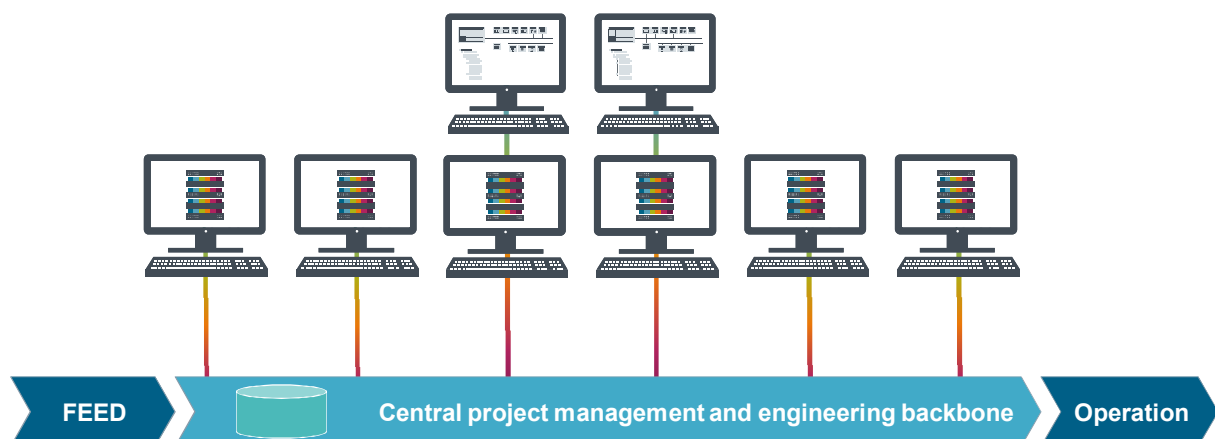
**SIMATIC PCS 7
PA Accelerator**



SIMATIC PCS 7

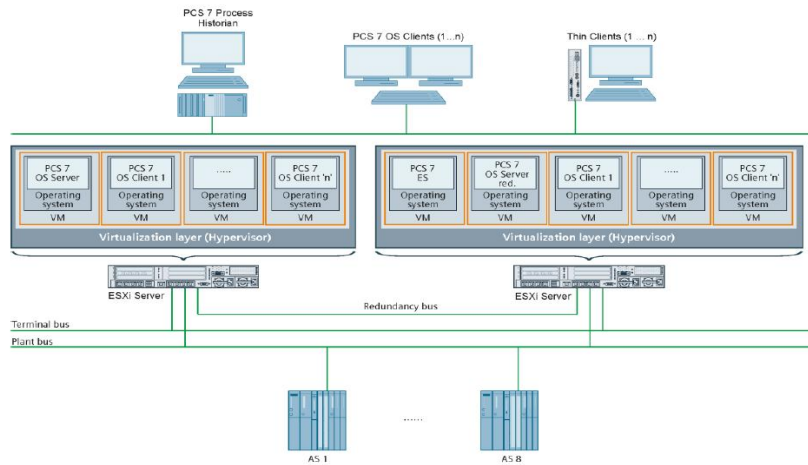
Standardization

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PCS 7 Virtualization Innovation Platform Project Engineering and Configuration

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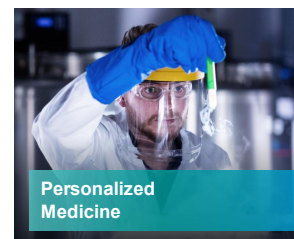
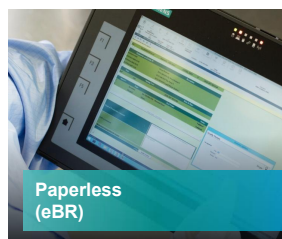


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VSS C&G Verical Glass & Schmitt AG / DI. RACH

New Technologies driving innovative manufacturing solutions – In Pharmaceutical Market

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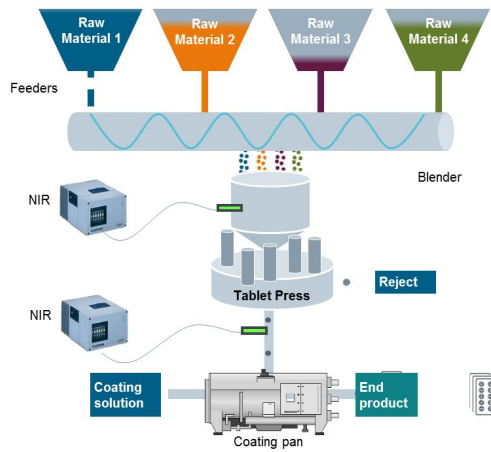


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SIPAT as enable for Continuous Manufacturing – First FDA approved change¹ from traditional batch to continuous

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Innovative partnerships to transform manufacturing operations

- Transforming assembled unit operations to continuous
- PAT Enabled central control system
 - Continuous quality verification
 - Real-time release testing
 - Smaller footprint and reduced waste
 - Improved yield and labor cost savings



FDA – Food Drug Administration; NIR – Near Infrared; PAT – Process Analytical Technology;
1 Yu, Lawrence, Ph.D. "Continuous Manufacturing Has a Strong Impact on Drug Quality." FDA Voice. 12 Apr. 2016.

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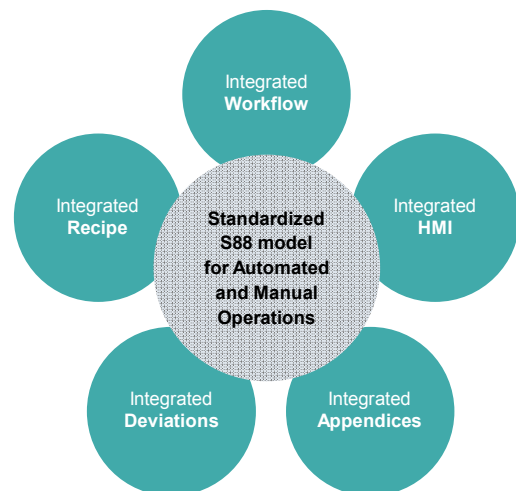
Integrated Operations through Paperless Manufacturing – Integrating Manual and Automated Operations

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Your benefits from going paperless

- Save time in engineering and design thanks to the native integration between the control system and MES
- Improve guidance and control for both manual and automated operations
- Drastically reduce review and approval efforts thanks to "Review by Exception"



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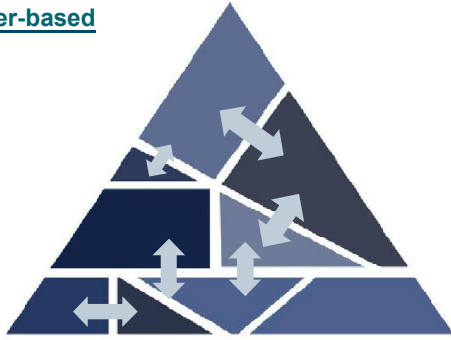
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Manufacturing Execution System @ Pharma

Core objective: Paperless Manufacturing

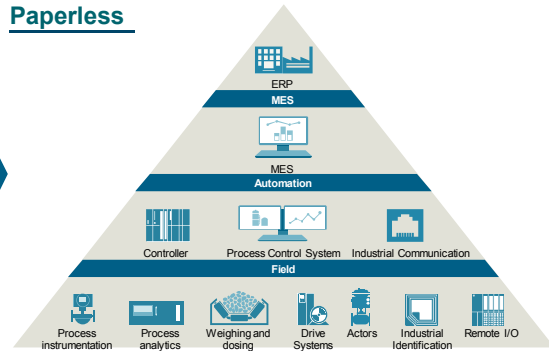
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Paper-based



- High amount of systems and interfaces

Paperless

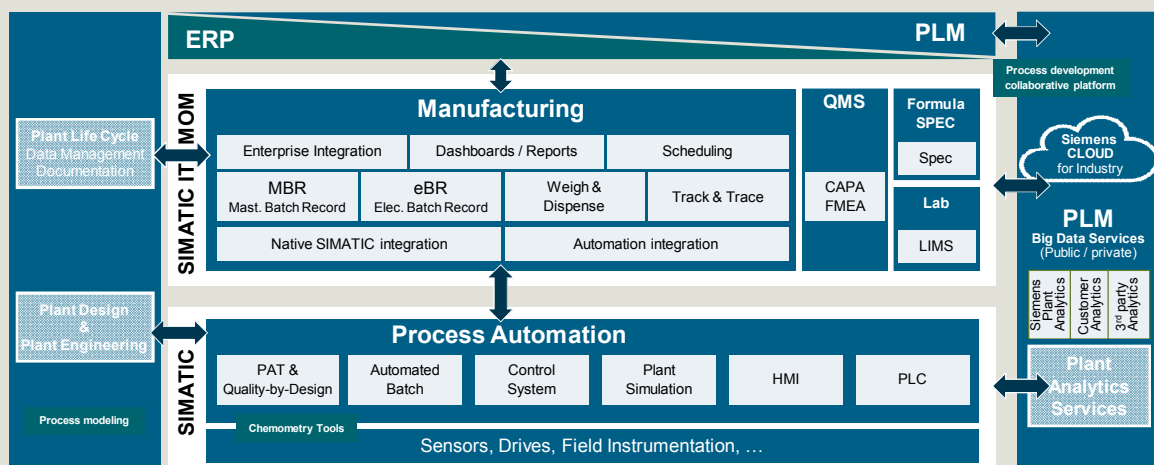


- Reduction of the number of interfaces
- Better structured

eBR Overview

Portfolio for the biopharmaceutical industry for the complete lifecycle

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Innovative Flexible and Single Use Concepts

Guiding intricate operations and set up

Customer benefits

- Optimize change over time
- Better process understanding
- Cost reduction

Strategies for operating single use equipment

- Flexible manufacturing
- Faster change over (reduced cleaning)
- Cost savings thanks to compact design
- Improved process understanding and optimization
- Plug and Play Equipment Identification



GSK, UK

Proof of Concept for the Pharmaceutical Factory of the Future

Customer benefits

- Optimize operations and visibility
- Showcase future manufacturing concepts



Demonstrating the “art of the possible”

- Consider current and future operator requirements
- Provide an innovative and immersive operator experience
- Use real automation and equipment for a real industrial context
- Seek, incubate and deploy advanced technology

Focused on bringing innovation to the Pharmaceutical Industry through our key initiatives

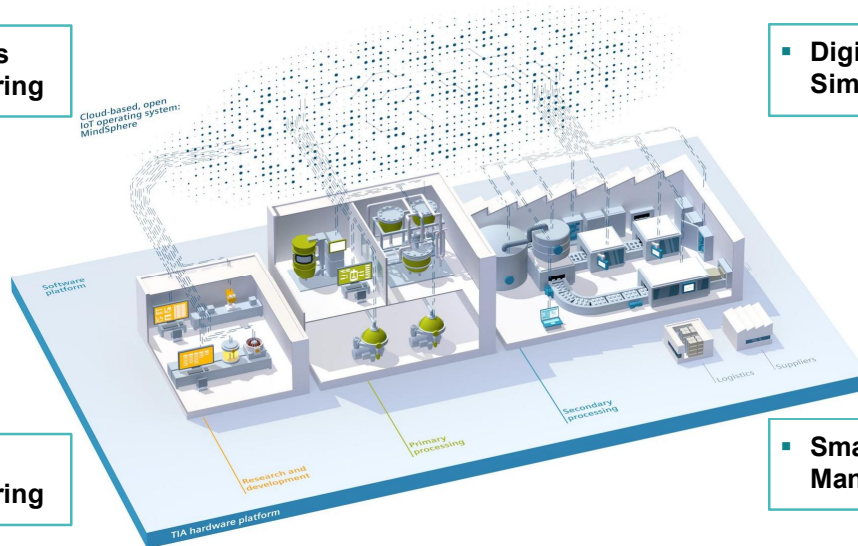
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Continuous Manufacturing

Digital Twin & Simulation

Paperless Manufacturing

Smart Bio Manufacturing



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“Digital Enterprise – Implement now” – Announcement of Digitalization Consulting

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Press conference ahead of the
Hannover Messe on Feb 27, 2018

“Our offering is tailored in each case to the added value and the business models of our customers.” This is where the new Siemens **“Digitalization Consulting”** concept comes into its own. This entails working together with customers to sound out the digital scope of the company over the entire value chain and draw up a digitalization roadmap including a calculation of the investment needed




Jürgen Brandes, CEO of the Process Industries and Drives Division

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3 Packages to support your digital transformation

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	Discovery  Where am I standing ?	Starter  Where should I go ?	Transformation  How do I transform ?
Package			
Approach	Snapshot of the IT /OT landscape Proposition of strategic directions	Mapping challenges along value chain First steps towards digital transformation	Deep-dive in IT & OT systems integration along the customer value chain and business processes
Deliverables	<ul style="list-style-type: none"> • Main pain points & challenges • Digital Index along the value chain 	<ul style="list-style-type: none"> • Prioritization matrix • Business ideas and initiatives 	<ul style="list-style-type: none"> • Detailed Roadmap • Main projects budget, ROI & NPV • Tech. specifications of projects
Package Time est.	1 Maturity Check Workshop 1 day	2 Digitalization Workshop 2 to 3 days	3 Consulting Variable – min 4 weeks

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3 Packages to support your digital transformation

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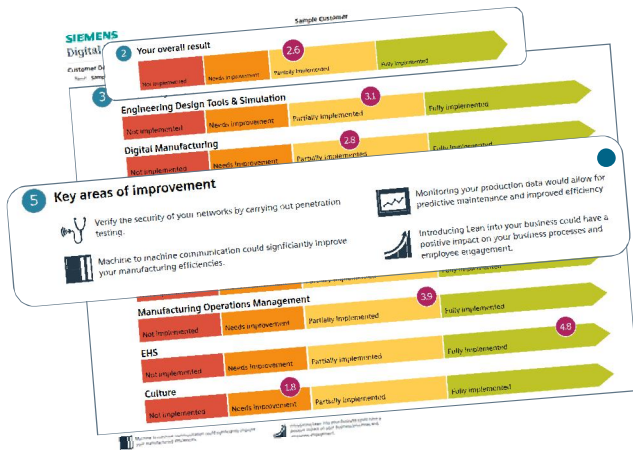
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“Discovery” Package A snapshot of your digital maturity

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1 Pager report on Digitalization Maturity

1. Holistic & multi-disciplinary view on digital maturity along customer's processes
2. Overall result classification
3. Results breakdown by standard Focus Areas (production, service, engineering...)
4. Key Areas for improvement

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3 Packages to support your digital transformation

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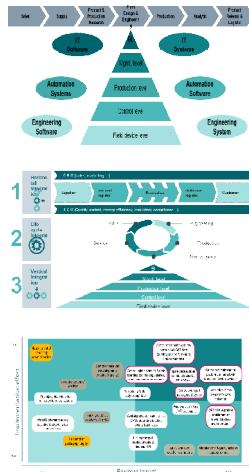
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Package Time est.	1 Maturity Check Workshop 1 day	2 Digitalization Workshop 2 to 3 days	3 Consulting Variable ~ min 4 weeks

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The “Starter” package: An entry point into your digital transformation journey

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Mapping the existing
landscape of systems

Identifying the
digitalization
opportunities

Organizing the
opportunities and the
quick wins

Report on how to start the digital transformation journey

1. A top-down approach about digitalization
2. From business drivers to technologies
3. An agnostic approach based on value of technologies
4. First idea of quick wins and first steps towards digital transformation

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3 Packages to support your digital transformation

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Package	Discovery Where am I standing ?	Starter Where should I go ?	Transformation How do I transform ?
Approach	Snapshot of the IT /OT landscape Proposition of strategic directions	Mapping challenges along value chain First steps towards digital transformation	Deep-dive in IT & OT systems integration along the customer value chain and business processes
Deliverables	<ul style="list-style-type: none"> • Main pain points & challenges • Digital index along the value chain 	<ul style="list-style-type: none"> • Prioritization matrix • Business ideas and initiatives 	<ul style="list-style-type: none"> • Detailed Roadmap • Main projects budget, ROI & NPV • Tech. specifications of projects
Package Time est.	1 Maturity Check Workshop 1 day	2 Digitalization Workshop 2 to 3 days	3 Consulting Variable – min 4 weeks

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“Transformation” Package : Engage the digital transformation

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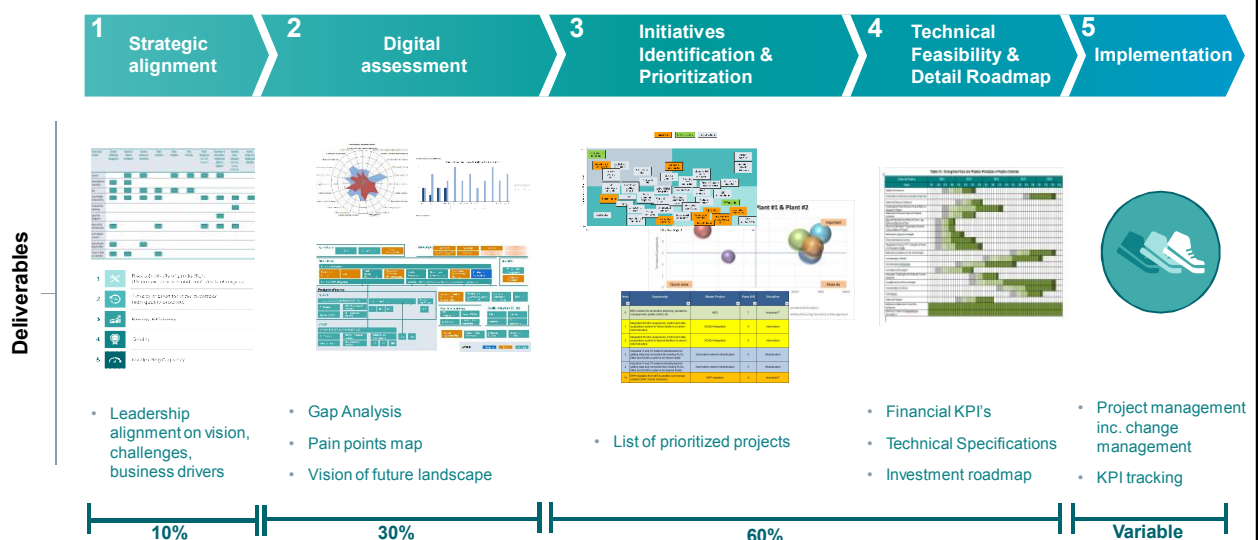


“Personalized Digital Transformation Manual” From Vision to Action

1. Top-down approach to turn customer’s digital strategy & vision into implementable actions
2. Roadmap tailored to existing installed-base
3. Concrete masterplan with priorities, project details & cost estimate (inc. financial KPI’s)
4. Vendor neutral

A step by step approach to ensure a continuous alignment with customer expectations

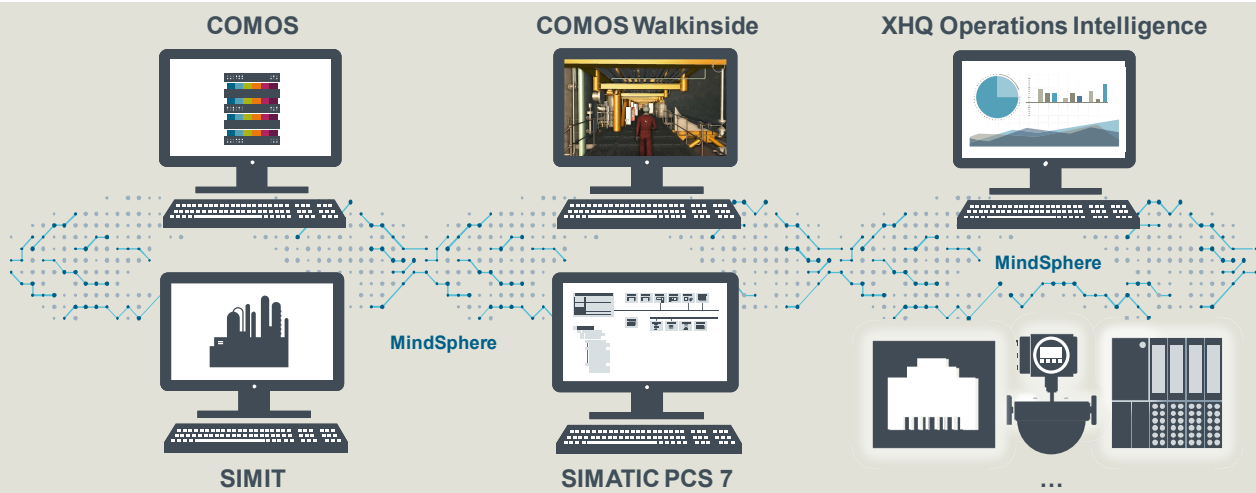
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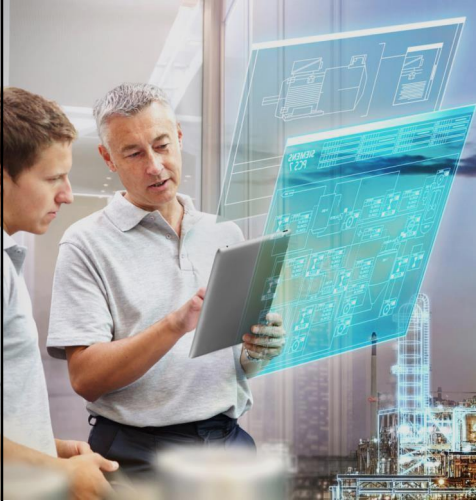
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Siemens with comprehensive and seamless Digital Enterprise portfolio for process plants



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