

# Il paradigma produttivo Industry 4.0 per l'industria di processo

Driving the Digital Enterprise for Process Industries



# Digitalization changes everything

Driving the Digital Enterprise  
for Process Industries

# Digitalization is the next level to yield productivity within Process Industries



Computing power,  
Connectivity, Sensors  
Cloud computing,  
Data analysis ...



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Digitalization



Next level of productivity

Automation



Siemens as experienced partner for Automation and Electrification

Electrification



Pioneer for Digitalization in industry

—————▶ Time

# Generating customer benefits is our key priority

## Industry trends

### Efficiency



- Resource and energy efficiency
- Demanded product/quantity
- ...

### Flexibility



- Individualized mass production
- Volatile markets
- ...

### Quality



- Closed-loop quality
- Traceability
- ...

### Time-to-market



- Fast innovation
- More complex products
- Lifecycle Management
- ...

## Security



HSSE – Health & Safety | Environment | Regulations/Standard | ...

Digital Enterprise is our portfolio of solutions for the digital transformation – in both discrete industry and process industry

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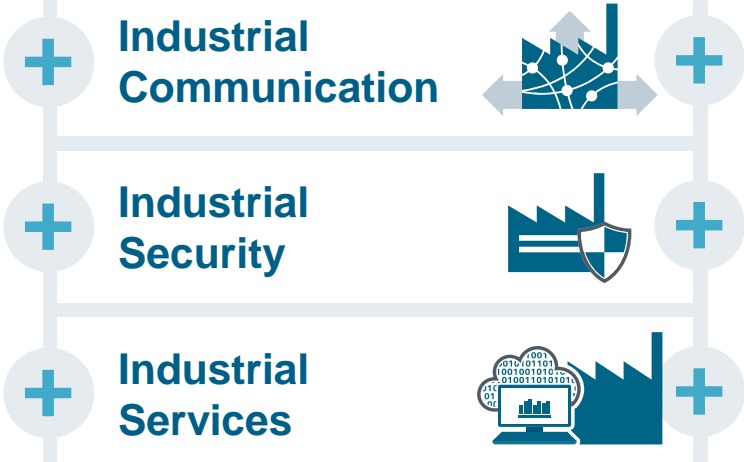
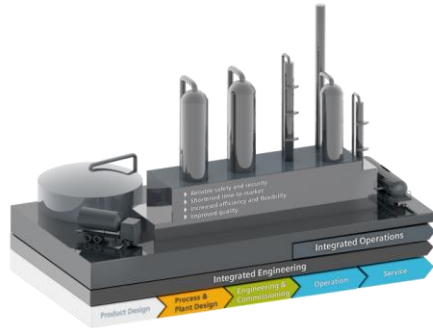
# Digital Enterprise

## Process Industries

## Discrete Industries



Industrial Software and Automation for process industries

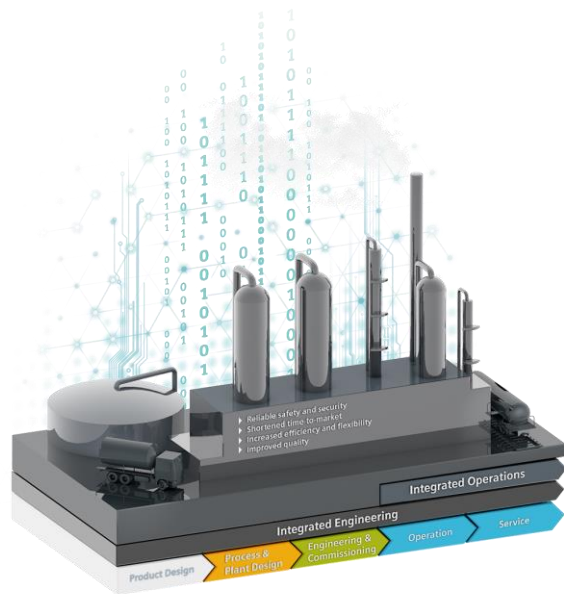


Industrial Software and Automation for discrete industries



Digital Enterprise Suite

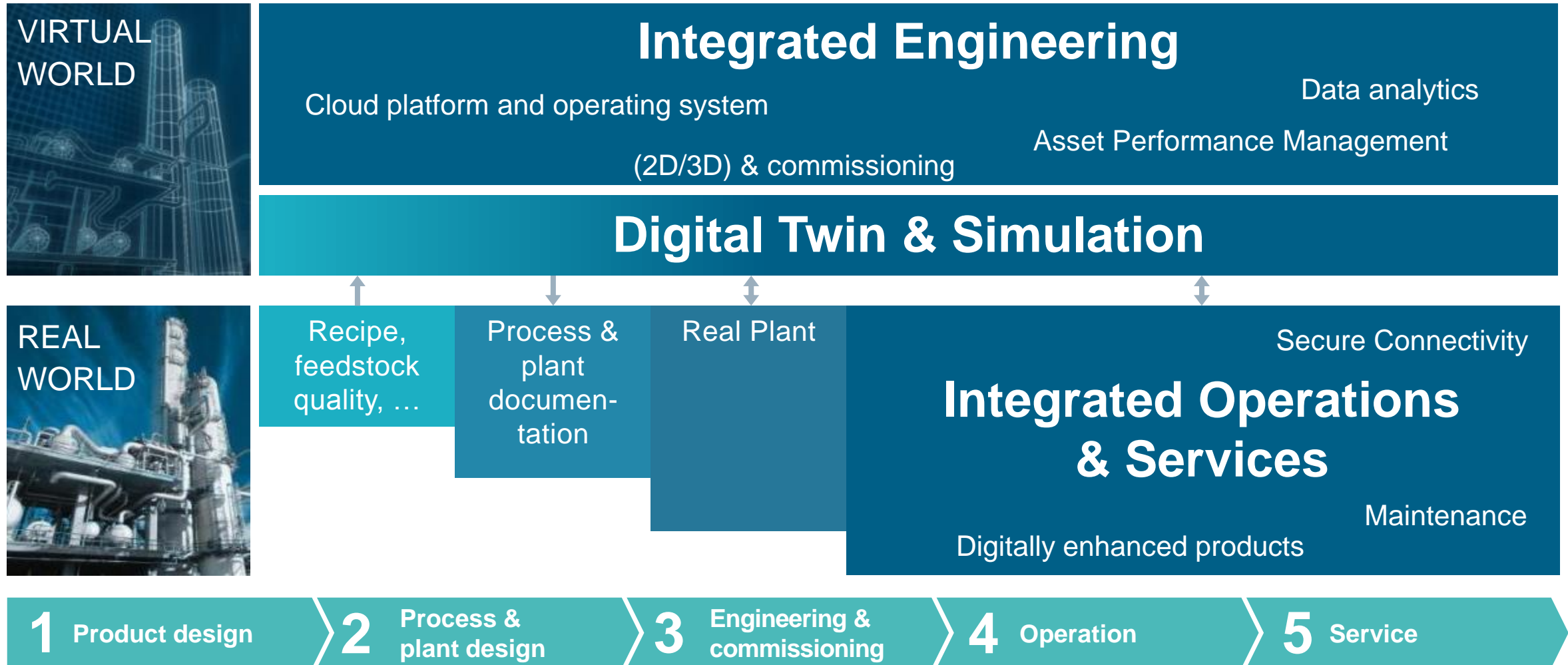
Digitalization of the field level



## From Integrated Engineering to Integrated Operations

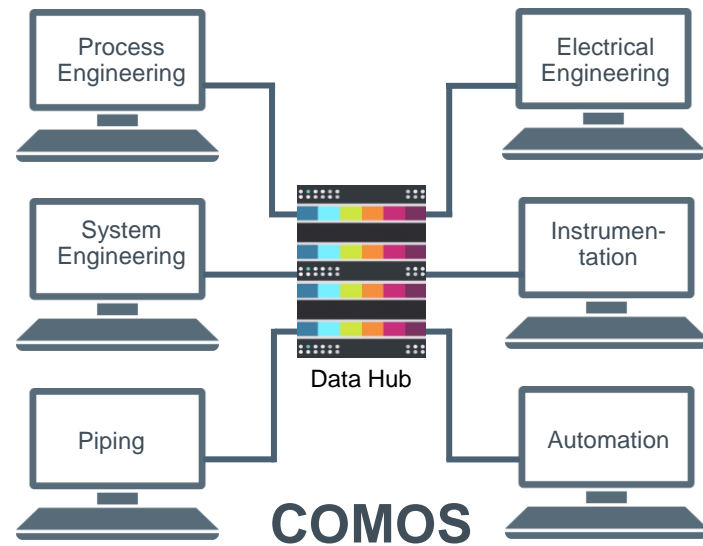
- Lifecycle plant management with a holistic tool landscape
- Common data model for a shorter time-to-market
- Increased efficiency through simulation
- Optimized operations based on high plant and process transparency with a digital twin

# Siemens drives the Digital Enterprise for Process Industries

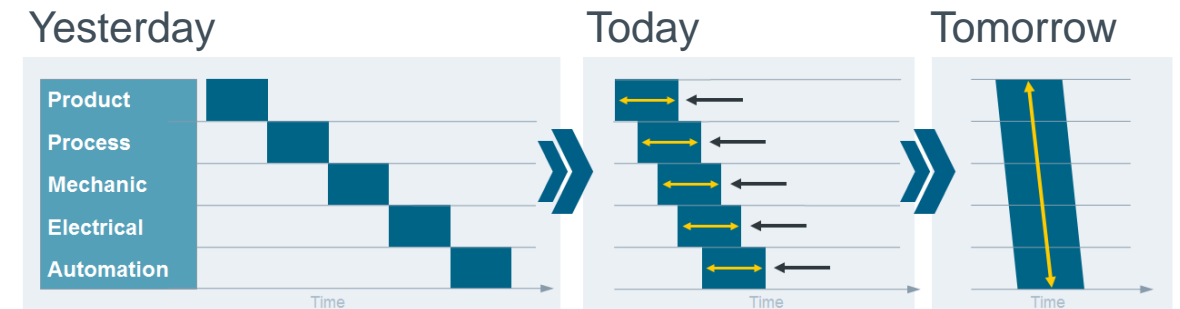


# Integrated Engineering for process plants: Common data model ensures consistency for all workflows along the lifecycle

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





# Integrated Engineering for process plants: Digital Twin and 3D visualization of the plant

During engineering, the Digital Twin of the plant is created, even before the real plant exists...

... this offers the possibility of an early 3D visualization of the plant, e.g. for training of service staff



1 Product design

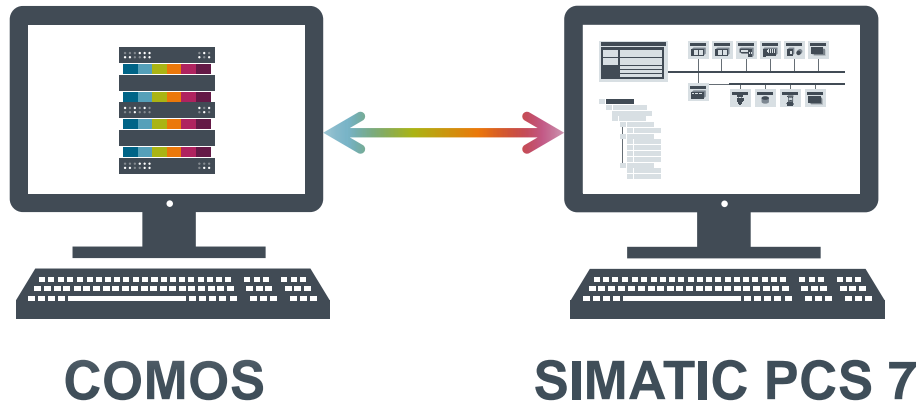
2 Process & plant design

3 Engineering & commissioning

4 Operation

5 Service

# Integrated Engineering: Data exchange between engineering system and automation



Automated engineering for DCS hard- and software

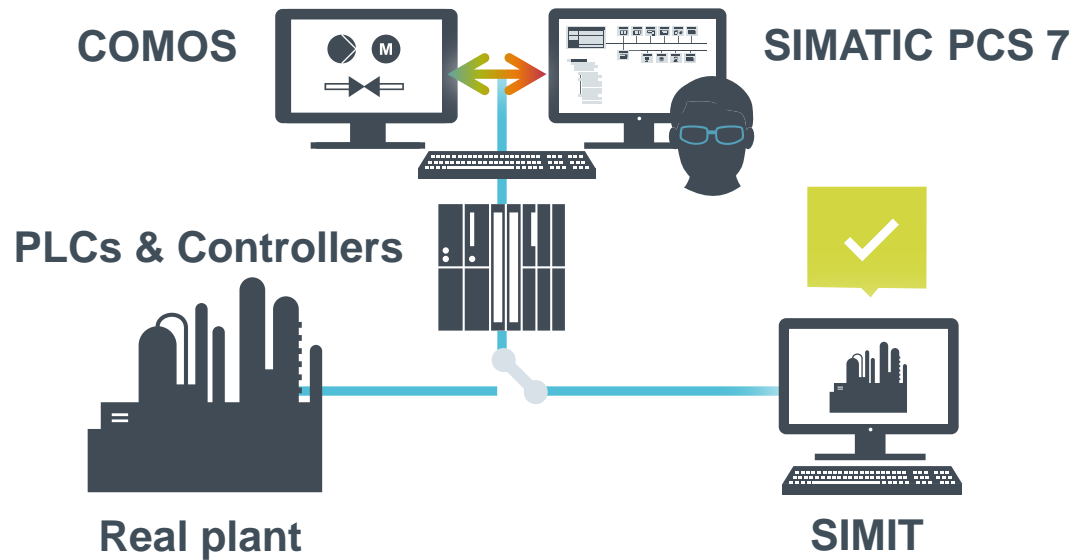
## Your benefits in Engineering

- Up to 60% time saving in automation engineering due to automated engineering of DCS hard- and software
- Consistent data ensure higher engineering quality
- Easy and fast integration of product data with configurators, libraries or standard interfaces



# Integrated Engineering and Integrated Operations for process plants: Simulation improves engineering and operational efficiency

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## Your benefits in Engineering and Commissioning

- Seamless transfer of engineering data
- Simulation and testing of the automation functions
- Training of operating personnel
- ✓ **Efficient and smooth system start-up of the real plant**
- ✓ **Avoidance of errors and costly reworking**
- ✓ **Increased safety**

1 Product design

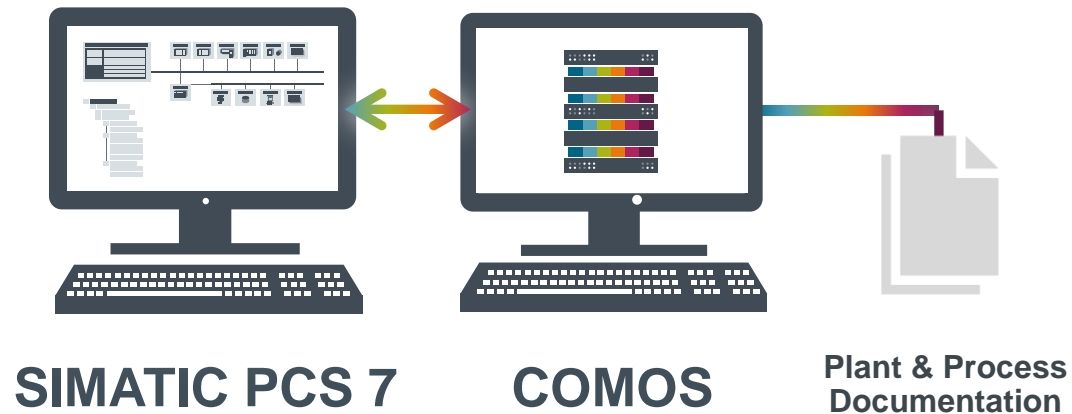
2 Process & plant design

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



## Your benefits in operation

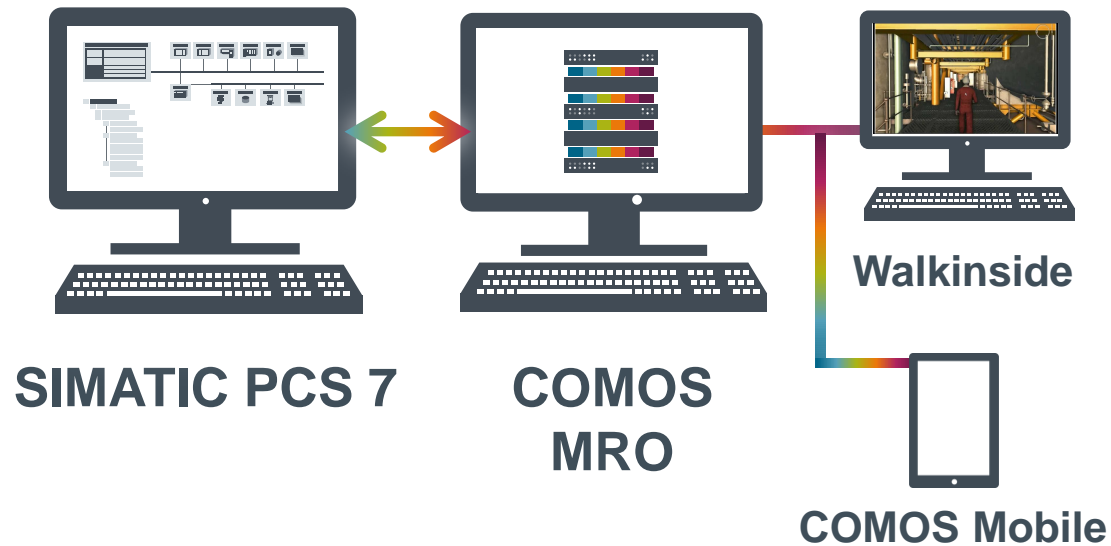
- Bi-directional interface
- Always as-is plant documentation
- More efficient maintenance management
- ✓ **30 % time savings**
- ✓ **20 % lower cost**
- ✓ **Optimized availability**

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



# Integrated Operations: Optimized workflow for maintenance management

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## Your benefits in Maintenance

- ✓ Time saving by direct and easy communication between operator and service personnel
- ✓ Asset location and necessary documentation available via COMOS and COMOS Walkinside
- ✓ All information also available on site
- ✓ Direct feedback about maintenance execution
- ✓ Plant documentation immediately updated

1 Product design

2 Process & plant design

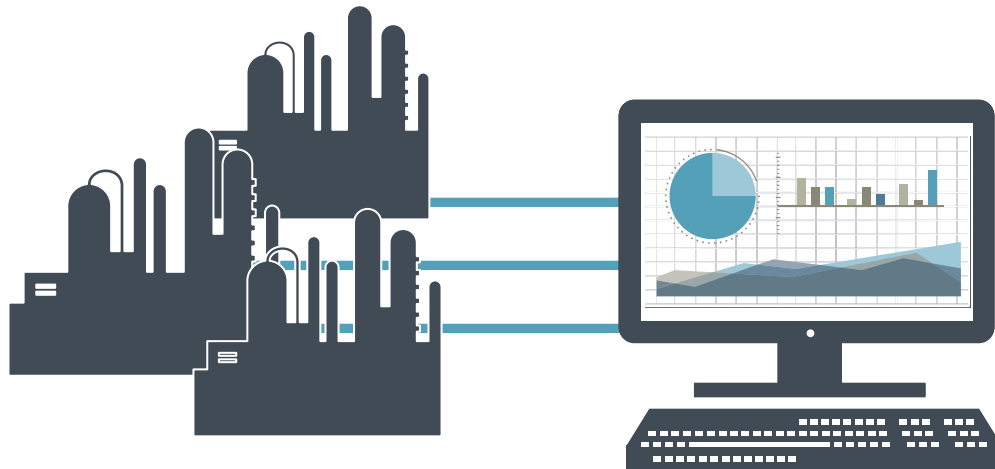
3 Engineering & commissioning

4 Operation

5 Service

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

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Plant-, process- and  
business data

XHQ  
Operations  
Intelligence

## 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

1 Product design

2 Process &  
plant design

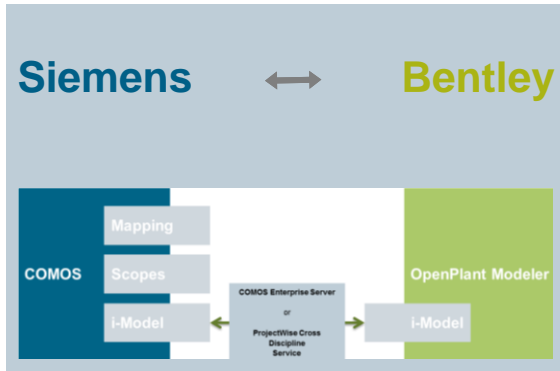
3 Engineering &  
commissioning

4 Operation

5 Service

# Our cooperation with Bentley opens numerous saving potentials, for example in engineering and plant lifecycle management

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## Extended Interface

Between COMOS (2D) and Bentley OpenPlant (3D)



## Cable Routing

Bentley BRCM and COMOS EI&C



## Digital Brownfield Approach

COMOS/COMOS Walkinside 3D Visualization and Bentley Context Capture (3D)



## FEED & Conceptual Design

Interaction between COMOS FEED & Bentley PlantWise for general arrangement





# Integrated Engineering and Integrated Operations for process plants: Sanofi-Aventis, Germany

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Sanofi-Aventis COMOS were ported to the corresponding continuous function chart (CFC) typical in SIMATIC PCS 7

Expectation: from 4 months to 2 weeks for the system programming between function clarification and commissioning

- >20 % savings in function planning and automation engineering
- Easier qualification through qualified system interfaces
- Up-to-date documentation over the lifecycle
- Learning for subsequent projects

# Twin plants from one plan: Efficiency through cloning – BASF, China and Brazil

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Simultaneous engineering of two plants for superabsorbent polymers in China and Brazil (cloning) by COMOS+PCS7

- Immediate learning effects support optimization of the system design and engineering processes
- The synergy effects exceeded all expectations
- Additional benefits that extend beyond the engineering and design phase

# Progressing toward the factory of the future with digitalization – Solvay/Butachimie, Chalampé, France

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Solvay/Butachimie in Chalampé is one of the world's biggest chemical manufacturers. Reindustrialization and concrete step towards the factory of the future

- Migration of all process control systems to SIMATIC PCS 7
- Virtual commissioning with SIMIT simulation framework
- Lifecycle management of plants and services until 2021
- Problem-free migration and smooth operation
- Fast commissioning, readiness for future modifications

# Increase transparency and support decisions through combination of multiple data point into meaningful information



Use Case → Asset Performance Management: *ExxonMobil* and *Tengizchevroil*

## Data Dimensions around Assets



### Challenges

Holistic **Asset Performance Management** across fleet

- Reduce unplanned outages and maintenance costs
- Optimize asset lifecycle
- Improve safety and reliability

### Value Proposition

XHQ for

- **Descriptive analytics** for asset conditions
- **Predictive analytics** for anomalies and early warning
- **Prescriptive analytics** for decision support

## XHQ Solution Examples today



### ExxonMobil Upstream

- High value rotating equipment e.g., gas turbines, pumps or motors
- Enhanced asset diagnostics, preventive maintenance and continuous asset health monitoring for 200 sites (globally)

### Tengizchevroil

Automated asset surveillance and asset performance monitoring, incl.,

- Predictive and real time monitoring
- Calculated indicators and reliability metrics
- Early indicators

# COMOS Walkinside enables virtual training in a safe environment

**D** Use Case → Simulation and Virtual Reality: *Total*

## Initial situation



### Challenges

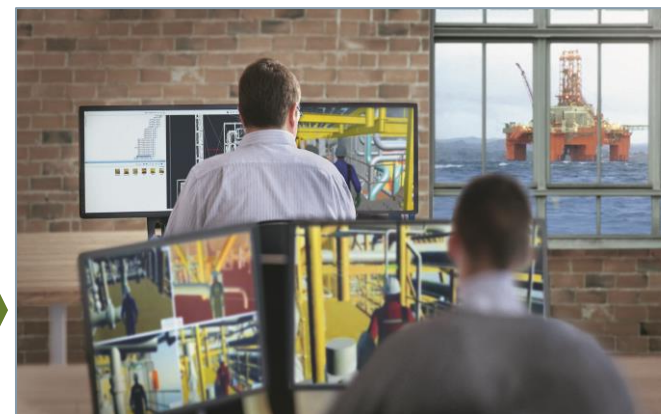
- Increasing shortage in experienced personnel
- Need for increased **asset uptime** and **safe** operation
- Need for **up-to-date** plant **information**

### Value Proposition

- Efficient and safe operator **trainings:**
  - **before** real plant **operation**
  - Based on **real-life scenarios**



## Actual status



Example **TOTAL** E&P, France

Training based on **COMOS Walkinside**

- **Virtual training** in the life-like virtual environment improves personal safety
- **Remote instruction** reduces costs for asset-related training through efficient collaboration for project stakeholders
  - **Faster time to first oil**
  - **Enhanced ROI** - increased efficiency, safety and asset uptime, lowered risk

# DSM Nutritional Products AG reduce engineering time and cost by use of Integrated Engineering with COMOS

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Use Case → Integrated Engineering: *DSM*

## Initial situation



### Challenges

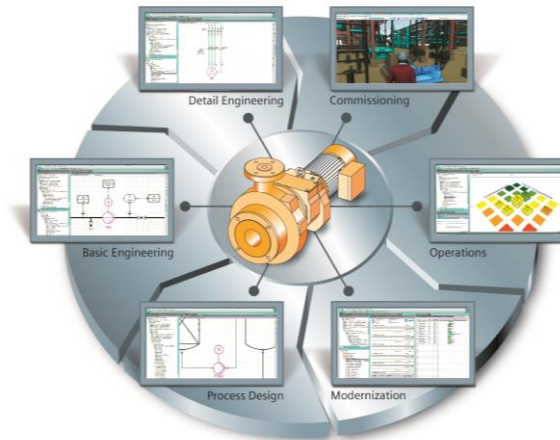
- Co-operation between engineering disciplines with **individual tools**
- **Data erosion** during plant lifecycle
- Up-to-date **documentation**

### Value Proposition

- **Data-base oriented engineering** (COMOS) incl. defined **workflows** and platform for **global cooperation**
- **Seamless transfer** of **plant documentation**
- **Data transparency**

## Actual status

DSM



### Example DSM Sisseln

- Reduced errors through data base and instantiation (higher data quality, single data input and data transparency through common platform)
- Reduction of engineering time
- Reduction of cost through automatism
- Higher planning and budget reliability

**15 – 25% cost savings** in process and automation engineering

## Initial situation



Already using COMOS  
since 2004



## Actual status



Structured Document  
Management

### Challenges

- **Data exchange and consistency** (non integrated engineering tools)
- **“Compliance”** based on plant qualification
- Transparent documentation for regulation in accordance with **‘risk-based approach’**

### Value Proposition

- **Increased efficiency and quality** in plant engineering
- **Optimized qualification** process
- **Plant documentation** in electrical format

### COMOS used since 2004

**Plant engineering, lifecycle data management and plant documentation**

*"Internal studies show we have achieved engineering savings of between 8% and 12% by using COMOS software."*

**Christoph Jauslin,**  
Head Engineering IT at Novartis Pharma