



SIEMENS

Digital Enterprise – Infinite opportunities from infinite data

siemens.com/digital-enterprise

The Digital
Enterprise

Cutting-edge
technologies

Portfolio
highlights

Digital Enterprise
Services

Financing
solutions

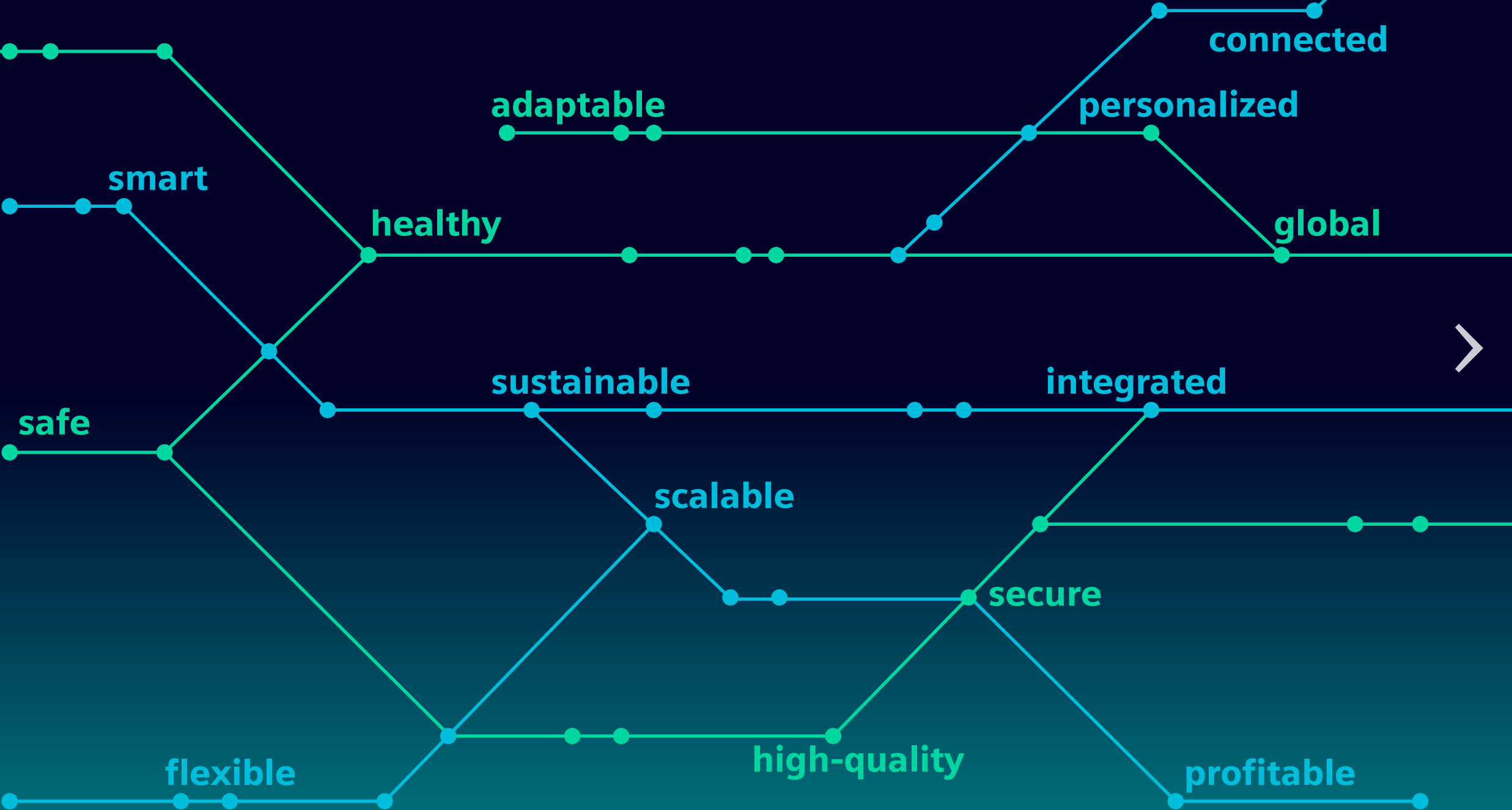
References

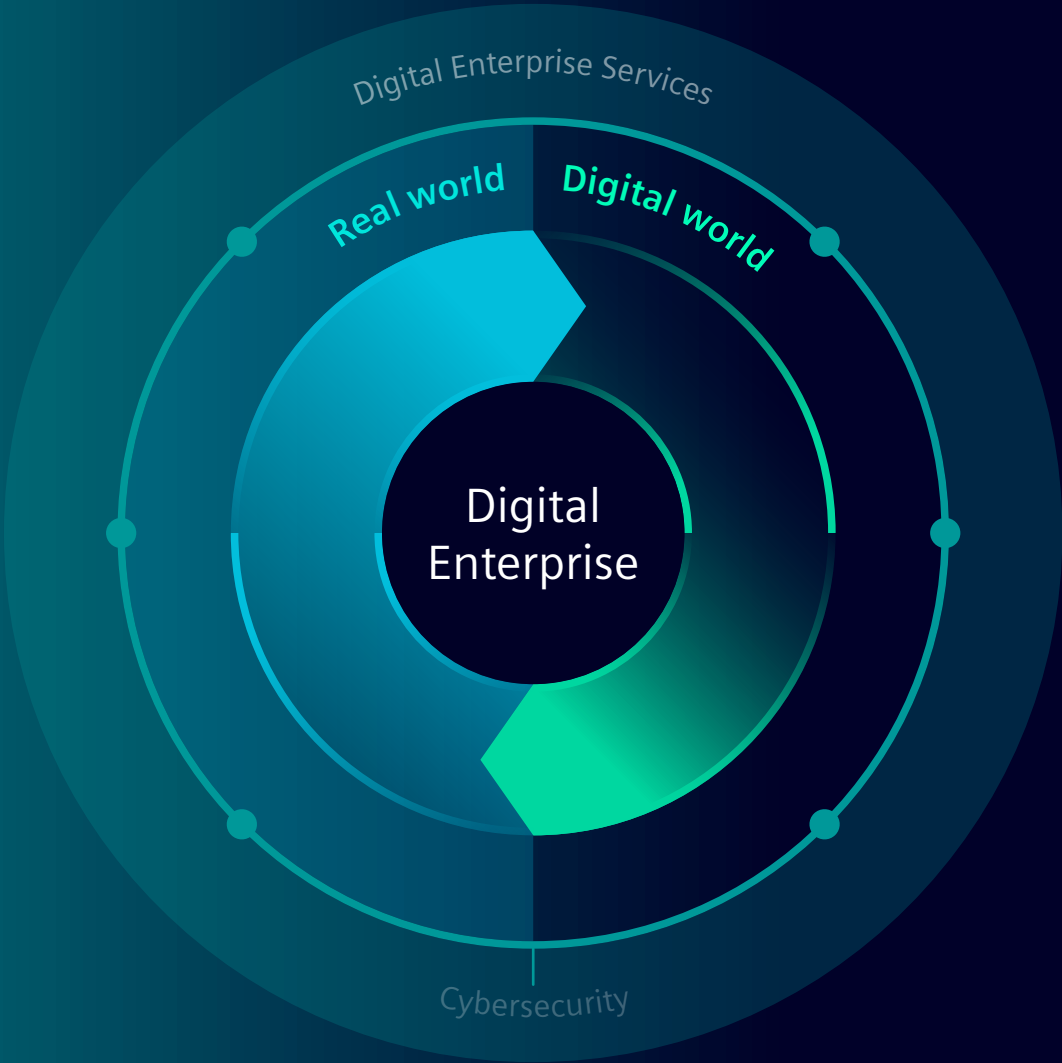


Customer demands drive the digital transformation

More flexible production, greater productivity, and the development of new business models are all possible today thanks to digital solutions. But the future of industry offers even more potential: Cutting-edge technologies will create new opportunities for both discrete and process industries to fulfill their customers' individual requirements and to do more with less.

While our resources are finite, data created in the Industrial Internet of Things (IIoT) are infinite and need to be collected, understood, and used. The Digital Enterprise is doing exactly this by combining the real and the digital worlds. As a result, the infinite amount of data allows us to use our finite resources efficiently and with that make the industry more sustainable.

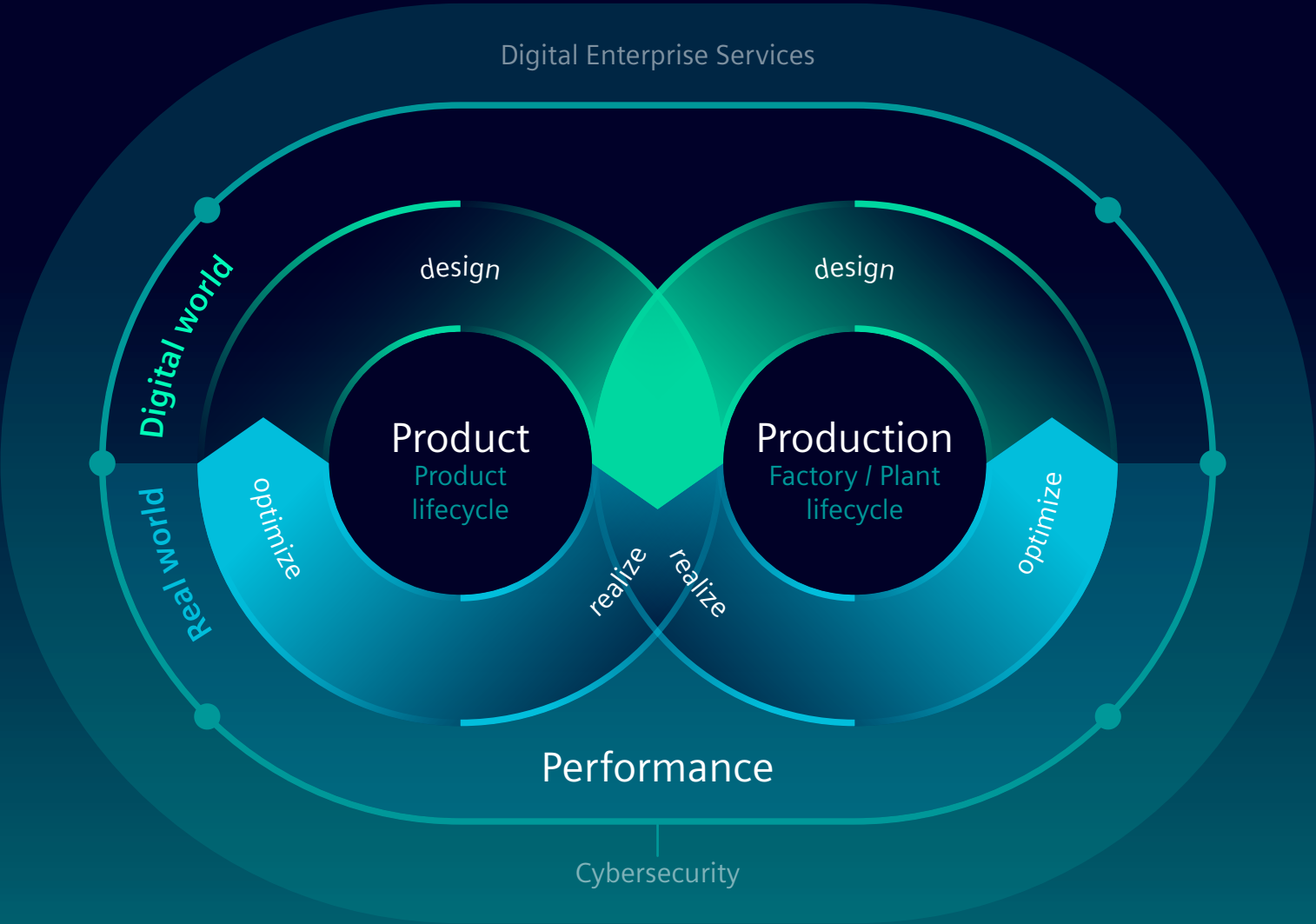




Combining the real and the digital worlds

Combining the real and the digital worlds makes it possible to seamlessly integrate the entire value chain from design to realization, while optimizing with a continuous flow of data. A true Digital Enterprise is able to harness the unlimited power of data by gaining valuable insights to make fast and confident decisions – and to create best-in-class products through efficient production.

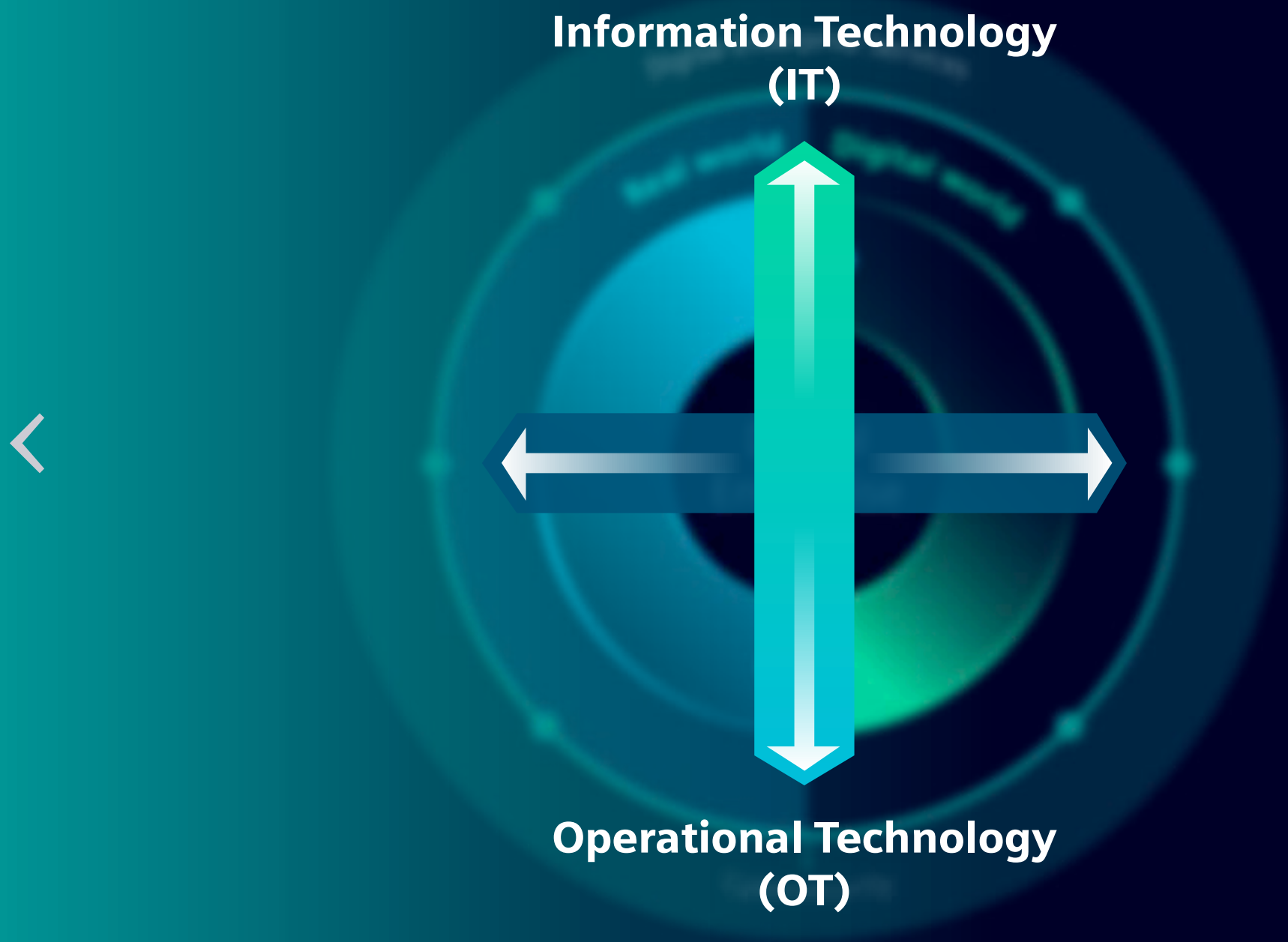
In a true Digital Enterprise, there is balance between security and openness. In order to protect all the continuous, multidirectional data flows, we incorporate a multi-layered security concept at every step. At the same time, there is a seamless flow of data between stakeholders to achieve collaboration like never before.



Comprehensive Digital Twin

Working with our comprehensive Digital Twin makes it possible to integrate the entire product lifecycle – and if required – even the factory and plant lifecycle. The generated performance data captured in the physical world enables a continuous and open loop of optimization for both the product and the production.

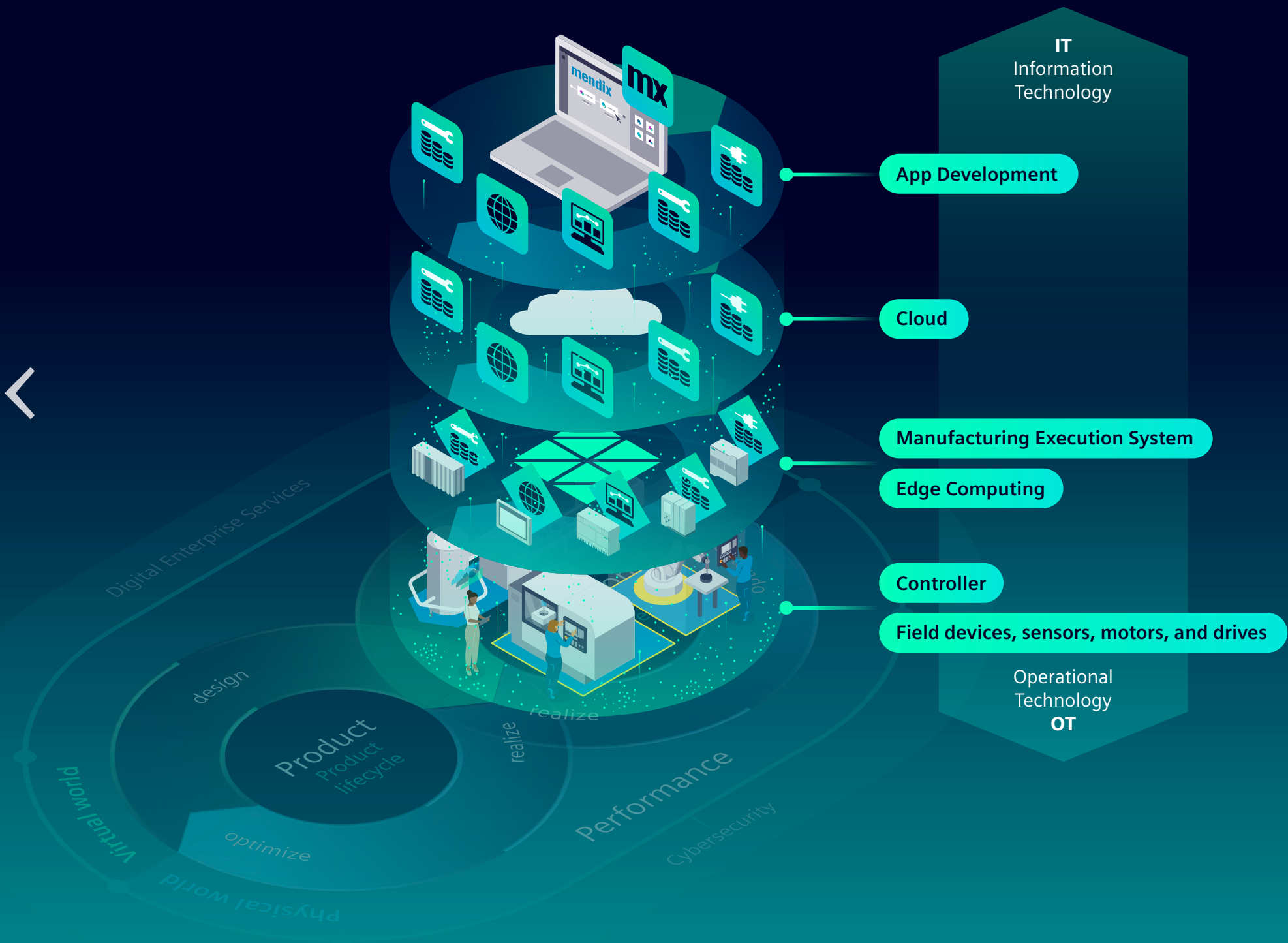
This comprehensive Digital Twin approach integrates all necessary components, even including a Digital Twin of the building, which you can use to optimize the performance and efficiency of your plant’s energy and physical infrastructure.



Digital Enterprise merges OT and IT from shop floor to top floor

Bringing together Operational Technology (OT) and Information Technology (IT)

The Digital Enterprise brings together processes that were previously separate. It breaks down traditional silos and helps bridge the gaps between software and hardware, IT and OT, shop floor and top floor.



Bringing together OT and IT – Data intelligence for data-driven decision making

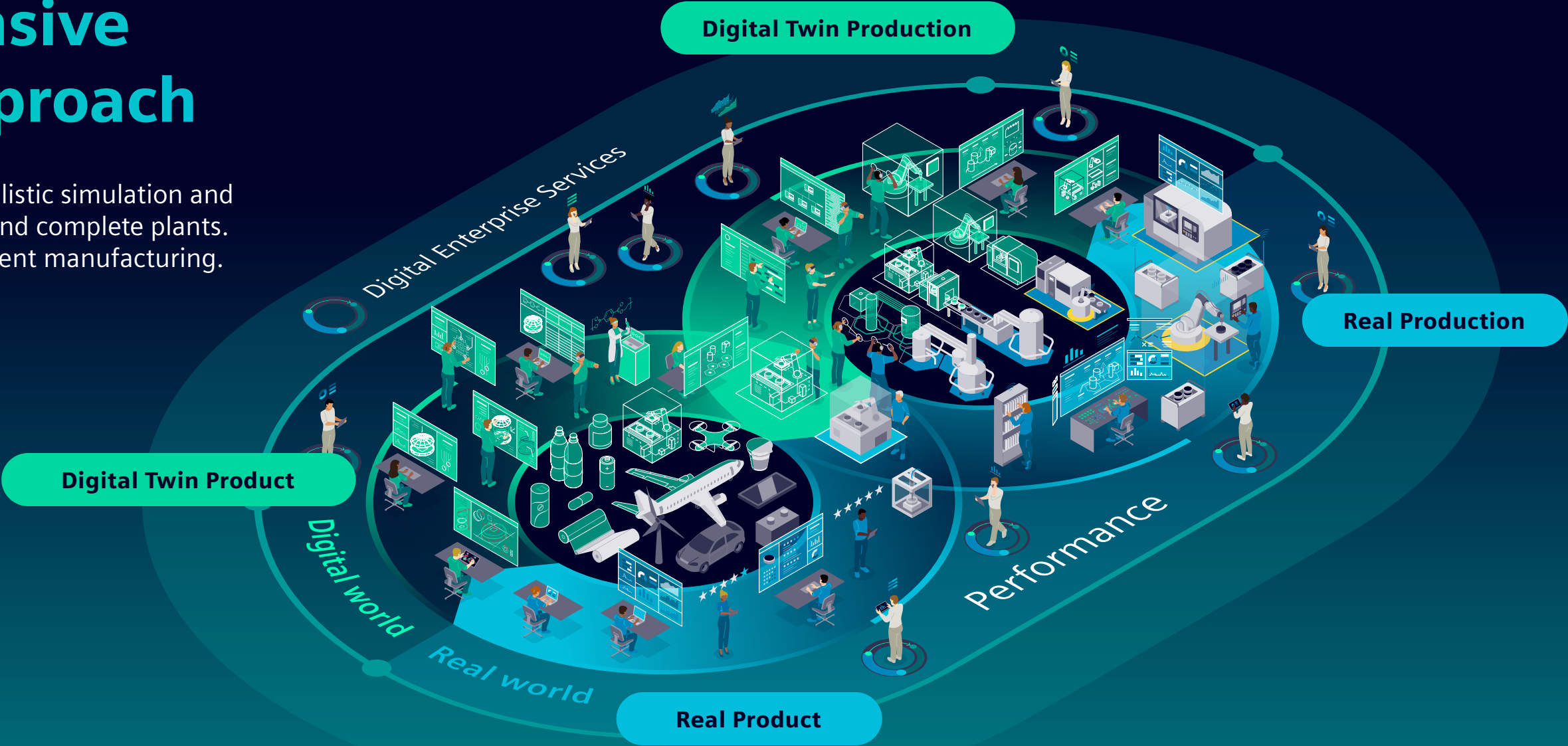
As a result, this provides entirely new findings and optimization potential, ranging from predictive maintenance and condition monitoring to improved validation and quality management processes and entirely new business models, such as pay per use.

The approach also enables the use of artificial intelligence with industrial applications. Vertical integration and its ability to combine OT and IT is thus driving implementation of the Industrial Internet of Things.

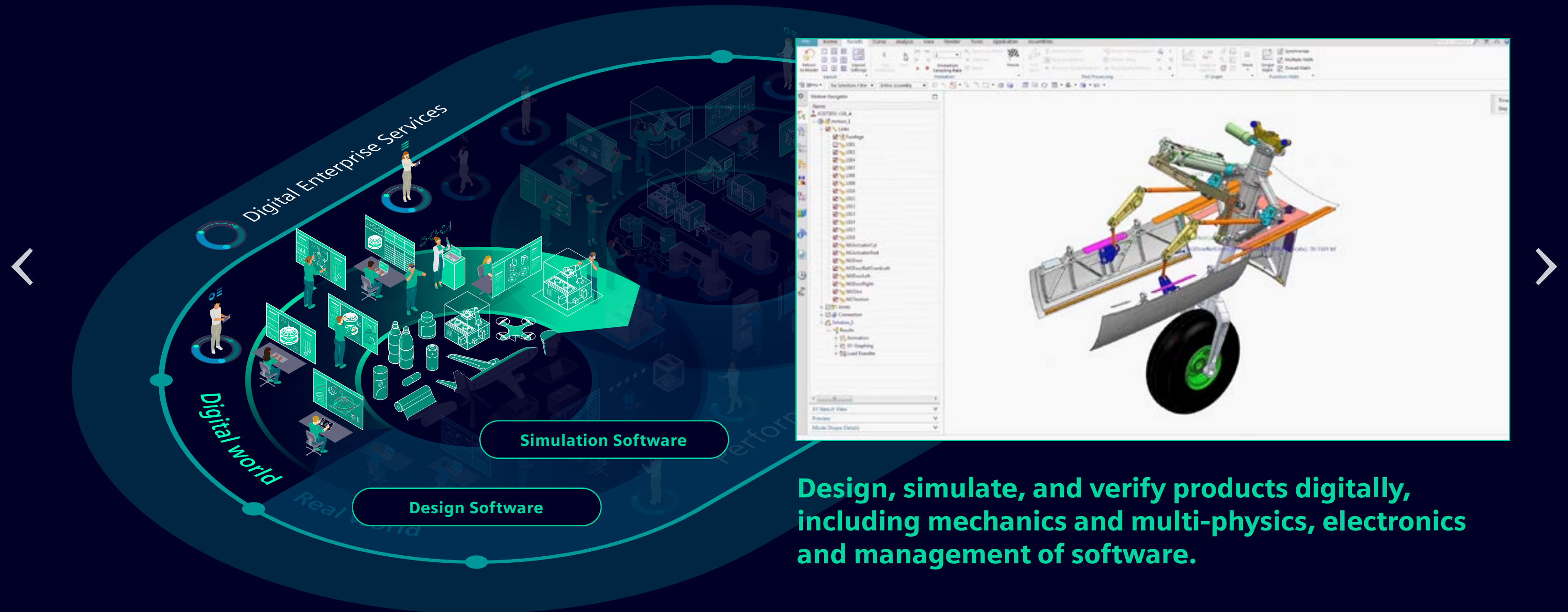
This offers great optimization potential – including technologies such as artificial intelligence for predictive maintenance, precise condition monitoring and improved quality.

The comprehensive Digital Twin approach

The Digital Twin approach allows the realistic simulation and validation of products, machines, lines and complete plants. It is the foundation for flexible and efficient manufacturing.

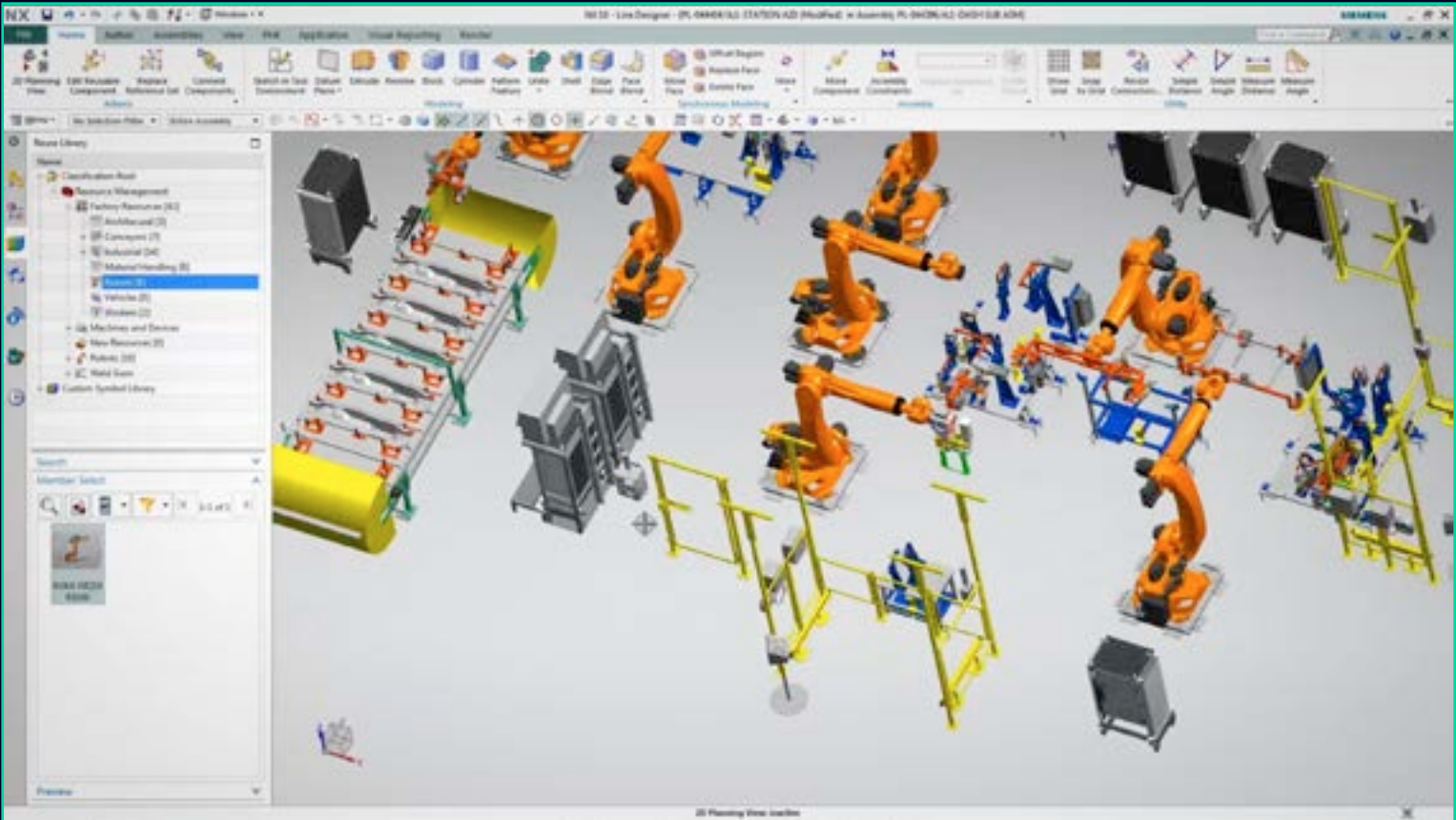


The Digital Twin Product

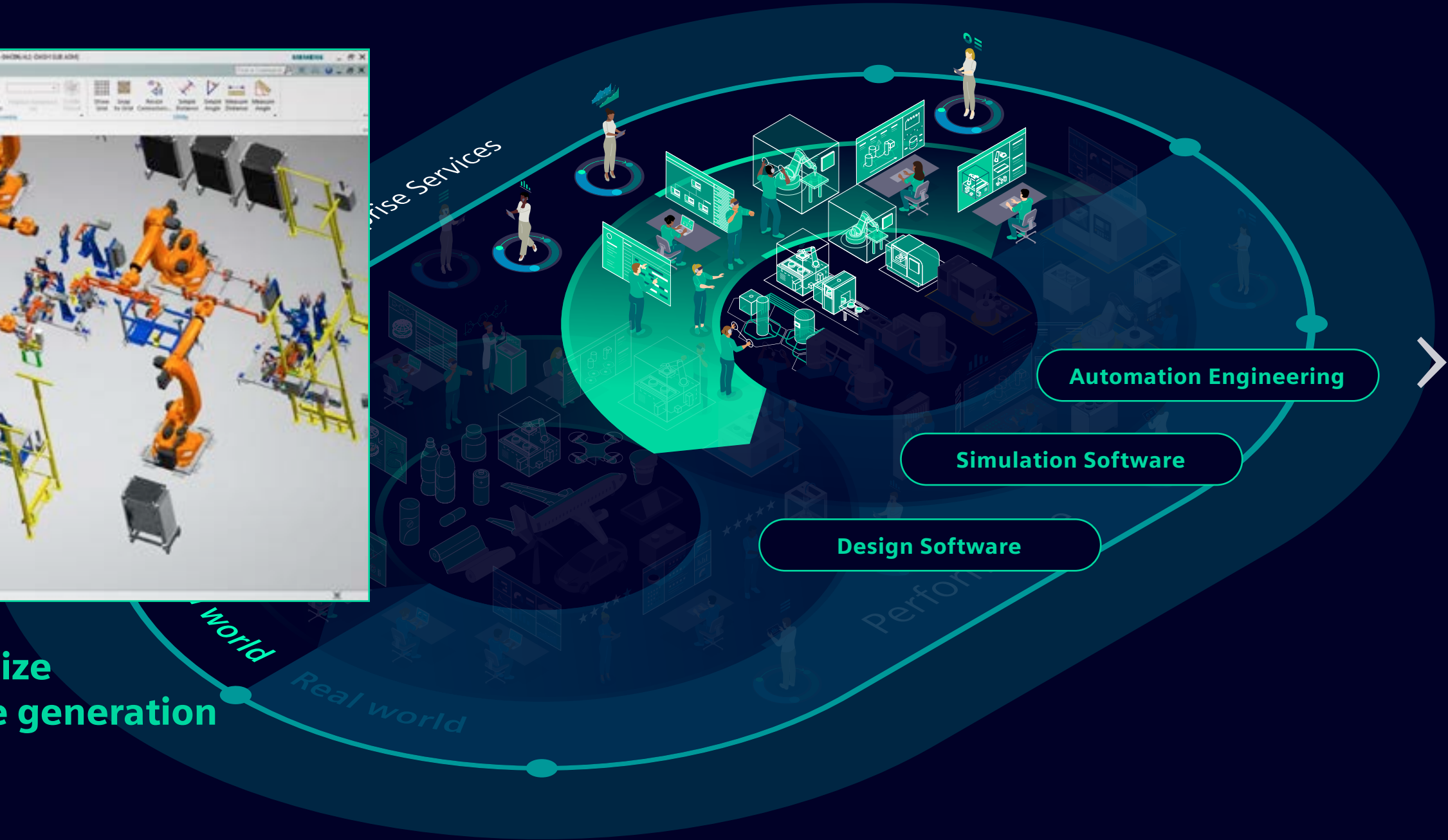


Design, simulate, and verify products digitally, including mechanics and multi-physics, electronics and management of software.

The Digital Twin Production



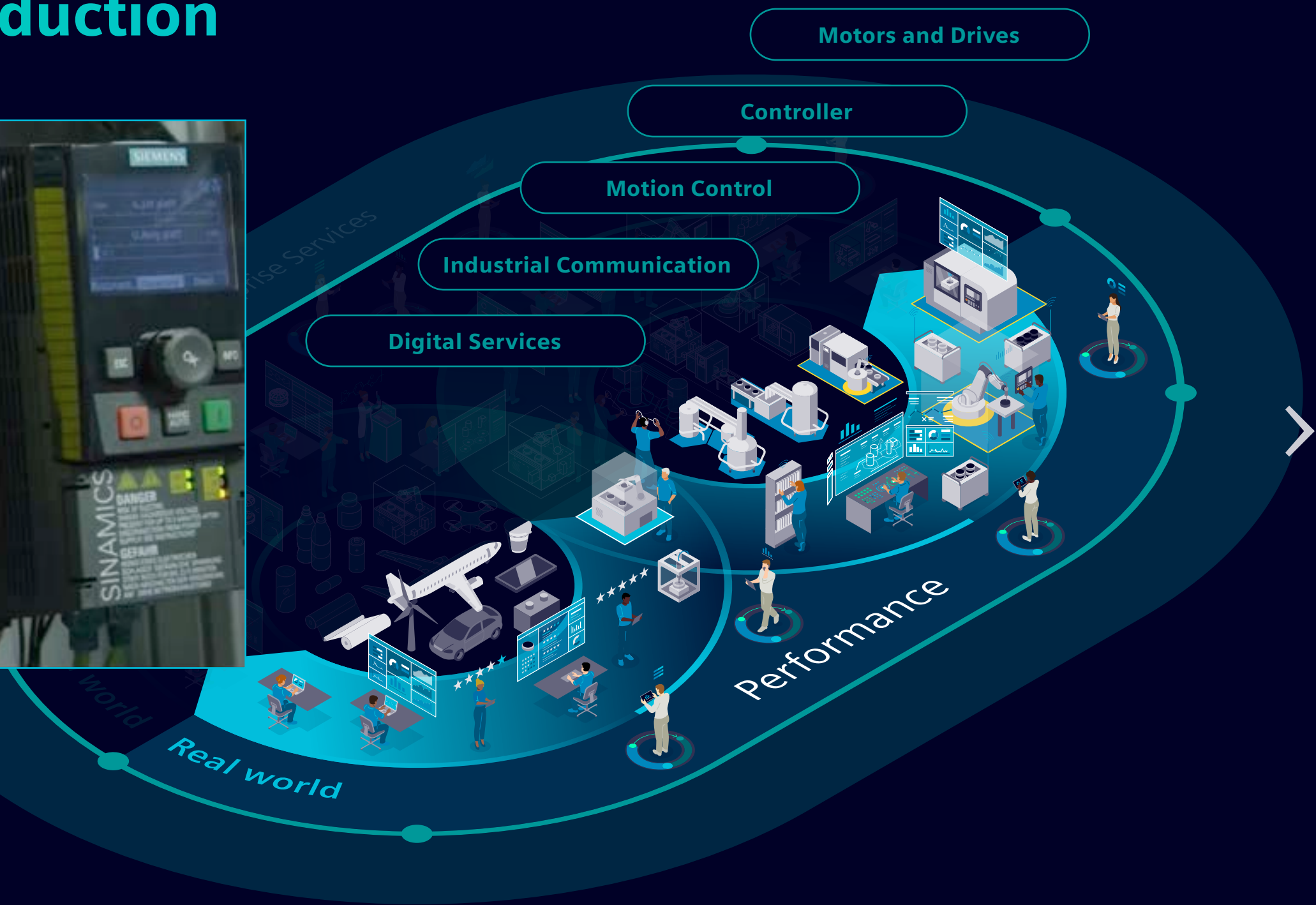
Plan, simulate, predict, and optimize production digitally with PLC code generation and virtual commissioning.



The real product and production

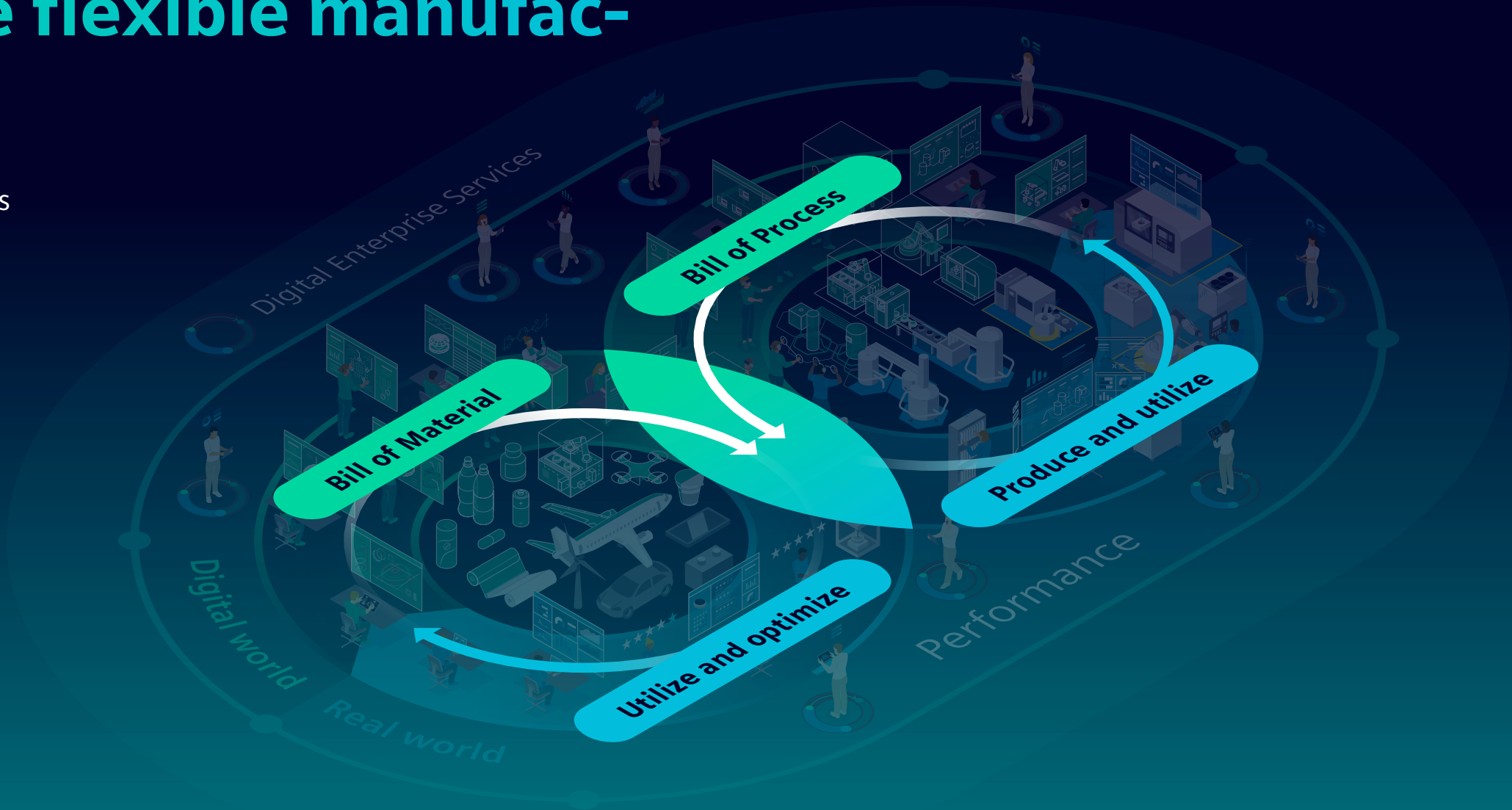


Run production efficiently and securely with Totally Integrated Automation and optimize product and production with data insights.



Combining real and digital to enable flexible manufacturing

The integration of product and process design enables manufacturability checks at an early phase to allow fast product introduction.



The map for the digital journey: Digital Threads

Digital Threads are the map for the digital transformation based on specific business workflows to becoming a real Digital Enterprise. They are the user journey through the digital transformation. They digitally connect all tasks and processes to tackle challenges and pave the way for products through the best design and production process to get them to market faster.



Next level efficiency

Digital Threads provide the shortest most efficient way to create a new product and efficient production. So the Digital Threads revolutionize the entire product and production process, from design and development to production and delivery.





As a technology leader in digitalization and automation, we co-create with our customers, making them smarter and more connected – saving our finite resources with infinite data.”

Cedrik Neike – CEO Siemens Digital Industries



Integrating cutting-edge technologies for **more sustainable and flexible production**

Through innovations and the integration of cutting-edge technologies into the Digital Enterprise portfolio, Siemens helps companies from all industries to achieve a more flexible and sustainable production.



MindSphere – Industrial IoT as a service

Industrial decision-makers increasingly have to face several challenges: more competition, customers demanding individualized products, shortening development times and fast-changing technologies.

To overcome these challenges, you need a trusted partner and expert with broad domain knowledge. Siemens MindSphere® provides you with the required transparency and data-driven insights needed to make the right decisions and strengthen your digitalization strategy.

As the trusted partner for the industrial world, MindSphere enables you to drive your business success by understanding the things that matter. You need to connect all of your machines and aggregate the relevant data into one system so you can perform concise and powerful analysis, optimize your processes, reduce costs, and accelerate your time to market. With the help of a strong and secure IoT solution that offers scalability, global IoT connectivity, and an easy application deployment process, you can make informed decisions. With MindSphere being built on Mendix, you can quickly create custom, low-code applications to accelerate the time-to-value for your industry investments.

[Learn more](#)

Edge Computing – from the field to the cloud

Make the most of your data

The digital transformation of industry brings with it an unlimited increase in the amount of data generated. Production machines, machine tools, processes, and plants all produce data containing valuable information for companies. If used intelligently, this data can help you optimize your processes and products, make better use of equipment, and improve maintenance scheduling.

New business models like innovative service concepts are also being created based on the Internet of Things (IoT). With Industrial Edge, you can take advantage of all this data, locally and in the cloud, depending on your needs. Industrial Edge is an integral part of the Digital Enterprise portfolio that serves to transform endless volumes of data into limitless opportunities.

[Learn more](#)





Artificial Intelligence in Industry

Utilizing the digitally generated data for a leap in productivity

With the digital transformation of industry, more and more data are being generated that offer a great deal of potential.

Artificial Intelligence (AI) and Machine Learning are technologies which enable engineers and data scientists to structure, analyze and evaluate the huge volume of data. The application scenarios range across the lifecycle: Smart recommendations, generative design, anomaly detection and preventive maintenance optimize the way and pace with which products are designed and produced.

To make use of industrial-grade AI applications in a trustworthy and value-adding way, they must interact seamlessly with software and automation as well as the corresponding IT infrastructure. Therefore, collaboration and open ecosystems are key to leveraging the great potential of these technologies.

[Learn more](#)

Industrial 5G

The future “speaks” 5G – and so do we

Industry 4.0, the smart factory, the Industrial Internet of Things (IIoT) – these are the future of industrial manufacturing. Designing production plants and intralogistics to be more flexible, autonomous, and efficient requires the right communication framework and comprehensive connectivity. The new 5G communication standard opens up important new prospects.

[Learn more](#)





Industrialize Additive Manufacturing

The Digital Enterprise portfolio includes leading software and automation solutions, seamlessly integrated along the Additive Manufacturing value chain. This holistic approach is unique in the scope of industrialization of Additive Manufacturing.

[↗ Learn more](#)



Comprehensive portfolio

... of integrated software, automation, and digital services supports companies in becoming a Digital Enterprise.

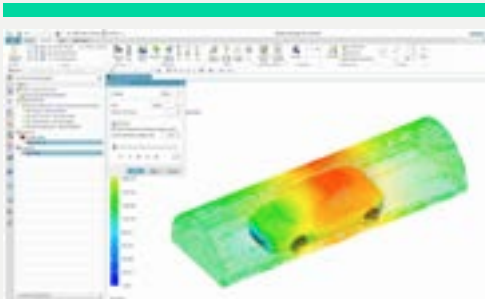
-  Digital Enterprise Services
-  Xcelerator
-  Totally Integrated Automation



The Digital Twin Product



NX CAD/CAM
Design, simulate, and perfect products in the virtual world



Simcenter
Simulate the product's physical behavior and aerodynamics



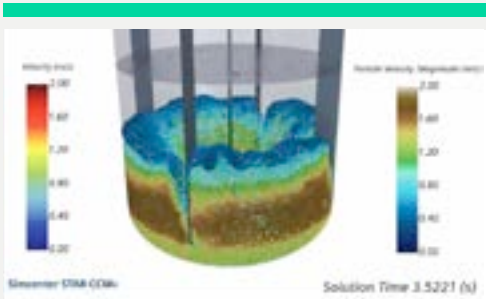
Capital, Xpedition
Develop integrated electrical and electronic systems



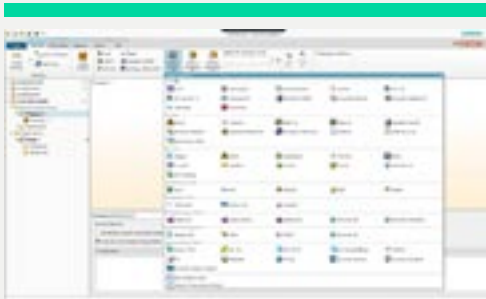
Polarion ALM
Develop, simulate, validate, and manage embedded software



gProms
Consistent, end-to-end data models for the entire lifecycle



Simcenter STAR-CCM+
Engineer innovation with CFD-focused multiphysics simulation



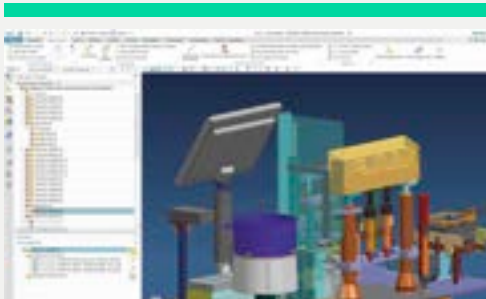
Simcenter HEEDS
Powerful design space exploration software package



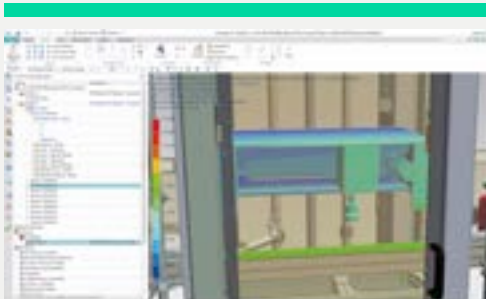
Teamcenter
Machine process planning and validation



NX Mechatronics Concept Designer
Easy evaluation of different machine concepts



NX CAD
Machine design



Simcenter
Machine concept validation through multi-physical simulation



Automation Designer with TIA Portal
Interdisciplinary engineering – from mechanical and electrical to automation



The Digital Twin Production



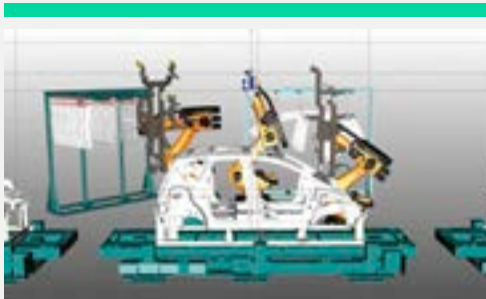
Teamcenter Manufacturing
Plan and validate production processes



Assembly Line Planner
Intuitive and 3D-focused Body-in-White planning system



Tecnomatix Plant Simulation
Simulate and optimize production processes and material flow



Tecnomatix Process Simulate
Simulate workflows and offline programming of robots



COMOS
Integrated plant management over the entire lifecycle – from engineering to operation



SIMIT
Virtual commissioning and operator training



PlantSight
One complete, digital twin for the process industry



Modular production with Module Type Package
Adapt your plant fast and efficiently to new processes and demands



TIA Selection Tool and TIA Portal
Exchange planning data digitally and platform-independently



TIA Portal and multiuser functions
Increase software quality and reduce engineering costs with IT standards



TIA Portal with SIMATIC PLC SIM Advanced, Tecnomatix NX MCD and SIMATIC Machine Simulator
Simulation and validation of machines with virtual commissioning



Create MyVirtual Machine with SINUMERIK ONE
Shorten machine commissioning and higher flexibility in engineering



Real product, production, and performance data



➤ **Consulting Services**
Identify potential for improvement throughout the entire lifecycle



➤ **Consulting Services for Process Industries**
Best individual preparation for the digital transformation



➤ **Analytics and Artificial Intelligence Services**
Take advantage of state-of-the-art technologies and algorithms to unleash efficiency potential



➤ **Applications and digital services**
Reach for operational excellence



➤ **Industrial Security Services**
Portfolio comprising hardware/software, and service experts versed in automation, digitalization, and cybersecurity



➤ **XHQ**
Turn data into actionable information



➤ **SIMATIC Energy Suite**
Visualisation and optimization of energy consumption



➤ **Asset Performance Suite**
Plant asset management and predictive maintenance enabled by Artificial Intelligence (AI)



➤ **Industrial Edge and Industrial Edge Apps**
Get started immediately with LiveTwin, Performance Insight and Notifier, without having to program it yourself



➤ **SINUMERIK Edge Apps for machine tools**
Quality improvement of workpieces and machine condition monitoring



➤ **Mendix**
Low-Code application development platform



➤ **SIMATIC S7-1500 TM NPU**
With the Neural Processing Unit (NPU), AI is seamlessly integrated into the S7-1500 controller – for new approaches and innovative strategies in automation



Real product, production, and performance data



➤ Totally Integrated Automation
The leading automation concept for absolute consistency thanks to consistent data management, global standards and uniform interfaces – from the field level to the enterprise level



➤ Opcenter
Harmonized, holistic portfolio of manufacturing operations management (MOM) capabilities



➤ Cybersecurity for industry
Integrated security for comprehensive protection at all levels



➤ Digital Connectivity for Industry
Benefit from a powerful base for all current and future IIoT applications



➤ Engineering and Integration Services
Our service experts will create the digital twin and set up the right connectivity for your plant components and systems and virtualize them on request



➤ Process Automation
Higher productivity and flexibility over the entire life cycle



➤ SIMATIC Controller with SCADA and Industrial Edge
Data generation, data provision and data analysis for OT-IT integration



➤ SIMATIC OPC UA S7-1500 and OPC UA Modeling Editor (SiOME)
Standardized interfaces for easy integration of machines into a line or factory



➤ Training Services SITRAIN
SITRAIN – Digital Industry Academy. The time for learning is now



➤ SINUMERIK ONE with Run MyVirtual Machine
Shorten job preparation and higher productivity



➤ Process Control
Successful plant operation today and tomorrow

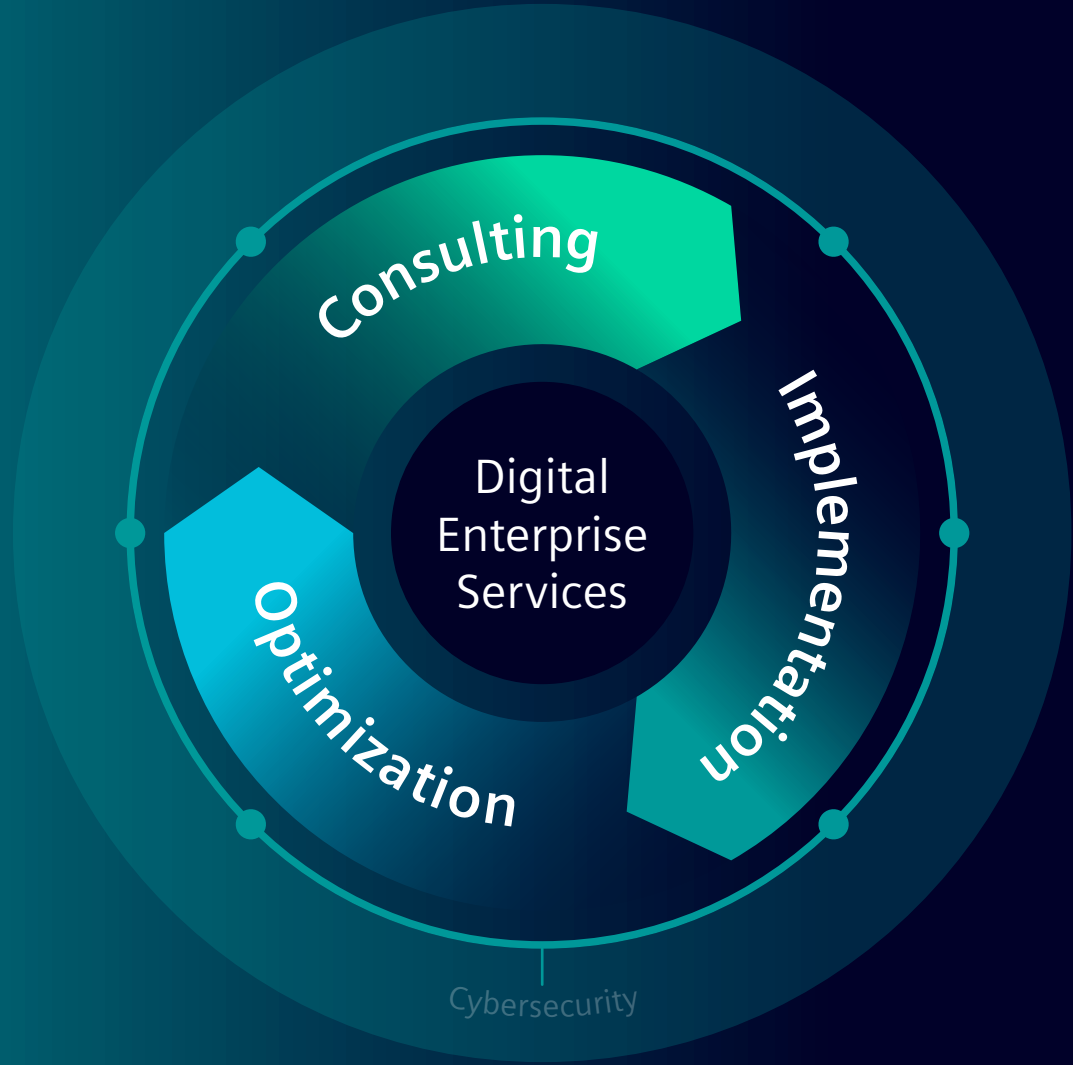


➤ Process Instrumentation
Measuring everything that matters

Digital Enterprise Services – Service is more than you think

Faster time to market. Better quality. More efficient production. Nowadays, being competitive means becoming digital – which can be overwhelming: Where do I start? Who can help me to digitalize my enterprise to my standards? Digitalization in an industrial environment requires specialized expertise and knowledge. Let us be part of your digitalization journey. From day one of the entire transformation process. Because service is more than you think.

 [Learn more](#)



Consulting


Our service experts work with you to determine your company’s level of digitalization, and then develop a digitalization strategy specially tailored to your needs and business drivers.

Implementation

Implementing tailored solutions by generating digital twins of your machines, plant, production and products in order to realize your digital transformation.

Optimization

Data analytics as well as artificial intelligence turn data into valuable insights for continuous improvement and transparency in order to help you to reach the next level of productivity.

 **Learn more**



Financing the future of manufacturing

Where Industry 4.0 technology and finance meet
















With manufacturing and production sectors accounting for about a fifth of global CO₂ emissions and more than half of the world's energy consumption, the need to adapt to changing market demands and CAPEX constraints while reducing environmental impacts are having a transformative effect on traditional manufacturing processes.

But how do you rationalize the costs of new technology and equipment? The answer: smart financing from Siemens. By understanding the technology, markets, applications and operating pressures, we provide financing to achieve your clearly identified and desired business outcomes. And because speed is of the essence, we can respond quickly with creative solutions that help you boost productivity, create efficiencies and capitalize on opportunities.

Siemens Financial Services – Financing that makes a difference

SFS offers a broad range of smart financing solutions to enable investment for sustained industrial competitiveness:

 [Learn more](#)

Equipment and Technology Plan	Retrofit Finance Plan	Smart Performance Finance	Vendor Finance <small>(for OEMs, distributors, and resellers sales)</small>	Extended Payment Terms
<p>An affordable way to benefit from the use of the latest technology</p> <hr/> <p></p> <p>Pay as you use new equipment and technology</p> <hr/> <p></p> <p>Existing credit lines remain untouched</p> <hr/> <p></p> <p>Simple and easy to use</p>	<p>A smart way of financing technology updates</p> <hr/> <p></p> <p>Pay as you benefit from updated technology</p> <hr/> <p></p> <p>Regular affordable payments</p> <hr/> <p></p> <p>Industrial expertise</p>	<p>Pay-per-use: payments aligned with production rates</p> <hr/> <p></p> <p>Flexible usage-based payments</p> <hr/> <p></p> <p>Planning certainty from payments aligned to actual usage</p> <hr/> <p></p> <p>Simple and easy to use</p>	<p>Give your customers the best-fit solutions with finance built in</p> <hr/> <p></p> <p>Differentiate and add value</p> <hr/> <p></p> <p>Better meet customer needs</p> <hr/> <p></p> <p>Expert guidance from Siemens</p>	<p>Flexible financing with longer payment terms</p> <hr/> <p></p> <p>Exclusively for Siemens' channel partners and customers</p> <hr/> <p></p> <p>Extend payment terms up to 180 days with flexible payment options</p> <hr/> <p></p> <p>Simple and easy to use</p>

◀ **Data integration
combined with
deep domain
know-how for
each industry**



Flexibility

Vingroup

From smartphones to ventilators in 3 weeks

Customer challenge

Shift from manufacturing smartphones to manufacturing ventilators

Solution

- License of Siemens customer Medtronic design for ventilator
- Digital twin for manufacturing by Siemens (Teamcenter, NX)

Customer benefit

- Shift to ventilator manufacturing technology from scratch in three weeks
- Were able to manufacture 55,000 ventilators/month



3
weeks
changeover

55k
throughput
per month



Siemens Motion Control

Planning and optimizing a digital factory with the digital twin before it was built

Customer challenge

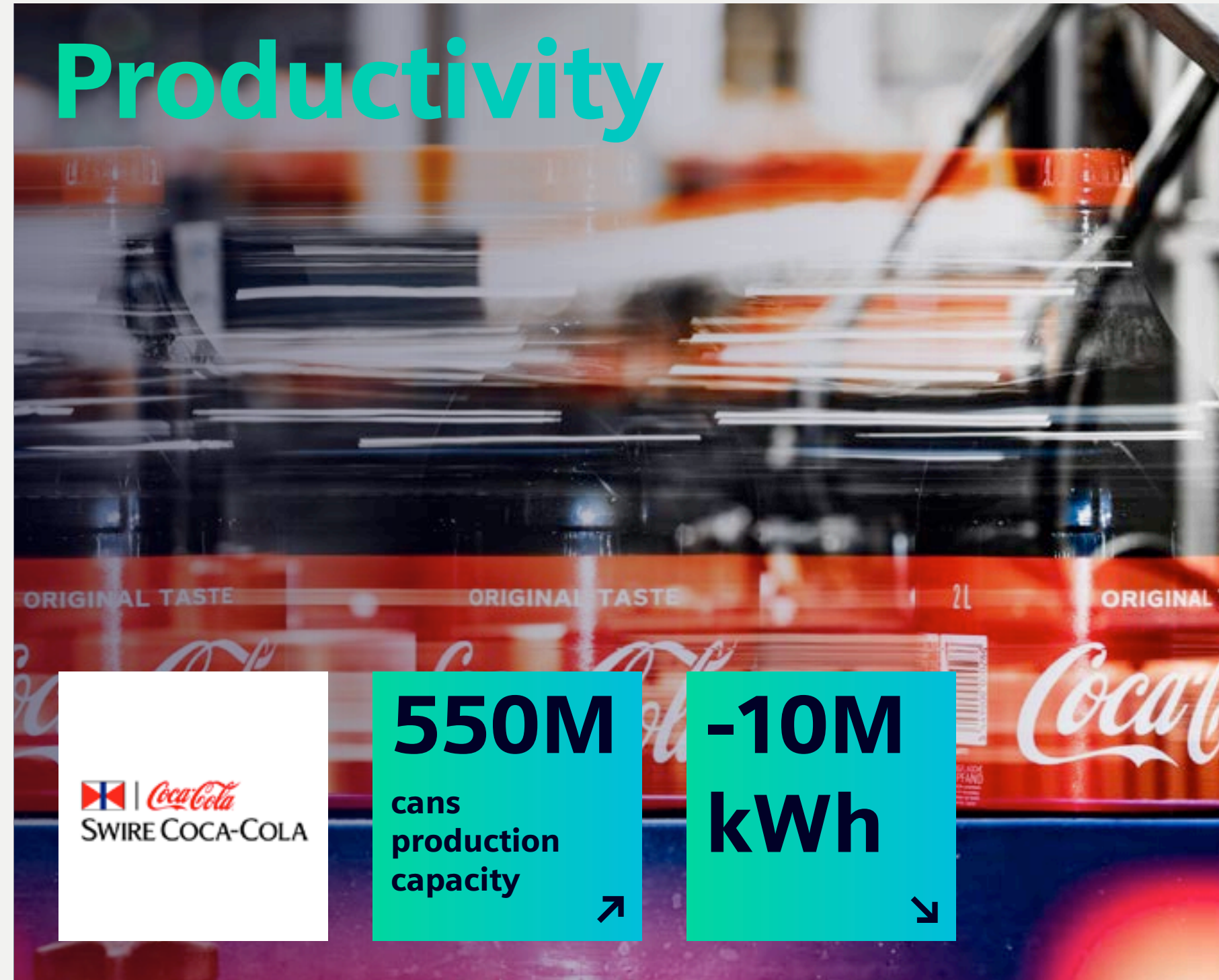
- Build a new lighthouse factory for Motion Control (MC) to cover the need of the fast growing Chinese market
- Show full potential of Siemens' automation and digitalization capabilities to customers
- Plan and optimize with digital twin

Solution

- Holistic approach using the full Digital Enterprise portfolio
- Planned and optimized with digital twin before factory was built

Customer benefit

- + 20% productivity
- + 30% volume flexibility
- + 50% material replenishment
- 40,000 m³ less water consumption p.a.
- 2,900 ton less CO₂ p.a.



| SWIRE COCA-COLA

Significant expansion of productivity
and increase in sustainability

Customer challenge

- Improve line performance and availability

Solution

- Tracking and analysis of downtimes
- Customized manufacturing information system and mobile app for asset overview, faster fault diagnosis and predictive maintenance

Customer benefit

- Unlock annual production capacity of 550 million cans
- Benchmark and standard for Swire Coca-Cola worldwide: to be extended to 100 production lines in next two years
- Starting point for building 18 digital plants in the future and saving 10 million kWh of electricity p.a.

Speed Quality

3x
higher
production
capacities

-30%
ferment time

 **WOLF
OF THE
WILLOWS**

WOLF OF THE WILLOWS

Speed: From barrel to can in no time

Customer challenge

- Lockdown boosted demand for different varieties of canned beers
- Ramp up production in short time for microbrewery Wolf of the Willows

Solution

- Integrated automation and software solution with partner Deacam (Fermecraft)
- Linking of all different, separated components and data that are part of brewing process: reaction of ingredients, temperature, state of fermentation etc., and streamlining the different processes

Customer benefit

- Rapidly scaled up production and tripled capacities
- Reduced ferment time from 25 to 18 days

 **Learn more**



Speed



1
year
development

-7
months
conversion
time

| BIONTECH

Vaccine against Covid within one year –
from development to release to production

Customer challenge


- Rapid production of Covid-19 vaccine in large quantities

Solution

- Paperless documentation of development and production, immediately fulfilling all documentation requirements

Customer benefit

- Accelerated vaccine development and production within one year
- Conversion time for existing production facility cut from one year to five months

 [Learn more](#)

Productivity



-66%
engineering
effort



7
days
certification
process



| **BYE AEROSPACE**

Reducing product development time
for all-electric composite aircraft

Customer challenge

- Develop and deliver aircraft with low operating costs, low noise and no CO₂ emissions for general aviation
- Optimize plane stability while working from home

Solution

- Leverage a comprehensive digital twin

Customer benefit

- Reduced product development time
- Decreased engineering effort by 66%
- Only 7 days to re-design, test and create reports for certification through digital twin

 **Learn more**

Flexibility



| PORSCHE

Innovative technology for the production of the Porsche Taycan

Customer challenge

- Tough implementation time schedule for the new construction in parallel with ongoing production
- Customization is very important for Porsche's customers, that's why every station needs the necessary flexibility

Solution

- Maximum flexibility using AGVs with SIMOVE
- Fully automated final assembly based on SIMATIC controllers and drive components, engineered on a common platform – TIA Portal

Customer benefit

- The production facility for the new Taycan eCar was constructed amid the existing factory in the shortest possible time, despite sportscar production running at full speed in parallel

[Learn more](#)

Quality



HEINRICH GEORG GMBH

SINUMERIK ONE increases productivity and efficiency

Customer challenges

- Tasks moved to the virtual world with a digital twin before real prototypes are available: for example, virtual commissioning, training of machine users

Solution

- Digitalization and optimization of manufacturing processes

Customer benefit

- Saves time, machines are optimized before commissioning, higher machine availability

[Learn more](#)



AIRBORNE

Digitalization, because automation alone won't do it

Customer challenge

- Increase the output of high-end composite line by replacing manual labor with automation
- Become more flexible for quick product changes
- Enable the company to produce many different composite parts at maximum quality and efficiency

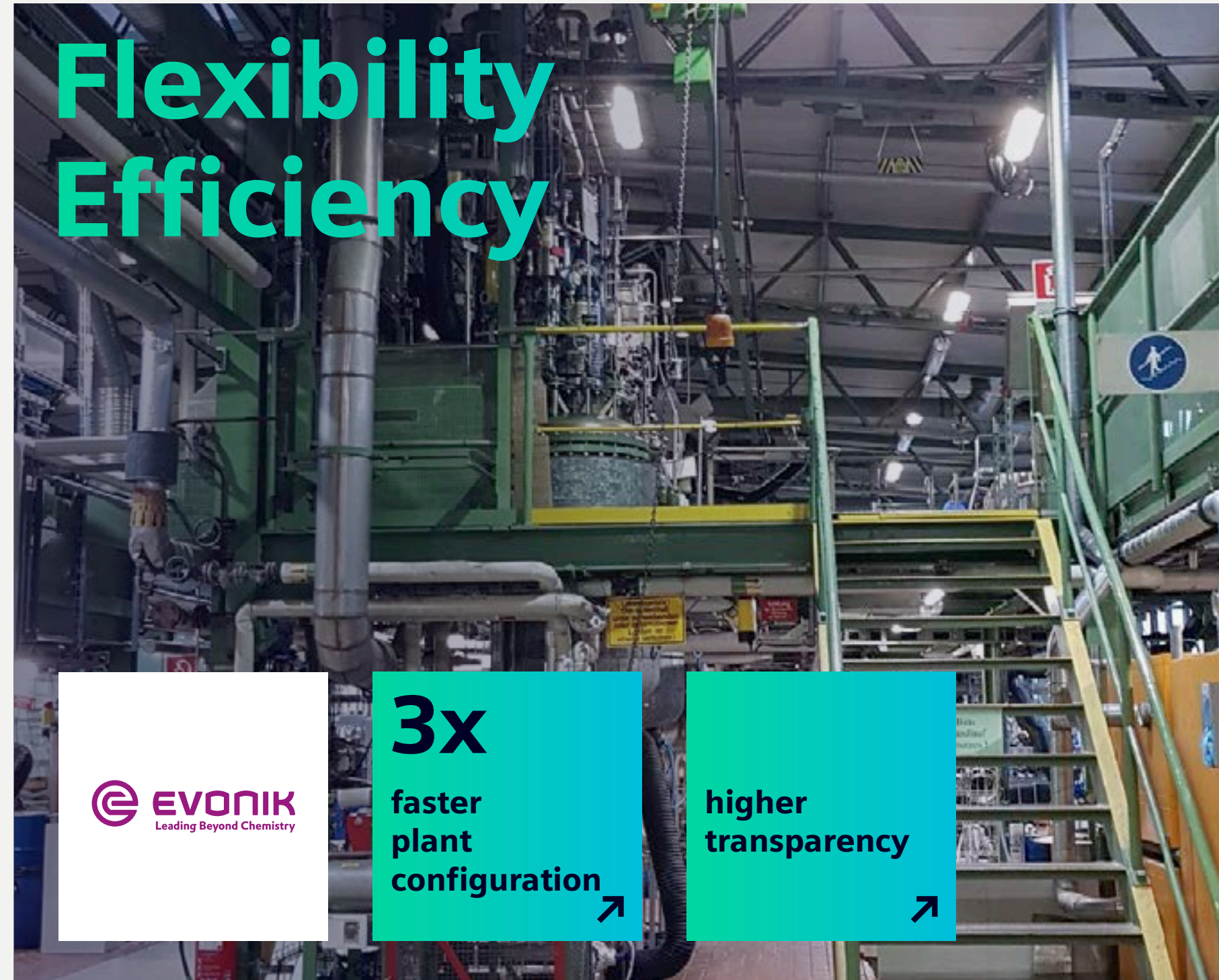
Solution

- Thorough assessment of Airborne's digital maturity during consulting phase
- Implementation of digital twins of machines, systems, products and production lines
- Optimization involves collecting required data and using it to optimize a plant


Customer benefit

- Reduced commissioning times for new machines by up to 60 percent
- Productivity time in mechanical prefabrication increased by 27 percent
- Engineering time reduced by 30 percent

[Learn more](#)



Flexibility Efficiency



3x
faster
plant
configuration ↗

higher
transparency ↗

EVONIK

Fast integration of plant sections in overall production

Customer challenge


- Modernization of the Technikum pilot plant at Wolfgang Industrial Park in Hanau
- High time pressure for retrofitting of the nine subsystems
- Integration of modular plants necessary in response to ever shorter innovation cycles and more specific adjustments to product portfolios

Solution

- SIMATIC PCS neo replaces the previous control system with an open, web-based process control system
- Cross-manufacturer interface Module Type Package (MTP) for inter-connection of subsystems
- SIMATIC Virtualization as a Service (SiVaaS) for the virtualization of systems

Customer benefit

- Three times faster configuration of new processes or subsystems than before modernization, easier administration, and central maintenance
- Parallel work of several users in one project reduces engineering time
- Simple integration of new modules and subsystems via plug-and-produce

 [Learn more](#)

Sustainability Efficiency

-35k €
material costs

-23%
median kettle heating time

NESTLÉ

From outdated to trendsetting

Customer challenge

- Growing importance of sustainability and efficiency
- Necessity to modernize an old, remotely located plant
- Replacing dated automation with the latest drives and PLCs

Solution

- Several digital twins were created: One is a digital model of the plant, the other is using the performance data from live operation
- Simulation of material flow in the factory to test and validate different production scenarios
- Data-based optimization of processes and performance

Customer benefit

- More sustainable production process with less wastewater and chemicals utilization
- Increased transparency of processes, resulting in 50,000 to 100,000 Euros of savings for raw materials
- Improved median heating time of kettles by 23 percent

[Learn more](#)



Sustainability



YorkshireWater

**Warning of
identified
issues
2 weeks
earlier** ↘

**Blockage
prediction
3x more
effective** ↗

Yorkshire Water

Clean waterways with artificial intelligence and IoT

Customer challenge


- To remove CSO blockages and thereby minimize the probability of a release of sewage water into rivers of Yorkshire thus preventing flooding in public areas
- To cut pollution incidents by 50 percent within Incident Reduction Plan 2020–2050

Solution

- Evaluates combined sewer overflow behavior in real time
- Provides a better understanding of the system’s performance of any issues
- Identifies if a sewer is blocked, not operating correctly, or if a CSO is soon to have operational issues

Customer benefit

- Pinpoints problems within the network
- Reduces flooding risks, pollution incidents, and sewer collapse
- Gives you more time to act and increases your operational efficiency

 [Learn more](#)



**Creating sustainable
industrial innovation**
with the Digital
Enterprise for a world
we want to live in –
today and tomorrow

The Digital
Enterprise

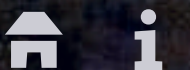
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Digital Enterprise explained

Why do you need the Digital Enterprise?
What does it make possible and which role do Digital Twins play?
The video provides answers to all your questions.

[Click here to watch the video](#)



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Security note

Siemens provides products and solutions with Industrial Security functions that support the secure operation of plants, solutions, machines, equipment and/or networks. They are important components in a holistic Industrial Security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends that you regularly check for product updates.

For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state of the art Industrial Security concept. Third-party products that may be in use should also be considered. For more information on Industrial Security, visit:

www.siemens.com/industrial-security

To stay informed about product updates as they occur, sign up for a product-specific newsletter. For more information, visit:

<http://support.automation.siemens.com>

