Die resiliente Fabrik - sicher, vernetzt, flexibel

Keynote Digital Factory und Cybersecurity

Hannes Barth

SIEMENS

That’s me

Diploma in Industrial Engineering and Management (“Wirtschaftsingenieurwesen”), University of Karlsruhe

SIEMENS Management Consulting

Various Positions in Strategy

General Manager RUGGEDCOM, Canada

VP, Head of Business Line Industrial and Rugged Networks

SIEMENS

As a global technology company, we empower our customers to transform their industries and markets, helping them to transform the everyday.

311,000
Employees [1]

€72.0 bn
Revenue [2]

€4.4 bn
Net income [3]

15.1%
Profit margin
Industrial Business [2]

[1] As of September 30, 2022 | [2] In fiscal 2022 | [3] Continuing and discontinued operations

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Businesses and Services of Siemens AG

Industrial Business

Digital Industries

Smart Infrastructure

Mobility

Siemens Healthineers[1]

Portfolio Companies

Siemens Advanta

Services

Siemens Financial Services

Siemens Real Estate

Global Business Services

1 Publicly listed subsidiary of Siemens; Siemens' share in Siemens Healthineers is 75%

Rising pressure in workforce, supply, demand and resources

Industries are **re-thinking production**

Growing Trends and Challenges

Lack of talent and distributed workforce

7.9 m
open jobs in manufacturing cannot be staffed in 2030
Source: Korn/Ferry

$600 bn
value cannot be realized by manufacturers in 2030 due to lack of workers
Source: Korn/Ferry

Volatility in supply and demand

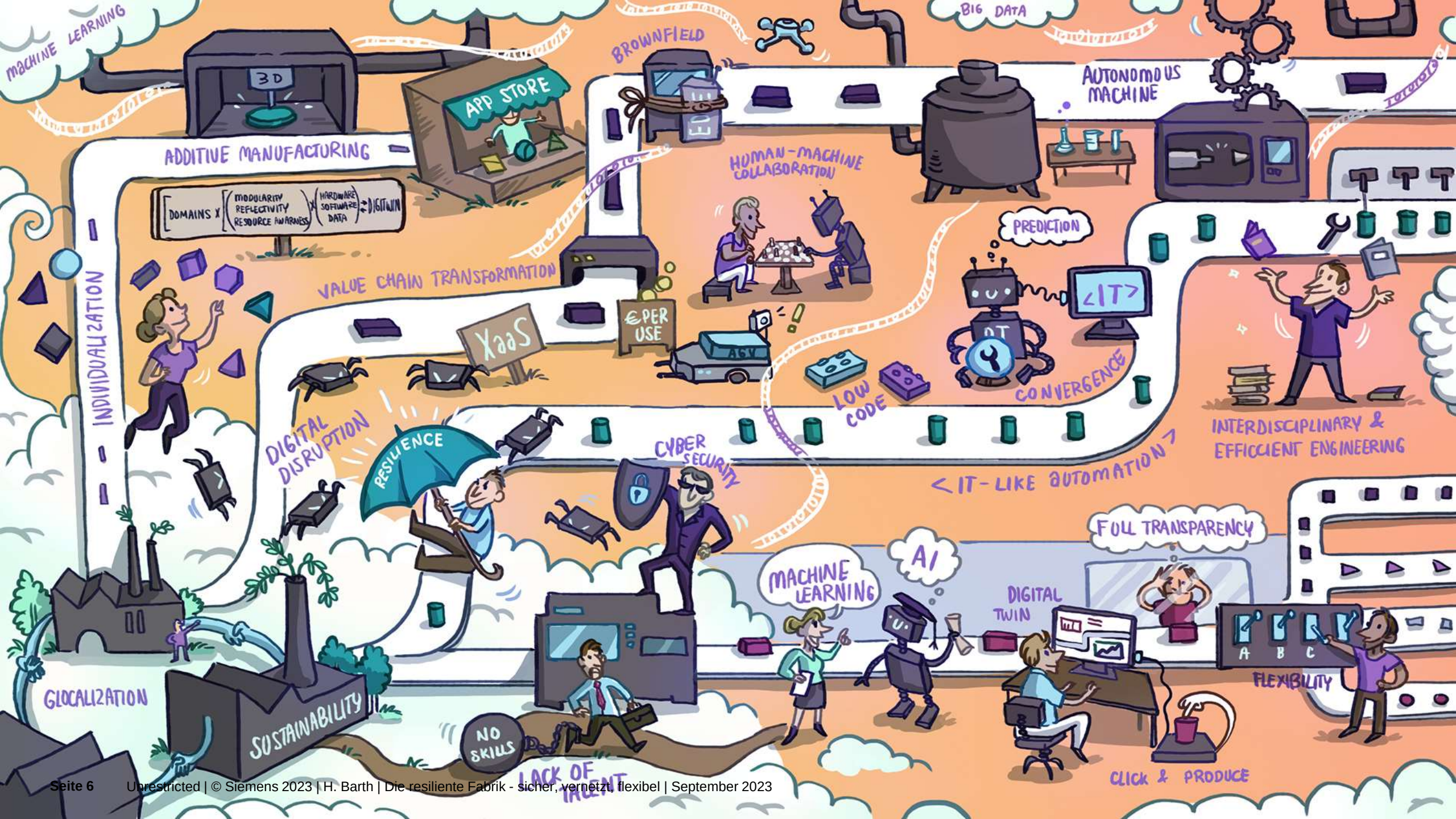
Shipping delays
had the biggest impact on manufacturers' supply chain in 2020/21
Source: Deloitte

Double-digit price increases
of raw materials in 2021
Source: McKinsey

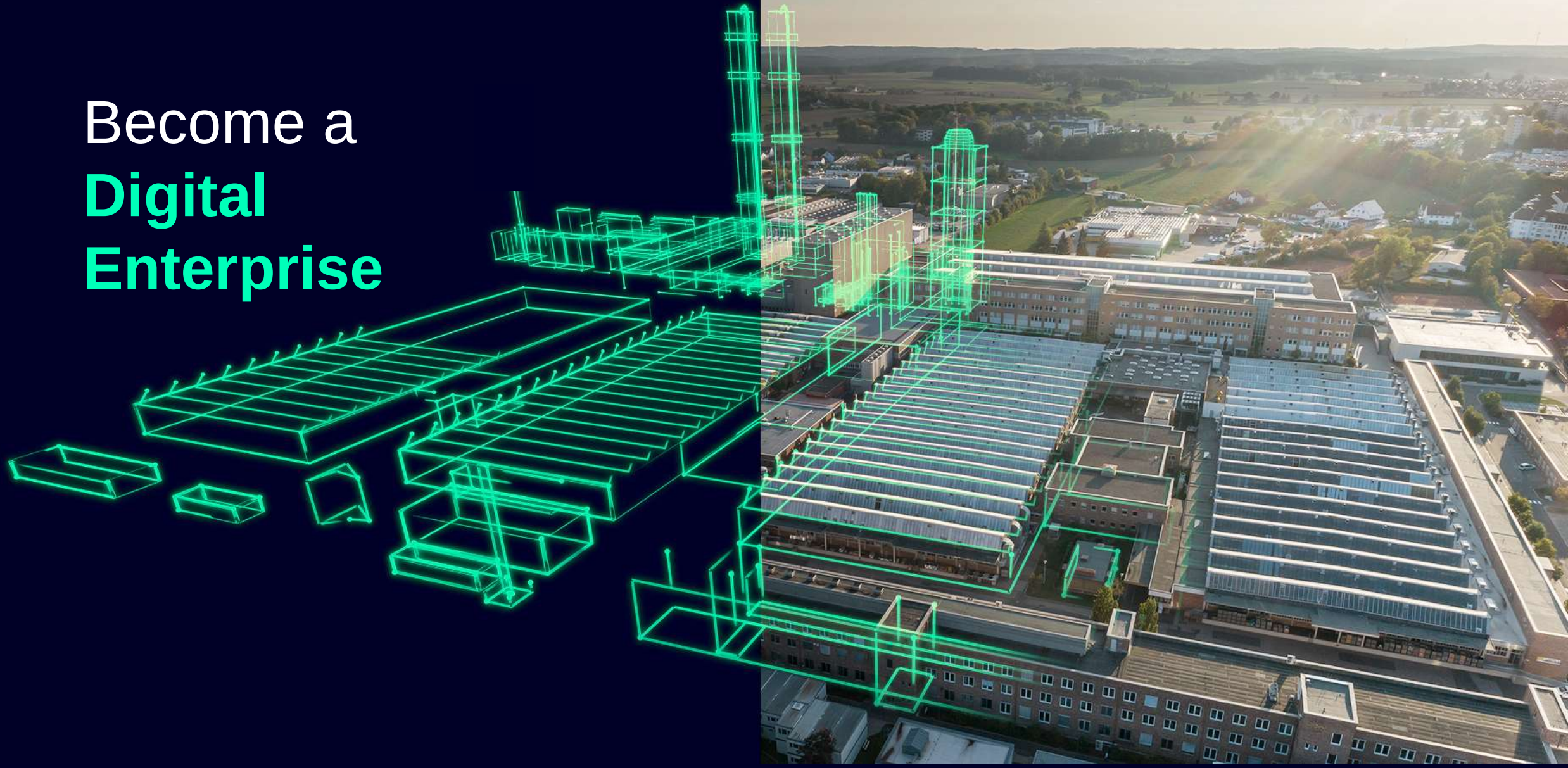
Scarce resources and sustainability

37%
of the global energy is consumed by industries
Source: IEA

30%
of global greenhouse gas emissions come from industry
Source: WEF


MACHINE LEARNING
3D
APP STORE
ADDITIVE MANUFACTURING
DOMAINS X
MODULARITY
REFLECTIVITY
RESOURCE AWARENESS
HARDWARE
SOFTWARE
DATA
DIGITWIN
BROWNFIELD
BIG DATA
AUTONOMOUS MACHINE
HUMAN-MACHINE COLLABORATION
PREDICTION
VALUE CHAIN TRANSFORMATION
XaaS
€PER USE
INDIVIDUALIZATION
DIGITAL DISRUPTION
RESILIENCE
CYBER SECURITY
LOW CODE
CONVERGENCE
<IT>
INTERDISCIPLINARY & EFFICCIENT ENGINEERING
<IT-LIKE AUTOMATION
FULL TRANSPARENCY
AI
MACHINE LEARNING
DIGITAL TWIN
FLEXIBILITY
A B C
GLOCALIZATION
SUSTAINABILITY
NO SKILLS
LACK OF
CLICK & PRODUCE

Become a **Digital Enterprise**



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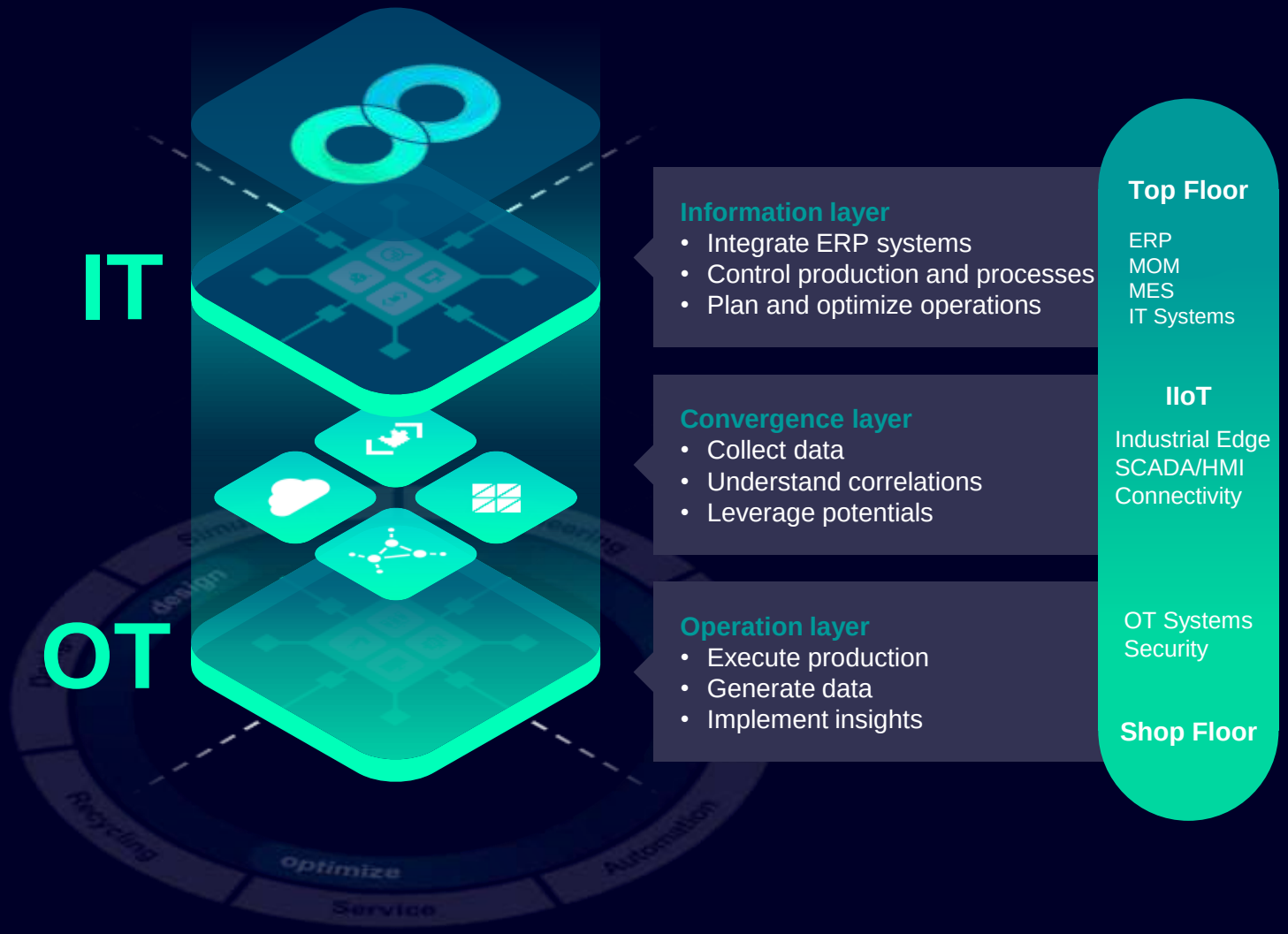
The convergence of IT and OT



Information layer
- Integrate ERP systems
- Control production and processes
- Plan and optimize operations

Convergence layer
- Collect data
- Understand correlations
- Leverage potentials

Operation layer
- Execute production
- Generate data
- Implement insights

Top Floor

ERP
MOM
MES
IT Systems

IIoT

Industrial Edge
SCADA/HMI
Connectivity

OT Systems
Security

Shop Floor

The convergence of IT and OT enables the Digital Enterprise

Laying the groundwork for data-driven decision making.

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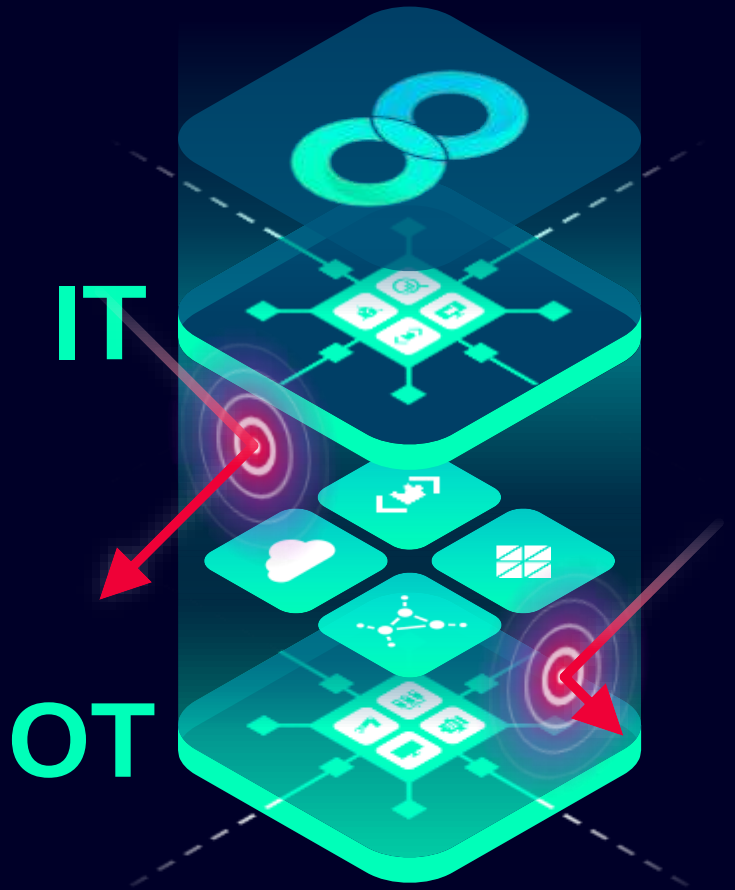
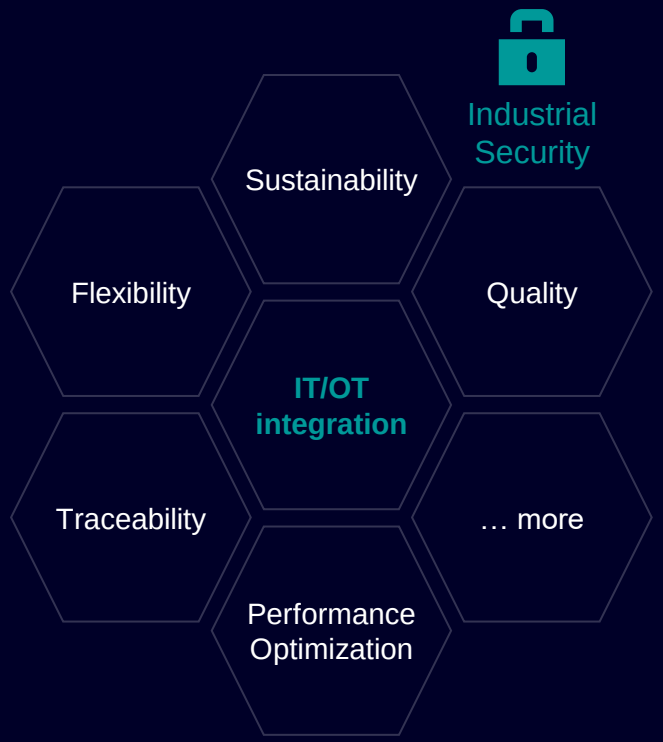
IT/OT integration use cases are scalable to boost your productivity based on Digital Enterprise Portfolio





Sustainable Operation

Efficient energy use, meet climate change and regulatory requirements

Flexible Production

Increase your production speed with the smart integration of IT/OT enabling paperless production with Order Processing

Higher Quality and Traceability

Track & Trace for auditable at any time thanks to a complete production database

Performance and Efficiency Optimization

Calculating KPIs e.g., OEE to optimize production.

Cost Reduction and Efficiency

Increase Equipment Availability through the identification of improvements and anomalies for reliable production

… many more are possible

Logistics

Increase flexibility and just in time thanks to smart data connection.

Maintenance

Decrease downtimes with maintenance management (reactive, preventive, predictive)

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Manufacturing Karlsruhe

Wir sind...

Ein Team

aus 1100 Menschen

mit 28

verschiedenen Nationalitäten

Innovativ

Neuanläufe / Jahr

> 160

Wachsen & lernen mit

unseren jungen Talenten

144

Uns begeistern Technologien mit echtem Mehrwert

Produktvarianten

> 24 000

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Speed

BIONTECH

1
year develop-ment

-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

This in only possibe with integration of value chain and stakeholders

Data needs to flow freely to seamlessly integrate the entire value chain from design to realization to optimization and even beyond company borders to connect all stakeholders.

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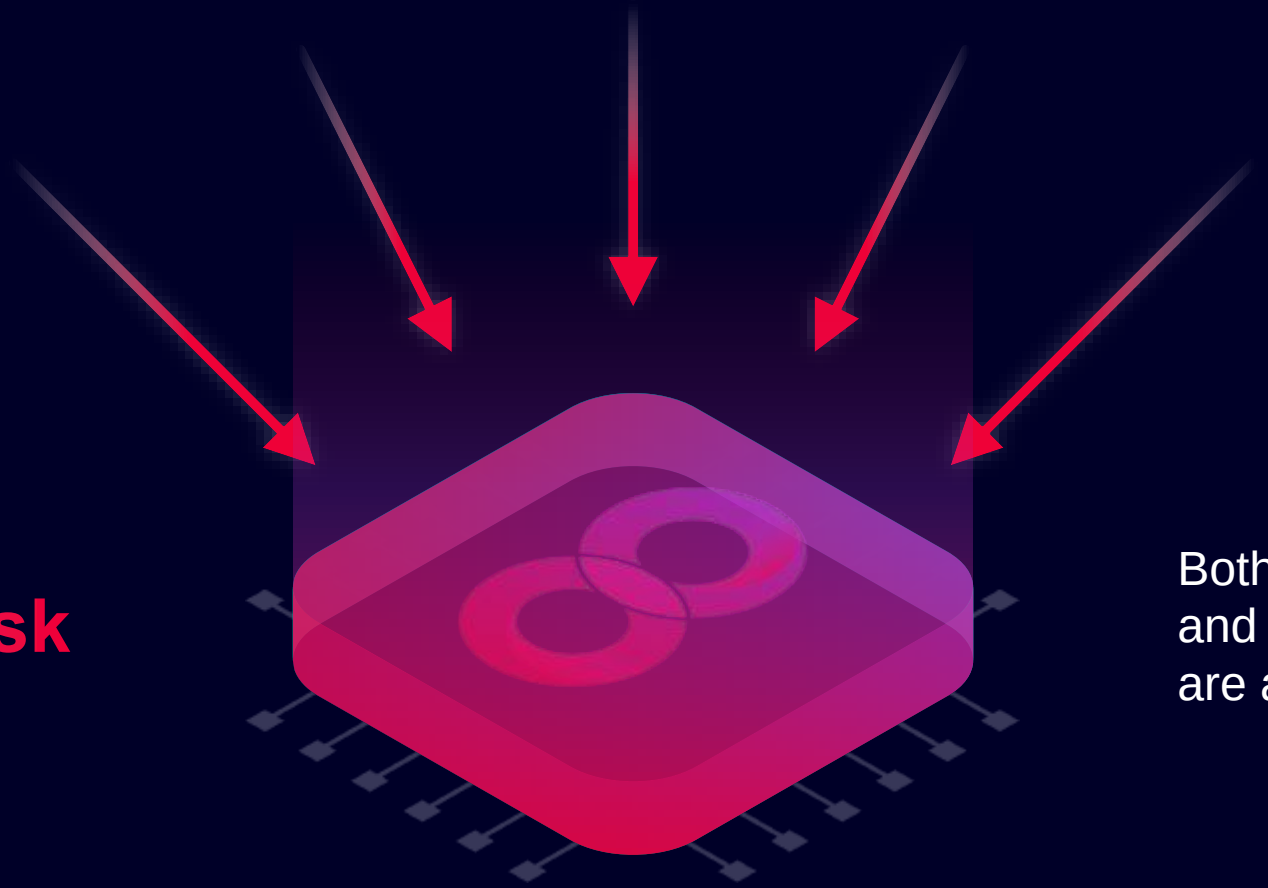
But all this also increases the risk of cyberthreats



Both Information Technology and Operational Technology are at risk.

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Attacks on Siemens by cybercriminals

A total of:

4-6 bil.
events per day

100,000
attack attempts per year

1,000
incidents in a month

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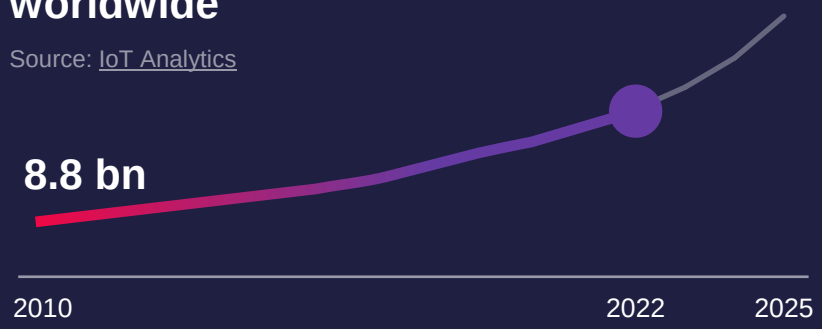
Exponential growth of vulnerabilities with digitalization means increased attack surface

Connected devices worldwide

Source: IoT Analytics



740,000

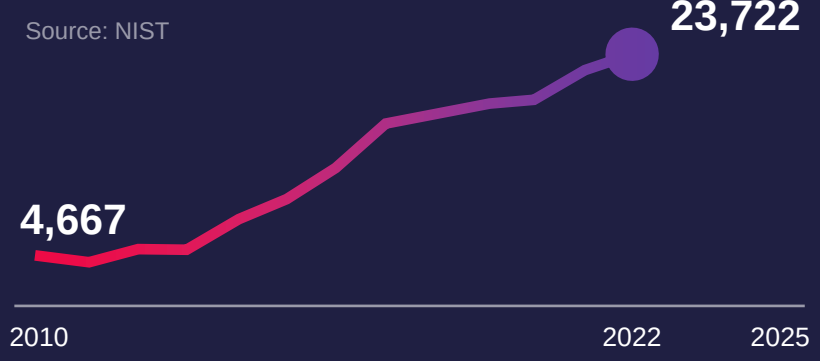
registered devices in Siemens in FY22

+9% compared to FY21

Source: ITAM[1]

Published vulnerabilities

Source: NIST



13%

of all disclosed vulnerabilities in software products during 2021 were evaluated as “critical”

Source: BSI

Connected devices X **Published vulnerabilities**

Despite not all vulnerabilities affect all devices, it is fair to assume the combination of increased connectivity and published vulnerabilities has a multiplication effect

Strong need for protection of automation systems and OT against Cyber-threats

Cybersecurity for Industry

1 IT Asset Management

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How to protect expertise and productivity of industrial companies?

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The convergence of IT and OT

Including **secure handling of data** vertically for the successful fusion of IT and OT.

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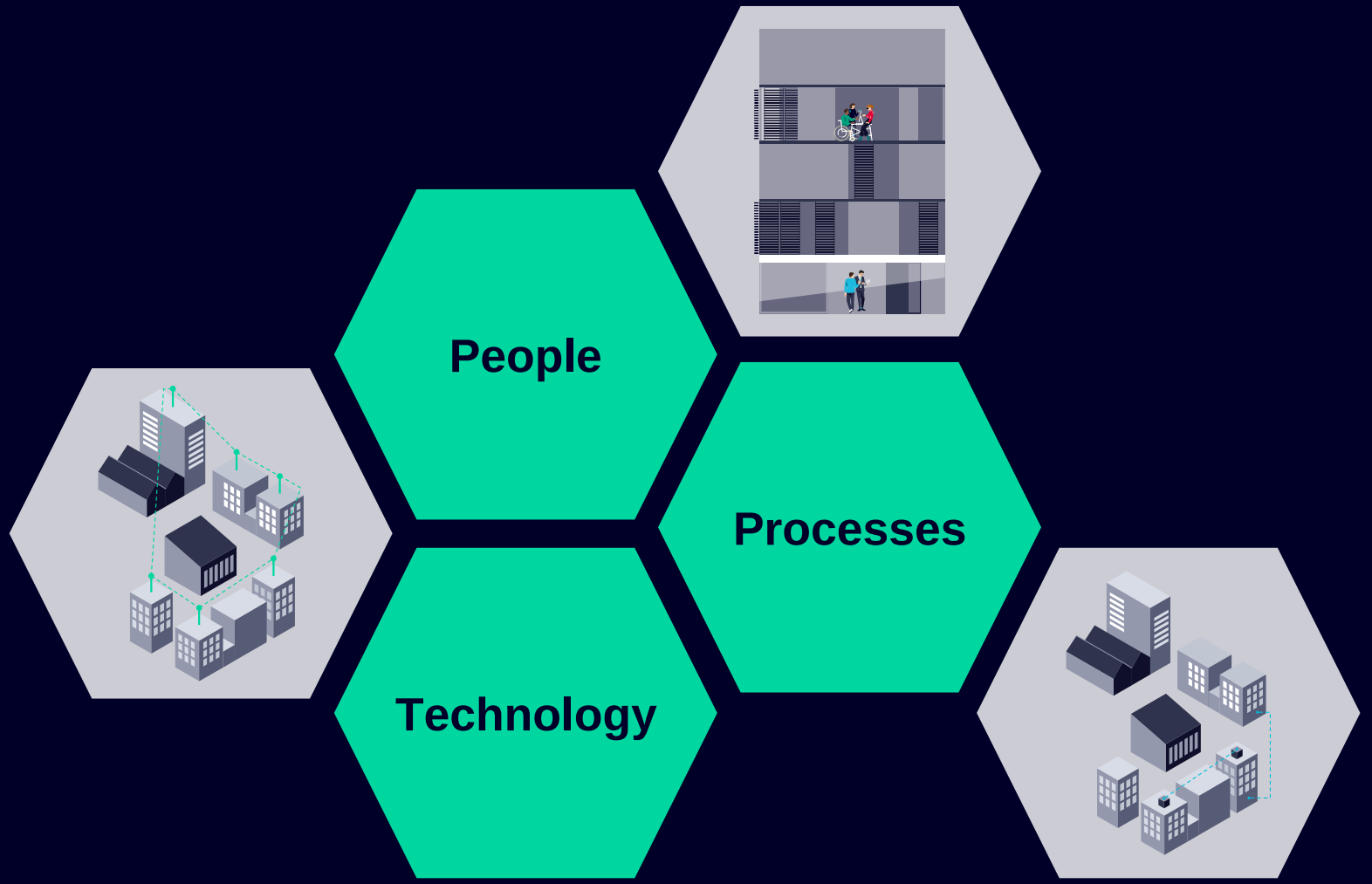
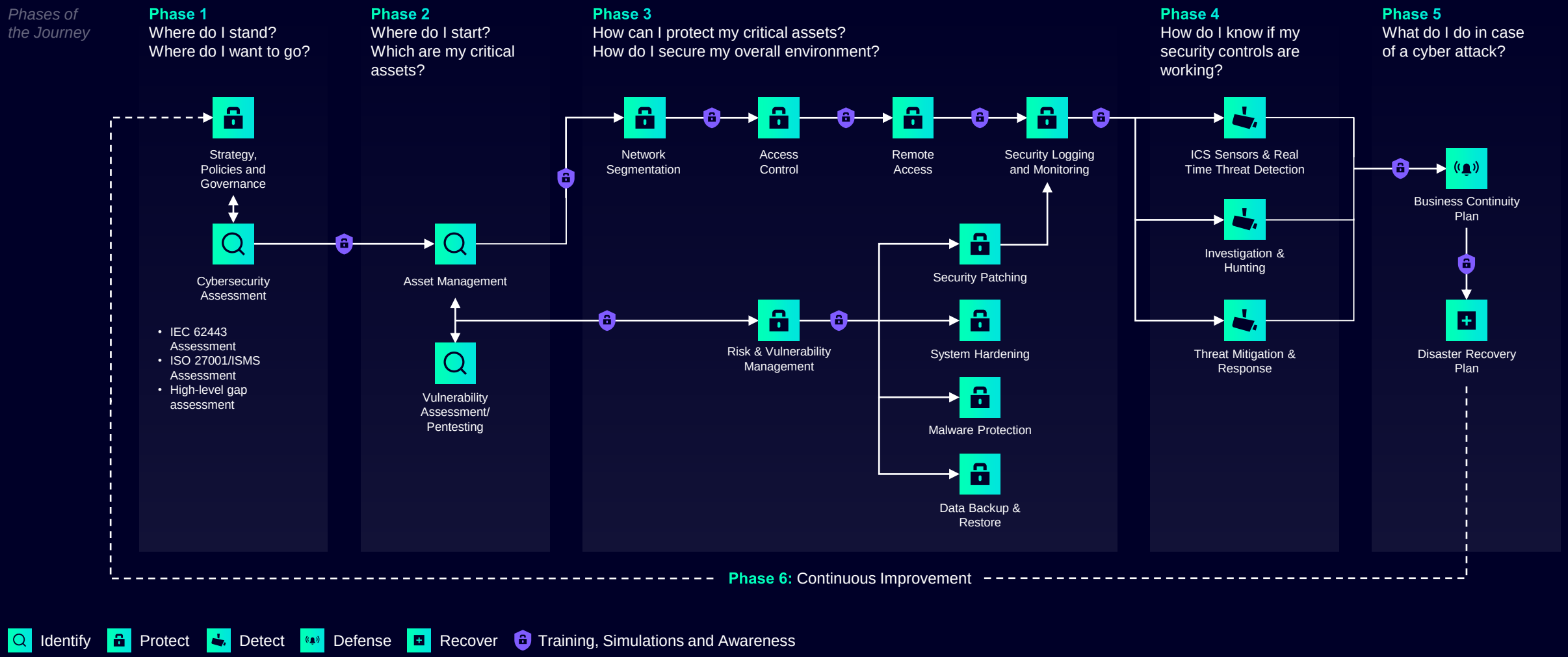
We think about cybersecurity holistically



Cybersecurity step by step



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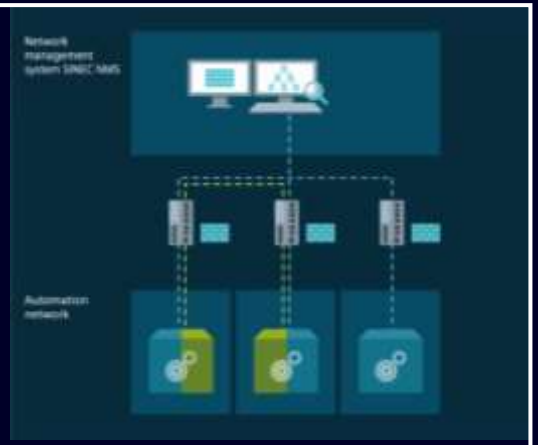
Network Management is key to fulfill security regulations (e.g. IEC-62433) and simplify maintenance for OT-plant operators

Central firewall management

Central configuration and management of the rule sets of decentralized cell firewalls.

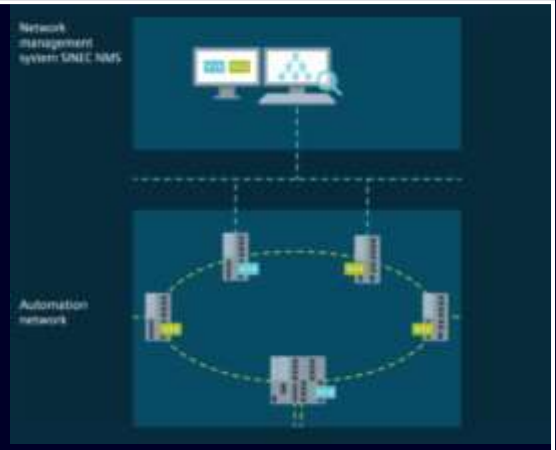
➔ Graphical and rule-based configuration of all permitted communication relationships at zone transitions



Central firmware updates

Simultaneous distribution of up-to-date firmware independently of devices

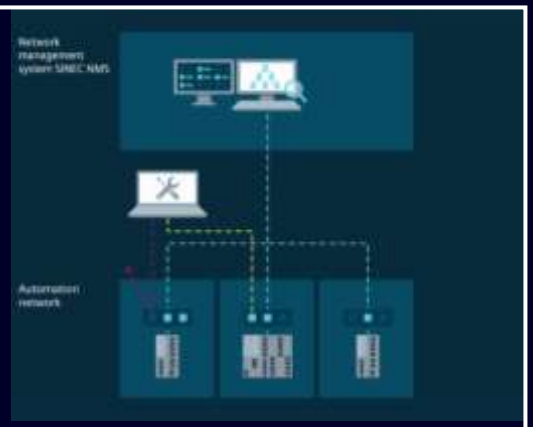
➔ Elimination of software vulnerabilities through regular firmware update



Device hardening

Rule-based device hardening by disabling unneeded services and ports

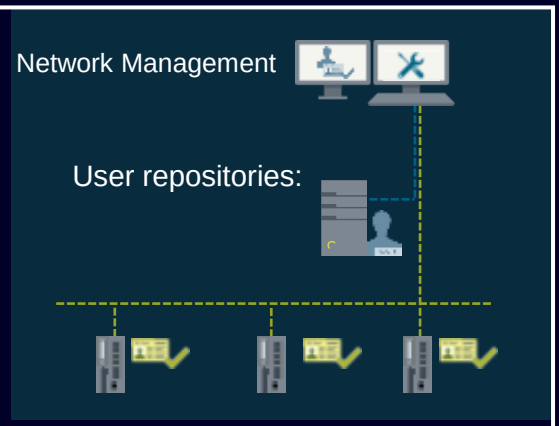
➔ Reducing the attack surface of monitored network components



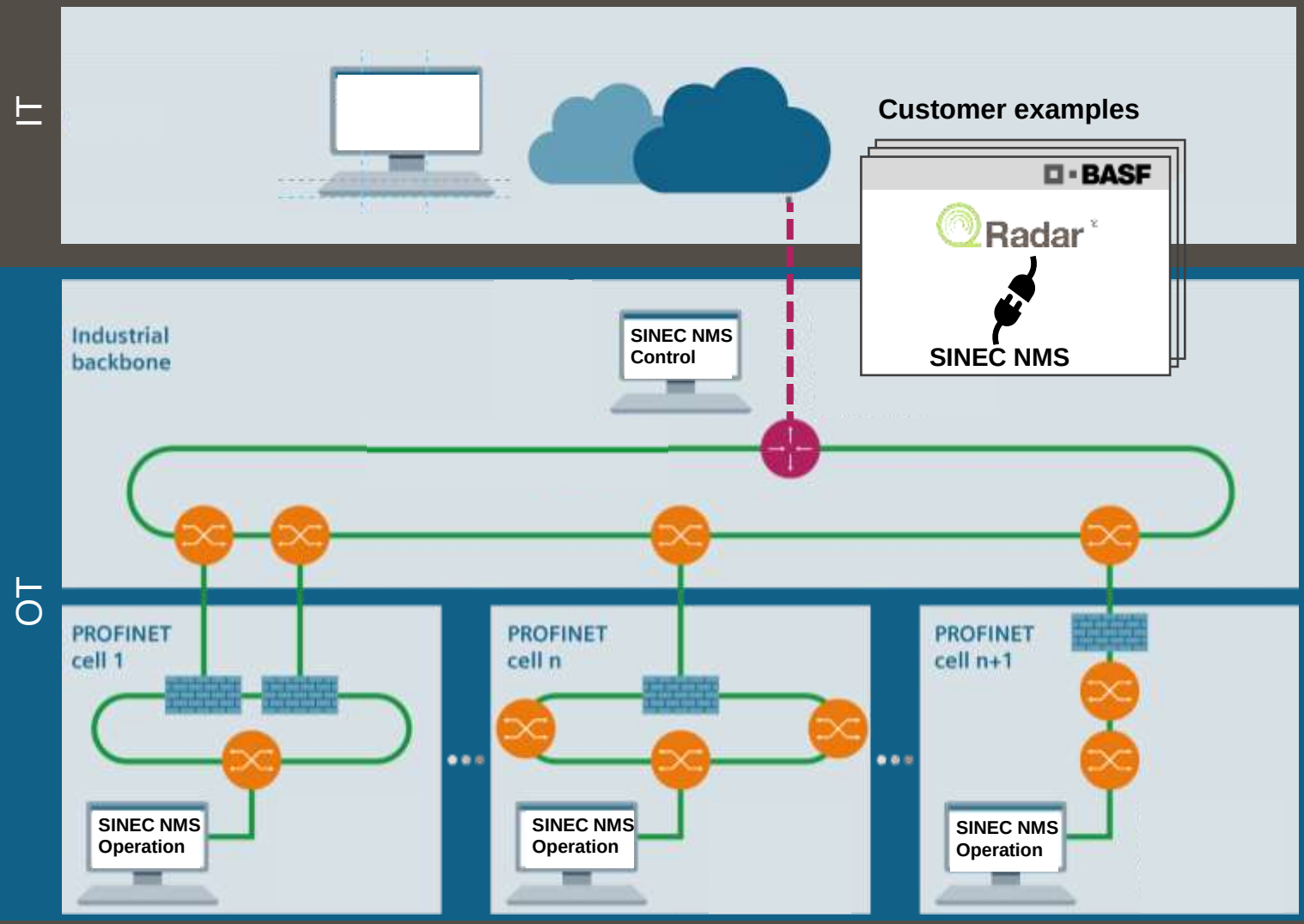
Central user administration

Controlled and traceable device access with centralized user administration.

➔ Integration of existing user databases, such as Active Directory and UMC



SINEC NMS – Leveraging OT-intimacy with IT-integration



Integration into IT

- Integration into northbound IT Systems via REST APIs or OPC UA
- **Data forwarding**: Relevant device and event data available via syslog to IT systems (e.g. SIEM)

SINEC NMS – Made for OT

- **Scalability**
  Manage, patch, backup- & restore up to 37,500 OT network devices
- **Graphical representation**
  Topological recognition and representation of OT networks for quick and easy troubleshooting
- **Interoperability**
  Tests also include 3rd party vendors

SINEC Security Monitor and Inspector are security software tools for different use cases from passive continuous monitoring to active one time scanning or both.

Monitor in a nutshell

SINEC
Security Monitor

- Software for passive, non-intrusive, continuous on-prem security monitoring during production
- Analysis of network traffic allows anomaly detection and integration into existing Security Information and Event Management (SIEM)
- Developed and used internally by Siemens – from OT experts to OT customers
- Monitor requires hardware (server, sensor, agent), software license (subscription) and services

Asset detection | **Vulnerability detection** | **Anomaly detection** | **SIEM**

Inspector in a nutshell

SINEC
Security Inspector

- Software for active scanning of components or networks (one time) in maintenance windows
- Developed for internal system tests, already in use for internal factories since >7 years
- No additional sensors (hardware) required
- Inspector requires software license (subscription) and optional services

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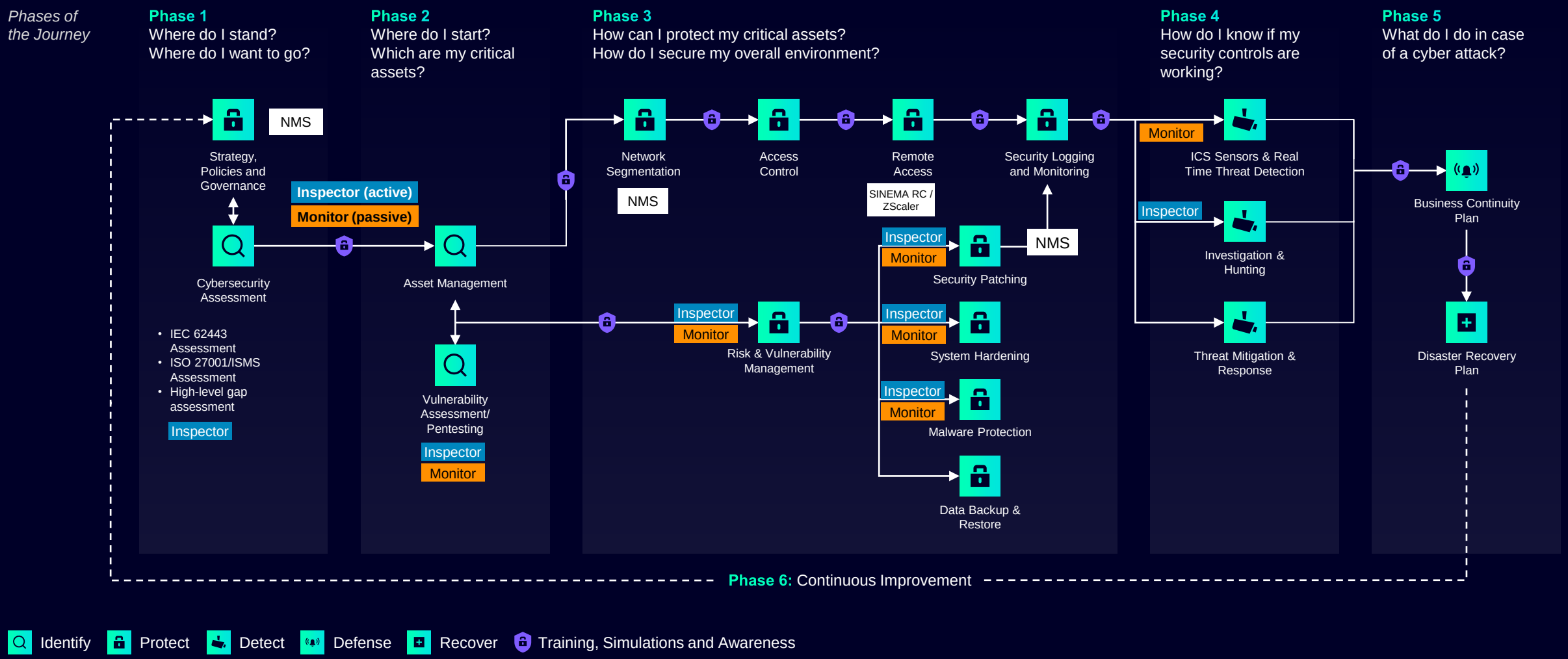
Cybersecurity step by step



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Legislation is underway in many parts of the world

Trying to find one individual who possesses all relevant cybersecurity talents is like trying to recruit a unicorn.

Source: EY Global, 2021

The **Cybersecurity Resilience Act (CRA)** strengthens the **EU Agency** for cybersecurity (ENISA)
Focus is on: Establishing a cybersecurity framework for products and services.

Source: European Commission, 2023

CIRCIA and **SEC** regulations **in US** will change how companies address cybercrime
Focus is on: reporting, disclosure criteria and transparency

Source: McKinsey, 2022

Tightening cybersecurity obligations across **Europe** – the **NIS2** directive
Focus is on: new rules, more sectors included

Source: European Parliament, 2023

Key changes in data privacy and cyber security laws across **Southeast Asia** in 2022

Source: Herbert Smith Freehills, 2022

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Digital Enterprise

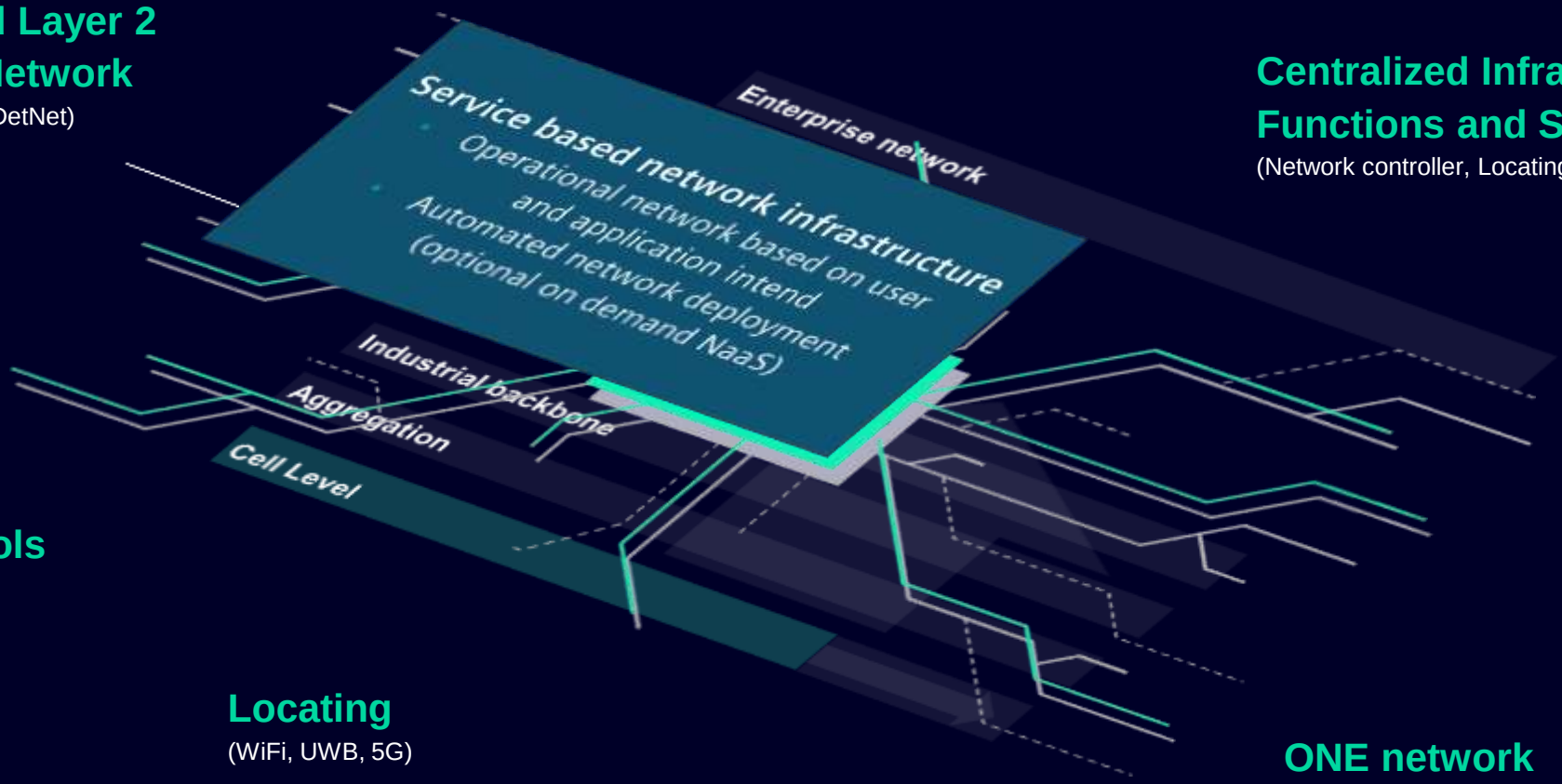
One of the greatest challenges of becoming a Digital Enterprise is optimally and **securely handling data** at all times.

From HW based network design to service based network infrastructure

Virtual Tunnels
(VXLAN, EVPN, DetNet)

Virtualized Layer 2 Machine Network
(VXLAN, EVPN, DetNet)

Centralized Infrastructure Functions and Services
(Network controller, Locating Hub)



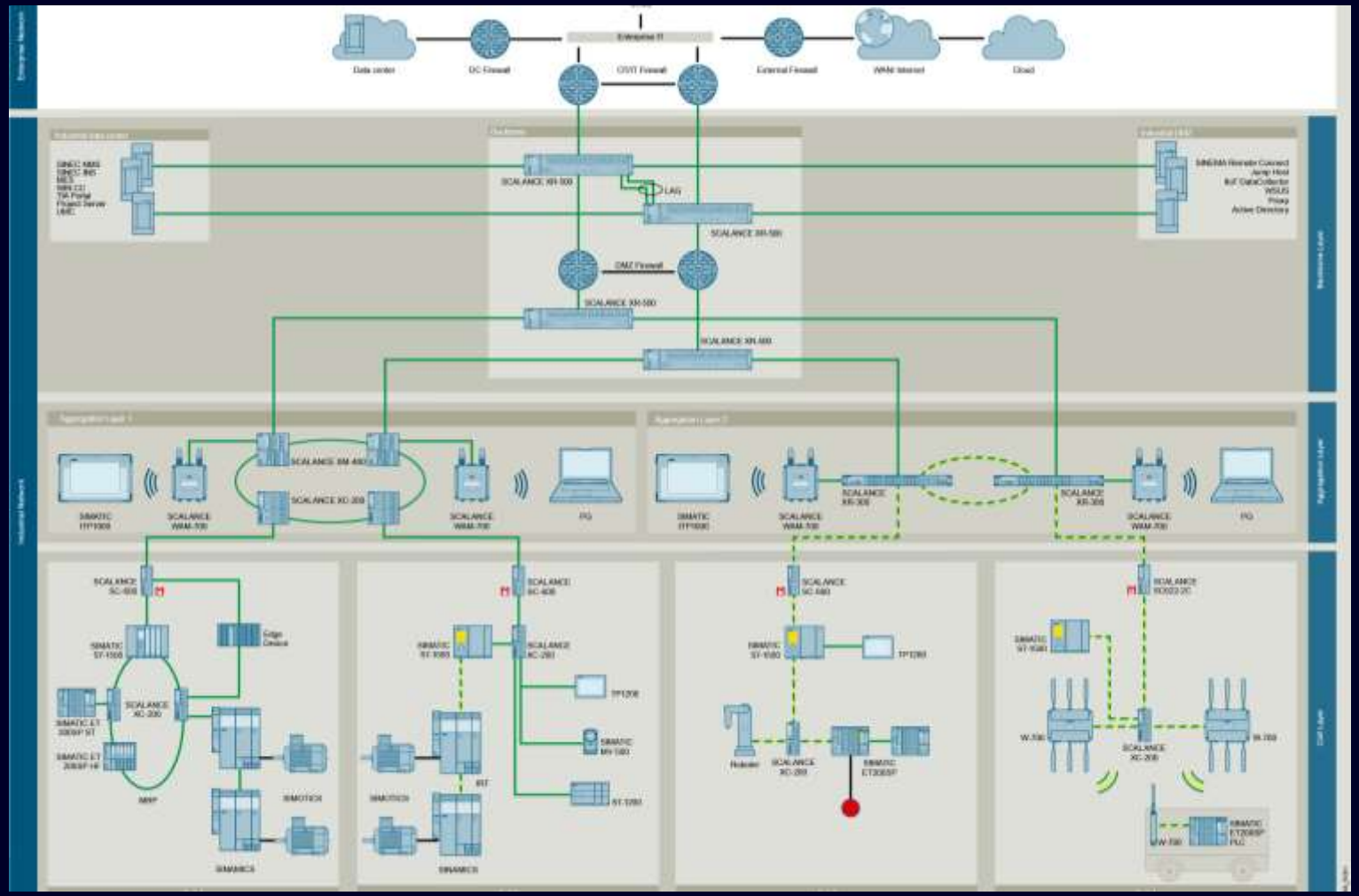
IP based realtime protocols
(DetNet)

Network Security
(Firewall, Zero Trust)

Locating
(WiFi, UWB, 5G)

ONE network
(Wired and Wireless)

Foundation for successful production



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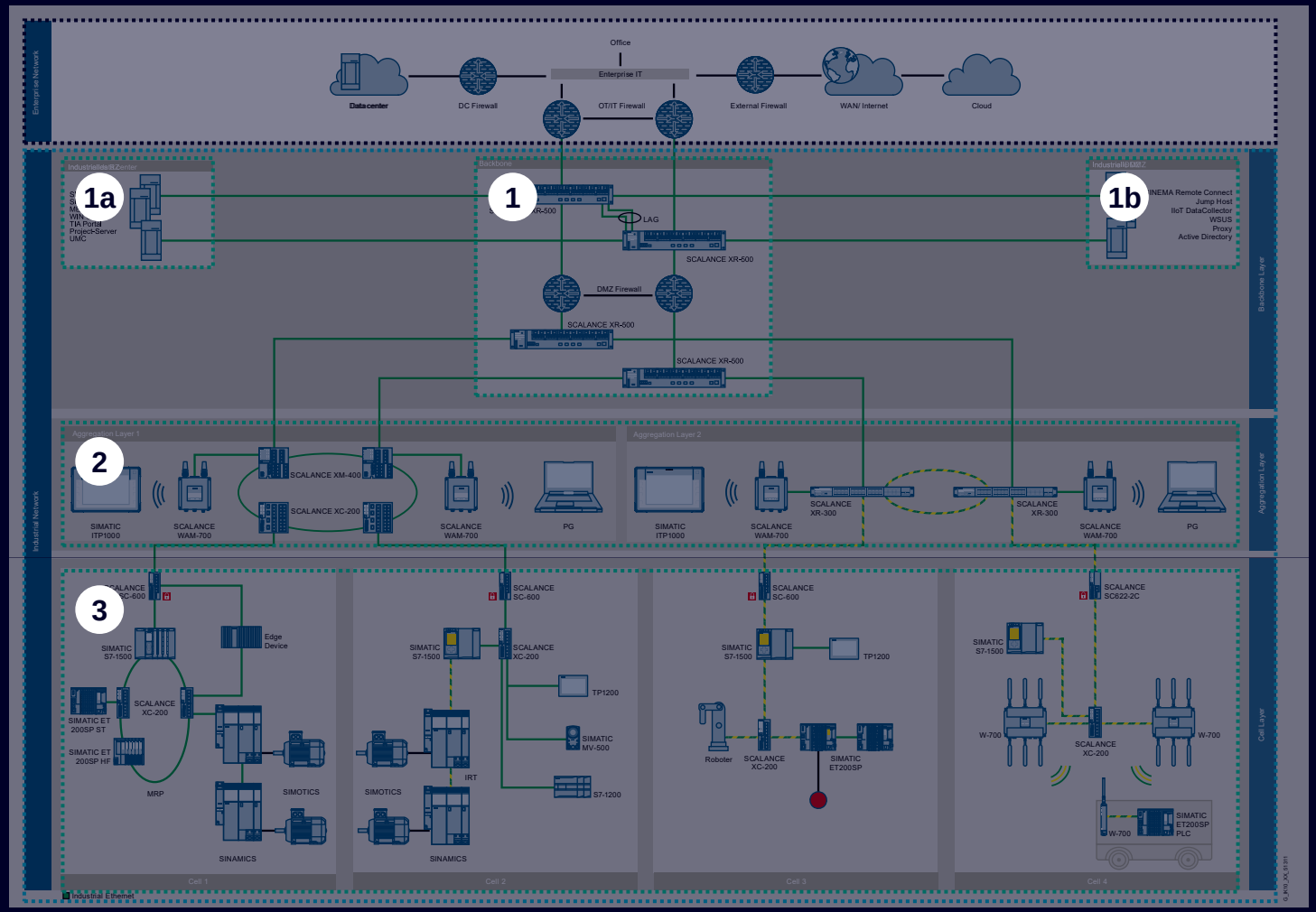
Overview network concept for Factory Automation
Network zones – Layer 2



Enterprise network – globally connected company solutions and systems

Industrial network – plant network

1 **Backbone** – central plant network connecting IT IDC & IDMZ to the OT network

- 1a Industrial data center (IDC)
- 1b Industrial Demilitarized Zone (IDMZ)

2 **Aggregation** – cumulating cells and possibility of added functionality

3 **Cell network** – one machine or functional group of the production in one cell

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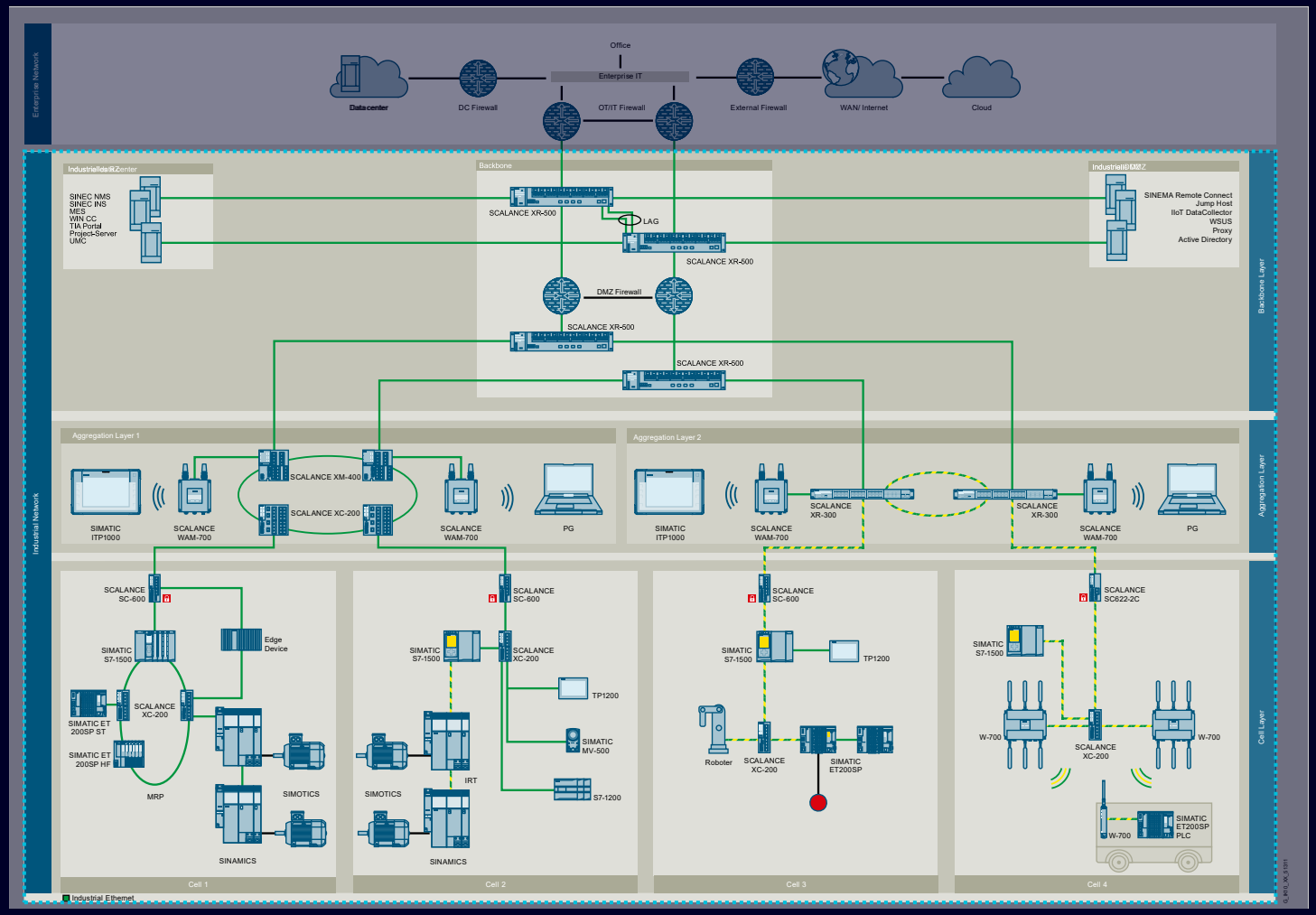
Overview network concept for Factory Automation
Industrial network



Industrial network

- Builds the basis for all production relevant communication needs of the customer
- Is physically separated from the enterprise network to comply with IEC 62443 (SL2) because of security
- Has a defined and controlled handover point to the enterprise network
- Is in responsibility of OT while aligned with IT operations

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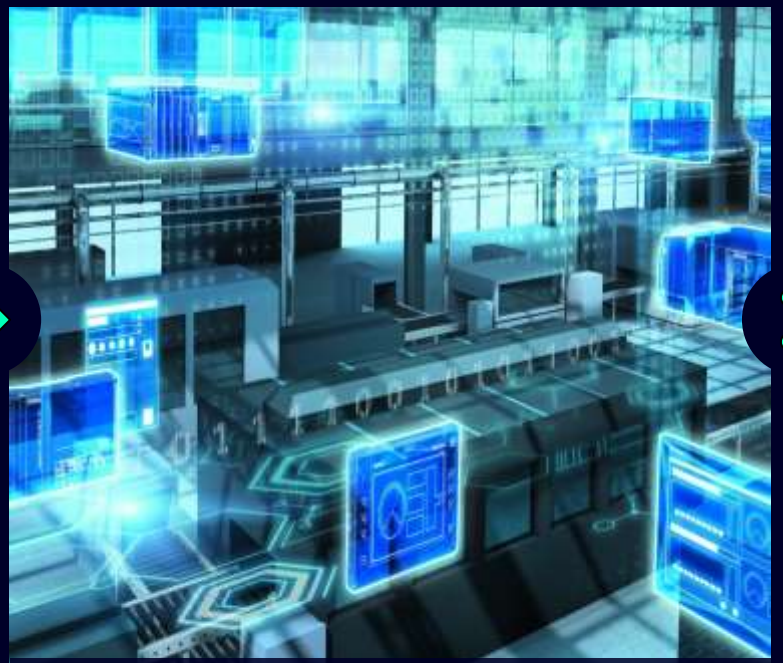
Future production of our customers requires flexibility and connectivity

Fixed production lines

accelerated to



Adaptive, modular production lines

towards

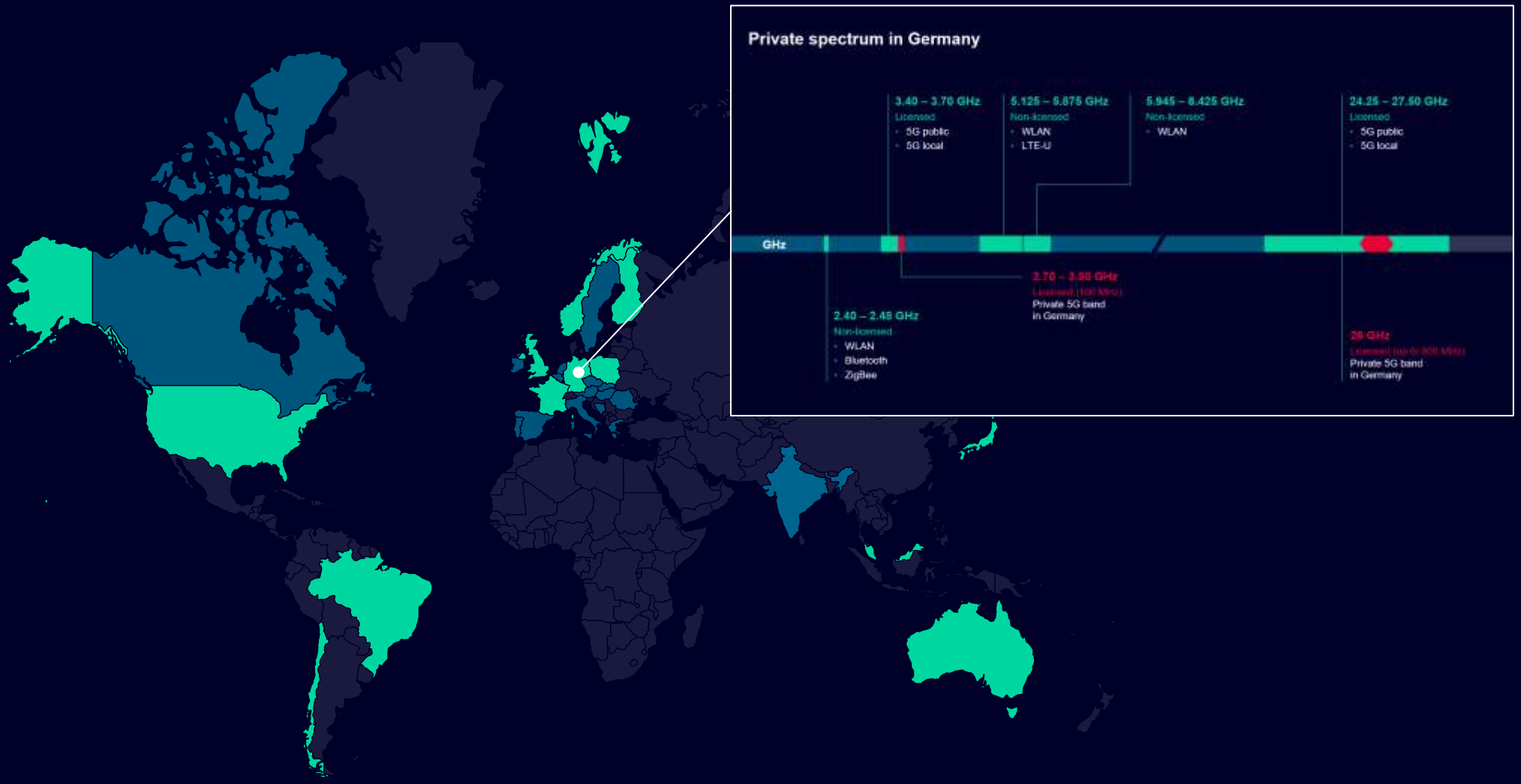
Future production

Industrial Wireless networks need a private frequency band!

- Self-management guarantees flexibility in production
- QoS supporting industrial needs
- Data stays on-premises

Private networks combined with private spectrum ensure optimal data privacy

Global overview spectrum availability for local private 5G networks



Coexistence of public and private 5G networks

Industrial 5G based on private 5G infrastructure at Manufacturing Karlsruhe

PRODUCTS

5G Core

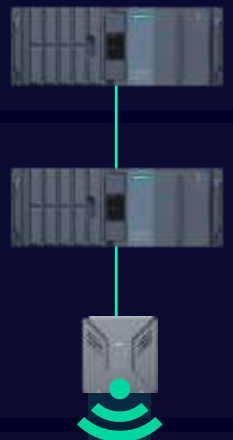
Management of the 5G network

Radio Access Network

Central Unit: Control of the radio network

Distributed Unit: Signal conversion

Radio Units : Signal transmission



User Equipment

Connection to the 5G network

e.g.
reliable wireless connectivity to AGV

5G SPECTRUM

5.230 € for 10 years usage

SERVICES

Consulting

Implementation

Aftersales

Future production requires **flexibility, connectivity** and **security**

Contact

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