Digital Twins and Process Control with Software Defined Automation

Accelerating autonomous production

Raghav Tripathi
Product Manager, Process Control Systems
Siemens, UK & Ireland

SIEMENS

? What

are the challenges our customers face?

Our customers’ challenges are increasing …

SIEMENS

? What

is the answer?

Turning key technologies into building blocks on the path to autonomous production

DIGITAL ENTERPRISE

Combining the real and the digital worlds – from product to production

IT/OT CONVERGENCE

…with data-driven decision making and full data transparency

DIGITAL BUSINESS PLATFORM

… faster with **Siemens Xcelerator**

CYBERSECURITY

…protecting data with a multi-layered "Defense in Depth" concept

BUILDING BLOCKS

Software-Defined Automation

Data & **Artificial Intelligence**

Industrial Metaverse & **Digital Twins**

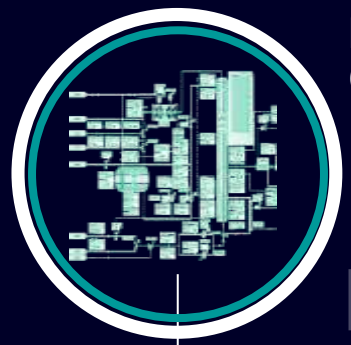
Autonomous production

SIEMENS

Driving the shift from HW-Based to SW-Defined Automation

Hardware-Based Automation …	… and Software-Defined Automation
OT-like graphical engineering/ **programming** of devices	**IT-like workflows**, high-level programming languages for engineering/programming of apps
Hardware/software coupled devices as “one box”	**Hardware/software decoupling** leads to **independence & various (OT/IT) deployments**
Limited **interoperability** & dominance of domain-specific comm. **protocols**	Designed for **easier integration** with digital technologies (e.g., Digital Twins, AI co-pilots, …)
One time configuration with **simple installation** & **replacement**	**Continuous software updates**, application lifecycle management

SIEMENS



Integrated Design and Configuration

Digital Lifecycle Excellence

Operational Excellence

DESIGN

Research & Development

Requirements

FEED
Front End Engineering Design

Detailed Eng

FID
Final Investment Decision

Procure

Construct

Realize

Optimize

Commission

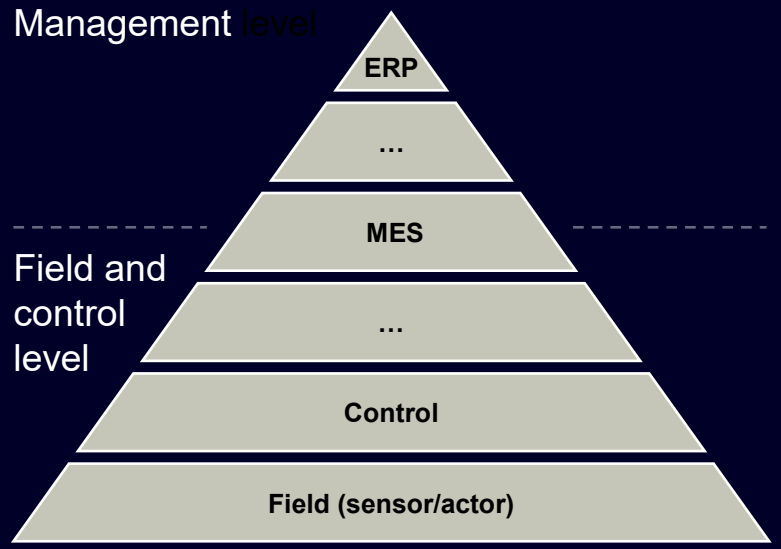
Start-up

Operate & Maintain

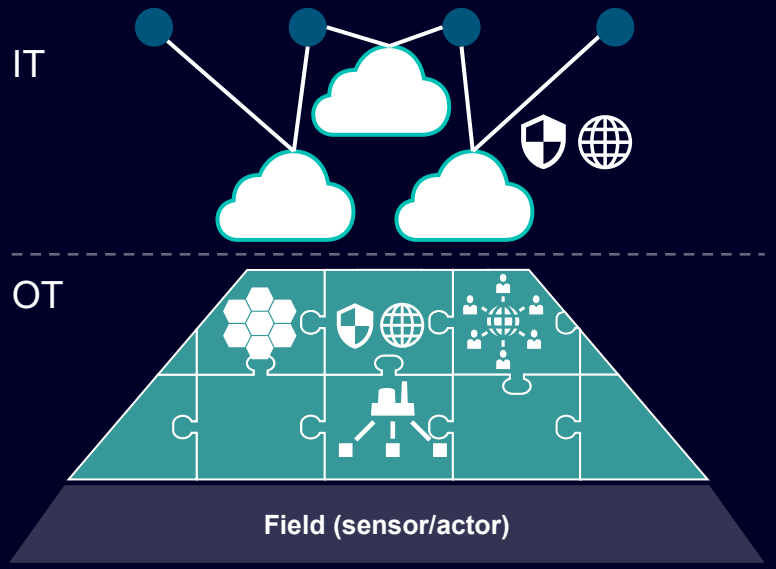
SIEMENS

Software-defined Automation is the way the industry will evolve from classic automation pyramid to a user-defined workflow architecture

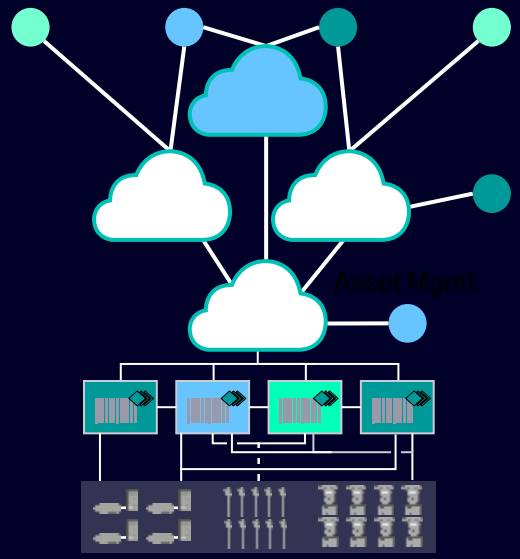
Yesterday



Today



Tomorrow *exemplary*

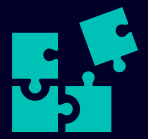


IT – OT convergence

SIMATIC PCS neo
Siemens Apps
3rd Party Apps

SIEMENS

Software-Defined Automation comprises four key elements

	IT-like Engineering	Cloud & Virtualization	Intelligent Operations	Dynamic Lifecycle Management
Explanation	SW development principles, applied to industrial automation	Decoupling fixed hardware from automation software	Smart solutions that build upon Software-Defined Automation	Management & Deployment infrastructure
				
		PCS neo engineering in the cloud	DCS Co-Pilot	
Siemens Portfolio	SIMATIC PCS neo	Virtual Process Controller	eaSie	SIMATIC PCS myExpert

Cybersecurity offering as strong protection layer for the software-based production

SIEMENS

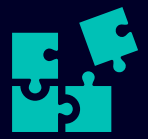
Software-Defined Automation comprises four key elements

	IT-like Engineering	Cloud & Virtualization	Intelligent Operations	Dynamic Lifecycle Management
Explanation	SW development principles, applied to industrial automation	Decoupling fixed hardware from automation software	Smart solutions that build upon Software-Defined Automation	Management & Deployment infrastructure
				
Siemens Portfolio	SIMATIC PCS neo	PCS neo engineering in the cloud Virtual Process Controller	DCS Co-Pilot eaSie	SIMATIC PCS myExpert

Cybersecurity offering as strong protection layer for the software-based production

SIEMENS

Software-Defined Automation comprises four key elements

	IT-like Engineering	Cloud & Virtualization	Intelligent Operations	Dynamic Lifecycle Management
Explanation	SW development principles, applied to industrial automation	Decoupling fixed hardware from automation software	Smart solutions that build upon Software-Defined Automation	Management & Deployment infrastructure
				
Siemens Portfolio	SIMATIC PCS neo	PCS neo engineering in the cloud Virtual Process Controller	DCS Co-Pilot eaSie	SIMATIC PCS myExpert

Cybersecurity offering as strong protection layer for the software-based production

SIEMENS

Software-Defined Automation comprises four key elements

	IT-like Engineering	Cloud & Virtualization	Intelligent Operations	Dynamic Lifecycle Management
Explanation	SW development principles, applied to industrial automation	Decoupling fixed hardware from automation software	Smart solutions that build upon Software-Defined Automation	Management & Deployment infrastructure
				
		PCS neo engineering in the cloud	DCS Co-Pilot	
Siemens Portfolio	SIMATIC PCS neo	Virtual Process Controller	eaSie	SIMATIC PCS myExpert

Cybersecurity offering as strong protection layer for the software-based production

SIEMENS

Software-Defined Automation comprises four key elements

	IT-like Engineering	Cloud & Virtualization	Intelligent Operations	Dynamic Lifecycle Management
Explanation	SW development principles, applied to industrial automation	Decoupling fixed hardware from automation software	Smart solutions that build upon Software-Defined Automation	Management & Deployment infrastructure
				
Siemens Portfolio	SIMATIC PCS neo	Virtual Process Controller PCS neo engineering in the cloud	eaSie DCS Co-Pilot	SIMATIC PCS myExpert

Cybersecurity offering as strong protection layer for the software-based production

SIEMENS

SIMATIC PCS neo – New Version 6.0 now available!

Process Safety according to IEC 61508 & IEC 61511

Enhanced alarming, e.g. alarm suppression

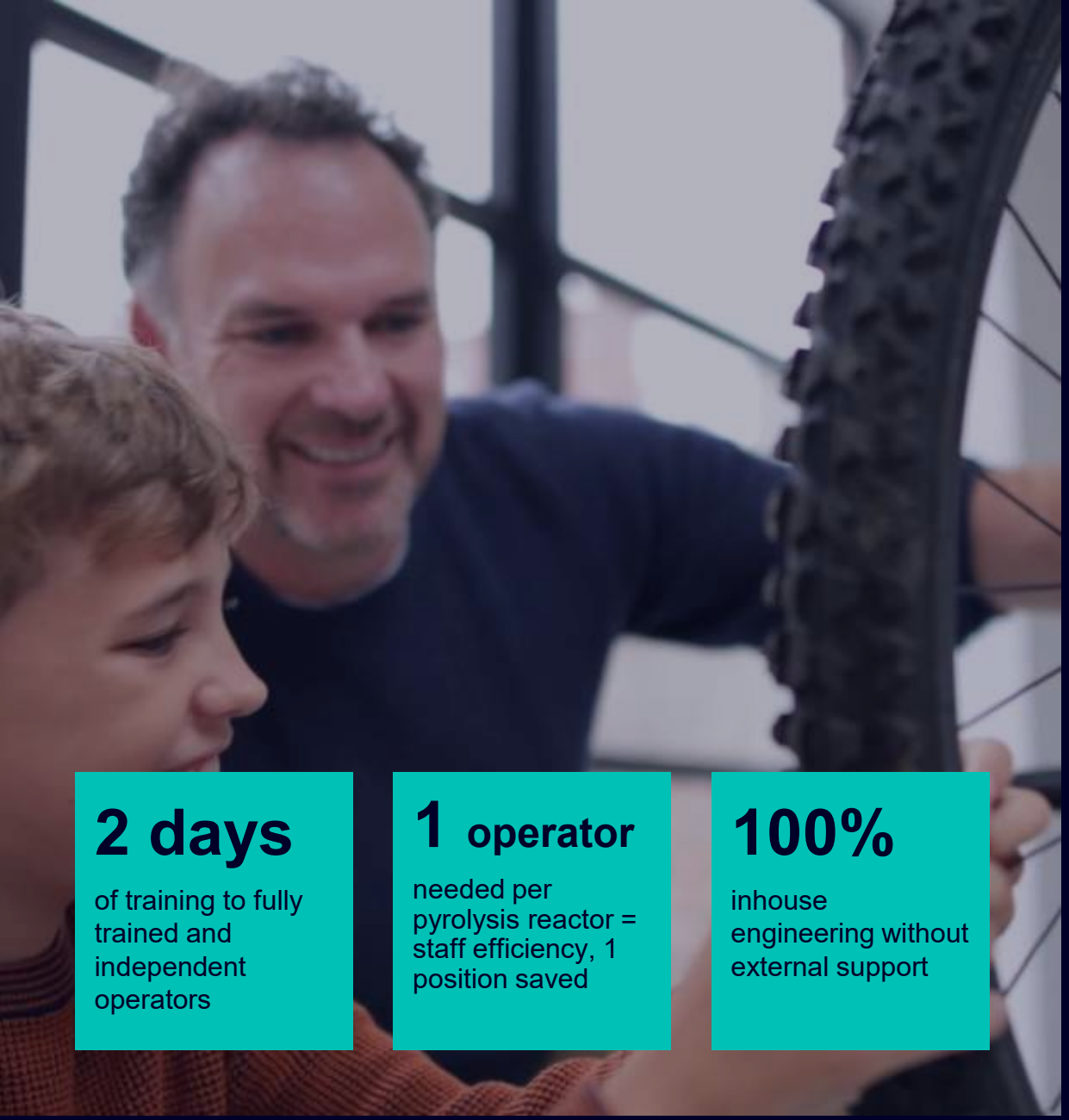
Enhanced field device diagnostics & system transparency

Telecontrol

Object type editor including UI simulation

PROFIBUS Configuration in Run

SIEMENS



2 days

of training to fully trained and independent operators

1 operator

needed per pyrolysis reactor = staff efficiency, 1 position saved

100%

inhouse engineering without external support

Pyrum Innovations AG

Intelligent automation to support a revolutionary recycling process and reduce waste

- SIMATIC PCS neo enables **modular automation** with **easy integration of new plant modules** and **web-based** operation — ideal for remote access and flexible control
- Intuitive interface and web platform **reduce training time and staffing needs** for operation and support
- **Scalability** supports sustainable pyrolysis processes converting used tires into high-value secondary raw materials

When we learned that SIMATIC PCS neo is web-based and that the system supports modularization of our plant, it was clear: this is the one, and nothing else.

SIEMENS

Source: BASF

BASF

Driving Innovation in White Biotechnology

- SIMATIC PCS neo deployed in **biotech lab** to control **innovative Vitamin B2 process** – validated in real **pilot** conditions
- Modular automation via MTP and Software-Defined Automation enables **fast module integration, flexible adaptation and faster time-to-market**
- Future-ready with **web-based multi-user engineering**, seamless IIoT/Edge integration, and **investment protection** through SIMATIC PCS 7 hardware compatibility

The successful pilot is the first step toward the global rollout of SIMATIC PCS neo at BASF. Testing under real conditions is essential for this. Now we know we can rely on a technology that will support us on the path to autonomous production.

SIEMENS

Engineering on a global scale and as a Service with SIMATIC PCS neo engineering in the cloud

Customer value

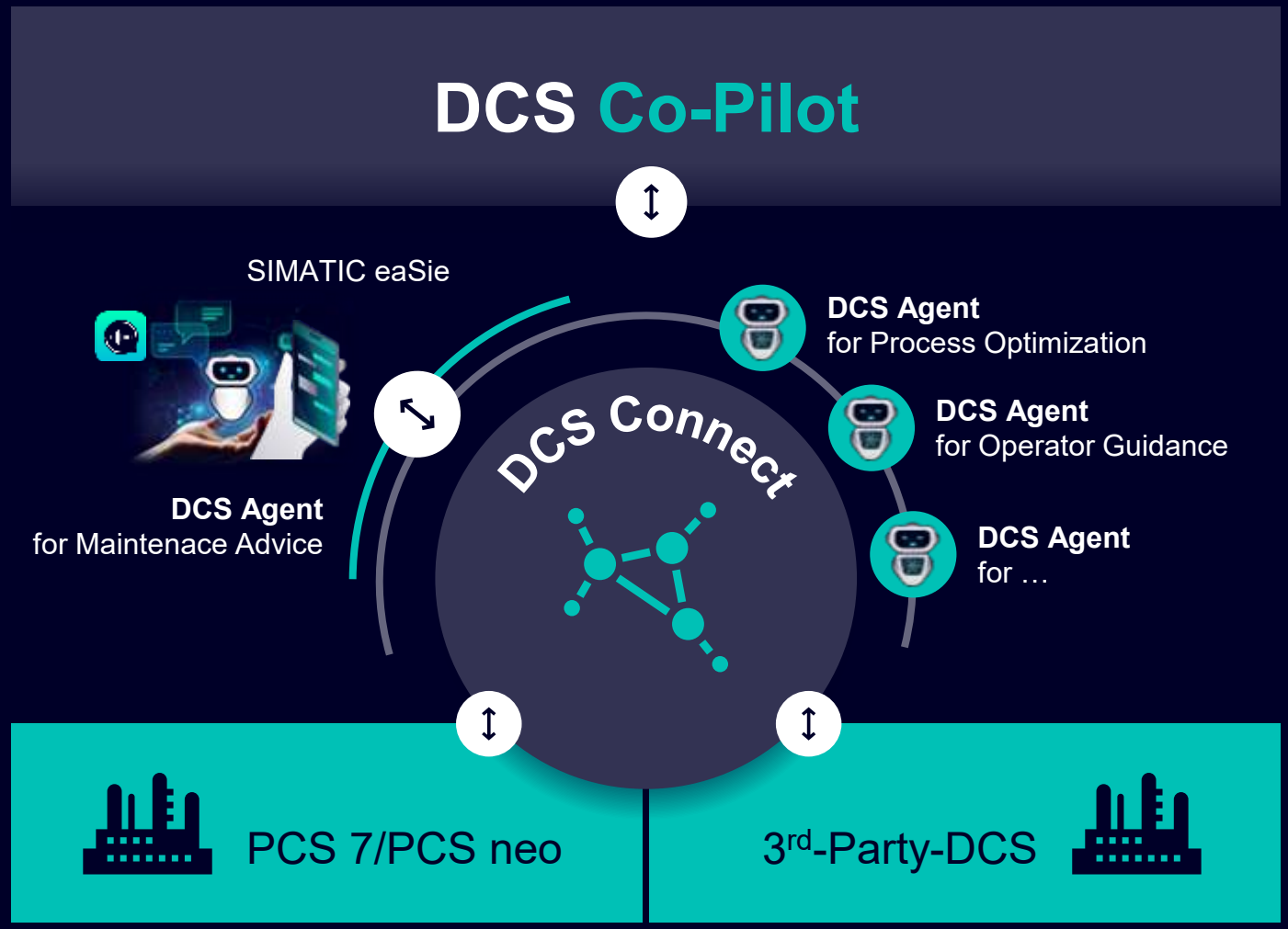
- Co-creation via multi-user for optimal engineering workflows
- Zero maintenance efforts
- Easy and secure access for all involved parties
- Integration of local workplace
- SaaS Business Model
  You pay what you use

Customers, e.g. ADURO CLEAN TECHNOLOGIES

SIEMENS

DCS Connect & DCS Agents will Enable AI and data-driven applications

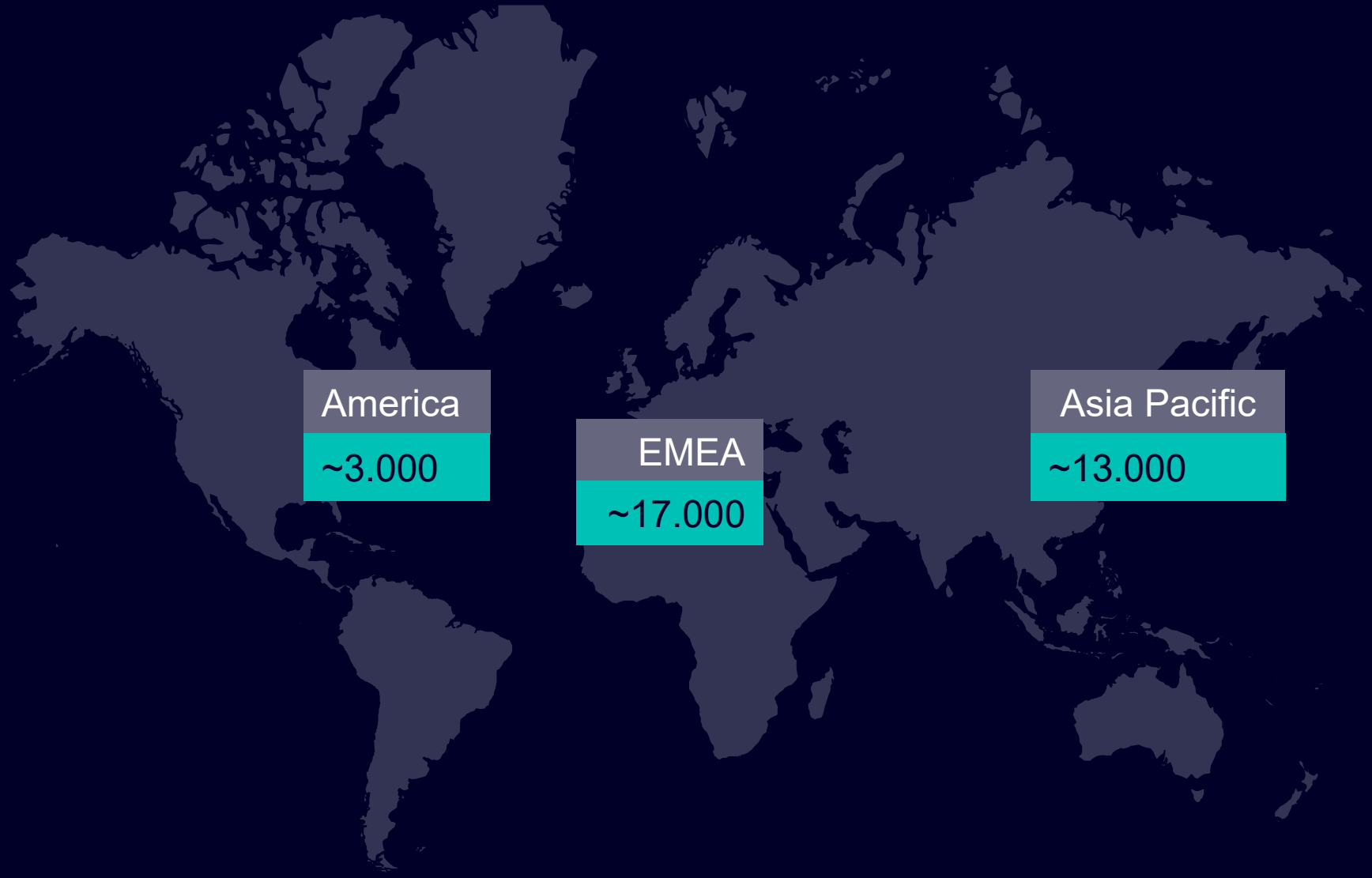
DCS Co-Pilot
with agents in the background for data-driven applications



SIEMENS

Siemens’ pledge towards the process industries

Driving the Software-Defined Automation journey together with our customers & partners



More than 33.000 installations

in all process industries with SIMATIC DCS systems

SIEMENS

? How

do customers benefit today?

SIEMENS

With PCS neo, we help our customers drive efficiency

… and jointly pave the path towards Software-Defined Automation

15%

Lower Total Cost of Ownership (TCO)

25%

Savings in project administration

70%

Engineering savings through easy integration of MTPs

50%

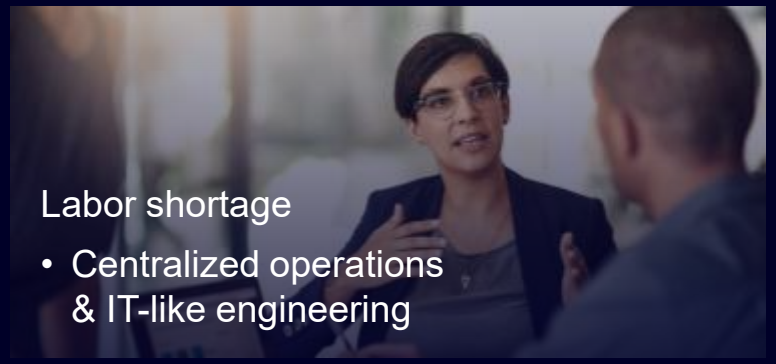
Increase in productivity

20%

Reduced testing

SIEMENS

How Software-Defined Automation helps overcoming the industry's challenges



Labor shortage

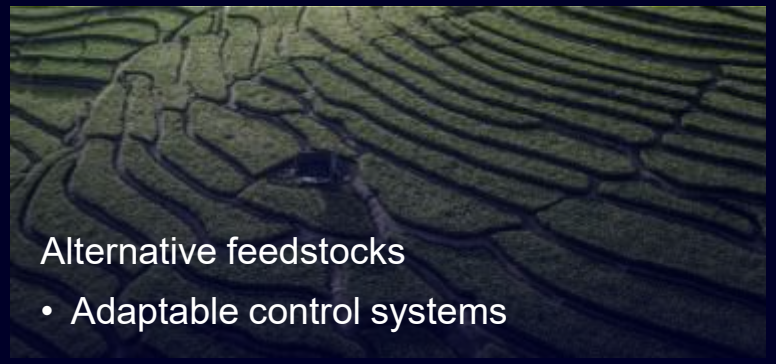
- Centralized operations & IT-like engineering

Energy & resource efficiency

- Dynamically optimize processes in real-time

Cybersecurity & Regulations

- Software-Driven updates & Data traceability

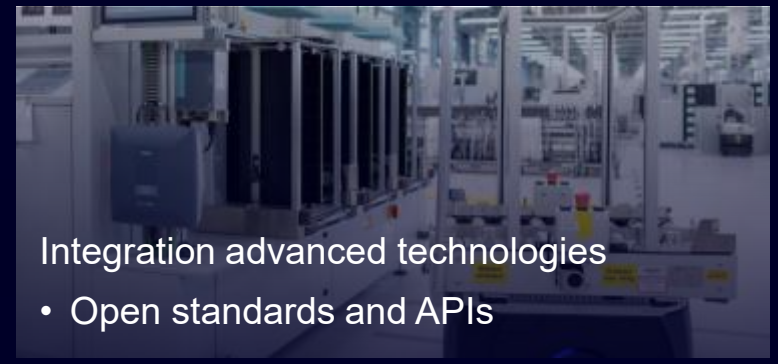


Alternative feedstocks

- Adaptable control systems

Inflexible operations

- No changing of physical hardware

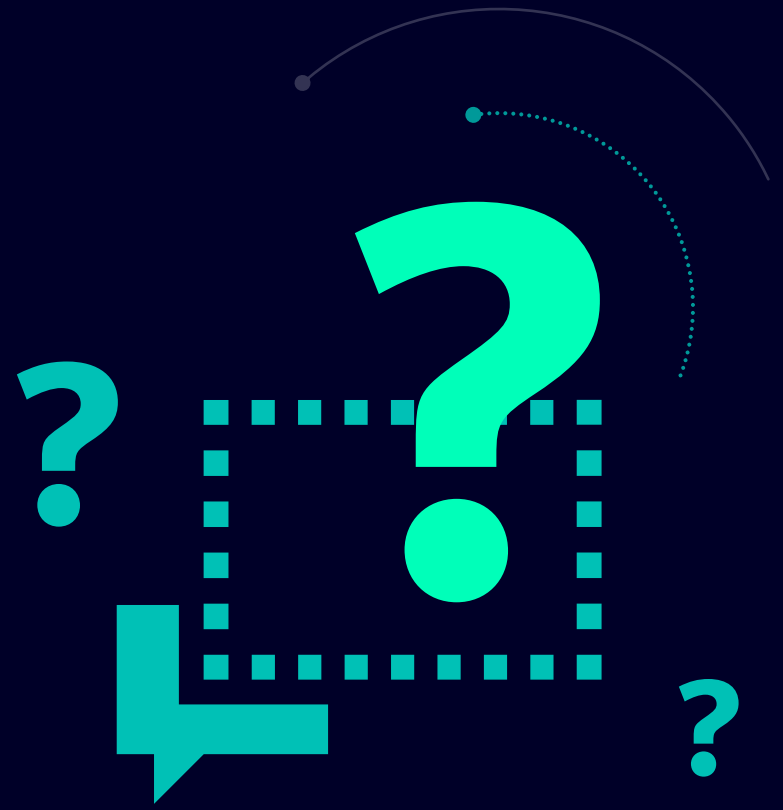


Integration advanced technologies

- Open standards and APIs

SIEMENS

Thank you very much for your attention!



SIEMENS

SIMATIC PCS myExpert – web based digital assistant

Offering a health & lifecycle dashboard for SIMATIC PCS 7 & SIMATIC PCS neo plants

With SIMATIC PCS myExpert, you maintain an overview of your process control system.

Prove the integrity of your process control system during security audits.

Relevant life cycle product information

Latest firmware and software updates

The latest security alerts

Display

- Obsolete hardware
- Firmware and software updates
- Security warnings/vulnerabilities

Systematic evaluation & planning

Necessary measures in PCS myExpert

Direct access to Siemens support

- For quick and easy creation of support requests in relation to your equipment
- Access for all authorized users to current and processed support requests
- Creation of a knowledge base about your support requests for your staff

SIEMENS